# Use of Vital Records in the Study of Congenital Heart Disease

HAROLD T. OSTERUD, M.D., M.P.H., VICTOR D. MENASHE, M.D., and MARIAN M. MARTIN, M.P.H.

CONGENITAL heart disease is responsible for one-half of all deaths from congenital malformations in Oregon. Improvement in diagnosis and treatment over the past decade, including spectacular and costly surgical advances, has developed. These advances raise many economic and sociologic questions which may be answered through an epidemiologic study. The only populations readily available for a study of congenital malformations were those of single institutions, and these were not representative of the population of the entire State. Thus, the birth and death certificates identifying congenital malformations were selected as the starting point in developing a population for study representative of the State as a whole. Fetal death certificates were not used because autopsies of fetuses were seldom performed, and "prematurity" was recorded most frequently as the cause of fetal death, a term giving no information about congenital malformations.

The epidemiologic investigation of congenital heart disease was started as a retrospective and descriptive study for the years 1957–61. The period was selected because in 1956 specific space for recording congenital malformations was designated in the confidential medical data section of the Oregon birth certificate, but the reporting during that first year was scanty. This paper is presented to demonstrate some of the values as well as some of the inadequacies of vital records in an epidemiologic study of congenital anomalies.

The purpose of this study was to investigate congenital heart disease and congenital malformations in Oregon and to study differences in the disease in population groups. With the original objectives established, the initial phase of the study directed toward ascertaining if data from vital records would be adequate or if other sources of data would be necessary to meet these objectives:

1. To establish the recorded incidence, and prevalence if possible, of congenital heart disease in Oregon.

2. To establish prognoses for different types of congenital heart disease.

3. To identify types of congenital heart disease in which the prognoses are most favorable for surgery.

4. To establish the various types of congenital heart defects that are diagnosable in early infancy and those that are not readily recognizable until later or at death, and to ascertain how the types are associated with other congenital malformations.

5. To establish, as a byproduct of this investigation, the reported incidence, and prevalence if possible, of the various categories of congenital malformations (other than heart defects) specified on birth and death certificates in Oregon.

*Dr. Osterud is associate professor, department of public health and preventive medicine, and Dr. Menashe is associate professor of pediatrics, crippled children's division, University of Oregon Medical School, Portland. Miss Martin is State registrar of vital statistics, Oregon State Board of Health.* *The investigation was supported by research grant HE–06336–04 from the National Heart Institute, Public Health Service.*

6. To establish prognoses for varying types of malformations other than congenital heart defects.

The information obtained was classified into the following categories:

1. All congenital malformations identified on birth and death certificates.
2. All congenital malformations identified on birth certificates for which there were matching death certificates.
3. All congenital malformations specified on death certificates but which were not mentioned on matching birth certificates.
4. All congenital malformations in categories 1, 2, and 3 identified by systems, including cardiovascular, nervous, genitourinary, digestive, respiratory, musculoskeletal, and skin, as well as unspecified multiple defects.
5. All congenital cardiovascular defects for which clinical records and autopsy information were available.
6. All unspecified multiple congenital defects for which clinical records and autopsy information were available.

## Methodology

Photostat copies of all birth and death certificates coded to congenital malformations were obtained from the Oregon State Board of Health, vital statistics section, for the years 1957–61. Information from these certificates was supplemented when possible with clinical and autopsy data obtained from private physicians, pathologists, hospitals, health departments, and the crippled children's division, University of Oregon Medical School. Death certificates specifying congenital heart disease as the cause or contributory cause of death were matched with birth certificates for Oregon residents.

The classification and coding of the congenital malformations, using the International Statistical Classification of Disease, Injuries, and Causes of Death, was difficult because greater detail in the classification of congenital malformations was desired. Therefore, although the code was carefully followed, categories were expanded when necessary to include additional identifiable anatomic lesions. This study was restricted to anatomic congenital abnormalities, and conditions such as inborn errors of metabolism were excluded.

The information obtained from birth and death certificates was transferred to master sheets and punchcards. The data obtained from birth certificates included the name, race, sex, date and place of birth, and address of parents at birth of child. The information on parents included race, ages at birth of child having a congenital malformation, marital status, and occupation. The items from the confidential medical data section included the attendant at birth, birth order, length of pregnancy, birth weight, specific congenital malformations, other children born alive now living or dead, mother's serology, and fetal deaths prior to this birth.

The information recorded from death certificates included the name, race, sex, date of birth and death, place of death (town, county, hospital, home, and so forth), residence, and occupation. The cause of death (immediate cause A, due to B, due to C, the contributory cause) and the interval between onset of illness and death were tabulated and carefully compared to clinical records and reports on autopsy (if performed).

### Birth Certificate Data

Eight congenital malformations were recorded for every 1,000 live births in Oregon during 1957–61. The number of malformations

**Table 1. Number of persons with congenital malformations recorded on birth certificates, by sex, male-to-female ratio, rate per 1,000 live births, and year of birth, Oregon, 1957–61**

| Year | Number of persons | Rate per 1,000 live births | Males | Females | Male-to-female ratio |
|---|---|---|---|---|---|
| 1957 | 311 | 8.22 | 188 | 123 | 1.53 |
| 1958 | 287 | 7.91 | 166 | 121 | 1.37 |
| 1959 | 299 | 8.16 | 155 | 144 | 1.08 |
| 1960 | 307 | 8.01 | 185 | 122 | 1.52 |
| 1961 | 307 | 8.19 | 175 | 132 | 1.33 |
| Total | 1,511 | 8.10 | 869 | 642 | 1.35 |

NOTE: 186,579 birth certificates were filed in Oregon for 1957–61, including births in families who lived out of the State.

recorded on birth certificates, classified by sex and year, are summarized in table 1. The male-to-female ratio was 1.35, and the male predominance was present in all 5 years but was almost nonexistent in 1959. The year-to-year variation in the number of infants with congenital malformations recorded on birth certificates was not statistically significant, an indication of stability of the occurrence of congenital anomalies.

The incidence rates for Oregon's 36 counties varied from a low of no recorded malformations in 1 county to a high of 18 per 1,000 live births in another. The comparison of the incidence rates by counties presented problems, as Oregon has many sparsely populated counties where few births occur, making the statistical comparison of incidence rates unreliable. When the State was divided into five areas similar in geography, climate, and economy (coast, Willamette Valley, central Oregon, eastern Oregon, and mountainous southwest Oregon), no statistically significant differences in the distribution of congenital anomalies were noted.

Congenital malformations were identified significantly more often in infants not born in hospitals. Only 1,860 infants, 1 percent of all Oregon births, were delivered outside hospitals. Twenty-six of these children, a rate of 14 per 1,000 births, were recorded as having congenital malformations compared with a rate of 8 per 1,000 births occurring in hospitals. The reason for this difference is not known.

The congenital malformations identified on birth certificates, by sex and system, are arrayed in table 2 and figure 1. The musculoskeletal, skin, and nervous systems account for 76 percent of all recorded malformations, and genitourinary, cardiovascular, digestive, and respiratory systems, for the remaining 24 percent.

**Table 2. Congenital malformations recorded on birth and death certificates, by system,[1] sex, and rate per 1,000 live births or deaths, Oregon residents 1957–61**

| Major system | Male | Female | Ratio | Total | Rate per 1,000 live births or per 1,000 deaths |
|---|---|---|---|---|---|
| | Malformations on birth certificates | | | | |
| Cardiovascular | 90 | 54 | 1.67 | 144 | 0.77 |
| Nervous | 140 | 131 | 1.07 | 271 | 1.45 |
| Digestive | 63 | 41 | 1.54 | 104 | .56 |
| Respiratory | 9 | 6 | 1.50 | 15 | .08 |
| Genitourinary | 136 | 20 | 6.80 | 156 | .84 |
| Skin | 199 | 133 | 1.50 | 332 | 1.78 |
| Musculoskeletal | 408 | 359 | 1.14 | 767 | 4.11 |
| Total | 1,045 | 744 | 1.40 | [2] 1,789 | 9.59 |
| | Malformations on death certificates | | | | |
| Cardiovascular | 299 | 222 | 1.35 | [3] 521 | 6.40 |
| Nervous | 105 | 96 | 1.09 | 201 | 2.47 |
| Digestive | 62 | 39 | 1.59 | 101 | 1.24 |
| Respiratory | 23 | 22 | 1.05 | 45 | .55 |
| Genitourinary | 63 | 37 | 1.70 | 100 | 1.23 |
| Skin | 1 | 2 | .50 | 3 | .04 |
| Musculoskeletal | 9 | 15 | .60 | 24 | .29 |
| Total | 562 | 433 | 1.30 | [4] 995 | 12.22 |

[1] System underlying cause of death for death certificates.
[2] Recorded on 1,511 birth certificates.
[3] This figure represents the actual number of deaths, as multiple cardiovascular lesions were not identified on the death certificates.
[4] 996 residents died. Sex of person was undetermined in 1 death attributed to cardiovascular defect.

Significantly more males than females were recorded as having congenital malformations in all systems except the nervous and musculoskeletal systems.

### Death Certificate Data

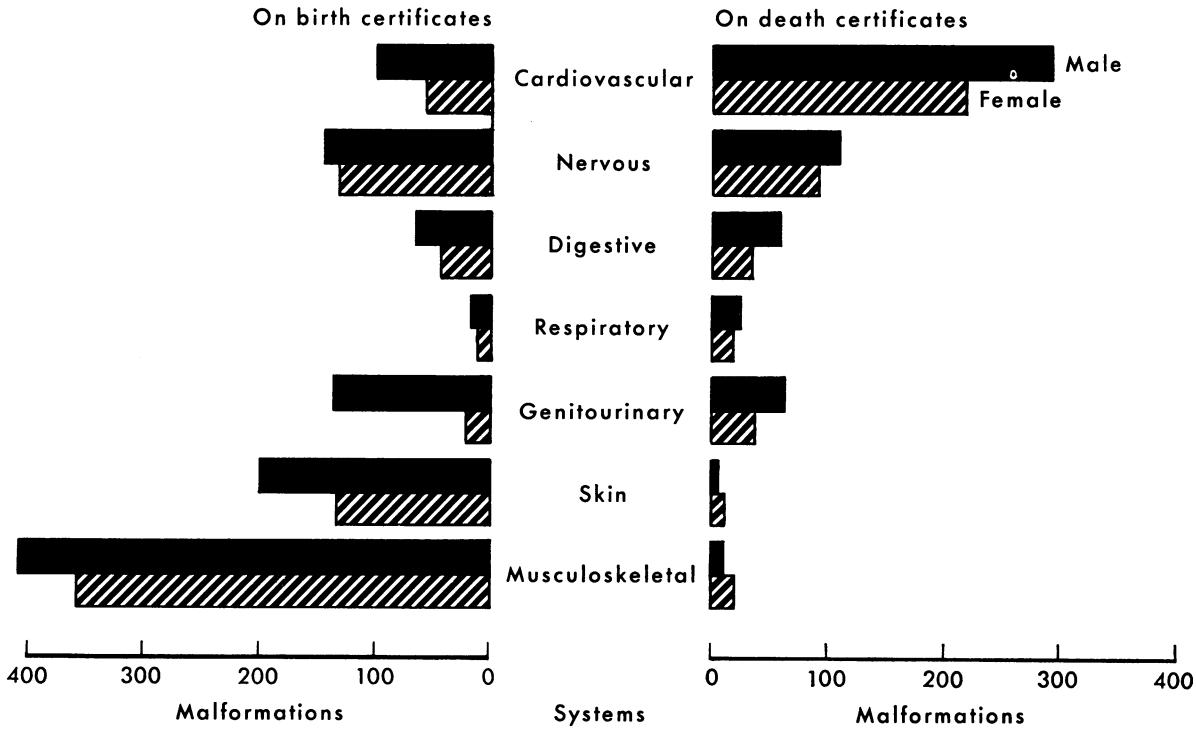
Congenital malformations recorded on death certificates are summarized in table 3. Congenital defects were identified as the cause of death in 12 of each 1,000 deaths from all causes. The age-specific death rates are summarized in table 4. Ninety-eight percent of the deaths from congenital malformations were of Oregon residents. The majority of the nonresidents who died in the State from congenital malformations, 2 percent of the total, lived near the Oregon border and obtained their medical care in the State.

Deaths from congenital malformations for the 36 Oregon counties ranged from 4.73 to 23.35 per 1,000 resident deaths. These differences were statistically significant. However, the differences in the distribution of deaths from congenital malformations were not significant for the five geographic areas as previously described, and no pattern was discernible in the geographic distribution of deaths.

The ratio of male-to-female deaths was stable for each year in the 5-year study period. The recorded deaths from congenital malformations for the State, by year, varied less than 10 percent from the 5-year mean of 204 cases, reflecting stability in the overall occurrence of deaths from congenital malformations. Similarly, the autopsy rate varied 6 percent or less from the 5-year mean of 140 autopsies.

Deaths from congenital malformations, classified by sex and major systems, are summarized in table 2 and figure 1. The underlying cause of death, by system, was identified on 97.6 percent of the death certificates. The unqualified term "multiple congenital defects" was noted on only 24 certificates, 2.4 percent of the total. The clinical records of these 24 deaths were reviewed, the underlying cause of death deter-

**Figure 1. Congenital malformations recorded on birth and death certificates, by sex and system, Oregon, 1957–61**



mined, and these data are included in tables 2 and 3.

Congenital heart disease was recorded as the underlying cause of death on 521 certificates, 52.3 percent of the total, more than all other systems combined. The nervous system accounted for 20 percent, digestive and genitourinary systems for 10 percent each, and the respiratory system for 4.5 percent. As expected, deaths from malformations of the musculoskeletal system, with 2.5 percent, and skin, with 0.3 percent, were rare.

In all systems except musculoskeletal and skin, deaths were recorded more frequently for males than females. However, the difference in the male-to-female ratio is significant for only the cardiovascular, digestive, and genitourinary systems.

### Comparison of Birth and Death Data

The congenital malformations most frequently recorded on birth certificates were of the musculoskeletal, skin, genitourinary (primarily of the external genitalia), and nervous systems, defects frequently diagnosed by simple visual inspection. The malformations identified on death certificates, when ranked by frequency, are in a reverse order with fewer deaths from the more obvious malformations. Defects of

**Table 3. Persons dying from congenital malformations recorded on death certificates, by sex, male-to-female ratio, rate per 1,000 deaths, and number of autopsies, Oregon residents, 1957–61**

| Year | Total | Rate per 1,000 deaths | Males | Females | Male-to-female ratios | Autopsies | |
|---|---|---|---|---|---|---|---|
| | | | | | | Number | Percent |
| 1957 | 210 | 13.43 | 117 | 93 | 1.26 | 148 | 70 |
| 1958 | 188 | 12.17 | 106 | 82 | 1.29 | 132 | 69 |
| 1959 | 219 | 13.11 | 121 | 98 | 1.23 | 143 | 65 |
| 1960 | 191 | 11.38 | 109 | 82 | 1.33 | 132 | 65 |
| 1961 | 212 | 12.56 | 122 | 90 | 1.36 | 146 | 69 |
| Total | [1] 1,020 | 12.52 | 575 | 445 | 1.29 | 701 | 68.7 |

[1] Includes 996 residents and 24 nonresidents among 81,453 deaths for 1957–61.

**Table 4. Deaths from congenital malformations, by system and age-specific death rates per 100,000, Oregon residents 1957–61**

| Age (years) | Total malformations | Malformations by system | | | | | |
|---|---|---|---|---|---|---|---|
| | | Cardiovascular | Nervous | Digestive | Genitourinary | Respiratory | Musculoskeletal |
| Under 1 | 1,895.7 | 985.2 | 365.3 | 196.4 | 88.6 | 83.0 | 47.0 |
| 1–5 | 38.4 | 18.7 | 11.2 | 4.8 | 1.6 | 2.1 | 0 |
| 6–9 | 20.7 | 11.3 | 4.7 | 3.3 | 1.3 | 0 | 0 |
| 10–14 | 13.4 | 8.2 | 2.9 | 1.2 | 1.2 | 0 | 0 |
| 15–19 | 15.4 | 10.0 | .8 | 0 | 3.8 | 0 | .8 |
| 20–29 | 9.4 | 5.7 | 2.1 | .5 | 1.0 | 0 | 0 |
| 30–39 | 9.3 | 4.9 | 1.3 | .4 | 1.8 | .8 | 0 |
| 40–49 | 12.5 | 6.9 | 0 | 0 | 5.6 | 0 | 0 |
| 50–59 | 18.4 | 5.9 | 1.6 | 1.1 | 9.7 | 0 | 0 |
| 60 and over | 11.2 | 2.7 | 1.2 | 2.3 | 4.6 | .4 | 0 |
| Total, all ages | 56.3 | 29.5 | 11.4 | 5.9 | 5.7 | 2.5 | 1.4 |

SOURCE: For age distribution, U.S. Bureau of the Census: Census of population, 1960. U.S. Government Printing Office, Washington, D.C., 1961.

the cardiovascular system were identified on 144 birth certificates compared with 521 identified on death certificates (fig. 1). In general, the less obvious congenital defects were the most lethal.

### Congenital Cardiovascular Disease

There were 154 congenital heart defects recorded on birth certificates for 144 persons (table 5). Specific anatomic defects of the heart were mentioned on 67 birth certificates, 43.4 percent of the total. The recorded incidence of the various anatomic lesions by year appeared to be stable but were too few in number to allow a significant year-to-year comparison. Unspecified congenital heart disease was recorded on 87 birth certificates, or 56.6 percent, reflecting the difficulty in diagnosis of specific cardiac defects at this early age.

Deaths from congenital cardiovascular disease identified on death certificates are summarized in figure 2. These deaths, classified by the anatomic lesion, if possible, are contrasted with congenital cardiovascular defects recorded on the matched birth certificates.

**Table 5. Congenital malformations of the cardiovascular system recorded on birth certificates, by rank order and sex, Oregon residents, 1957–61**

| Malformation | Total number of defects | Male | Female |
|---|---|---|---|
| Congenital heart disease, unspecified | 87 | 49 | 38 |
| Patent ductus arteriosus | 16 | 9 | 7 |
| Ventricular septal defect | 12 | 10 | 2 |
| Atrial septal defect | 7 | 5 | 2 |
| Tetralogy of Fallot | 5 | 4 | 1 |
| Pulmonary stenosis, valvular | 5 | 5 | 0 |
| Coarctation of the aorta | 4 | 2 | 2 |
| Aortic stenosis | 3 | 1 | 2 |
| Dextrocardia | 3 | 2 | 1 |
| Hypoplastic left heart | 2 | 2 | 0 |
| Pulmonary artery stenosis | 2 | 1 | 1 |
| Transposition of great vessels | 2 | 1 | 1 |
| Congenital heart block | 2 | 1 | 1 |
| Arrhythmia (unspecified) | 2 | 1 | 1 |
| Hypoplastic aorta | 1 | 0 | 1 |
| Truncus arteriosus | 1 | 1 | 0 |
| Total | [1] 154 | 94 | 60 |

[1] The 154 defects occurred in 144 individuals. Male-to-female ratio was 1.55.

**Table 6. Congenital cardiovascular disease recorded on death certificates and matched with the individual's birth certificate, Oregon residents, 1957–61**

| Age at death | All deaths from cardiovascular malformations | Recorded on birth certificates | | |
|---|---|---|---|---|
| | | Cardiovascular malformations | Other malformations [1] | No malformations |
| Under 24 hours | 54 | 30 | 12 | 12 |
| 1 day | 33 | 14 | 1 | 18 |
| 2 days | 30 | 9 | 2 | 19 |
| 3 days | 18 | 2 | 4 | 12 |
| 4 days | 13 | 2 | 2 | 9 |
| 5 days | 7 | 2 | 1 | 4 |
| 6 days | 11 | 1 | 2 | 8 |
| 7 days | 6 | 2 | 1 | 3 |
| 8–27 days | 48 | 8 | 9 | 31 |
| 28 days–5 months | 107 | 16 | 14 | 77 |
| 6–11 months | 15 | 0 | 2 | 13 |
| 12–23 months | 14 | 1 | 1 | 12 |
| 24–35 months | 2 | 0 | 0 | 2 |
| Total | [2] 358 | 87 | 51 | 220 |

[1] All congenital malformations excluding congenital cardiovascular.

[2] Includes only infants who were born and who died during the 5-year study period.

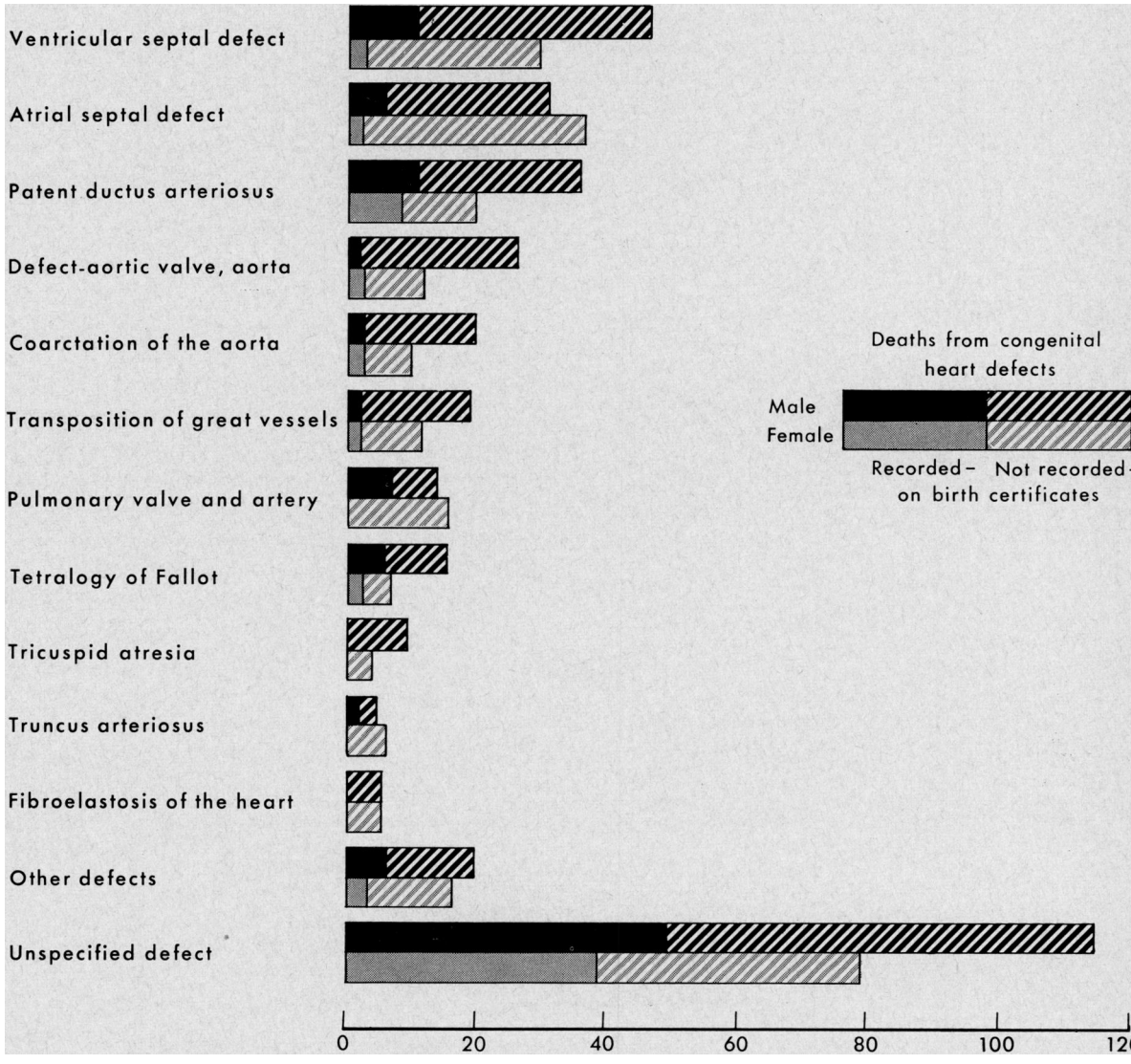
The discrepancy between the number of congenital cardiovascular defects reported on birth certificates compared to those on death certificates (fig. 1) clearly illustrated that birth certificates were an inadequate source of morbidity data. Cardiovascular defects represented only 8 percent of all congenital defects recorded on birth certificates, yet account for 52 percent of all deaths from congenital malformations (521 out of 996). Deaths from congenital cardiovascular disease were matched with birth certificates of these persons in order to discover the number of defects recognized at or shortly after birth (table 6). Congenital heart disease was recorded on both the birth and death certificates of only 25 percent of the 358 infants who were born and who died of this cause during the study period. Congenital malformations of other systems were recorded on 14.2 percent of the birth certificates without mention of congenital heart disease.

No congenital malformations were recorded on 61.5 percent of the 358 birth certificates, and

congenital cardiovascular disease was not identified on 75 percent. This reflects the difficulty of early diagnosis of congenital heart disease. However, congenital heart disease had been recorded on only 44 of 87 birth certificates of infants who died at under 2 days of age. This discrepancy could be reduced if the birth certificate were attached to the infant's case record for the attending physician to review and check for completion. The practice of having secretaries, clerks, admitting personnel, nurses, or other persons be responsible for completing the birth certificate, with the duty of getting the physician's hasty signature, leads to omissions and incomplete recording of the confidential medical data.

The information on birth and death certificates frequently needed supplementation with data from clinical records and autopsy reports. For example, the term "congenital heart disease" was recorded on 191 death certificates without specifying the anatomic abnormalities. The term "multiple congenital malformations" necessitated inquiry as to the cause of

**Figure 2. Deaths from congenital heart defects identified on death certificates, classified by sex, anatomic lesion, and whether recorded or not on matched birth certificates, Oregon, 1957–61**



death. Clinical records were studied in 97.5 percent of the deaths of residents, and autopsy reports in 78 percent. The more common congenital heart lesions are summarized in table 7, first as recorded on death certificates and then as supplemented after the review of clinical records and autopsy reports. The number of identified anatomic lesions was increased 36.5 percent by the review, and unspecified congenital heart disease deaths were reduced from 191 to 99. Multiple heart defects were identified in 72 percent of the deaths compared with only 9 percent mentioned on birth certificates.

The information obtained from review of the clinical records and autopsy reports made possible an evaluation of the accuracy of birth and death certificates as a source of data for the study of congenital defects. Fourteen persons, of whom 11 died, were found upon review to have been mistakenly recorded as having congenital defects on birth certificates. Of the 11 persons who died, 7 were recorded as having congenital heart disease but, on autopsy, 5 were found to have atelectasis, and 2 hemorrhagic pulmonary edema. Undoubtedly the infants were cyanotic at birth with labored heart action, and these symptoms can easily lead a physician to suspect congenital heart disease. The remaining four who died were recorded on the birth certificates as having respiratory malformations, but one had atelectasis, one was premature, and two had hyaline membrane disease. Of the three who lived, one had a "temporary wrist drop," one "molding of the head," and for the third, a recording of an undescended testicle in a female was an error in the record.

**Table 7. Congenital heart defects as recorded on death certificates and as supplemented with data from clinical records and autopsy reports, Oregon residents, 1957–61**

| Congenital heart disease | Number recorded on— | | Percent increase [1] |
|---|---|---|---|
| | Death certificates | Death certificates plus autopsy and clinical data | |
| Ventricular septal defect | 75 | 119 | 58.7 |
| Atrial septal defect | 69 | 88 | 27.5 |
| Patent ductus arteriosus | 53 | 115 | 117.0 |
| Defects, aortic valve and aorta | 37 | 54 | 45.9 |
| Transposition of great vessels | 29 | 42 | 44.8 |
| Pulmonary valve and pulmonary artery stenosis | 28 | 61 | 117.8 |
| Coarctation of the aorta | 27 | 40 | 48.1 |
| Tetralogy of Fallot | 21 | 37 | 76.2 |
| Tricuspid atresia | 10 | 18 | 80.0 |
| Truncus arteriosus | 9 | 10 | 11.1 |
| Fibroelastosis | 8 | 8 | .0 |
| Other specified defects | 35 | 117 | 234.2 |
| Unspecified congenital heart disease | 191 | 99 | [2] −48.1 |
| Total | 592 | [3] 808 | 36.5 |

[1] Increase in lesions recognized after the death certificates were supplemented with clinical and autopsy data.
[2] Decrease.
[3] The 808 lesions were present in 496 residents dying from congenital cardiovascular disease, or an average of 1.6 defects per person.

On 34 death certificates the cause of death, recorded as congenital heart disease or unspecified congenital malformations, was found to be in error. A review of the autopsy reports and clinical records revealed that 24 of the 34, or 4.6 percent of all congenital cardiovascular deaths, had been mistakenly attributed to congenital cardiovascular defects.

Of these 34 persons, 20 were male and 14 were female. Nineteen died at less than 1 year of age, 17 of these at less than 28 days. Six of the 17 died at less than 1 day of age. Eleven were more than 50 years of age, and only 4 were between the ages of 1 and 50. This distribution was expected, as it corresponds to the numbers of deaths occurring at different ages, with the greater number occurring at less than 1 year and over 50 years.

The 34 deaths erroneously diagnosed as caused by congenital defects were usually the result of physicians having had to sign the death certificate before they had the autopsy report. This could be avoided if corrected supplemental death certificates were filed (a practice not often followed in Oregon), or the original certificate should state, "cause of death probably congenital heart disease, autopsy results pending." The vital statistics section could then query the physician at a later time to obtain corrected supplemental data. Also,

the lack of autopsy information contributed in some measure to inadequate reporting on the birth certificates of infants dying at less than 3 days of age.

The cause-specific death rates from all congenital malformations for Oregon and for the United States were compared with the rates as determined after the review of clinical and autopsy records (table 8). No statistically significant differences were noted from year to year. The cause-specific death rate for congenital heart disease was 6.1 per 100,000 in 1900 for all death registration States compared with 6.2 for all death registration States in 1957, 1958, 1959, and 1961. No statistically significant differences were found when the cause-specific death rates for the United States and Oregon were compared with the rates obtained after review (table 8), a testimony to the value of vital statistics in predicting trends.

Information, though incomplete, was obtained for all the objectives as outlined. For example, the hypoplastic left heart kills as many infants as tetralogy of Fallot and had a much poorer prognosis; all infants in this study having it died in the first 2 weeks of life. Infants with isolated defects of the heart have a significantly longer life than infants with multiple defects, but there was no difference in the length of survival between infants with two or more heart defects than with two. More males than females have congenital heart disease, but there was no statistically significant difference in the length of survival between males and females with congenital heart disease. Deaths during surgery have been reviewed. Malformations frequently associated with congenital heart disease, such as mongolism, have been studied. However, the objectives of this study could not be fully achieved using vital records as the source of data. A study, using the clinical records matched with birth and death certificates of patients with congenital heart defects diagnosed at Oregon hospitals and clinics specializing in the diagnosis and treatment of congenital heart disease, is currently underway. A better estimate of incidence of malformations and evaluation of vital records will be obtained from this investigation. The vital records serve as a valuable source of data in this morbidity study.

Vital records were found to be of value in identifying a population with congenital heart disease. The use of vital records is not an end in itself, but identifies a population for study. This identification enabled the investigators to obtain additional data from other sources. The results obtained from use of these additional records contributed to a better description of congenital heart disease in Oregon.

## Summary

Birth and death certificates of Oregon residents mentioning congenital malformations were examined to determine their usefulness in ascertaining the incidence of various types of malformations and in identifying a population with congenital heart defects. Birth certificate data for the period 1957–61 revealed 8 congen-

**Table 8. Cause-specific death rates per 100,000 for congenital malformations and congenital cardiovascular disease, for the United States, Oregon, and as corrected for Oregon, after review of clinical records and autopsy reports, 1957–61**

| Year | United States | | Oregon (uncorrected) [1] | | Oregon (corrected) [2] | |
|---|---|---|---|---|---|---|
| | Congenital malformations | Congenital heart disease | Congenital malformations | Congenital heart disease | Congenital malformations | Congenital heart disease |
| 1957 | 12.8 | 6.2 | 12.4 | 6.0 | 11.6 | 5.7 |
| 1958 | 12.4 | 6.2 | 11.0 | 5.0 | 10.5 | 5.0 |
| 1959 | 12.3 | 6.2 | 12.0 | 6.4 | 11.9 | 6.1 |
| 1960 | 12.2 | 6.3 | 10.7 | 6.0 | 10.6 | 5.4 |
| 1961 | 12.1 | 6.2 | 11.5 | 6.2 | 11.2 | 5.7 |

[1] Data obtained from the death certificates as filed at the Oregon State Board of Health.
[2] Data tabulated after review of clinical and autopsy records.

ital malformations per 1,000 live births, with malformations of the musculoskeletal, skin, and nervous systems accounting for 76 percent of the 1,789 defects recorded.

Congenital defects were identified as the cause of death in 12 of each 1,000 deaths from all causes; congenital malformations were recorded on death certificates of 996 Oregon residents during the 5-year study period. Congenital heart disease was mentioned as the underlying cause of death on 52.3 percent of the certificates, while this defect represented only 8 percent of the malformations recorded on birth certificates. Supplementing death certificate data with information from clinical records and autopsy reports resulted in a 36.5 percent increase in the number of anatomic defects identified.

The study of vital records was found to be of significant value in identifying a population with congenital heart disease because identification enabled investigators to obtain additional data from other sources. Inadequate recording of congenital heart defects on birth certificates reflected the difficulty of diagnosis at an early age and lack of proper certification on the document.

---

# Education Notes

**Public Health Education Research.** The University of California School of Public Health, Berkeley, annonunces the expansion of its doctoral program in health education to provide research training and experience on a more intensive basis. A community research teaching site will give students experience in field research while conducting their own studies within a broad program of systematic research.

The National Institutes of Health, Public Health Service has awarded a grant to the School of Public Health for expanded teaching resources, particularly for educational research in public health. Fellowships are also available through the grant funds.

For further information write: Division of Health Education, School of Public Health, University of California, Berkeley, Calif. 94270.

**Teachers for Dental Public Health.** The University of Michigan Schools of Public Health, Dentistry, and Education are cooperating to prepare teachers of dental public health. The program, embracing concepts of community, preventive, and social dentistry, offers courses in adult education, college teaching, and dental teaching. Selected aspects of public health, preventive dentistry, and research are emphasized.

The course is open to both dentists and dental hygienists. It runs for four or five semesters and leads to the degree of master of public health. Applicants already having that degree can complete the program in two or three semesters.

Limited funds are available through a Special Purpose Traineeship Grant from the Public Health Service to provide successful applicants with a basic stipend, tuition, and certain travel costs.

Information and applications may be obtained from: Dr. David F. Striffler, University of Michigan, School of Public Health, Ann Arbor, Mich. 48104.

**Training for College Teaching.** Boston College School of Nursing announces a masters program to prepare public health nurses for faculty positions in collegiate schools of nursing. The program will start in September 1965 and will be three semesters and a summer session in length. Federal traineeships are available. For further information write to the dean, Graduate School of Arts and Sciences, Boston College, Chestnut Hill, Mass. 02167.

**Epidemiology.** The Communicable Disease Center, Public Health Service, is offering a course in Applied Epidemiology for Physicians, Nov. 15–19, 1965. The course is part of the continuing program of the Center's Training Branch and will stress the use of epidemiologic techniques in the preventable disease field. Program activities will include group solution of epidemiologic problems, seminars, and panel discussions.

Further information and application forms may be obtained from: Communicable Disease Center, Atlanta, Ga. 20333. Attention: Chief, Training Branch.