
Obstetric Perinatal Mortality Review

During 2005, the obstetric half of the perinatal team reviewed mothers' records of perinatal deaths across the state. Stillbirths (fetal deaths) and neonatal deaths were included; all levels of care were represented. The purpose of this article is to report to the readership on what we found in order to improve understanding of the distribution and causes of perinatal deaths with a focus on potential preventability. It must be emphasized that the reviewers had the benefit of hindsight and brought their own views as to what constitutes appropriate care to the record review. It is not known, even if care had been modified, that outcomes would be different.

Excluding terminations for fetal malformations which took place at 20 weeks' gestation or later, the maternal records of 222 perinatal deaths were reviewed. Perinates of multiple gestation pregnancies accounted for 22 or 10% of the deaths (since offspring of multiple gestations account for approximately 3% of births, the disproportionate representation of multiple gestation pregnancies to perinatal mortality is apparent). Two hundred of the deaths occurred in singleton pregnancies; 68% were fetal deaths and 32% were neonatal deaths.

Multiple Gestations

The importance of early preterm labor as a cause of perinatal death in multiple gestation pregnancy is indicated by the fact that 64% of the perinatal mortality occurred in pregnancies ending prior to 23 weeks' gestation (generally viewed as previable). Ninety-one percent of the perinatal deaths occurred under 26 weeks' gestation; none occurred after 31 weeks.

In addition to prematurity, complications in these multiple gestation pregnancies included twin-twin-transfusion syndrome, premature separation of the placenta, congenital malformations, and sepsis.

Singleton Pregnancies

Less Than 23 Weeks' Gestation (Presumed Previabile)

Thirty-six fetal deaths and seventeen neonatal deaths occurred at less than 23 weeks' gestation. Thirty-one of the fetal deaths occurred antepartum; five occurred in-

trapartum. The latter losses clearly related to the very preterm labor.

Congenital malformations, cord problems, placental abruption, and viral infection were involved in the fetal deaths. The most common reason, however, was "unknown."

The seventeen neonatal deaths of these very immature babies resulted from preterm labor with or without rupture of membranes, placental bleeding problems, and cervical incompetence. These losses under twenty-three weeks' gestation accounted for 27% of the perinatal deaths reviewed.

23-29 Weeks' Gestation

Fifty-three deaths (again 27%) occurred in this gestational age category. These babies were potentially viable, but very preterm.

There were thirty fetal deaths. Two of these occurred intrapartum. In one case a woman with a placental abruption presented with no fetal heart tones. In the second, the fetus suffered from known triploidy.

Twenty-eight fetal deaths occurred antepartum. Nine were of unknown cause, five manifested severe intrauterine growth restriction, five were associated with premature placental separation, four babies were anomalous, two cases occurred in the context of preeclampsia and eclampsia, and one each occurred due to a cord problem, infection, and alloimmune thrombocytopenia.

There were twenty-three neonatal deaths. Immaturity, often in association with infection, was the common theme. Three women had cervical incompetence, three had placental abruption, and in one case delivery had to be effected for maternal indications (HELLP syndrome).

30-36 Weeks' Gestation

Fifty-five or twenty-eight percent of the perinatal deaths occurred in this gestational age interval. There were thirty-nine fetal deaths and sixteen neonatal deaths. Two intrapartum fetal deaths occurred. In one case there was known anencephaly and in the second there was a placental abruption. In the latter case prompt cesarean was performed (decision-incision interval 8 minutes), but the baby was stillborn.

There were thirty-seven antepartum deaths. Seventeen were of unknown cause, seven occurred in association with placental abruption, five manifested intrauterine growth restriction, five represented cord problems including vasa previa, there were two malformations, and one occurred in the setting of diabetes mellitus.

There were sixteen neonatal deaths, thirteen of these babies suffered from congenital malformations including one congenital malignancy, five abnormal karyotypes, and two neural tube defects.

Group B strep sepsis accounted for one neonatal death (the mother was culture negative) and two newborns died secondary to asphyxia. Diabetic ketoacidosis was present in one case and the second mother suffered from anaphylaxis vs. amniotic fluid embolism.

37 Weeks' Gestation and Later

Thirty-nine perinatal deaths or 20% occurred in full-term perinates. Fetal deaths occurred in 31 cases. Five of these were intrapartum. One woman with a placental abruption presented with no fetal heart tones, three fetuses had known trisomy 18, and in one case there was unappreciated fetal distress in the second stage of labor (vide infra).

Twenty-six stillbirths occurred antepartum. Twelve were of unknown cause, there were four babies with congenital malformations, six cord problems, and four cases of severe intrauterine growth restriction.

Eight neonatal deaths occurred. Seven of these babies were anomalous and one death occurred related to sepsis.

The table provides summary data for the one hundred forty-seven perinatal deaths occurring at 23 weeks' gestation or later. The thirty-eight fetal deaths in the "unknown" category stand out. As stillborns are more intensively evaluated, some will have causes identified. This information is important both for the family and for the care providers.

Singleton Pregnancies □ 23 Weeks' Gestation

Fatal Deaths	N=100
Unknown cause	38
Malformation	15
Placental Abruption	15
Intrauterine growth restriction	14
Umbilical cord complication	11
Asphyxia	3
Infection	1
Other	3
Neonatal Deaths	N=47
Malformation	20
Immaturity	17
Infection	8
Asphyxia	2

Potential Preventability

In our 2002-2003 Iowa obstetric perinatal mortality review, potential preventability was identified in 8.4% of cases. Eight were ascribed to the patient and twenty-one to the physician or nurse.

In the current review twelve cases (5.4 %) indicated potential preventability. In ten of these twelve cases, the patient was at fault. Methamphetamine or cocaine abuse (n=6) and/or no prenatal care (n=7) were the issues.

There were only two cases of physician/nurse preventability. One woman, who had sustained two previous second trimester losses followed by a full-term delivery following prophylactic cerclage, in the current pregnancy had a cerclage placed at 19+ weeks gestation and delivered within one week. An earlier prophylactic cerclage (e.g., 13 weeks) might have improved the outcome.

The second case of physician/nurse preventability involved the delayed recognition of fetal distress in the second stage of labor and, therefore, delayed performance of a cesarean delivery. The difficulty was that the maternal heart rate was being misinterpreted as the fetal heart rate. Whenever electronic fetal heart rate monitoring is employed, the physician and nurse must assure themselves that it is indeed the fetus who is being monitored.

—Frank J. Zlatnik, M.D.

Statistics from the Iowa Department of Public Health last appeared in *The Iowa Perinatal Letter* in 2001. What follows is an update of vital statistics information covering births occurring in Iowa hospitals for the years indicated.

Iowa Statewide Perinatal Experience

The Mothers

Table 1
Percent Live Births by Maternal Risk Characteristics

%	1975	1985	1995	2004
Age <18	5.8	3.0	4.0	2.5
Age >34	4.1	5.1	9.	10.9
Parity >3	10.9	8.8	10.0	10.7
Education <12	17.4	12.4	12.5	14.8
Unmarried	8.1	13.6	25.4	31.6

Comment: The demographic risk factors listed in Table 1 increase the chance of adverse perinatal outcomes. Only 2.5% of mothers were under age 18 at delivery in 2004. This “good news” has been noted nationally. Abortion rates have also fallen, especially in very young women. Abstinence-based sex educators and family planning providers can debate who gets credit for this low rate, but we all should be happy.

Over the past 30 years, there has been a progressive increase in the percentage of births to women age 35 and over. This reflects delayed childbearing and better fertility treatments. Historically, the older gravida was of lower socioeconomic class. This is not necessarily true today; the converse often pertains.

The most striking change over the years in Table 1 is the increasing percentage of unmarried mothers. This too has been identified across the nation. Certainly, the unwed mother is not as stigmatized today as she was 30 years ago. My own view, however, is that this increase in unmarried mothers is a disturbing social trend. Although many of these infants born to unmarried women are being raised by couples in committed relationships, many reflect single-parent families. This circumstance often imposes limits on occupational and educational attainment and may have intergenerational effects.

The Babies

Table 2
Low-Birth-Weight Infants*
and Very-Low-Birth-Weight Infants†
(By Year—Live Births)

	1975	1985	1995	2004
Number of Low-Birth-Weight Infants	2301	2055	2056	2524
Percent	5.5	5.0	5.6	6.6
Number of Very-Low-Birth-Weight Infants	358	329	360	445
Percent	0.9	0.8	1.0	1.2

* LBW = <2500 g.

† VLBW = <1500 g.

Comment: Despite our efforts, we are not gaining on the problem of prematurity. In the last decade, the percentages of LBW and VLBW infant deliveries have actually increased. Most of these babies are born preterm and are not growth restricted. Some of this increase may be associated with the increase in the adverse demographic factors listed in Table 1. Much of the increase, however, reflects an increasing percentage of multiple births secondary to more older mothers and, especially, to infertility treatments. Products of multiple gestation account for a little more than 3% of live births, but approximately 30% of births of babies weighing under 1500 g. (VLBW's). Active efforts are under way on our own infertility service to modify fertility treatments to minimize the chance of multiple pregnancies. We recognize that this is a serious problem, but infertile couples often do not.

Table 3
Perinatal Outcome

	1975	1985	1995	2004
Live Births	41,360	41,183	36,869	38,188
Fetal Deaths	369	255	225	216
Rate*	8.8	6.2	6.1	5.6
Neonatal Deaths	434	238	164	109
Rate†	10.5	5.8	4.4	2.9
Perinatal Deaths	803	493	389	325
Rate*	19.2	11.9	10.5	8.5

* Per 1000 live births plus stillbirths

† Per 1000 live births

Comment: The falling fetal and neonatal death rates over time are gratifying. Since the demographic factors haven't consistently changed in a fashion that would create a lower risk population and since the percentage of small babies has increased, the improvements in the death rates reflect advances in perinatal care and the good job done by Iowa physicians and nurses. High-risk pregnancies are identified, fetal well-being testing is employed, and delivery is effected preventing potential fetal deaths. Betamethasone administration to the mother, birth of the baby in a neonatal center, surfactant treatment of the newborn, and better recognition of infection in the newborn have all played roles in the dramatic decline in neonatal mortality.

The Hospitals

Table 4
The Hospitals – 2004

<u>Level</u>	<u>N</u>	<u>% Births</u>	<u>% VLBW's*</u>
I	71	19	3
II	15	30	8
II – Regional	6	28	25
III	2	19	36
UIHC	1	4	29

* Very-Low-Birth-Weight = <1500 g.

Comment: That effective regionalization of perinatal care exists in Iowa is well demonstrated in Table 4. Iowa's smallest obstetric services still account for 19% of births in the state, but for only 3% of VLBW's. Conversely, University Hospitals accounts for only 4% of births in the state, but 29% of VLBW's. Overall, 90% of VLBW's in Iowa in 2004 were delivered in hospitals with neonatal intensive care units. Most of these units had neonatologists on staff.

In 1975, there were 140 active obstetric services in Iowa. Today, that number is 82. In 1995, 18 counties did not have hospitals with obstetric services. Today, 31 of Iowa's 99 counties do not have hospitals with obstetric services. Although the smaller number of obstetric services in existence today, than in decades past, and the rather large number of counties without obstetric services might suggest an access problem, I do not think in 2006, this is generally the case. Many of the hospitals that have closed over the past three decades were close to surviving institutions. Many of the counties without obstetric services are contiguous to counties that have center hospitals. In the western part of the state, where the population is less dense, there may be increased travel times to obtain obstetric services, but I don't think we are in a "crisis" situation. There are potentially serious problems of access on the horizon, however. Lack of timely access to cesarean delivery is a potential problem in rural areas if general surgeons are not readily available. In addition, high medical liability insurance premiums might discourage family physicians from continuing to provide obstetric care. Closure of the local obstetric service, however, doesn't improve things. Longer travel times may decrease compliance with prenatal care and will add time in an emergency before the patient arrives at the closest hospital with a functioning obstetric service. We must remain vigilant and must pay continuing attention to the availability of obstetric services in rural Iowa.

—Frank J. Zlatnik, M.D.

Ways to Improve Obstetric Care in Iowa

What follows is a personal "Top 10 List" of care practices that I think can improve the already good obstetric care provided in our state.

- #10. Thoroughly evaluate the cause of a fetal death. The recent state initiative is on target. A thorough evaluation will often provide an answer. This is important information for parents and may modify care in a subsequent pregnancy.
- # 9. Remember the prerequisites for elective induction. They are: a parous woman, 39 weeks' gestation, vertex presentation, a favorable cervix, and an eager patient. If all pertain, things should go well.
- #8. If a patient at term has a non-reactive non-stress test and if this non-reactivity cannot be explained by congenital malformation, maternal drug use, or too short a testing period, consider effecting delivery. Most times induction of labor will be the correct step; at times the pattern will be ominous enough that one will proceed to cesarean.
- # 7. Defer elective repeat cesarean delivery to 39 completed weeks' gestation.
- # 6. Treat twin deliveries in the delivery room as a "double setup" situation. After delivery of twin A, one hopes twin B will deliver vaginally also, however, problems may arise which necessitate cesarean birth. All hands should be on deck for a twin delivery so that anesthetic and surgical capability can be put to immediate use if necessary.
- #5. Prevent eclampsia. Identify preeclampsia; hospitalize; consider effecting delivery.
- # 4. Consider progestin treatment in the woman with a previous preterm birth.
- # 3. Recognize that the patient with diabetes mellitus requiring drug therapy in an attempt to control her blood sugars is at risk for fetal death, even in the context of normal testing. In my opinion, such a patient should be delivered prior to her EDD.
- # 2. Understand fetal heart rate monitoring so that you can provide good care to your laboring patients.
- # 1. Accurately determine the estimated date of delivery (EDD). Many obstetric decisions rest on an accurate appreciation of gestational age. Take a careful history (LMP, cycle length, oral contraceptives?) and remember that the first ultrasound is the most accurate one for dating.

Good-bye and good luck!
—Frank J. Zlatnik, M.D.