(*16*). This treatment is frequently complicated by infections and bleeding that may require hospital admission (*17*).

At the other end of the spectrum, with the lowest rate of death in acute care hospitals, were patients with tumors of the genitourinary tract, colon-rectum, and miscellaneous sites. Prostate cancers accounted for the largest percentage of genitourinary tumors. Patients with these tumors and with colorectal tumors are most likely to be treated surgically and then followed in the community; few are referred to the cancer center for further investigation of their tumors.

Analysis of the limited number of variables included in this study has yielded some interesting findings, some tending to confirm previous work and others not previously reported in this context. Important variables that are not included in this study relate to the social supports of the dying cancer patient and to the type and severity of symptoms experienced. Inclusion of these variables could be expected to make it easier to predict place of death on the basis of the patient's characteristics.

References

1. Ryder, C. F., and Ross, D. M.: Terminal care—issues and alternatives. Public Health Rep 92: 20–29, January-February 1977.
2. Krant, M. J.: The hospice movement. N Engl J Med 299: 546–549 (1978).
3. Flynn, A., and Stewart, D. E.: Where do cancer patients die? A review of cancer deaths in Cuyahoga County, Ohio, 1957–1974. J Community Health 5: 126–130 (1979).
4. Office of the Assistant Secretary for Planning and Evaluation, Department of Health and Human Services: Programs and financing for long-term care services. Working paper No. 4 *in* Working papers on long-term care, prepared for the 1980 Undersecretary's Task Force on Long-Term Care. Washington, D.C., October 1981, pp. 63–78.
5. Office of Research, Demonstration, and Statistics, Health Care Financing Administration: Medicare: use of home health services, 1977. HCFA Publication No. 03064. Baltimore, Md., January 1981.
6. Brody, J. A., Cornoni-Huntley, J., and Patrick, C. H.: Research epidemiology as a growth industry at the National Institute on Aging. Public Health Rep 96: 269–273, May-June 1981.
7. Alderson, M. R.: Terminal care in malignant disease. Brit J Prev Soc Med 24: 120–123 (1970).
8. Ward, A. W. M.: Terminal care in malignant disease. Soc Sci Med 8: 413–420 (1974).
9. Soukop, M., and Calman, K. C.: Cancer patients: where do they die—an analysis. Practitioner 219: 883–888 (1977).
10. Wilkes, E.: Some problems in cancer management. Proc R Soc Med 67: 1001–1005 (1974).
11. Brody, S. J., Poulshock, S. W., and Masciocchi, C. F.: The family caring unit: a major consideration in the long-term support system. Gerontologist 18: 556–561 (1978).
12. West, T. S.: In-patient management of advanced malignant disease. *In* The management of terminal disease, edited by C. M. Saunders. Edward Arnold, London, 1978, pp. 139–153.
13. Bishop, Y., Fienberg, S. E., and Holland, P.: Discrete multivariate analysis. MIT Press, Cambridge, Mass., 1975.
14. U.S. General Accounting Office: Entering a nursing home—costly implications of Medicaid and the elderly. Report to the Congress of the United States by the Comptroller General. Washington, D.C., Nov. 26, 1979, pp. 131–137.
15. Twycross, R. G.: Relief of pain. *In* The management of terminal disease, edited by C. M. Saunders. Edward Arnold, London, 1978, pp. 65–98.
16. Bates, T. D., and Vanier, T.: Palliation by cytotoxic chemotherapy and hormone therapy. *In* The management of terminal disease, edited by C. M. Saunders. Edward Arnold, London, 1978, pp. 125–133.
17. Hersh, E. M., Bodey, G. F., Nies, B. A., and Freireich, E. J.: Causes of death in acute leukemia. JAMA 193: 99–103 (1965).

Uterine Cancers of Unspecified Origin—a Reassessment

CONSTANCE L. PERCY, MS
JOHN W. HORM, MSc
JOHN L. YOUNG, Jr., DrPH
ARDYCE J. ASIRE, MS

The authors are statisticians in the Demographic Analysis Section, Biometry Branch, National Cancer Institute, National Institutes of Health.

This paper is based on one presented at the 14th annual meeting of the Society for Epidemiological Research, in Snowbird, Utah, in June 1981.

Tearsheet requests to Constance L. Percy, National Cancer Institute, Landow Bldg., Rm. 5B–06, Bethesda, Md. 20205.

SYNOPSIS

Uterine cancer ranks third in cancer incidence and fifth in cancer mortality among American women. The epidemiologic characteristics of cancer of the cervix uteri and the corpus uteri are different. When

only "cancer of the uterus, not otherwise specified (NOS)" is reported, problems arise in data analysis. In this study, uterine cancer deaths from the National Cancer Institute's Surveillance, Epidemiology, and End Results Program, 1977–79, are compared with those from three previous studies.

Uterine cancer deaths certified only as uterus, NOS, on death certificates have decreased 34 percent in the past 30 years. However, even in the late seventies, 25 percent of the uterine cancer deaths were still not being specified as either cervix uteri or corpus uteri on death certificates.

Following the deaths certified as cancer of uterus, NOS, back to the pertinent hospital records showed that in recent years 75 percent of these deaths were actually diagnosed as cancer of the corpus uteri, compared with 20 percent 30 years ago. The failure to assign these unspecified uterine cancers to corpus uteri indicates that mortality from cancer of the corpus uteri is still underreported.

Although the reporting of the specific subsites of cancer of the uterus on death certificates has improved during the past 30 years, every effort should be made to achieve further improvement in accuracy.

UTERINE CANCER RANKS THIRD in cancer incidence (*1*) and fifth in cancer mortality (*2*) among women in the United States. Cancer of the cervix uteri and cancer of the corpus uteri are two distinct forms of malignant neoplasms with different epidemiologic characteristics. Each has its own pattern of incidence and of mortality rates with respect to age, race, and histology (*1*). Therefore, when a substantial proportion of uterine cancer deaths are reported as "cancer of the uterus, unspecified," that is, NOS (not otherwise specified), problems can arise in data analysis. The study described here was done to reassess the group of deaths for which cancer of the uterus, NOS, was listed on the death certificate as the underlying cause and thus answer the following questions. Over the past 30 years, has there been a reduction in the numbers of cancers of the uterus, NOS, reported on death certificates? When these deaths reported as due to cancer of the uterus, NOS, are reviewed and checked back to the hospital and pathology diagnoses, do the percentages verified as cancer of the cervix uteri, corpus uteri, or uterus, NOS, change?

Materials and Methods

To answer these questions, we studied data on uterine cancer deaths from 3 years (1977–79) of the Surveillance, Epidemiology, and End Results (SEER) program of the National Cancer Institute (NCI). Under this program, cancer incidence data have been collected since 1973 from 10 population-based cancer registries in the United States (*1*). Each patient in these registries is followed until death, at which time a copy of the death certificate is obtained from the State health department. For our study, we used all death certificates on which uterine cancer was listed as the underlying cause of death from 8 of the 10 SEER areas. Death certificates from Hawaii and Puerto Rico were not included because of technical difficulties. We compared the underlying cause of death stated on the death certificate with the hospital and pathology diagnoses to check for agreement in coding. These results from the SEER data were then compared with data on uterine cancer deaths from three other studies of cancer that had been conducted during the previous 30 years.

'Finally, we compared each uterine cancer death with the decedent's hospital and pathological records to see if the initial diagnosis agreed with the underlying cause of death on the death certificate.'

The earliest survey was done in Iowa in 1950. As part of this cancer morbidity study, death certificates were collected and compared with the relevant hospital case reports (*3*). During the Cancer Prevention Study (CPS) that the American Cancer Society carried out in 25 States during the early 1960s, the accuracy of reporting for several cancer sites, including the uterus, was examined (*4*). Data from 1970 and 1971 of the National Cancer Institute's Third National Cancer Survey (TNCS) were used to study the accuracy of cancer death certificates in eight areas of the United States (*5*).

Table 1. Percentage distribution of uterine cancer deaths, by subsite and year, United States, 1950–78

Subsite	1950, reference 6 (N = 15,989)	1960, reference 7 (N = 14,341)	1970, reference 8 (N = 12,017)	1978 reference 2 (N = 10,842)
Cervix uteri	52	59	55	47
Corpus uteri	7	10	16	26
Uterus, NOS	41	31	29	27

For each of the four studies, the percentages of uterine cancer deaths that occurred at each subsite of the uterus were then determined. A comparison of these percentages with the corresponding percentages for uterine cancer deaths in the entire United States was then possible. Finally, we compared each uterine cancer death with the decedent's hospital and pathological records to see if the initial diagnosis agreed with the underlying cause of death on the death certificate.

Results

The actual number of deaths from uterine cancer in the United States declined 32 percent from 1950 to 1978, the most recent year for which mortality statistics were available from the National Center for Health Statistics (table 1). The percentage of uterine cancer deaths classified as cervix uteri changed little over the years; it remained at about 50 percent. However, the percentage of deaths classified as cancer of the corpus uteri increased steadily, from 7 percent in 1950 to 26 percent in 1978, while the percentage classified only as cancer of the uterus, NOS, decreased steadily.

Table 2 gives the percentages of uterine cancer deaths that were classified as cervix uteri, corpus uteri, and uterus, NOS, in the four studies. For each study, the distribution of uterine cancer deaths by subsite was similar to that shown in table 1 for the entire United States for the corresponding period. For example, in Iowa, 56 percent of the 256 uterine cancer deaths in 1950 were classified as cervix uteri, 7 percent as corpus uteri, and 37 percent as uterus, NOS; in the entire United States in 1950, the comparable percentages were 52, 7, and 41. In the CPS, TNCS, and SEER data, also, the mortality percentages for cancers of the cervix uteri, corpus uteri, and uterus, NOS, were similar to the U.S. mortality percentages for the corresponding years. As shown in table 2, the percentage of uterine cancer deaths reported as cancer of the uterus, NOS, decreased slightly over the period 1950–79, from 37 percent in Iowa in 1950 to 27 percent in the SEER areas during the years 1977–79.

Table 2. Percentage distribution of uterine cancer deaths in four studies, by subsite and year

Subsite	Iowa, 1950, reference 3 (N = 256)	CPS, 1959–64, reference 4 (N = 385)	TNCS, 1970–71, reference 5 (N = 1,470)	SEER 1977–79 (N = 1,837)
Cervix uteri	56	51	55	41
Corpus uteri	7	17	19	29
Uterus, NOS	37	32	26	27

In the second part of the study, we compared the underlying cause of death on the death certificate with the hospital and pathology diagnoses (table 3). In all four studies, about 95 percent of the deaths attributed on the death certificate to cancer of the cervix uteri were confirmed by the hospital records as being due to cancer of the cervix uteri. In Iowa, in 1950, only two-thirds of the deaths attributed on the death certificate to cancer of the corpus uteri were confirmed by the hospital records. This proportion increased to 83 percent in the CPS (1959–64) and to 94 percent and 95 percent for each of the NCI studies. The percentage of deaths attributed to uterine cancer, NOS, that remained cancer of the uterus, NOS, upon hospital review dropped from more than 40 percent in the early studies to 24 percent in the TNCS and dropped still further to only 11 percent in the 1977–79 SEER data.

For each of the four data sets, table 4 shows the detail that was found when the patients whose death certificates read "cancer of the uterus, NOS" were followed back to the hospital. The percentage of deaths attributed on the death certificate to cancer of the uterus, NOS, that are found to be cancer of the cervix uteri and cancer of the corpus uteri when checked back to hospital records has changed greatly over time. In the early years, represented by Iowa in 1950, the ratio of corpus uteri deaths to cervix uteri deaths was 1:2. In the current SEER program, however, the ratio is reversed and the corpus to cervix ratio is 6:1. Also, the proportion of deaths remaining as uterus, NOS, when checked back to the hospital records has decreased greatly, from 34 percent to 10 percent. The uterine cancer deaths actually found to be due to cancers of other specific or unknown sites comprised about 15 percent of the total uterine cancer deaths for each study during the 30-year period.

Table 3. Percentages of the underlying causes of death for uterine cancer confirmed by hospital diagnosis

Subsite in hospital diagnosis [1]	Underlying cause of death on death certificates: Total uterus	Cervix uteri	Corpus uteri	Uterus, NOS
Iowa, 1950 (reference 3)				
Total number of uterine cancers	256	144	18	94
Cervix uteri	67	*94*	6	38
Corpus uteri	13	2	*66*	20
Uterus, NOS	20	4	28	*42*
CPS, 1959–64 (reference 4)				
Total number of uterine cancers	385	196	66	123
Cervix uteri	56	*95*	9	18
Corpus uteri	26	2	*83*	34
Uterus, NOS	18	3	8	*48*
TNCS, 1970–71 (reference 5)				
Total number of uterine cancers	1,470	811	283	376
Cervix uteri	61	*97*	3	27
Corpus uteri	32	3	*94*	49
Uterus, NOS	7	*<1*	3	*24*
SEER, 1977–79				
Total number of uterine cancers	1,837	801	541	495
Cervix	47	*95*	4	13
Corpus	50	4	*95*	76
Uterus, NOS	3	<1	1	*11*

[1] Pathological diagnosis included in hospital diagnosis.
NOTE: Italicized numbers show agreement between causes of death on death certificates and hospital diagnoses.

Discussion

Although over the past 30 years there has been a 34 percent drop in the uterine cancer deaths certified only as cancer of the uterus, NOS, on death certificates, the latest data still show that more than a fourth of the uterine cancer deaths are not specified as either cervix uteri or corpus uteri.

The four studies used in our analysis appeared to be representative of U.S. mortality data for the corresponding periods. We did not include a study done in Connecticut by Bailar and Eisenberg (*9*) because their methods were different from those used in the four studies we analyzed. Bailar personally reviewed the original hospital material on the cancers of the uterus reported to the Connecticut Tumor Registry and was able to determine the specific part of the uterus in which the cancer originated in all but 5 percent of the cases. Such a determination was not made in the four studies cited here. However, the 40 percent of uterine cancer deaths reported as uterus, NOS, during the Connecticut study in the early 1950s is similar to the Iowa figure of 38 percent for 1950.

To sum up, in the SEER program (1977–79), cancer of the corpus uteri was diagnosed for 76 percent of the uterus, NOS, deaths, but the term "corpus uteri" was omitted by the physician signing the death certificate. In contrast, 30 years ago, uterus, NOS, more often meant cervix uteri than corpus uteri. As table 3 shows, the percentage of cancer of the uterus, NOS, deaths that are found to be due to cancer of the corpus uteri when the hospital records are reviewed has gradually increased.

Since, currently, about 3,000 deaths each year in the United States are certified as being due to

Table 4. Distribution of deaths assigned on death certificates to cancer of the uterus, NOS, among the cancer sites named in hospital diagnoses as the underlying causes of death

Cancer site in hospital diagnosis	Iowa, 1950, reference 3: Number	Percent	CPS 1959–64, reference 4: Number	Percent	TNCS, 1970–71, reference 5: Number	Percent	SEER, 1977–79: Number	Number
Total uterine cancer deaths	115	100	137	100	470	100	583	100
Cervix uteri	35	31	22	16	103	22	64	11
Corpus uteri	20	17	42	31	184	39	374	64
Uterus, NOS	39	34	59	43	89	19	58	10
Other cancer sites	21	18	14	10	94	20	87	15

[1] Hospital diagnoses included in pathological diagnoses.

Table 5. Corrected percentage distribution of uterine cancer deaths by subsite and year, United States, 1950–78

Subsite	1950 (N = 14,870)[1]	1960 (N = 13,911)[1]	1970 (N = 11,296)[1]	1978 (N = 10,408)[1]
Cervix uteri	70	66	65	52
Corpus uteri	15	21	29	45
Uterus, NOS	15	13	6	3

[1] These totals differ from those in table 1 because the uterus, NOS, deaths diagnosed as "Other cancer sites" (see table 4) have been subtracted.

cancer of the uterus, NOS, such ambiguity is a serious problem in epidemiologic studies based on mortality data. The common practice of adding together the mortality due to cancer of the corpus uteri and the mortality due to cancer of the uterus, NOS (*10, 11*), somewhat overstates the mortality due to corpus uteri cancer. However, by multiplying the proportional distribution of uterus, NOS, deaths from table 4 by the number of uterus, NOS, deaths for the entire United States from table 1, one can arrive at a corrected distribution of uterine cancer deaths in the United States, as in table 5. It can be seen, by comparing tables 1 and 5, that dividing the allocation of the uterus, NOS, deaths between cervix uteri and corpus uteri preserves the trends in the deaths from these two cancers but at markedly different levels from those in table 1. As table 5 shows, the proportion of uterine cancer deaths due to cancer of the cervix uteri decreased from 70 percent in 1950 to 52 percent in 1978, and the proportion due to cancer of the corpus uteri increased over this same period from 15 to 45 percent. It should be noted that although allocating the uterus, NOS, deaths in this way preserves the general time trends, it does not preserve the demographic characteristics of the decedents, such as age, race, and geographic area.

Uterine cancer should be specifically designated as originating in either the cervix uteri or the corpus uteri, whenever possible. In the SEER program (*1*), less than 2 percent of the hospital diagnoses of uterine cancer were "cancer of the uterus, NOS." Personnel in the vital statistics section of every State health department should be urged to query those physicians who sign death certificates only as "cancer of the uterus, NOS," and to request a more specific diagnosis. England and Wales instituted such an inquiry system some years ago (*12*) and were able to reduce the proportion of uterine cancer deaths for which the subsite of the disease was unspecified from 49 percent to only 5 percent over a 20-year period. Moreover, the percentage of uterus, NOS, death certificates in these countries has remained low ever since (*13*). In the United States, every effort should be made to further improve the reporting of the specific cancer subsites of the uterus on death certificates.

References

1. Young, J. L., Jr., Percy, C. L., and Asire, A. J., editors: Surveillance, epidemiology, and end results: incidence and mortality data, 1973–1977. NIH Publication No. 81-2330 (National Cancer Institute Monograph No. 57). U.S. Government Printing Office, Washington, D.C., June 1981.
2. National Center for Health Statistics: Vital statistics of the United States, 1978. Public Health Service, Hyattsville, Md., vol. 2 (Mortality), pt. A. In press.
3. Haenszel, W., Marcus, S. C., and Zimmerer, E. G.: Cancer morbidity in urban and rural Iowa. PHS Publication No. 462 (Public Health Monograph No. 37). Public Health Service, Washington, D.C., 1956, table 4, p. 11.
4. Hammond, E. C., Johnson, H., and Percy, C. L.: Reporting of cancer of the lung, liver, and uterus. Cancer 20: 1802–1806, October 1967.
5. Percy, C. L., Staneck, E., and Gloeckler, L.: Accuracy of cancer death certificates and its effect on cancer mortality statistics. Am J Public Health 71: 242–250, March 1981.
6. U.S. National Office of Vital Statistics: Vital statistics of the United States, 1950. Public Health Service, Washington, D.C., 1953, vol. 3 (Mortality).
7. National Vital Statistics Division: Vital Statistics of the United States, 1960. Public Health Service, Washington, D.C., 1963, vol. 2 (Mortality), pt. A.
8. National Center for Health Statistics: Vital statistics of the United States, 1970. Public Health Service, Rockville, Md., 1974, vol. 2 (Mortality), pt. A.
9. Bailar, J. C. III, and Eisenberg, H.: Uterine tumors of unspecified origin. Cancer 18: 589-591, May 1965.
10. Pollack, E. S., and Horm, J. W.: Trends in cancer incidence and mortality in the United States, 1969–76. J Natl Cancer Inst 64: 1091–1103, May 1980.
11. Devesa, S. S., and Silverman, D. T.: Cancer incidence and mortality trends in the United States: 1935–74. J Natl Cancer Inst 60: 545–571, March 1978.
12. General Register Office: Statistical review of England and Wales, 1977. Her Majesty's Stationery Office, London, 1979.
13. Office of Population, Census, and Surveys: Mortality statistics: Cause, 1977. Her Majesty's Stationery Office, London, 1979.