ORIGINAL ARTICLE

Mortality from Congenital Abnormality in Malaysia 1991-1997: The Effect of Economic Development on Death Due to Congenital Heart Disease

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Summary

An analysis was done of available data from the Department of Statistics Malaysia, on the type of congenital abnormality contributing to death, to determine whether progress in health care over recent years was associated with any decline in mortality from congenital abnormality.

A significant decline in death due to congenital abnormality was observed between 1991 and 1996. This was attributable to a decline in deaths due to congenital heart disease occurring because of improvements in cardiac surgical services for infants. In 1997 death due to congenital heart disease increased significantly. This could be attributed to improvements in the diagnosis of congenital heart disease in the neonate.

Key Words: Congenital abnormality, Mortality, Anencephaly, Congenital heart disease, Infant, Malaysia

Introduction

Death in the perinatal period is one of the 5 leading causes of death in Malaysian hospitals[1]. Using the methodology of the new Ministry of Health rapid reporting system for perinatal deaths, it has been found that congenital abnormalities accounted for 18% of stillbirths and neonatal deaths[2]. Department of Statistics figures showed that congenital abnormalities, as a cause of death in infants, have become increasingly important. In 1970, 6.7% of infants deaths were due to congenital abnormalities; this rose to 10.2% by 1980 and 20.7% by 1990[3]. This was due mainly to a rapid decline in infant deaths due to other causes. These findings indicate that Malaysia has reached a stage in development where congenital abnormality has become a significant health care problem and must be addressed to ensure a continuing decline in the infant mortality and perinatal mortality rates. For this reason congenital abnormalities were included as an agenda item of the recent Ministry of Health Conference on Perinatal Mortality[4].

The purpose of this paper is to report on an analysis of available data on the type of congenital abnormality contributing to death in the perinatal period, and to determine whether

developments in health care provision over recent years have been associated with a decline in deaths due to congenital abnormality. Such information would be useful in explaining the above changes and planning strategies for the future.

Materials and Methods

Death numbers due to congenital abnormalities and specifically congenital heart disease and anencephaly, were obtained from vital statistics reports published by the Department of Statistics of Malaysia. In these reports, deaths were classified according to the ninth revision of the international classification of diseases (ICD 9) and congenital abnormality was defined as any death allocated a code number from 740 to 759, inclusive, death due to congenital heart disease as all deaths due to abnormalities of the heart and circulatory system with an ICD 9 code number 745, 746 or 747, and anencephaly as all deaths with the code number 740. Non-cardiac abnormalities included all deaths due to congenital abnormality excluding those coded as 745, 746 and 747.

Vital statistics reports, detailing the required information, were available from 1991 to 1997. In these reports stillbirths below 28 weeks were omitted, and the cause of death for stillbirths was not available. Using these reports, the death rate was calculated for each year from 1991 to 1997 for 4 groups: all congenital abnormalities, cardiac abnormalities, non-cardiac abnormalities and anencephaly. The reports gave the age of death in years only for the cumulative group of congenital abnormalities (codes 740 - 759) and not for each of the subgroups falling within this. Therefore, for each of the ICD 9 group of congenital abnormalities studied, the death rate and 95% confidence interval (CI) was calculated by including all deaths in that group irrespective of age at death per 1000 live births. Deaths not medically certified were excluded.

Results

Over the 7-year period analysed, there were a total of 27,707 medically certified infant deaths and a further 8480 uncertified infants deaths: the subsequent analysis does not include the medically uncertified deaths. Congenital abnormalities accounted for 26.6% of infant deaths. The total number of deaths due to congenital abnormality in all ages was 7376, and of this number 86% occurred in infants below 1 year of age. The ICD 9 classification of these deaths is shown in Table I. Cardiac abnormalities were the commonest, accounting for 2818 deaths (38.2%) followed by anencephaly in 865 (11.7%).

A significant decline in the number of deaths due to congenital abnormalities was observed for the years 1991 to 1996 from 2.12 (95% CI 1.99 - 2.25) to 1.77 (95% CI 1.66 - 1.88) per 1000 live births. When these deaths were divided into cardiac and non-cardiac causes, it was found that the decline was attributable to a decline in deaths due to cardiac abnormalities (Figure I). Deaths due to cardiac abnormalities declined from 0.84 (95% CI 0.76 - 0.92) to 0.64 (95% CI 0.57 - 0.70) per 1000 live births. Deaths due to other non cardiac abnormalities ranged from 1.17 to 1.28 per 1000 live births between 1991 to 1996 and were not significantly different for any one year. Deaths due to anencephaly ranged from 0.22 - 0.27 and did not significantly decline (Table II).

In 1997 there was a significant increase in all deaths due to congenital abnormalities from 1.77 to 2.04 (95% CI 1.92 -2.16) from the previous period. This increase was almost entirely attributable to increased deaths from cardiovascular abnormalities which increased from 0.64 to 0.84 (95% CI 0.76 - 0.92).

Discussion

The present data shows that there has been a decline in deaths due to congenital abnormalities from 1991 to 1996 and this decline is almost entirely due to a decline in deaths due to

Table I
Causes of Deaths Due to Congenital Anomaly, Malaysia 1991 - 1997. Cause of Death adapted from the 9th Revision of the International Classificationof Diseases

	Year							
Cause of Death	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**Total**
Anencephalus and similar anomalies (740)*	136	122	116	132	121	117	121	865
Spina bifida (741)	3	6	6	3	5	13	7	
Other congenital anomalies of the nervous system (742)	39	55	53	54	49	70	68	
Congenital anomalies of heart and circulatory system (745-747)	433	433	419	385	352	346	450	2818
Congenital anomalies of respiratory system (748)	97	108	132	95	92	55	51	
Cleft palate and cleft lip (749)	0	0	0	0	0	1	0	
Other deformities of the digestive system (750, 751)	12	22	18	17	18	15	14	
Congenital anomalies of the urinary system (753)	11	13	6	12	12	12	15	
Certain congenital musculoskeletal deformities (754)	0	0	0	2	4	1	32	
Other and unspecified congenital anomalies (743, 744, 752, 755-759)	351	351	341	358	329	328	367	
Total	1082	1110	1091	1058	982	958	1095	7376
Total live births	511376	528109	536931	535185	535053	540866	537104	

Numbers after cause of Death refer to ICD codes

congenital heart disease. In 1997 there was a significant increase in deaths due to congenital heart disease bringing the rate of death due to all congenital abnormalities back to the level it was in 1991. During this period there was no change in the rate of death due to anencephaly or non cardiac abnormalities.

The decline in deaths due to congenital heart disease could be due to improved cardiothoracic surgical services. A limited service in cardiothoracic surgery for infants began in 1988, amounting to about one patient per week. By 1989 there were two paediatric cardiologists. The surgical service was expanded when the National Heart Institute opened in 1992. Within a year, 40% of all open heart surgery was on children, amounting to around 1000 procedures per year. Prostaglandins, used for maintaining patency of the ductus arteriosus, became available on the government drug list in 1994. (Personal communication Dr Lim Miin Kang). Prostaglandin E_1, used for maintaining patency of the ductus arteriosus, became available on the government drug list in 1995 (Information supplied by Pharmacy Division, Ministry of Health).

In 1995, funding was approved to develop neonatal nurseries including the purchase of ultrasound machines that could be used for echocardiographic examinations and these became available at the end of that year. After the

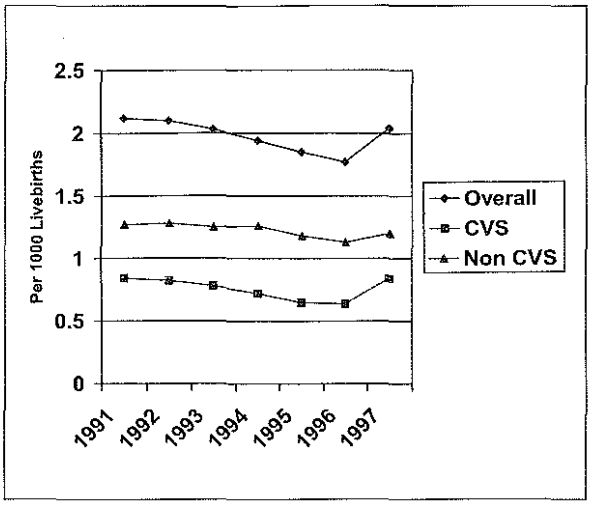

Fig. 1: Deaths due to all congenital abnormalities, cardiovascular abnormalities (CVS) and non-cardiovascular abnormalities (Non CVS) from 1991-1997.

arrival of these machines, paediatricians began to develop the skill required to identify an abnormal heart. Paediatricians running the five neonatal nurseries where this first shipment of ultrasound machines were placed found that access to echocardiography lead to an increase in the number of severely ill neonates who were diagnosed to have congenital heart disease. (Personal communication). The increase in neonates with this diagnosis would not have been matched by an increase in services so it is likely that some of them did not receive treatment. To save this group of severely ill neonates who formerly died with other diagnoses would require expert stabilisation with prostaglandins infusion and mechanical ventilation followed by skilled transportation. Skilled neonatal transport is currently under development in Malaysia. Since this first shipment of neonatal ultrasound machines in 1995 a number of other centres have received machines. Perhaps this and the development of neonatal transport services might lead further increases in the number of infants who present for surgical management of a congenital heart lesion. Services would need to be provided for this group.

Death due to anencephaly did not change significantly over the period of study. This suggests that no change has occurred in the management of anencephaly over this period. A reduction in the incidence of anencephaly has been found in South Australia which was thought to be due not only to improved antenatal diagnosis but also an overall reduction in the incidence of neural tube defect. Improvements in maternal diet, more specifically the folic acid content of the diet as well as folic acid supplementation, could be the reason for this[5]. Malaysia has experienced a period of rapid socio-economic development since it gained independence in 1957. Improvements in maternal diet would be expected; however, these

Table II
Deaths Due to Congenital Anomaly in all Age Groups per 1000 Livebirths, 1991 to 1997

	Year						
Cause of Death	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
Congenital anomalies of the heart and circulatory system (745 - 747)	0.84	0.82	0.78	0.72	0.65	0.64	0.84
Anencephalus (740)	0.27	0.23	0.22	0.27	0.22	0.22	0.25
Non cardiovascular (740 - 744, 748 - 759)	1.27	1.28	1.25	1.26	1.17	1.13	1.20
Total (740 - 759)	2.12	2.10	2.03	1.98	1.85	1.77	2.04

improvements have not been reflected in any change in death due to anencephaly over the seven-year period under study.

Although a decline in death due to other non-cardiac congenital abnormalities might also have been expected over this period; this has not been observed. Neonatal intensive care has continued to develop and improvements in the outcome of very low birth weight infants receiving intensive care have been documented over the period under study[6]. The outcome of congenital abnormalities amenable to neonatal surgery might also be expected to improve with improved neonatal intensive care but this was not seen. To address some of these questions rising from this present analysis, a more sensitive methodology is required and to devise strategies for the further reduction of perinatal deaths this should be put in place.

Thus, there were 2425 deaths falling into code 749 (other abnormalities) of the ICD 9 classification which accounted for 32.9% of congenital abnormality deaths. It is likely that a large part of this group were infants with multiple abnormalities. It would be important to examine this group more closely, using finer definition of congenital abnormality and techniques such as chromosomal analysis to determine if preventive strategies can be put in place.

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