Henry Ford Hospital Medical Journal

Volume 34 | Number 4 Article 13

12-1986

Characteristics, Mortality, and Outcome of Infants Weighing Over 2500 Grams Who Require Intensive Care

Anthony Udo-Inyang

Chang Y. Lee

Follow this and additional works at: https://scholarlycommons.henryford.com/hfhmedjournal

 Part of the Life Sciences Commons, Medical Specialties Commons, and the Public Health Commons

Recommended Citation
Udo-Inyang, Anthony and Lee, Chang Y. (1986) "Characteristics, Mortality, and Outcome of Infants Weighing Over 2500 Grams Who Require Intensive Care," *Henry Ford Hospital Medical Journal* : Vol. 34 : No. 4 , 279-281.
Available at: https://scholarlycommons.henryford.com/hfhmedjournal/vol34/iss4/13

This Article is brought to you for free and open access by Henry Ford Health System Scholarly Commons. It has been accepted for inclusion in Henry Ford Hospital Medical Journal by an authorized editor of Henry Ford Health System Scholarly Commons.

Characteristics, Mortality, and Outcome of Infants Weighing Over 2500 Grams Who Require Intensive Care

Anthony Udo-Inyang, MD,* and Chang Y. Lee, MD†

Documentations of morbidity and mortality of infants weighing over 2500 g who require intensive care, along with research to improve their outcome, have not received adequate emphasis in the literature. From 1981 to 1984 these infants accounted for 495 (40.1%) admissions and 16 (9.8%) deaths in Henry Ford Hospital's neonatal intensive care unit. The most common diagnoses were hematologic diseases (24.6%), meconium aspiration (20.4%), respiratory distress/asphyxia (17.2%), congenital anomalies (13.8%), and infants of diabetic mothers (10.7%). Infant mortality was 56.2% from congenital anomalies, 25% from meconium aspiration, 6.2% from infection, 6.2% from maternal accident, and 6.2% from accidental neonatal asphyxia. About 44% of the deaths were potentially preventable. Investigative studies are recommended to improve the outcome of higher birth weight infants who require intensive care. (Henry Ford Hosp Med J 1986;34:279-81)

Since the establishment of the intensive care unit in 1960, more attention has focused on the incidence, mortality, and outcome of increasingly small birth weight infants (1,2). A limited number of papers have dealt comprehensively with higher birth weight infants requiring neonatal intensive care (1,3). The purpose of this report is to document our experience with infants weighing over 2500 g in the neonatal intensive care unit and to stimulate clinical research to improve the outcome of these neonates.

Materials and Methods

The study population included all infants admitted to Henry Ford Hospital's neonatal intensive care unit (NICU) from January 1, 1981, through December 31, 1984. Subjects were selected using the NICU patient log and computer printout from medical records with the use of two criteria: birth weight over 2500 g and admission to NICU. Data recorded included the patients' year of admission, race, and sex; maternal age, gravida, and parity; method of delivery; maternal complications; gestational age; Apgar scores; primary and secondary diagnoses; weight; lengths of NICU and total hospital stay; mortality; and therapy. Efforts to establish one diagnosis for each patient were not always successful (eg, meconium aspiration and jaundice). To verify the accuracy of the data, 80% of discharge summaries and 15% of random sample charts of the studied patients were reviewed.

All patient data underwent computer analysis in the biostatistic department at Henry Ford Hospital. Data were evaluated with the use of analysis of variance, χ^2 test, Student's t test or its nonparametric analogue (Mann-Whitney test), Fisher's exact test, and Kruskal-Wallis test, depending on the appropriate specificities of each test.

Results

Characteristics

From 1981 through 1984, 495 (40.1%) of the 1,233 infants (10,070 total deliveries) admitted to Henry Ford Hospital's NICU weighed over 2500 g at birth. Of the 163 infants who died in the NICU during this period, 16 (9.8%) had weighed over 2500 g (Table 1).

Birth weight ranged from 2500 to 5100 g with a mean of 3301.3 g. The mean gestational age was 39.3 weeks, with 86% of the infants older than 37 weeks. Male births predominated (54.5%). Of the NICU admissions, 55.3% were black, 39.4% white, and 5.3% were of other races (Indians and Orientals). The mean one minute Apgar score was 6.53; 14.3% of the patients had a one minute score of 0 to 3, 24% scored 4 to 6, and 61.6% scored 7 to 10. The mean five minute Apgar score was 8.11; 1.7% had a five minute score of 0 to 3, 11.6% scored 4 to 6, and 87% scored 7 to 10 (Table 2). The mean length of stay in the NICU was 7.93 days; 34.6% of the patients stayed less than three days, 54% stayed less than five days, and 16% stayed more than ten days (Table 2). For deliveries, 64.8% of the neonates were delivered by spontaneous vaginal delivery, 33% by cesarean section, and 1.6% by low forceps. Some patients (11.7%) were transferred to the regular nursery before being sent home. The maternal age was 26.06 ± 5.88 years (Table 2).

Submitted for publication: November 18, 1986.
Accepted for publication: January 5, 1987.
*Formerly Department of Obstetrics-Gynecology, Henry Ford Hospital. Currently Department of Obstetrics-Gynecology, Mount Sinai Hospital, Detroit, MI.
†Department of Obstetrics-Gynecology, Henry Ford Hospital.
Address correspondence to Dr Lee, Department of Obstetrics-Gynecology, Henry Ford Hospital, 2799 W Grand Blvd, Detroit, MI 48202.

Table 1
Data for Deliveries and Admissions to Neonatal Intensive Care Unit (NICU) During Four Years of Study

Year	Deliveries	NICU Admissions No.	NICU Infant Admissions Over 2500 g No.	%	NICU Deaths No.	%	NICU Infant Deaths Over 2500 g No.	%
1981	2,797	323	103	31.0	57	17.2	4	7.0
1982	2,690	353	121	34.0	52	14.7	4	7.7
1983	2,603	303	139	45.9	30	9.9	5	16.7
1984	1,980	247	132	53.4	24	9.7	3	12.5
Total	10,070	1,235	495	40.1	163	13.2	16	9.8

Diagnostic Categories and Mortality

Twelve main diagnostic groups were used for the 495 patients (Table 3). The most common causes for admission were hematologic disorders (polycythemia, hyperbilirubinemia/jaundice, and anemia), which occurred in 166 cases (24.6%). However, no mortality occurred with these complications. Meconium aspiration occurred in 138 cases (20.4%) and accounted for 25% (four cases) of the mortality (Table 4). Respiratory problems including respiratory distress syndrome (RDS), birth asphyxia, and transient tachypnea accounted for 17.2% (116 cases); no mortality occurred in this category. Ninety-three neonates (13.8%) were admitted with congenital anomalies; 56.2% mortality occurred in this group (Table 4). Thirty-nine infants (5.8%) were admitted with suspected infections, and 19 infants (2.8%) were admitted under the diagnosis of trauma (Table 3). One neonate died in each of these categories (Table 4). Seventy-two neonates (10.7%) of diabetic mothers were admitted to the NICU, and no mortality occurred in this group. Other diagnoses included large infants for gestational age, convulsion, intrauterine growth retardation, neonates of mothers with drug abuse, and normal infants for observation (Table 3). We were unable to conduct a meaningful morbidity and follow-up evaluation in this study because the NICU follow-up clinic for higher birth weight infants was not organized at Henry Ford Hospital until January 1984.

Discussion

Henry Ford Hospital consists of the main multispecialty hospital complex in the city of Detroit and several satellite clinics in the suburbs. The NICU is located at the main hospital and represents the sole level III nursery for the system. Most uncomplicated pregnancies and deliveries at term at the satellite clinics are dealt with at the community hospitals with level I or II nurseries close to the clinics. Pregnancies at risk and with anticipated neonatal complications are transferred from these satellite clinics and community hospitals to our NICU. Neonates requiring specialized care are sometimes referred to our NICU from other hospitals in the Detroit metropolitan area. Of the neonates weighing over 2500 g in our study, 5% were in this referral category. Of the total number of infants in our study, a significant portion (40.1% of total NICU admissions) weighed over 2500 g and also had a significant mortality (9.8% of total mortality) (Table 1). Philips et al (1) reported that 41% of the neonates admitted to their NICU in Florida weighed over 2500 g with a mortality of 11%. Kulkarni et al (3) reported 42.1% of such admissions in Missouri with a mortality of 12%.

As discussed by Philips et al (1), a significant portion of neonatal deaths in the group weighing over 2500 g are potentially preventable. Although 56% of the mortality was due to major congenital anomalies, 25% of the deaths were due to meconium aspiration. Davis et al (4) reported that the mortality associated with meconium stained amniotic fluid was 0.8%. However, the mortality from meconium aspiration syndrome was 40%.

Table 2
Variables of Neonatal Intensive Care Unit (NICU) Infants Weighing Over 2500 Grams

Variable	Mean	Standard Deviation
Mother's age	26.07	5.88
Gravity	2.59	1.76
Parity	1.08	1.33
Gestational age (LMP/Ultrasound)	39.30	2.35
Apgar 1 min	6.53	2.43
Apgar 5 min	8.11	1.58
Infant's weight (grams)	3,301.30	522.42
NICU stay (days)	7.93	12.87

Table 3
Diagnoses of Neonates Weighing Over 2500 Grams Admitted to Neonatal Intensive Care Unit (NICU) From 1981 to 1984

Diagnosis	No.	Percent
Hematologic diseases	166	24.6
Meconium aspiration	138	20.4
Respiratory problems	116	17.2
Congenital anomalies	93	13.8
Infants of diabetic mothers	72	10.7
Infections	39	5.8
LGA* (mother not diabetic)	19	2.8
Trauma to infant	9	1.3
Convulsion/seizures	6	0.9
IUGR*	4	0.6
Infants of IVDA* mothers	4	0.6
Normal infants	10	1.5

*LGA = large for gestational age, IUGR = intrauterine growth retardation, and IVDA = intravenous drug abuse.

Table 4
Data for 16 Neonates Weighing Over 2500 Grams Who Died in Neonatal Intensive Care Unit (NICU) During Four Years of Study

Weight (Grams)	Sex/Race	Apgar Scores (1/5 Minutes)	Age (Weeks)	Life Span (Days)	Diagnosis
3,930	M/W	8/9	37.5	1	Congenital hydrocephalus
2,540	M/B	8/10	36	1	Congenital anomalies
2,650	F/B	1/1	42	1	Meconium aspiration
3,500	M/B	7/8	36	2	Septicemia
2,700	F/B	1/5	40	58	Dwarfism, sepsis
3,010	M/B	8/9	40	2	Brain death with anoxia
3,660	M/B	2/5	40	3	Meconium aspiration
2,640	F/B	2/7	40	137	Pancreas anomaly, multiple gastrointestinal atresia
3,480	M/B	5/7	40	7	Meconium aspiration
3,120	M/B	1/1	38	1	Congenital anomaly, Downs syndrome
2,970	M/B	1/7	37.5	8	Malformations of great vessels, congestive heart failure
2,600	F/B	3/7	36.5	1	Congenital esophageal atresia, heart anomaly
3,182	F/B	7/8	40	1	Meconium aspiration
3,220	F/W	1/5	38	6	Motor vehicle accident in uteri
3,610	M/W	1/5	40	11	Multiple congenital anomalies
2,820	F/W	1/1	37	1	Omphalocele, meningomyelocele

Although the incidence of symptomatic aspiration syndrome appears to be reduced by combined obstetric and pediatric efforts, the aspiration cannot be prevented altogether (4,5). Miller and associates (6) suggested fetal gasping secondary to asphyxial insult as the main cause of intrauterine meconium aspiration. Therefore, it is not unreasonable to recommend early intervention when the fetus records an abnormal fetal heart rate pattern in the presence of thick meconium in amniotic fluid. Infection (6.2%), trauma (6.2%), and accidental neonatal hypoxia (6.2%) constitute the other preventable causes of mortality.

As demonstrated in the present study and previously reported studies, a significant portion of total NICU admissions (40.1% to 42.1%) weighed over 2500 g and had a significant mortality (9.8% to 12%). More work is required to reduce current mortality rates in this group. Neonates with congenital anomalies which can be amended by surgery should be referred promptly to the centers with pediatric surgical capabilities. To avoid intrauterine meconium aspiration, fetal heart rate should be monitored closely when the fetus passes a thick meconium. Also, the NICU follow-up clinic should be organized to conduct a meaningful, long-term morbidity study of higher birth weight infants who require NICU admission.

References

1. Philips JB III, Dickman HM, Resnick MB, Nelson RM Jr, Eitzman DV. Characteristics, mortality, and outcome of higher-birth weight infants who require intensive care. Am J Obstet Gynecol 1984;149:875-9.

2. Merenstein GB. Outcome of neonatal intensive care. Milit Med 1975;140:190-1.

3. Kulkarni P, Hall RT, Rhodes PG, Sheehan MB. Postneonatal infant mortality in infants admitted to a neonatal intensive care unit. Pediatrics 1978;62:178-83.

4. Davis RO, Philips JB III, Harris BA Jr, Wilson ER, Huddleston JF. Fetal meconium aspiration syndrome occurring despite airway management considered appropriate. Am J Obstet Gynecol 1985;151:731-6.

5. Carson BS, Losey RW, Bowes WA Jr, Simmons MA. Combined obstetric and pediatric approach to prevent meconium aspiration syndrome. Am J Obstet Gynecol 1976;126:712-5.

6. Miller FC, Sacks DA, Yeh SY, et al. Significance of meconium during labor. Am J Obstet Gynecol 1975;122:573-80.