NORTH CAROLINA INSTITUTE OF MEDICINE

INFANT MORTALITY IN NORTH CAROLINA:

An Inventory of Programs with Recommendations

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Much attention is being given to infant mortality by many diverse groups in North Carolina because of the appalling nature of its statistics in 1987 and 1988. Infant mortality rates in our state had been declining consistently since 1970, dropping from 24.1/1000 that year to a low of 11.6/1000 in 1986. An upward "blip" occurred in 1987 to 12.1/1000 with another rise a year later to 12.6/1000, the latter representing the worse experience of all the states. There were more than 97,000 births in the state during 1988 with 1,227 infants dying before their first birthday. These figures demonstrated a definite reversal of the trend of diminishing infant deaths during the previous two decades.[1]

Over the next year some improvement occurred as evidenced by the drop to 11.5/1000 reported for 1989. Throughout the five-year period ending with 1989 the overall trend was toward fewer infant deaths in actual numbers as well as in rate.

The Institute of Medicine of North Carolina invited the author to compile an inventory of the programs designed to reduce infant mortality in North Carolina and to make recommendations specifically in the area of education that could conceivably improve infant mortality rates in this state.

The following is a report of that inventory followed by a comparison of mortality rates in the various counties of the state with recommendations for educational efforts which may have some positive effect on the infant mortality rates throughout North Carolina.

Methodology

To gain an inventory of the programs currently in place, every county health department, every county medical society and each North Carolina medical school department of pediatrics and department of obstetrics and gynecology were requested to share with the author their current programs specifically designed toward reducing infant mortality.

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In addition, the North Carolina Medical Society was asked to report on its efforts at reducing infant mortality at a symposium held by the Institute of Medicine on April 12, 1990. Mr. George E. Moore, Executive Vice-President of the North Carolina Medical Society, responded and his report will follow in the results section below.

The North Carolina Academy of Family Physicians was also asked to respond to this inquiry and that report was made by C. Christopher Bremer, President-elect of that organization. His report also follows in the results section below. The request was an open ended query without specific questions being asked.

These requests were made in the spring and early summer of 1990 and the responses were received well into the fall of that year.

The responses were compared with statistics made available through the Division of Statistics and Information Services, Information Services Section.[1] These included infant deaths and rates by race from the years 1970 through 1989, annual percent changes in infant deaths 1985-1989 and infant deaths and rates by county of residence for the years 1988-1989 and the five-year period of 1985-1989.

Sixty-seven of the 100 county health departments responded individually or in concert with neighboring counties to the author's request for information. Most reported using WIC (Women, Infants and Children nutritional) programs and the Baby Love program which coordinates maternity care for pregnant patients. Many reported utilizing an educational approach in the public school systems to inform pre-adolescents and adolescents about contraception and, if that failed, about the importance of early prenatal care and the dangers of smoking and drug and alcohol abuse during pregnancy. Some county health departments took these educational efforts to the community at large, enlisting the assistance of business, civic and religious leaders.

Virtually all reports included prenatal clinics and many included family planning clinics. The shocking statistics of infant mortality and the available means to reverse them were publicized via the media and through awareness workshops for community leaders and employers in a large number of counties while emphasis on family planning and preconceptual counseling was utilized in many educational efforts. Some county health departments recruited volunteers from the community to accept personal responsibility for pregnant patients to assure their keeping clinic appointments and complying with instructions regarding prenatal care and postpartum management for themselves and tracking programs for their babies.

Some health care providers were given additional training to upgrade their professional skills, e.g., some nurses became nurse clinicians or certified nurse midwives. Some counties reported affiliations with departments of obstetrics and gynecology in nearby medical schools or community hospitals.

Occasional mention was made of financial incentives for physicians who had been forced out of obstetrics because of increasing liability

insurance premiums. Incentive programs to encourage pregnant patients to attend prenatal clinics were also reported.

Results

Attempts at recognizing common denominators in those counties with improvement in infant mortality rates as well as in those counties with worsening infant mortality rates were made. It is on these "common denominators" and data derived from worldwide literature on reducing infant mortality that the final recommendations in this report are based.

Of the 67 counties responding to the author's request, [either singly or in concert with neighboring counties making up a district health department], 32 reported some improvement in infant death rates for 1989, 13 had essentially no change while the remaining 22 had worse figures (see Table I).

The 22 counties demonstrating a worsening death rate from 1988 to 1989 accounted for 18% of infant deaths in the former year and 27.5% last year with the rate increasing from 7.2/1000 to 12.9/1000. The figures for the 13 counties with essentially no changes from one year to the next already boasted rates better than the state at large -- 9.3/1000 for each year compared with 12.6 and 11.5 respectively for the entire state -- and claimed only 14.2% and 15.2% of all infant deaths for 1988 and 1989 respectively. Those 32 counties showing the greatest improvement reported rates of 15.8/1000 in 1988 and claimed a rate of only 7.5/1000 in 1989 dropping their percentage of all infant deaths from 33.6% to 24.2% (see Table II).

An attempt to identify common denominators for the respective groups was made. Especial attention was given to educational efforts since the author was charged by the North Carolina Institute of Medicine to address those issues specifically.

Educational efforts were viewed from various standpoints; namely, medical and nonmedical and whether these informative endeavors were directed to patients, health care providers or to the public at large.

Of the 33 county health departments not responding, 5 had no change in their infant mortality rates while 14 were noted to have decreases and a similar number experienced increases. Eleven hundred and seventy infant deaths were reported in North Carolina in 1989. Three hundred and ninety-six occurred in those 33 counties not responding, representing 33.8% of all infant deaths. As a group, those counties suffered 420 infant deaths in 1988 and with 1227 statewide deaths occurring that year, this group represents 34.2% of all North Carolina infant deaths. The rates for those counties are not known precisely but proportionately the rates for 1988 and 1989 respectively could be estimated at 12.9/1000 and 11.9/1000. These figures are similar to statewide figures of 12.6 and 11.5 for these years.

Cross proposes a multifaceted public education program to improve public awareness of the important aspects of perinatal health.[2] Eight

perinatal health education features are emphasized to change health behavior by getting public participation in an attempt to reduce infant mortality. These eight aspects of perinatal education are:

- Preconceptual health
- Proper nutrition during pregnancy
- Dangers of alcohol, drugs and tobacco
- Early recognition of problems in pregnancy & preterm labor
- Childbirth education
- Parenting skills
- Community educational efforts
- Family planning education (& services)

The three groups of counties responding to the author's request for information were compared with one another regarding their utilization of these features. Those counties with no change from 1988-1989 were noted to incorporate these educational efforts in greater proportion than the other two groups (see Table III). Promotion of preconceptual health and early recognition of problems in pregnancy, including preterm labor, were obviously emphasized among those counties more so than the other two groups. Most significantly, family planning was reported by almost every county in this group while only about 25% of the counties in the other two groups mentioned contraception in their reports.

It would appear that those counties demonstrating the best infant mortality rates for both years could have improved only slightly compared with the other two groups. Those counties which demonstrated worsening death rates seem to lack an emphasis on preconceptual health and early recognition of problems in pregnancy and preterm labor compared with the best group. They also seem to compare unfavorably in the area of preconceptual health with the counties with the greatest improvement even though all other educational measures for these two groups were comparable.

The most improved group compares favorably with the unchanged group in the field of preconceptual health, attention to nutrition, community educational efforts and in family planning education and services.

Seventy-six county medical societies exist in North Carolina. Twenty-seven of their presidents responded to the author's request for information. Most medical societies do not have an organized program to reduce infant mortality; however, some members of some county medical societies are very actively involved through their own practices to offer obstetrical and pediatric services to all segments of their respected county populations to help reduce infant deaths. Educational efforts directed to the public as well as to health care providers are included in many county society efforts, either alone or in conjunction with nearby medical schools or community hospitals or health departments.

Seven of the eight medical school departments of pediatrics and obstetrics and gynecology reported their respective efforts for their individual catchment areas.

Among educational programs the Bowman Gray School of Medicine Departments of Obstetrics and Gynecology and Pediatrics have promoted and continue to offer courses for doctors and nurses in all obstetrical units in northwest North Carolina in neonatal resuscitation, stabilization and treatment with wide participation.[3] In addition, a regional program of risk assessment, education and enhanced prenatal care for mothers resulted in a reduction of low birth weights among enrolled private patients but no such improvement was noted in public patients -- the Matthew effect? (see page 8).

Duke's obstetrical educational programs include ongoing lecture series and consultations in the northeastern tier of counties as well as in the Fayetteville Area Health Education Center.[4] Efforts to increase neonatal intensive care beds and to deliver prenatal and obstetrical services in local areas are continually underway. Specific educational efforts by Duke pediatrics include identification and evaluation of infants with congenital heart lesions and metabolic disorders which may lead to sudden infant death syndrome (SIDS).[5] Other especially active emphases are placed on prevention of teenage pregnancy through vigorous educational efforts, parental instruction in monitoring infants with chronic lung diseases and in cardiopulmonary resuscitation and parental instruction in optimal care to ensure optimal growth and development during the initial months of life.

The Department of Pediatrics at the University of North Carolina at Chapel Hill maintains a Neonatal Data Management System that catalogues admissions to all nursery intensive care units in the state.[6] It is the only known statewide data base which could be invaluable in monitoring the outcome of future programs. In addition, a program of active on-site teaching of nursery personnel in community hospitals is ongoing to improve the stabilization of premature and critically ill infants as well as local nursing capability.

The most extensive and ambitious efforts have been reported by Dr. Watson Bowes of the Department of Obstetrics and Gynecology at the University of North Carolina, Chapel Hill.[7] Among numerous service programs the educational efforts are medical, nonmedical, patient oriented, directed to health care providers as well as business, civic and political leaders. The following are specific programs reported by Doctor Bowes:

> <u>State Perinatal Education Grant</u>. This grant provides funding for education of perinatal health care workers in our region as well as elsewhere in the state to improve the quality of perinatal services offered and the coordination of care between providers.
>
> <u>White Paper on Preterm Birth</u> developed guidelines for transfer of patients in preterm labor to Level III centers for labor inhibition or delivery.
>
> <u>Preconception health appraisal in family planning clinics in approximately 50 counties in the state</u>. The major goal of this program is the prevention of birth defects and preterm birth. The preconception health planning efforts of these two investigators has also included the publication of the first major textbook

about preconception health published in the U.S. This program has also resulted in a public information and education component which includes educational modules for health fairs and a teacher training module which is used in middle schools throughout the state. It is anticipated that this curriculum will be available to all middle school children by 1991. Many components of the North Carolina Preconception Program have been adopted by other states.

New Beginnings, the first prospective, controlled trial of reproductive health promotion introduced into industry. This study is being conducted in collaboration with Northern Telecom, Brown-Wooten Mills, Sara Lee Corporation and Kayser Roth.

Program for identification and management of prenatal patients involved in substance abuse and drug addiction. This program will provide support for patients with substance abuse, especially alcohol and cocaine addiction, and will also provide education for a wide range of health care providers in the resources available with which to address the problems of these patients who are at high risk for preterm birth, fetal death, and infant mortality.

Current Practices. This quarterly publication is sent to all Obstetricians/Gynecologists, Pediatricians, and Family Medicine Physicians in the state. Each issue summarizes the current "state-of-the-art" in Obstetrics, Gynecology, and Neonatal topics. Many of these articles address issues that bear directly on improvement in infant mortality.

Minifellowships in obstetrical ultrasound. This two week course offers practicing obstetricians didactic and "hands-on" experience in Ob-ultrasound evaluation. These courses have provided many practicing obstetricians with the skills necessary for the early detection of fetal abnormalities some of which are amenable to therapy resulting in the prevention of perinatal death.

Minifellowship in Maternal/Fetal/Neonatal Medicine. This course is a four-week course providing obstetricians, pediatricians, and family practitioners small group continuing education in modern concepts and methods of perinatal medicine. This course is oriented to knowledge and methods for the antenatal detection of remedial fetal problems, the prevention of preterm birth, and the treatment of high-risk neonates.

Intensive Course in Nutrition which provided physicians, public health officials and registered dieticians education in developing strategies for lowering infant mortality through nutritional programs.

North Carolina Perinatal Substance Abuse Task Force. This task force was created to advise the State's Drug Cabinet regarding appropriate education and prevention activities to reduce the impact of perinatal substance use on infant mortality and morbidity.

"First Step" Multimedia Campaign. This campaign, coordinated by the Statewide Perinatal Council and the Division of Maternal and Child Health of the North Carolina Department of Environment, Health, and Natural Resources, involves printed, radio, and television educational messages as well as a toll-free phone system to address the specific concerns of individuals planning or experiencing a pregnancy.

The Department of Obstetrics and Gynecology at East Carolina University is cooperating with the health departments of three eastern North Carolina counties in developing and implementing a plan to reduce infant mortality with the help of a grant from the Kate B. Reynolds Foundation.[8]

Out of interest the causes of death were reviewed with the realization that there were a number of conditions considered preventable or treatable which, if identified early enough, could have prevented some infant deaths. Table IV lists the causes of infant death for the years 1987 and 1988.[9] Certainly, the problem of sudden infant death syndrome (SIDS) looms as the most frequently reported cause of infant death. Unfortunately, it is one of the least understood problems and the least likely to be addressed effectively in the foreseeable future. The other leading causes may be more amenable to early identification and possible treatment.

Mr. George E. Moore, Executive Vice-President of the North Carolina Medical Society and C. Christopher Bremer, M.D., President-elect of the North Carolina Academy of Family Physicians, reported for their respective organizations at the symposium sponsored by the Institute of Medicine on April 12, 1990.[10] Mr. Moore reported for the North Carolina Medical Society that no specific comprehensive program addressing the various aspects of infant mortality was underway but the Society was actively involved in several efforts which relate directly to the infant mortality problem in North Carolina. These activities include the following: 1] Legislative efforts to liberalize eligibility requirements for pregnant women and infants under Medicaid. 2] Professional liability insurance premium supplements to physicians practicing obstetrics in underserved areas of the state. 3] A major program through the NCMS Foundation to provide critically needed health care manpower to medically underserved areas of the state. 4] Legislation that provides a statewide compensation fund and health care services for infants born with birth-related neurological impairment. 5] General support in efforts of State Health Director, County Departments of Public Health, Division of Medical Assistance, Child and Maternal Health Sections of the Department of Human Resources. Active Committees on maternal health, indigent care, liaison with state health agencies, etc.

The North Carolina Academy of Family Physicians has encouraged an additional malpractice insurance company to enter the state and the legislature has been lobbied to pass The Rural Obstetrical Care Incentive Bill which was designed to defray liability insurance expenses for physicians practicing obstetrics in rural counties. In addition, the Academy of Family Physicians has managed to increase Medicaid eligibility to 150% of the federal poverty line as well as Medicaid

obstetrical reimbursement to $950.00 per delivery. Plans are underway to increase medical eligibility to 185% of the poverty level and to add to the Rural Obstetrical Care Incentive Fund. In conjunction with the State Medical Society, the Academy of Family Physicians has supported the new infant neurological birth defect bill. On the national level, the American Academy of Family Physicians is supporting a bill to revitalize the National Health Service Corps while on a state level incentive programs to increase the number of family physicians in North Carolina and to encourage medical schools to recruit and train students most likely to enter family practice are underway.

Discussion

Most studies of infant mortality report that low birth weight is the primary determinant but there are many other factors that play a role. In fact, attempts to prevent low birth weight have not been very successful but survival of these infants has increased because of successful treatment in intensive care nurseries. Even though specific relationships are difficult to define, socioeconomic and biomedical characteristics of those populations with high infant mortality rates are not as high in quality as those segments of the population with relatively low infant mortality rates.

Joseph reports that populations with a poor standard of health seem to achieve only minimal improvement over time whereas those with a good standard of health seem to show substantial and continual improvement in infant mortality figures.[11] He reported on infant mortality in 122 nations over a period of 20 years beginning in 1965 showing that Japan and East Germany representing those countries with low infant mortality rates showed considerable decline in those rates by 1985. Countries such as Rwanda and Ethiopia demonstrated no improvement or even increased infant mortality rates during that 20-year period. Joseph quoted Robert Merton in a 1968 article on a psychosocial phenomenon in science which he had labeled the "Matthew effect" after chapter 25, verse 29 of St. Matthew which is paraphrased as follows: "Unto everyone that hath shall be given and he shall have abundance; but from him that hath not shall be taken away even that which he hath."

In a Belgian perinatal mortality study conducted by DeWals et al in 1989 social inequalities and geographic variations in infant mortality were seen to exist in spite of long established policy of social welfare and free access to health services.[12] Vandenbussche et al analyzed perinatal deaths in various geographic regions of Belgium and in spite of the fact that the highest rates of low birth weight and premature births occurred in the south of Belgium, the northern districts suffered the higher death rates suggesting adverse biomedical characteristics of ethnic groups in the north.[13]

Infectious diseases have a high association with low birth weight infants. Chorioamnionitis was found to be associated with infectious disease associated with early neonatal low birth weight deaths while sepsis was associated with increased death rates throughout the first year of life. Successful treatment of those infections has not resulted in a lowering of death rates among blacks to the same extent as among

whites.[14] Taylor and Emery reported that an unexpected increased death rate in the post-neonatal period in Sheffield, England during the 1970's occurred in children with relatively minor diseases but they were children in families where the father was either absent or unemployed, again suggesting a poorer standard of health in the family as another determinant of high infant mortality.[15]

Among the responses one obstetrician stated: "While I applaud any and all new efforts to reduce infant mortality in North Carolina, I truly feel that we have not been idle in this respect. Given some of the problems, I feel that we have done a fairly good job in the medical field regarding infant mortality, at least at the local level. While there is always room for improvement, I believe that we may be approaching the maximum as to what we can do as far as health care. I don't believe we will see dramatic reduction in infant mortality until society can make some inroads on the socioeconomic ills that beset us, i.e., poverty, ignorance, illiteracy, racism, etc., ..."[16]

In making this statement, Dr. Samuel Gilmore, a private practitioner in Kinston, North Carolina, responding on behalf of the Lenoir-Greene Medical Society, stated in a different way what students of infant mortality in Europe concluded after their in depth analyses. Doctor Gilmore and his associates provide services to their county health department as so many other physicians in North Carolina do in addition to their own practices.

According to Lee and Corpuz even though teenagers are at higher risk than their older counterparts in giving birth to low weight babies, reducing the number of teenage pregnancies would not affect the overall infant mortality rate appreciably.[17] It would certainly help the teenagers as a group and since the United States has the highest teenage fertility of any of the developed countries success in reducing adolescent pregnancies should not be expected or measured by a reduction in the national incidence of low birth weight or neonatal mortality rate.

Howie and colleagues[18] of Ninewells Hospital and Medical School in Dundee, Scotland, reported that breast feeding confers protection against gastrointestinal illness that persists beyond the period of breast feeding itself. This professor of obstetrics and gynecology at the University of Dundee studied 227 mothers who breast fed their babies for at least 13 weeks. He found that those babies had significantly less gastrointestinal illness than those who were bottle fed from birth. Furthermore he found that this reduction in illness seemed to prevail whether or not supplements were introduced before 13 weeks of gestation and that this protective effect persisted beyond the period of breast feeding itself. There were also reductions in rates of respiratory illness in the test group but the significance was somewhat less. There seemed to be no consistent protective effect of breast feeding against ear, eye, mouth or skin infections, infantile colic, eczema or diaper rash.

Conclusions and Recommendations

From the information reported by our own health care providers in North Carolina as well as data analyzed by students of infant mortality in other localities, it appears that simple solutions are not expected to reverse our appalling infant death figures. The contributing causes are multifactorial forcing the treatment to be multifaceted.

All eight of Doctor Cross' educational efforts should be emphasized, especially preconceptual health promotion and early recognition of problems of pregnancy, including preterm labor. In addition, family planning information must be made available to all segments of our society including adolescents and services offered either gratis or at affordable costs. Patients must be educated by every available means including public school curricula, electronic and printed media, personal mentoring by lay volunteers and through health care providers. In its report to the Kate B. Reynolds Health Care Trust, the North Carolina Institute of Medicine advocated the use of all sorts of media to assure that all concerned were informed.[19] Newspaper news releases; public service announcements of radio and television; all sorts of advertising targeting information to high risk groups, and using fast food restaurants, churches and videotapes were advocated.

Constant updating of skills of doctors and nurses through continuing education programs provided by medical schools, medical societies, community hospitals and professional periodicals have to be made top priority in institutions if obstetrical and pediatric care is offered.

Finally, all responsible business, industrial, civic and political leaders need to be informed of the overwhelming impact infant morbidity and mortality cause of society. Frequent awareness sessions with such leaders must be held to keep these "movers and shakers" constantly aware that even though the "Matthew Effect" is operational sooner or later "he that hath shall have taken away that that he has" also.

In practical terms the author urges the North Carolina Institute of Medicine to work on the strengths that are available, i.e., use all of its influence to reach all aspects of society with the following four messages:

1] Promote preconceptual health.
2] Educate regarding early recognition of problems in pregnancy, including preterm labor.
3] Promote the value of family planning and insist on affordable family planning services.
4] Encourage breast feeding even if for a short period.

Table I

Sixty-Seven Counties Responding

Better (32)	No Change (13)	Worse (22)
Appalachian district	Toe River District	Alamance
Allegheny	Avery	Bertie
Ashe	Mitchell	Brunswick
Watauga	(Yancey)	Camden
Beaufort	Cherokee	Catawba
Buncombe	Clay	Cherokee-Clay-
Burke	Currituck	Graham
Cabarrus	Forsyth	(Cherokee)
Carteret	Nash	(Clay)
Chatham	Onslow	Graham
Craven	Pasquotank-	Chowan
Gaston	Perquimans-	Cleveland
Guilford	Camden-Chowan	Columbus
Haywood	(Pasquotank)	Davidson
Henderson	Perquimans	Davie
Johnston	(Camden)	Durham
Martin-Tyrrell-	(Chowan)	Jackson
Washington	Pitt	Lee
Martin	Randolph	Macon
Tyrrell	Transylvania	Madison
Washington	Wayne	New Hanover
Montgomery		Orange
Northampton		Pasquotank
Person		Sampson
Richmond		Scotland
Robeson		Wake
Rockingham		
Rowan		
Rutherford-Polk-		
McDowell		
Rutherford		
Polk		
McDowell		
Surry		
Union		
Yadkin		
Yancey		
1988 - 1989	1988 - 1989	1988 - 1989
15.8 - 7.5	9.3 - 9.3	7.2 - 12.9

Table II

Counties Not Responding

Infant death rates	1988	1989
Alexander	9.4	2.9
Anson	17.5	15.4
Bladen	12.5	6.6
Caldwell	20.8	19.8
Caswell	11.0	14.9
Cumberland	15.2	12.2
Dare	9.0	2.9
Duplin	15.0	13.1
Edgecombe	17.5	16.2
Franklin	12.0	17.9
Gates	8.2	14.8
Granville	23.1	7.0
Greene	22.1	20.8
Halifax	16.9	17.3
Harnett	18.6	7.9
Hertford	11.3	13.2
Hoke	12.8	13.0
Hyde	16.1	13.5
Iredell	19.6	6.4
Jones	0.0	13.3
Lenoir	10.1	12.2
Lincoln	6.9	8.6
Mecklenburg	13.1	12.2
Moore	13.9	11.2
Pamlico	6.8	7.1
Pender	8.1	14.9
Stanly	8.2	8.4
Stokes	4.4	10.4
Swain	14.9	4.9
Vance	9.5	21.1
Warren	16.9	8.4
Wilkes	17.5	17.2
Wilson	5.4	9.8

Table III

	Better (32)	Unchanged (12)	Worse (23)
Preconceptual Health	8	4	3
Attention to Nutrition	7	5	9
Patient Education re drugs, alcohol & smoking	6	4	7
Early Recognition of Pregnancy Problems & Preterm Labor	3	3	3
Birthing Classes	6	4	7
Parenting Skills	6	4	7
Community Educational Efforts	11	7	11
Family Planning Education & Services	7	11	6

Table IV

NORTH CAROLINA INFANT DEATHS BY CAUSE OF DEATH

CAUSE	1987	1988
ALL INFANT DEATHS	1134	1227
INFECTIOUS DISEASES	20	22
CANCER	2	1
BENIGN NEOPLASMS	0	1
CONGENITAL HYPOTHYROIDISM	0	1
DWARFISM	0	3
OTHER PROTEIN-CALORIE MALNUTRITION	0	1
METABOLIC AND IMMUNITY DISORDERS	11	6
SICKLE-CELL ANEMIA	2	0
DEFIBRINATION SYNDROME	2	1
MENINGITIS	6	7
OBSTRUCTIVE HYDROCEPHALUS	1	0
OTHER CEREBRAL DEGENERATION	0	1
WERDNIG-HOFFMAN DISEASE	2	2
INFANTILE CEREBRAL PALSY	1	1
ANOXIC BRAIN DAMAGE	6	2
UNSPECIFIED ENCEPHALOPATHY	1	0
UNSPECIFIED DISORDERS OF NERVOUS SYSTEM	0	1
MULTIPLE CRANIAL NERVE PALSIES	1	0
UNSPECIFIED MYONEURAL DISORDERS	0	1
MUSCULAR DYSTROPHY	2	1
HEART DISEASE	25	24
STROKE	3	2
LYMPHOEDEMA	0	1
ACUTE RESPIRATORY INFECTIONS	6	8
PARALYSIS OF VOCAL CORDS OR LARYNX	1	0
PNEUMONIA AND INFLUENZA	16	21
CHRONIC OBSTRUCTIVE PULMONARY DISEASE	5	3
OTHER DISEASES OF RESPIRATORY SYSTEM	9	10
GASTRIC ULCER	0	2
UMBILICAL HERNIA	2	1
VASCULAR INSUFFICIENCY OF INTESTINE	1	1
NONINFECTIVE GASTROENTERITIS AND COLITIS	0	1
INTUSSUSCEPTION	1	0
PARALYTIC ILEUS	0	1
VOLVULUS	0	1
PERITONITIS	1	2
OTHER DISEASES OF PERITONEUM	1	0
OTHER DISORDERS OF INTESTINE	1	0
ACUTE & SUBACUTE NECROSIS OF LIVER	0	1
LIVER ABSCESS AND SEQUELAE OF CHRONIC LIVER DISEASE	3	1
CHRONIC PASSIVE CONGESTION OF LIVER	0	1
NEPHRITIS AND NEPHROSIS	7	4
KIDNEY INFECTION	1	0
OBSTRUCTION OF URETER	0	1
URINARY TRACT INFECTION, SITE NOT SPECIFIED	0	1
URINARY OBSTRUCTION, UNSPECIFIED	0	1
PRICKLY HEAT	0	1
KYPHOSCOLIOSIS AND SCOLIOSIS	1	0

CONGENITAL ANOMALIES	221	222
MATERNAL HYPERTENSIVE DISORDER	3	3
MATERNAL INFECTION	2	0
MATERNAL INJURY	1	0
OTHER MATERNAL CONDITION AFFECTING FETUS OR NEWBORN	0	1
INCOMPETENT CERVIX	7	6
PREMATURE RUPTURE OF MEMBRANES	15	18
OLIGOHYDRAMNIOS	2	0
POLYHYDRAMNIOS	3	1
MULTIPLE PREGNANCY	41	25
OTHER MATERNAL CONDITION AFFECTING NEWBORN	1	3
PLACENTA PREVIA	2	2
PLACENTAL HEMORRHAGE	9	15
UNSPECIFIED PLACENTAL ABNORMALITY	1	0
PROLAPSED CORD	2	1
OTHER COMPRESSION OF UMBILICAL CORD	0	2
CHORIOAMNIONITIS	16	9
BREECH BIRTH	1	0
OTHER MALPRESENTATION	0	1
PRECIPITATE DELIVERY	3	3
ABNORMAL UTERINE CONTRACTIONS	1	0
OTHER COMPLICATIONS OF LABOR AND DELIVERY	2	0
SLOW FETAL GROWTH AND FETAL MALNUTRITION	4	4
EXTREME IMMATURITY	86	92
OTHER PRETERM INFANTS	38	48
BIRTH TRAUMA	4	3
INTRAUTERINE HYPOXIA AND BIRTH ASPHYXIA	26	21
RESPIRATORY DISTRESS SYNDROME	82	91
OTHER RESP. CONDITIONS OF FETUS AND NEWBORN	113	141
PERINATAL INFECTIONS	33	22
FETAL AND NEONATAL HEMORRHAGE	4	5
HAEMOLYTIC DISEASE DUE TO ABO ISOIMMUNIZATION	0	1
DISSEMINATED INTRAVASCULAR COAGULATION	1	1
NECROTIZING ENTEROCOLITIS	6	9
PERINATAL INTESTINAL PERFORATION	0	1
HYDROPS FETALIS NOT DUE TO ISOIMMUNIZATION	3	7
OTHER HYPOTHERMIA OF NEWBORN	0	2
OTHER DISTURBANCES OF TEMPERATURE REGULATION	0	1
OTHER CONDITIONS IN PERINATAL PERIOD	83	79
PYREXIA OF UNKNOWN ORIGIN	0	1
DYSPNOEA AND RESPIRATORY ABNORMALITIES	1	1
SUDDEN INFANT DEATH SYNDROME	130	182
UNATTENDED DEATH	1	6
ASPHYXIA	0	1
RESPIRATORY FAILURE	0	1
OTHER ILL-DEFINED CONDITIONS	0	1
UNKNOWN CAUSE	9	10
AUTO ACCIDENTS	8	13
PLANE ACCIDENT	1	0
ACCIDENTAL POISONING BY AGENTS AFFECTING THE CARDIOVASCULAR SYSTEM	0	1
SURGICAL ACCIDENT OR REACTION TO MEDICAL CARE	1	2
ACCIDENTAL FALL	0	1
FIRE	2	7
EXCESSIVE HEAT	0	1
EXCESSIVE COLD	0	1
DROWNING	2	4
INHALATION OF FOOD	6	2

INHALATION OF OTHER OBJECT	1	4
SUFFOCATION IN BED OR CRADLE	3	1
SUFFOCATION BY PLASTIC BAG	1	0
SUFFOCATION BY OTHER SPECIFIED MEANS	0	2
ACCIDENTALLY SHOT	1	0
ACCIDENTALLY BURNED BY HOT/CORROSIVE MATERIAL	1	0
UNSPECIFIED ACCIDENTS	2	2
HOMICIDE	5	6
UNDETERMINED WHETHER INJURY OR PURPOSEFUL	2	1

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