Adverse Pregnancy Outcomes: Information from the Medical Record*

MARGE A. BREWSTER, Ph.D. and MARY A. HEIM, B.S.

Department of Pathology
University of Arkansas for Medical Sciences
Little Rock, AR 72205

ABSTRACT

Adverse reproductive outcomes were sought via medical records of 14 central Arkansas hospitals serving a five county area encompassing 28,102 live births in the 1980 to 1982 study period. This population-based study estimated the overall congenital anomaly case incidence to be 3.5 percent of live births. Information on pregnancy history of the cases or on parental occupations was often not recorded in the medical records of infant or mother, precluding the use of these records for many etiologic investigations. Fetal wastage cases found through hospital sources encompassed 86 percent of the number reported to the Department of Health. Autopsies were performed in only 16 percent of fetal death cases. Many of the fetal death cases not subjected to autopsy had no apparent cause of death listed; reasons for this lack of investigation warrant further study. These pregnancy outcome data have been correlated with agricultural pesticide usage and can be examined in a variety of environmental contexts for development and testing of etiologic hypotheses.

Introduction

Toward the major goal of preventing adverse reproductive outcomes, the University of Arkansas for Medical Sciences and Arkansas Children’s Hospital have begun the Arkansas Reproductive Health Monitoring System (ARHMS), with initial coverage of three years of pregnancy outcomes to residents of a five county central Arkansas area. This report conveys the incidence of congenital anomalies and of fetal wastage occurring in this central Arkansas area, the lack of important information on medical records of the infants with congenital anomalies, and the lack of autopsy investigation of fetal deaths.

Methods

The study area was five counties of central Arkansas served by 14 hospitals.* Problem cases were sought via inpatient diagnosis records and also via logbooks kept in nurseries, surgical suites, delivery rooms, and selected pediatric clinics. Fetal wastage (spontaneous abortion,

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* Each hospital gave consent for the sharing of its medical records with ARHMS.
ADVERSE PREGNANCY OUTCOMES

Fetal death) and congenital anomalies were the reproductive outcomes studied. The hospital coverage included all referral hospitals serving the five county region; excluding problems not routinely seen in hospital settings, coverage of the region is estimated to be comprehensive. The 28,102 live births (25 percent of the state total) to residents of the study region were thus examined.

Medical record review was performed in all infant cases; maternal chart review was conducted whenever the infant case was identified in the hospital of birth. Data abstracted included maternal address, race, sex of infant, hospital of birth, date of birth, hospital of abstract, specific suboptimal pregnancy outcomes (specific congenital anomalies, spontaneous abortion, etc.), parental occupations, maternal history (illnesses, drugs, smoking, alcohol, etc.), family history (birth defects, consangunuity, epilepsy, deafness, mental retardation, other). Problems were coded according to the International Classification of Disease, Version 9 (ICD-9) and the British Pediatric Association Classification of Diseases as modified by the Centers for Disease Control. Parental occupations were coded according to the U.S. Census Bureau Occupational Classification System.

Tallies of live births by county of residence, race, and sex were obtained from the Vital Statistics Division, Arkansas Department of Health. Fetal wastage data by county of residence were obtained from the Arkansas Department of Health as well as being sought by ARHMS in hospital sources.

Results

Case incidence data are shown in table I. Of the 2,645 problem cases found in 29,766 births, 39 percent were live births with one or more congenital anomalies (ICD-9 Codes 740 to 759.9). Most cases had only one defect recorded, with the exception of those with heart/circulatory anomalies. Incidence of congenital anomalies is shown in table II, totaling 4.5 per 100 live births. Limb anomalies and musculoskeletal deformities were most frequently present (including congenital hip dislocation, varus and valgus foot deformities, clubfoot, polydactyly, limb reduction deformities, genu valgum and varum, hip dysplasia, etc.).

Cases in which both maternal and infant medical records had been reviewed were examined to determine the proportion of cases having selected information in these medical records. These data by the hospital categories of "referral" and "general" are compiled in table III. (This analysis included many infants residing outside the five county study area, so that the total cases analyzed exceeds that shown in table I.) Maternal age was generally present in the medical record, but other information potentially pertaining to the pregnancy outcome was quite variable. Other pregnancy information sought, which was present in the medical record in less than three percent of the cases, included medications used prior to pregnancy, pre-pregnant weight, weight gain during pregnancy, x-ray during pregnancy, contraceptives used, and

<table>
<thead>
<tr>
<th>Problem of Incidence, Central Arkansas (1980-1982 Births)</th>
<th>Number per 100 Live Births*</th>
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</thead>
<tbody>
<tr>
<td>Fetal wastage, found via hospital records</td>
<td>1664</td>
</tr>
<tr>
<td>Spontaneous abortion</td>
<td>1306</td>
</tr>
<tr>
<td>Missed abortion, &lt;22 weeks gestation</td>
<td>142</td>
</tr>
<tr>
<td>Fetal death (stillbirth), ≥22 weeks gestation</td>
<td>216</td>
</tr>
<tr>
<td>Congenital anomaly, total live birth</td>
<td>981</td>
</tr>
<tr>
<td>Total all cases</td>
<td>2645</td>
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*Reference to 28,102 live births known to Vital Records.
nausea during pregnancy. Although the pregnancy information available in the medical record varied greatly with the individual hospital, maternal alcohol usage was stated more frequently in charts of referral hospitals, suggesting that referral hospitals are more alert to the possibility of fetal alcohol syndrome.

All 4,922 adverse outcome cases found in the course of this study (i.e., no regard to place of residence) were examined to determine the frequency of information on parental occupations appearing in the medical records. Maternal occupation was available for 40 percent of the cases, including 10.0 percent listed as house­wife and 11.5 percent listed as unemployed. Paternal occupation was available for 33 percent of the cases, including 2.2 percent unemployed.

This larger data set (all cases found regardless of residence) included 356 cases of fetal death (≥22 weeks gestation) in which medical records were examined for autopsy information. Autopsies were definitely obtained in 16 percent of these fetal deaths; another 15 percent of the fetal death cases had unclear medical records in this regard. Thus, 69 to 84 percent of fetal death cases had no autopsy performed. Thirty-one (8 percent) of the fetal death cases were stated to have one or more congenital anomalies.

**Discussion**

Population-based data on incidence of congenital anomalies in the United States is available mainly from the Met-
ropolitana Congenital Defects Program (MACDP) developed by the Centers for Disease Control (CDC) and operational since 1976. This program finds cases of major malformation known to hospitals in the five county Metropolitan Atlanta area encompassing a birth cohort similar to that of the entire state of Arkansas. Our finding of 3.5 congenital anomaly cases per 100 live births agrees closely with the 4.4 per 100 found by MACDP over this same 1980 to 1982 period. Defect incidences of less major malformations from this program and from others now in various stages of development in over a dozen states (most of which are based in State Departments of Health) are difficult to compare owing to varying methods of finding the cases. Oakley has recently reviewed the utility of the MACDP in testing hypotheses of putative teratogenic agents (airport noise and spray adhesives) and in monitoring trends of birth defects (documenting major increases in patent ductus arteriosus and ventricular septal defects and a major decrease in neural tube defects, all for reasons unknown). Case-control studies are greatly facilitated by having an available list of cases (for examples, the MACDP cases were used to identify an association between diazepam and facial clefts and to deny association between military exposure to Agent Orange and birth defects. The central Arkansas congenital anomaly case incidence has been compared by us to application rates of agricultural insecticides and to 68 individual agricultural pesticides. Suggestive correlations are now under study in an expanded agricultural region. Careful monitoring of adverse reproductive outcomes and correlation of such data with environmental factors clearly has a role in the development and testing of etiologic hypotheses.

Ideally, such studies would be performed without the necessity of contacting cases in order to determine potentially confounding factors, such as maternal smoking or chronic illness. Our results (table III) indicate that medical records contain good information on maternal age, fair-to-good information on last menstrual period, and poor information about other maternal/family factors pertinent to the pregnancy outcome. Availability of this information is highly variable between hospitals, as shown by table III range data, and is not always superior in referral hospitals. The under-ascertainment of pregnancy information and of information on parental occupations is a serious detriment to the development of etiologic hypothesis. Parental occupation has recently been included on Arkansas birth certificates. These records will thus be invaluable in establishing "denominator" data on frequency of specific occupations among parents of child-bearing age. Linkage of such birth records to adverse outcome records will afford better occupational information. Our findings clearly indicate that medical records cannot currently be employed retrospectively to study etiologic factors.

Spontaneous abortion and fetal death are required to be reported in Arkansas; ARHMS hospital case ascertainment yielded 86 percent of the reported fetal wastage cases, suggesting that most of these events do occur in hospital settings. Of the known fetal death cases, autopsies were not conducted in a large proportion. In many of the cases not autopsied, there was no apparent cause of death, raising the question as to why more cases of fetal death are not studied in this manner. A more detailed analysis of these cases is planned.

In summary, we have reported in brief the incidence of adverse repro-

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ductive outcomes found via hospital sources in a population-based study in central Arkansas. Pregnancy information obtainable from hospital medical records is highly variable and of overall poor quantity, precluding the use of the medical record to study etiologic factors. Only a small proportion of fetal death cases was accompanied by congenital anomalies or other stated cause of death, yet autopsies were infrequent in fetal death cases.

References