Connecticut, 1935–51

Survival of Uterine Cancer Patients in Different-Sized Hospitals

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SINCE 1956 the National Cancer Institute, Public Health Service, and the Connecticut State Department of Health have been engaged in a study of uterine cancer in Connecticut. The study is based on data from the standard tumor record forms submitted to the Connecticut Tumor Registry by nearly all Connecticut hospitals, supplemented by information from original hospital charts, tumor clinic records, death certificates, and other sources. Although the primary function of this study is to examine the characteristics and distribution of uterine cancer in the State as a whole, statistical reports have been prepared for each of the participating institutions. These individual reports have been pooled to permit comparison of uterine cancer statistics for hospitals of different sizes.

A comparison of patients admitted to different hospitals or groups of hospitals is of course necessary in planning or studying the distribution of medical services and facilities; it also has important applications in the evaluation of treatment.

First, a direct comparison of the survival rates reported by different hospitals is meaningful only if the patients whose survival experience is compared are essentially alike with respect to such factors as age, extent of tumor, and general health. Dissimilarities among groups of patients studied may account for much of the wide variation in reported survival rates for uterine cancer (*1*) and other diseases.

Second, knowledge of the characteristics of patients is necessary in evaluating the selective factors determining the choice of one hospital rather than another. Large hospitals, particularly those specializing in the treatment of a limited number of diseases, probably attract selected groups of patients. This means that there is some uncertainty in extrapolating the results obtained in well-known treatment centers to the "average" cancer patient treated in his own community hospital.

A third reason for comparing patients treated in large and small hospitals is to evaluate the effects of hospital size itself. It seems reasonable that there should be some benefits associated with the more extensive facilities and experience of the large institutions. However, except for the limited data previously published from the Connecticut Tumor Registry (*2*), there seems to have been no systematic study of hospital size and survival rates of uterine cancer patients.

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Characteristics of Patients

This report is based on the records of 3,210 patients with cervical cancer and 3,010 patients with cancer of the uterine corpus, all of whom were first found to have cancer during the period 1935–51. These figures exclude patients with carcinomas in situ and those with chorionic

tumors but include all other patients with uterine cancer listed in the Connecticut Tumor Registry for the period under review. Among those included are 854 who were not admitted to Connecticut hospitals and who were reported by death certificate only. In collecting the data, the original hospital and tumor clinic records were reviewed and abstracted in every case by Bailar so that a high degree of uniformity in definitions and abstracting procedures was maintained.

Hospitals have been grouped according to the number of general hospital beds in each in 1951 (*3*). There were 5 hospitals with more than 350 beds, 8 with 200 to 350 beds, and 13 with fewer than 200 beds. Information from all cooperating hospitals located in other States and from several Connecticut hospitals reporting only a handful of cases has been excluded from the data for hospital-size group but has been included in the figures for all hospitals combined. For this reason, and because many patients were admitted to more than one hospital, the figures for the separate size groups do not add to the total for all hospitals in the tables which follow. In addition, in some of the tables "Total cases reported" includes the cases reported by death certificate only; these of course do not appear in the figures for different hospital groups. Patients treated at more than one hospital are included with the treatment figures for the first hospital only.

A substantial number of uterine cancers, particularly those reported by death certificate only, were not specified to be of either cervix or corpus. However, a separate study of reporting practices shows that, in general, when Connecticut physicians write "cancer of the uterus," they mean "cancer of the uterine corpus." Therefore, in all the tables, cases reported as cancer of the uterus are included with those specified as corpus. The small hospitals reported a slightly higher proportion of unspecified cases than either of the other hospital groups, but the difference is not significant. The number of unspecified cases has been falling in recent years (*2*).

Table 1 shows the total number of cervical and corpus cancers reported by hospitals in the different groups, with the number first diagnosed in each hospital-size group and the number who were treated in each group. In this table, one can find the number of cases referred into the hospitals after diagnosis, and perhaps treatment elsewhere, and the number referred out of the hospitals for treatment elsewhere, by subtracting the second or third line from the first line in the table for either site. For instance, the 13 Connecticut hospitals with fewer than 200 beds admitted 139 (697 minus 558) cervical cancer patients who had already had the diagnosis made at another hospital. For both sites there was evidently considerable referral of cases into and out of hospitals in all three size groups. The five largest hospitals admitted and treated more patients than all other hospitals combined, but even the smallest hospitals reported substantial numbers of cases.

A comparison of the distribution of corpus cancers with that of cervical cancers shows that, although the total numbers were nearly the

Table 1. Total cases of uterine cancer reported to Connecticut Tumor Registry and number first diagnosed or treated in hospitals of different sizes, by site of tumor, 1935–51

Tumor site	Total cases reported	Hospital size (beds)		
		Fewer than 200	200 to 350	More than 350
Cervix				
Total cases reported	3, 210	697	922	1, 981
First diagnosis in this hospital group	--------	558	786	1, 533
Treatment in this hospital group [1]	--------	412	653	1, 670
Reported by death certificate only	202	------	------	------
Corpus and unspecified uterus				
Total cases reported	3, 010	595	673	1, 300
First diagnosis in this hospital group	--------	522	625	1, 135
Treatment in this hospital group [1]	--------	438	540	1, 119
Reported by death certificate only	652	------	------	------
Specified corpus	[2] 2, 205	542	622	1, 202
Not specified cervix or corpus	[2] 805	53	51	98

[1] Includes palliative and supportive therapy when given to patients who did not receive either radiation or surgery as definitive treatment.
[2] Includes cases reported by death certificate only.

same, each group of hospitals reported fewer corpus than cervical tumors. This is the result of two factors: a high proportion of corpus cancers were reported by death certificate only; and patients with corpus cancer were less often referred from one hospital to another than were patients with cervical cancers. These considerations may partly account for the common but incorrect clinical impression that in Connecticut cervical cancer is considerably more common than cancer of the uterine corpus.

Table 2 shows, for both sites, the median age of patients at diagnosis, the proportion of tumors localized at the time of diagnosis, the proportion of cases diagnosed microscopically, and the median duration of symptoms before diagnosis of cancer. The figures by size of hospital are based on place of diagnosis and exclude patients referred to the hospital for evaluation or treatment.

Corpus cancer patients were, on the average, considerably older than cervical cancer patients, but within each site group the age distribution of patients was nearly the same for the three hospital-size groups. For cancers of both cervix and corpus, the median age of the total group of patients was higher than the median age of patients in any hospital-size group because, in general, patients reported on death certificates only were older than those reported by hospitals.

Table 2. Characteristics of patients with uterine cancer reported to Connecticut Tumor Registry, by site of tumor and size of hospital, 1935–51

Tumor site	Total cases reported	Hospital size (beds)		
		Fewer than 200	200 to 350	More than 350
Cervix				
Median age at diagnosis (years)	52. 8	52. 5	52. 5	51. 7
Percent of tumors localized:				
1935–46	49. 8	46. 8	50. 9	50. 1
1947–51	52. 3	48. 5	52. 5	54. 5
Percent microscopically confirmed	92. 1	91. 8	91. 5	94. 7
Median duration of symptoms (months)	4. 6	4. 5	4. 6	4. 7
Corpus and unspecified uterus				
Median age at diagnosis (years)	60. 8	59. 5	57. 3	59. 3
Percent of tumors localized:				
1935–46	77. 3	75. 1	78. 8	77. 7
1947–51	81. 8	83. 0	83. 3	81. 1
Percent microscopically confirmed	92. 1	90. 8	91. 7	94. 2
Median duration of symptoms (months)	5. 6	5. 1	5. 4	5. 9

The stage of tumors at the time of diagnosis has been tabulated for two time periods, 1935–46 and 1947–51. The data by stage are based only on information recorded prior to treatment. In both periods approximately one-half of all cervical tumors were confined to the cervix. It is discouraging to find that, for the State as a whole, there was an increase of only 2.5 percent in the proportion of localized cervical tumors reported from the first time period to the second. There was a somewhat greater improvement (4.5 percent) in the proportion of corpus tumors localized at the time of diagnosis. There do not seem to have been any significant differences among the three groups of hospitals in the stage of the tumors of either site at the time of diagnosis. These data therefore do not support the impression that the large city hospitals admit patients with more advanced tumors, and with correspondingly poorer prognoses, than smaller institutions. For both sites, the improvement in stage at diagnosis was shared equally by the three hospital groups.

Of the total number of reported tumors of both cervix and corpus, 92.1 percent were microscopically confirmed. More detailed data show that the proportion of confirmed cases has been rising steadily since 1935. Throughout the study period, the largest hospitals reported the highest proportion of diagnoses based on tissue examination; for the period 1947–51, 98.2 percent of their diagnoses were microscopically confirmed. In recent years, the microscopic confirmation of tumors of the uterine corpus has not been as complete as for cervical tumors.

The data on median reported duration of symptoms before the diagnosis of uterine cancer show that patients with corpus cancer delayed substantially longer than patients with cervical cancer in seeking treatment. For cervical cancer there were no significant differences among hospital-size groups with respect to duration of symptoms before diagnosis. In contrast, the time between onset of symptoms and diagnosis

of cancer of the uterine corpus did vary with hospital size, being shortest for the small hospitals and longest for the large hospitals, with the intermediate-sized hospitals falling between. This is somewhat surprising in view of the finding that there were no significant differences among the three hospital groups in stage of corpus cancer at diagnosis (table 2). The difficulties of measuring the duration of symptoms accurately are well known, and small differences must not be given more emphasis than they deserve. However, the differences observed among the three groups of hospitals cannot be the result of biased data unless there is a consistent bias which is greater in small than in large hospitals, or vice versa, and which operates for corpus cancer but not for cervical cancer. It seems possible that the differences in median duration of symptoms of corpus cancer are real.

Treatment and Survival Rates

Comparing cancer survival rates in different hospitals is hazardous because the patient population may vary from one hospital to another in such important characteristics as age, stage of cancer, and general health. Also, the practice of referring patients from one hospital to another for treatment creates problems of bias and selection in the data. The latter difficulty can be avoided by considering the survival rates of cases first diagnosed in a particular hospital, wherever they may have been treated, but then it is difficult to interpret survival rates in terms of the treatment policies used at the various hospitals. In the present series a further source of difficulty is the relatively high proportion of cases lost. The survival rates given have been computed by standard actuarial methods (*4,5*), which permit partial use of the data on lost patients. Even so, lost cases introduce an element of uncertainty which cannot be eliminated. In spite of these limitations, the comparison of survival rates can be interesting and informative. The data given here refer only to crude survival rates, with no adjustment for recurrences in patients still living.

Cancer of Uterine Cervix

Table 3 shows, for patients treated in each hospital-size group, the stage of cervical tumors falling into three broad treatment categories. The stage classification used corresponds roughly to the League of Nations stage system (*6*) with stages III and IV pooled as "remote extensions or metastases." In each of the three hospital groups, the majority of patients were treated with radiation. However, the proportion treated by surgery, either alone or in combination with radiation, depended to a great extent on both tumor stage and hospital size. Surgery was used more frequently for localized tumors than for those which had extended beyond the cervix. In all three stage groups, the small and intermediate hospitals used surgery more often than the large hospitals. This asso-

Table 3. Number of cases of cervical cancer reported by hospitals and percent treated surgically, by stage of disease and size of hospital where patient was treated, Connecticut, 1935–51 [1]

Stage of disease and treatment	Total cases reported by hospitals	Hospital size (beds)		
		Fewer than 200	200 to 350	More than 350
Confined to cervix:				
Radiation only	1,084	161	241	661
Surgery only	190	43	54	88
Radiation and surgery	173	27	65	75
Percent receiving surgery [2]	25	30	33	20
Regional extension:				
Radiation only	811	117	160	518
Surgery only	27	6	7	13
Radiation and surgery	46	7	15	22
Percent receiving surgery [2]	8	10	12	6
Remote extension or metastases:				
Radiation only	384	39	88	252
Surgery only	10	3	4	3
Radiation and surgery	13	3	4	6
Percent receiving surgery [2]	6	13	8	3
Cases with stage reported, untreated or treated elsewhere	200	278	258	292
Cases with stage not reported	70	13	26	51

[1] Excludes patients with unknown stage or unknown treatment. Treatment includes only radiation or surgery directed against the primary site of the tumor.
[2] Alone or in combination with radiation.

ciation between treatment and size of hospital seems to be related to the limited radiation facilities available in the smaller institutions.

Table 4 shows, separately for small, intermediate, and large hospitals, the followup status and estimated 5-year survival rates by stage for cervical cancer patients. The survival rate for localized tumors was 61 percent, and there was little variation among the hospital groups. Patients with remote extensions or metastases had an estimated 5-year survival rate of only 13 percent, and again there was little variation from one hospital group to another. However, survival of patients with regional extensions of cancer was 36 percent in the large hospitals, a considerable increase over the 24 percent and 26 percent rates for the small and intermediate hospitals.

Table 4. Survival rates of patients with cervical cancer reported by hospitals to Connecticut Tumor Registry, by stage of disease and size of hospital where patient was treated, 1935–51 [1]

Stage of disease	Total cases reported by hospitals	Hospital size (beds)		
		Fewer than 200	200 to 350	More than 350
All stages	**2,751**	**408**	**641**	**1,643**
Survived	1,143	162	254	700
Died	1,510	232	356	894
Lost	98	14	31	49
Estimated 5-year survival rate (percent)	44	42	43	45
Tumor confined to cervix	**1,457**	**233**	**362**	**828**
Survived	825	127	200	482
Died	566	93	142	315
Lost	66	13	20	31
Estimated 5-year survival rate (percent)	61	59	60	62
Regional extension	**884**	**130**	**182**	**553**
Survived	267	30	43	184
Died	588	99	131	351
Lost	29	1	8	18
Estimated 5-year survival rate (percent)	33	24	26	36
Remote extension or metastases	**410**	**45**	**97**	**262**
Survived	51	5	11	34
Died	356	40	83	228
Lost	3	0	3	0
Estimated 5-year survival rate (percent)	13	11	12	13

[1] Excludes untreated patients and those with stage not reported. Totals are slightly larger than totals in table 3 because table 3 excludes treated patients for whom the method of treatment was not given.

Table 5. Five-year survival rates after treatment of patients with cervical tumor first diagnosed at small and intermediate-sized hospitals,[1] by stage [2] of disease and place of treatment, Connecticut, 1935–51

Stage of disease	Percent survival of patients treated in hospitals with—	
	Fewer than 350 beds	More than 350 beds
Confined to cervix	60	64
Regional extension	26	41
Remote extension or metastases	12	20

[1] Fewer than 350 beds.
[2] Excludes patients with cervical tumors of unknown stage.

Table 5 gives survival rates by place of treatment for patients having the diagnosis first made in the small or intermediate-sized hospitals. These data show that, stage by stage, cases referred from smaller to larger hospitals for treatment had better prognoses than those treated at the original institutions. The difference is particularly striking for patients with regional extensions of cervical cancer. This may be due to a correlation between the efficacy of treatment and hospital size, or within each stage it may be due to the referral of patients with better than average prognoses.

This last hypothesis is supported by the observation that the entire group of patients with regional extensions of cervical cancer treated in the larger hospitals had a survival rate of 36 percent (table 4), compared with a survival rate of 41 percent for the subgroup of patients referred to the larger hospitals for treatment (table 5). There is a similar difference in survival rates for treated patients with remote extensions or metastases (13 vs. 20 percent) and a smaller difference for patients with localized tumors (62 vs. 64 percent).

If this difference in survival rates were due to

the superior quality of treatment in the large hospitals, it might be expected that the large institutions would have higher 1- or 2-year survival rates for patients in each of the three stage groups, even though the 5-year survival rates for localized and advanced cases are the same in all hospital-size groups. That is, it might be expected that the large hospitals would be able to delay some deaths from cancer substantially longer than the smaller hospitals, even though the deaths cannot be prevented. However, examination of this hypothesis showed that the short-term survival rates in the large hospitals were not significantly higher than those in the small or intermediate hospitals.

Incidence and survival were also examined in relation to the marital status of patients. In the State as a whole, only 3.8 percent of cervical cancer patients had never been married; the corresponding figure for corpus cancer was 14.0 percent. There were no significant variations between hospital-size groups in these proportions. Survival rates for unmarried patients with either form of uterine cancer were below the corresponding rates for married patients but did not show any significant correlation with hospital size.

The data at hand do not permit an evaluation of the effects of several other important variables on survival. During the years under review tumor clinics were established in most Connecticut hospitals. It seems unlikely that these clinics caused any substantial increase in the proportion of early diagnoses of cervical cancer (table 1), but they may have influenced

Table 6. Number of cases of cancer of corpus and unspecified uterus reported by hospitals and percent treated surgically, by stage of disease and size of hospital where patient was treated, Connecticut, 1935–51 [1]

Stage of disease and treatment	Total cases reported by hospitals	Hospital size (beds)		
		Fewer than 200	200 to 350	More than 350
Confined to corpus:				
Radiation only	356	61	90	200
Surgery only	793	224	206	351
Radiation and surgery	600	84	164	344
Percent receiving surgery [2]	80	83	80	78
Regional or remote extension, or metastases:				
Radiation only	160	24	39	94
Surgery only	93	30	17	42
Radiation and surgery	88	7	19	60
Percent receiving surgery [2]	54	61	48	52
Cases with stage reported, untreated or treated elsewhere	197	145	130	165
Cases with stage not reported	71	20	8	44

[1] Excludes patients with unknown stage or unknown treatment. Treatment includes only radiation or surgery directed against the primary site of the tumor.
[2] Alone or in combination with radiation.

Table 7. Survival rates of patients with cancer of corpus and unspecified uterus reported by hospitals to Connecticut Tumor Registry, by stage of disease and size of hospital where patient was treated, 1935–51 [1]

Stage of disease	Total cases reported by hospitals	Hospital size (beds)		
		Fewer than 200	200 to 350	More than 350
All stages	**2,095**	**430**	**537**	**1,093**
Survived	1,129	230	315	572
Died	846	168	199	461
Lost	120	32	23	60
Estimated 5-year survival rate (percent)	59	60	62	57
Tumor confined to uterus	**1,752**	**369**	**461**	**897**
Survived	1,046	215	298	524
Died	597	124	144	320
Lost	109	30	19	53
Estimated 5-year survival rate (percent)	65	66	68	63
Regional or remote extension, or metastases	**343**	**61**	**76**	**196**
Survived	83	15	17	48
Died	247	44	55	141
Lost	13	2	4	7
Estimated 5-year survival rate (percent)	26	26	24	27

[1] Excludes untreated patients and those with unknown stage. Totals are slightly larger than totals in table 6 because table 6 excludes treated patients for whom the method of treatment was not given.

survival rates in less direct ways. During the war years there were severe shortages of physicians and hospital beds in some areas of the State. These shortages may have changed practices in the referral of cancer patients, thus raising or lowering survival rates in various institutions. At some times and places during the years of the study, radiation facilities were inadequate or unavailable; this also may have influenced referral practices and survival rates.

Because of the difficulties involved in comparing survival rates, one can only speculate on the reasons for the variations in survival of patients with regional extensions of cervical cancer. The differences seem too great to be explained by variations in general treatment policies (table 3). It would be rash to assume that large hospitals are uniformly better than smaller hospitals; nevertheless, it seems reasonable that the probability of survival for patients treated in any given institution should depend on the facilities and staff available. The pattern of survival rates for this series of patients is consistent with the hypothesis that there is a large group of patients having relatively favorable prognoses which do not depend greatly on the exact methods or techniques of treatment; that there is a smaller group of patients with advanced cancer who have poor prognoses regardless of treatment; and that the intermediate group with regional extension is the only one which derives substantial benefit from the more extensive facilities and the greater training and experience of the physicians at the large hospitals.

Cancer of Uterine Corpus

The distribution of patients with cancer of the uterine corpus by stage and treatment is given in table 6. A comparison with table 3 shows that surgery was much more frequently used for corpus tumors than for cervical tumors, whether the cancer was confined to the site of origin or had extended into other tissues. For corpus as well as for cervical cancer, surgery was more commonly used in the smaller than in the large hospitals; this difference was found in all stage groups.

Table 7 shows the survival rates by tumor stage and hospital size for corpus cancer patients. A comparison with table 4 shows that survival rates were distinctly higher after treatment for corpus cancer than after treatment for cervical cancer, although the survival of patients with localized tumors was approximately the same for the two sites (65 and 61 percent respectively). The number of tumors extending beyond the uterus was too small to permit further subdivision by stage. Although the intermediate hospitals had the best overall survival rate for corpus cancer, stage-by-stage variations among the hospital groups were small and did not form the consistent pattern seen in the cervical cancer data. The lack of association between hospital size and corpus cancer survival rates emphasizes the dissimilarity of these two forms of uterine cancer. Data on survival by place of diagnosis, similar to table 5 for cancer of the cervix, are not given here, but they show no clear relation between size of hospital and 5-year survival.

Summary

From 1935 through 1951, 6,220 patients with malignant tumors of the uterus were reported to the Connecticut Tumor Registry. Data on these patients have been analyzed statistically for small, intermediate, and large hospitals. Among the hospital groups there were no significant differences for cancer of either cervix or corpus in the age of patients or the stage of cancer at the time of diagnosis. There were also no significant differences in the duration of symptoms of cervical cancer from one hospital group to another, but for corpus cancer the small hospitals admitted a higher proportion of patients with relatively short histories than did the large institutions. In general, the differences in characteristics of patients admitted to small, intermediate, and large hospitals were not striking.

In all hospital-size groups, most cervical tumors were treated with radiation alone, while most corpus tumors were treated with surgery, either alone or in combination with radiation. Survival rates of corpus cancer patients did not seem to depend upon the size of the hospital in which they were treated. There was no association between hospital size and survival rates for cervical cancer patients with localized tumors, or for those with remote extensions or metastases. For cervical cancer patients with re-

gional extensions, however, survival rates in the large hospitals were considerably higher than those in the small or intermediate hospitals.

REFERENCES

(1) Kottmeier, H. L., editor: Annual report on the results of treatment in carcinoma of the uterus. Stockholm, 1958, vol. 11.

(2) Griswold, M. H., et al.: Cancer in Connecticut 1935–1951. Connecticut State Department of Health, Hartford, 1955.

(3) Guide to hospitals. Hospitals (Administrators Guide Issue) 25: 19, June 1951, pt. 2.

(4) Cutler, S. J., and Ederer, F.: Maximum utilization of the life table method in analyzing survival. J. Chronic Dis. 8: 699–712, December 1958.

(5) Berkson, J., and Gage, R. P.: Calculation of survival rates for cancer. Proc. Staff Meet. Mayo Clin. 25: 270–286, May 24, 1950.

(6) Heyman, J., editor: Annual report on the results of radiotherapy in carcinoma of the uterine cervix. Stockholm, 1951, vol. 6.

Medical Self-Help Training Program

A new program to train the American people to care for their own health needs if deprived of a physician's services in a national emergency was formally introduced to health professions in October 1961 by the Public Health Service's Division of Health Mobilization in cooperation with other Federal agencies with civil defense responsibilities and the American Medical Association. The training course will be made available to the public through State and local health, civil defense, and education authorities and medical societies.

The medical self-help training course contains the basic information a person needs in order to preserve life and health under an attack situation and assumes that those affected will have to care for themselves by dint of their own ingenuity and with the resources they have on hand at the moment of disaster.

The program consists of two parts: a reference manual for emergency health care in the home and a formal training course. A training kit contains all materials needed for instruction.

Subject matter of the reference manual, "Family Guide—Emergency Health Care," parallels the training course lessons. The subjects are: radioactive fallout and shelter; hygiene, sanitation, and vermin control; water and food; shock; bleeding and bandaging; artificial respiration; fractures and splinting; transportation of the injured; burns; nursing care of the sick and injured; infant and child care; and emergency childbirth.

The initial distribution of the manual is being restricted to professional health, civil defense, and educational personnel for evaluation of the material prior to its release to the general public.

To acquaint these professional groups with the training program, a medical self-help workshop was held in October 1961 in Brooklyn, N.Y., another will be held in November in Alameda, Calif., and a third in December in Battle Creek, Mich. The approximately 100 persons attending each workshop will obtain training kits for instituting courses in their respective States. Subsequently, kits will be available for distribution throughout the country.

State administration of the program will be under the direction of a Medical Self-Help Training Committee comprised of the State's health officer, civil defense director, and chief school officer and representatives of the State medical society.