Ovarian Cancer Incidence and Mortality in American Indian, Hispanic, and Non-Hispanic White Women in New Mexico

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Abstract
Although ethnic and racial differences in ovarian cancer incidence and mortality have been reported worldwide, few published data have addressed the epidemiology of ovarian cancer among U.S. American Indians and Hispanics.

We reviewed ovarian cancer incidence and survival data from New Mexico’s population-based cancer registry collected from 1969 to 1992, and examined state vital records data for ovarian cancer deaths collected from 1958 to 1992, focusing on ethnic differences in occurrence and outcomes of ovarian malignancies.

Non-Hispanic white women had age-adjusted incidence rates that were slightly higher (13.3/100,000) than rates for American Indians (11.4) and Hispanics (10.7) over the 24-year period. Ovarian cancer mortality rates were also higher for non-Hispanic whites than for minority women. Neither incidence rates nor mortality rates for ovarian cancer improved over the span of the study period. In addition, the stage at diagnosis did not shift substantially over time for any of the ethnic groups studied, nor did the distribution of various histopathological types shift proportionately. Only slight improvement was observed in 5-year survival over the time period of the study, with greater gains among younger (50 years old or less) versus older women.

Ethnic differences in ovarian cancer incidence and mortality were apparent in our population-based data. However, our analysis indicated no reduction in ovarian cancer incidence or mortality in our state over the past quarter century and only slight improvement in 5-year survival.

Introduction
Ovarian cancer is the second most common malignancy of the female genital tract, and is the most fatal of all female genital malignancies. Worldwide, the lowest incidence of ovarian cancer has been found in developing countries and the highest incidence in Scandinavian countries (1). The average annual incidence rate of ovarian cancer for women in the United States from 1987 through 1991 was 14.8/100,000 (2). Several reports, however, have shown that the incidence rates in the country vary by race and ethnicity (3–6). Although recent studies (5, 6) have reported differences in age-adjusted ovarian cancer incidence rates in Asians and blacks compared with whites in the United States, fewer published data are available on other ethnic populations in the country, including American Indians and Hispanics.

New Mexico’s population, consisting primarily of American Indians, Hispanics, and non-Hispanic whites, provides a unique opportunity to investigate ethnic differences in cancer incidence, mortality, survival, and time trends. To further describe the epidemiology of ovarian cancer in New Mexico’s American Indian and Hispanic women, we reviewed our state’s population-based data from 1969 to 1992 on ovarian cancer incidence and survival, and examined state vital data on ovarian cancer mortality from 1958 to 1992.

Materials and Methods
Incidence Data. The New Mexico Tumor Registry, a member of the SEER program of the National Cancer Institute, has recorded population-based cancer incidence in New Mexico since 1969. Ovarian cancer cases were identified through our SEER center’s active surveillance of hospital records, outpatient clinic records, pathology and autopsy reports, and radiation therapy records. The Registry also reviews state death certificates that mention ovarian cancer.

Ovarian cancer cases were coded as 183.0 in the International Classification of Diseases for Oncology (7). Stage of disease was defined using the SEER definitions for extent of disease. The summary stages of local, regional, and distant stages were used. Local cancers were defined as those confined to one or both ovaries. Regional cancers included neoplasms that involved local structures in the pelvis beyond the ovary and/or malignant cells in peritoneal fluid. Distant cancers extended beyond the pelvic structures and involved the peritoneal surfaces, liver metastases, or pleural fluid. Cancers were assigned to an unknown stage if insufficient information was available to assign a stage or if staging occurred more than 2 months after histological diagnosis. From 1969 to 1992, 2.4% of ovarian cancers were diagnosed at an unknown stage. A total of 1884 ovarian cancer cases were included in this analysis.

The abbreviations used are: SEER, Surveillance, Epidemiology, and End Results; NOS, not otherwise specified; BSO, bilateral salpingo-oophorectomy.
We used histopathological classifications for ovarian cancer in our analysis that were consistent with the classification scheme as recently reported in another analysis of national SEER data (3). The major histopathological types that we included were: adenocarcinomas, NOS, papillary adenocarcinoma, clear cell adenocarcinoma, endometrioid carcinoma, cystadenocarcinoma, NOS, serous cystadenocarcinoma, NOS, papillary serous cystadenocarcinoma, mucinous cystadenocarcinoma, mucinous adenocarcinoma and mucin-producing adenocarcinoma, stromal cell tumor, and dysgerminoma.

Borderline ovarian tumors were coded as a separate entity in the SEER data set beginning in 1986. A borderline ovarian tumor is defined as an epithelial ovarian tumor with histological and biological features intermediate to clearly benign and frankly malignant ovarian neoplasms. We excluded borderline tumors from our analysis.

Methods used to assign race and ethnicity and the validation of these methods have been reported previously (8, 9). As noted in earlier publications (8, 9), methods for assignment of race and ethnicity have been constant throughout the period of data collection. Self-reported ethnic status as Hispanic, American Indian, and non-Hispanic white was highly correlated with assignment of ethnicity through the SEER registry (8). Because of the small number of blacks, Asians, and members of other ethnic groups in New Mexico, we restricted this analysis to the three ethnic groups as noted above.

**Mortality Data.** Ovarian cancer deaths were coded as 175.0 in ICD-7 (10) and as 183.0 in ICD-8 (11) and ICD-9 (12). Coded death certificate data were obtained from the New Mexico Bureau of Vital Statistics for the period from 1958 through 1992. As described in earlier reports (9, 13), the Bureau’s coding procedures have been consistent throughout the study period.

**Data Analysis.** Population estimates for New Mexico used to calculate incidence and mortality rates in this study were derived from the censuses of 1960 (14), 1970 (15), 1980 (16), and 1990 (17). Estimates of the American Indian population in 1960 and of the Hispanic population in 1960 and 1970 were adjusted for systematic errors in processing and for the different techniques used to identify individuals of Hispanic ethnicity (9). For time periods not centered on a decennial census, the population was estimated for the period midpoints by extrapolation or interpolation. Average annual age-specific and age-standardized incidence rates for all localized, regional, and distant stages of ovarian cancer were calculated for the periods 1969–1972, 1973–1977, 1978–1982, 1983–1987, and 1988–1992. We calculated the data in these 5-year intervals to facilitate comparisons with published data from other reports (3). Age-adjusted and age-specific mortality rates were calculated for the same period as the incidence rates and also for the earlier periods, 1958–1962 and 1963–1967. Age-adjusted rates were calculated according to the direct method using the 1970 U. S. population as a standard. Relative 5-year survival was calculated using the methodology described by Ederer et al.(18).

Analyses were performed using standard SAS procedures (19) and PcDash, a locally developed software package for analysis of SEER data that also includes analytic programs for calculating relative survival.

**Results**

Table 1 shows the age-adjusted incidence rates for all stages of ovarian cancer combined. For the entire 24-year period, non-Hispanic whites had the highest age-adjusted incidence rate, followed by American Indians and Hispanics.

Table 1 also shows the age-adjusted ovarian cancer incidence rates for local, regional, and distant stages of disease at diagnosis by ethnic group and time period. A large proportion of all ovarian cancer cases were diagnosed in late stages. Incidence rates for each stage of disease remained relatively stable from the initial to the most recent time period for each of the three ethnic groups. Rates for American Indians showed more variability, probably related to the small number of cases per time period.

Age-specific incidence rates showed an increase during the fifth and sixth decades of life with relatively stable rates thereafter. This trend was similar for each of the three ethnic groups over the span of the study period (data not shown).

We examined ovarian cancer incidence data by histopathological type. The distribution of histopathological types was comparable among the three ethnic groups. Serous and papillary serous carcinomas comprised the largest proportion (31%) of ovarian cancers observed from 1969 to 1992 followed...
by adenocarcinomas, NOS (18%), papillary adenocarcinoma, NOS (13%), mucinous and mucin-producing carcinomas (13%), and cystadenocarcinomas, NOS (9%). For all ethnic groups combined, 5-year survival was greatest for dysgerminomas (85%), and mucinous cystadenocarcinomas (78%), followed by clear cell adenocarcinomas (67%), stromal cell tumors (66%), and endometrioid carcinomas (65%). No consistent ethnic differences in 5-year survival by histopathological type were apparent. When the data were examined by time period for all ethnic groups combined, for all ovarian cancer histopathological types combined, we found 40.1% survival in the early period (1969–1982) versus 42.7% in the last 10 years of the study period (1983–1992). Survival analysis by histopathological type over these two time periods, for all ethnic groups combined, indicated that the major histopathological types that showed improvement in 5-year survival were: clear cell adenocarcinomas (64.0% in the early period versus 71.4% in the later period), endometrioid carcinoma (55.9 versus 73.0%), stromal cell tumors (60.1 versus 78.8%), and dysgerminomas (82.8 versus 93.2%).

When the survival data were analyzed by age group for younger women (50 years old and below) and for older women (≥51 years old), 5-year survival was substantially better for the younger group; i.e., 58.8% versus 33.0% for the older age group (all ethnic groups combined). We further analyzed the data for changes in survival by time period and age group for all ethnic groups combined. We found that the 5-year survival for the younger group improved from 56.6% in 1969–1982 to 61.0% in 1983–1992. For the older group of women with ovarian cancer, the 5-year survival improved slightly less, from 31.3% in the early period to 34.4% in the later period.

Age-adjusted mortality rates for ovarian cancer are shown in Table 2. Mortality rates varied by ethnic group, with the highest rate observed for non-Hispanic whites from 1958 to 1992. Age-adjusted mortality rates did not decrease substantially during the 35-year study period, although the small number of cases for American Indians resulted in significant variability in rates by 5-year time period.

**Discussion**

Our review of ovarian cancer data in New Mexico showed that non-Hispanic white women had slightly higher age-adjusted incidence rates than American Indian and Hispanic women, and that improvement in rates and in stage distribution at diagnosis were not apparent over time. The mortality data also showed that during the 35-year study period, ovarian cancer mortality did not improve for any of the three ethnic groups. Furthermore, the distribution of histopathological types of ovarian tumors was similar for all ethnic groups. Survival data showed only slight improvement in 5-year survival from the earliest 14-year period to the last 10-year period of our study, although gains were greater among younger versus older women with ovarian cancer.

The epidemiology of ovarian cancer in non-white ethnic groups in the United States has been presented in several descriptive reports for black and Asian women, with each of those racial/ethnic groups demonstrating lower ovarian cancer incidence than whites (4, 5, 20, 21). Those few reports on ovarian cancer among U.S. American Indians and Hispanics have also focused primarily on presentation of descriptive data. Incidence of ovarian cancer in American Indians from western Washington in the 1980s was low compared with whites (22), whereas among Alaska natives, ovarian cancer incidence from 1969 to 1983 was elevated compared with that of whites (23).
Mortality from ovarian cancer among American Indians varies by geographic region, with overall rates from 1984 to 1988 comparable to mortality rates for the United States for all races (24). The Hispanic populations of Los Angeles and New Mexico in 1969–1975 showed a lower incidence of ovarian cancer compared with non-Hispanic whites (6) comparable to more recent reports among Hispanics in Florida (25), Denver (26), and New York (27). Preliminary data for Hispanics in three SEER catchment areas in California also showed lower incidence rates than the comparison white population during the period 1988–1992 (2). Thus, although ovarian cancer occurrence appears to be consistently lower among Hispanics than non-Hispanic whites in different parts of the country, for native peoples, lower incidence and mortality is not as consistent compared with whites.

Risk factors for ovarian cancer include increasing age, low parity, uninterrupted ovulation, infertility, and, possibly, infertility drug use and estrogen replacement therapy (28–30). However, American Indians and Hispanics have had higher birth rates in New Mexico than non-Hispanic whites over most of the last quarter century (31) and may explain the ethnic differences in ovarian cancer risk.

P.O. contraceptive use has been shown to decrease ovarian cancer risk by suppressing ovulation (32, 33). In two recent case-control studies of cervical dysplasia among Hispanics, non-Hispanic whites, and American Indians, comparable proportions of control women (approximately 85%) among each of these ethnic groups reported use of p.o. contraceptives (ever) (34, 35). Although p.o. contraceptive use nationwide has increased over the course of the study span 1969–1992, ovarian cancer rates have not changed. Higher socioeconomic status has also been associated with higher rates of ovarian cancer. In New Mexico, a large proportion of American Indians (46%) and Hispanics (28%) live below the poverty level compared with non-Hispanic whites (16%; Ref. 31). This finding is consistent with the relative ranking of ovarian cancer incidence in our state, although the observation provides little insight into the causes of the disease.

Five-year survival rates for ovarian cancer as reported by the national SEER program from 1973 to 1991 have increased only minimally, from 36 to 42% over that 18-year time period (2). Similarly, in our study, only slight gains were observed in 5-year ovarian cancer survival over time, with a greater improvement among women <51 years old versus older women. Only four of the major histological categories we examined (clear cell adenocarcinomas, endometrioid carcinoma, stromal cell tumors, and dysgerminomas) showed clear improvement in 5-year survival over time. Although stage at diagnosis is a strong determinant of ovarian cancer survival, the New Mexico data indicate little temporal change in rates of regional or distant stage cancer for all histological types combined.

Our study has potential limitations that must be recognized. Although case ascertainment and surveillance procedures have been consistent throughout the study period, the possible ethnic differences in access to health care (and thus, to diagnoses) in New Mexico may represent sources of bias in our rate calculations. Ethnic misclassification could also represent another source of bias, although we have previously shown that bias through ethnic misclassification is not problematic in our incidence or mortality data (8, 9). Cause of death ascribed to ovarian cancer is a likely source of bias in the mortality data (36). Misclassification of causes of death to symptoms, signs, and ill-defined conditions also occurs at higher rates in New Mexico’s minority women compared to the white majority (37). The data on incidence (Table 1) and mortality (Table 2) suggest that misclassification of ovarian cancer deaths is greater for American Indians than for the other major ethnic groups in the state. Furthermore, the small number of cases for American Indians results in rates that were unstable over the time periods that we included in our analysis. A common gynecological procedure associated with hysterectomy includes BSO. The frequency of this procedure in a case-control study of New Mexico women with breast cancer found among the control women 16.4% of non-Hispanic white women and 10.4% of Hispanic women reported having a BSO.4 These rates of BSO would minimally effect our rate calculations.

Despite these potential limitations, our data suggest ethnic differences in ovarian cancer incidence and mortality rates that have not shown improvement over the past quarter century. Reasons for ethnic differences in ovarian cancer occurrence may be explained by differences in parity, p.o. contraceptive use, and other factors that have not been adequately investigated among the different ethnic groups in our state. Appropriately designed etiological studies carried performed among the different ethnic populations in New Mexico may help to elucidate etiological factors for ovarian cancer.

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