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THE RELIABILITY OF CERTIFICATES OF DEATHS FROM CANCER[1]

By

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The basic data from which knowledge of mortality conditions arises are the entries of the cause of death placed upon death certificates. Without this information there would be no accurate measuring stick by which to judge the success of current public health activities or to plan programs for preventing and controlling the diseases responsible for taking large numbers of lives.

The first efforts to establish regular certification and registration of the cause of death met with considerable skepticism and some opposition by physicians who maintained that it was impossible to summarize correctly the cause of death in the few words desired on a death certificate. Moreover, it was asserted that a large proportion of the returns would be so vague and inaccurate as to be misleading if not worthless. The importance of the registration of each death together with its cause was slowly accepted, however, so that the admission of Texas to the death registration area in 1933 signified that reporting of deaths was nationwide in scope.

Unfortunately the completion of the death registration area does not mean that all deaths are registered. In some parts of the country, especially in rural areas, and among certain classes of the population such as the Negroes and Indians an appreciable proportion of the deaths are unregistered. Although the completeness of registration can still be improved the main battle to establish registration has been won. The principal effort now should be directed toward improving the information entered upon the certificates, the most important item of which is the cause of death.

The cause of death published in official reports on vital statistics may differ from the original cause of death as a result of the physician entering the incorrect diagnosis or because the rules for coding multiple causes of death arbitrarily select certain causes in preference to others. In the opinion of some people a certain proportion of the reported causes of death are incorrect because of the desire to protect the deceased or his family from undesirable publicity. The stigma often attributed to a few diseases such as syphilis, tuberculosis, and cancer may possibly result in the withholding of information concerning a limited number of such cases. More important as a source of error in reporting causes of death is the entry of a vague or ill-defined cause such as senility, sudden death, dropped dead, etc., by physicians who do not appreciate the importance of returning as precise a diagnosis as possible. Due largely to the practice of health departments and the Bureau of the Census of returning certificates with ill-defined causes to the physician with a request for more definite information, the certification of the cause of death has become more specific in recent years.

[1] From the Division of Public Health Methods, National Institute of Health. Assistance in the preparation of these materials was furnished by the personnel of Work Projects Administration Official Project No. 65-2-23-356.

[2] United States Public Health Service.

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But even so, in many parts of the country, especially in rural areas, from 10 to 20 per cent of all causes of death still fall in the vague and ill-defined class.

About 60 per cent of the death certificates filed in this country have more than one cause of death entered upon them (1). Since it is impracticable to tabulate more than one cause of death in combination with other characteristics of the deceased such as age, sex, and color, it is necessary to establish some procedure for selecting one of the multiple causes as the primary cause of death. In some countries this selection is left to the physician, but the practice in the United States has been to follow a set of coding rules known as the Manual of Joint Causes of Death. Changes in these rules which become desirable from time to time must necessarily affect the frequency with which various diagnoses are tabulated as the primary cause of death. In the past, the effect of coding rules upon published causes of death has not been carefully studied. The Division of Vital Statistics of the Bureau of the Census, however, has now initiated plans to analyze the results of current procedures so that in the future a better idea can be obtained of the influence of coding rules upon the selection of the primary cause of death.

In a study of the incidence of cancer conducted by the United States Public Health Service in ten urban areas from 1938 to 1940 data were collected which make possible an evaluation of the validity of some of the information entered upon the death certificates of persons who die from cancer. The present discussion will be limited to an analysis of the consistency of the entries for primary site of cancer and age.

The areas surveyed were Atlanta, Ga.; Chicago, Ill.; Detroit, Mich.; Pittsburgh, Pa.; New Orleans, La.; Birmingham, Ala.; Dallas and Fort Worth, Texas; San Francisco and Alameda County, Cal.; Philadelphia, Pa.; and Denver, Col. (2, 3, 4.) In each area the county in which the city is located was also surveyed; in addition nine counties adjoining Atlanta were included. The data were collected by means of a questionnaire mailed to every physician, hospital, and clinic in the study area. Information from those who failed to return the questionnaire was obtained by personal visit. Reports were obtained from all of the hospitals and clinics and from 98 per cent of the physicians.

Among other items of information for every case under observation or treatment during the study year each respondent was requested to report the primary site of cancer, any other site or sites involved, the type of cancer, and whether or not the diagnosis was confirmed by a microscopic examination of tissue. A copy of the death certificate filed for each person who died from cancer in the area during the study year was obtained from the local health department. At the end of the survey the files of the local health department were again searched for certificates of persons reported in the survey as having died during the study year but for whom no certificate was obtained in the first search. The deaths of such persons were usually attributed to a nonmalignant cause. The site or sites of cancer reported in the survey and the cause of death recorded on the death certificate were coded in accordance with the International List of Causes of Death and the Manual of Joint Causes of Death. From 20 to 25 per cent of the cases obtained in the survey were reported by more than one respondent; if the respondents disagreed concerning the primary site, the manual of Joint Causes of Death was not used but the primary

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site was chosen on the basis of the information of the schedule such as date of first diagnosis, method of confirmation of diagnosis, etc.

An attempt was made to secure a case report for every death certificate with cancer as the cause of death as well as to find a death certificate for every case reported as dying during the study year. For 13,524 persons a case report and a death certificate were obtained. A cross classification of these cases by primary site on the schedule and primary cause of death on the death certificate is presented in table 1. The corresponding percentages are shown in table 2.

When the schedule cases are grouped by primary site into nine broad categories, 84.5 per cent of the 13,524 death certificates had a primary site which fell in the same category as that of the site on the schedule. The percentage agreement varies widely among the groups of sites; the closest agreement, 92.6 per cent, is found for cancer of the digestive tract while the least agreement was reported for cancer of the skin and brain with less than one-half of the reports showing the same primary site on both schedule and death certificate. Two categories, bones and all others, show only slightly better agreement.

Part of this discrepancy, especially for cancer of the brain and skin, results from the entry of a nonmalignant cause of death upon the death certificate. Nearly one-half of the cases with cancer of the brain for whom a death certificate was available had a cause of death which was coded as nonmalignant. The prin-

Table 1. Comparison of the Primary Site of Cancer Classed in Broad Groups Reported in Survey with That Recorded on Death Certificates.

Primary site on death certificate	Primary site reported in survey									
	Buccal cavity	Digestive tract	Respiratory system	Genito urinary system	Breast	Skin	Brain	Bones	All others	Total
Buccal cavity	463	12	20	1	—	48	—	10	12	566
Digestive tract	22	5,194	29	127	43	19	—	8	128	5,570
Respiratory system	14	26	816	24	33	7	1	7	35	963
Genito urinary system	3	75	11	3,046	16	8	2	6	76	3,243
Breast	—	8	3	28	1,166	2	—	2	16	1,225
Skin	20	1	3	4	1	144	—	4	19	196
Brain	1	1	1	—	1	3	90	—	7	104
Bones	3	3	3	1	6	5	2	101	30	154
Other malignant	35	115	24	101	55	66	5	49	408	858
Total malignant	561	5,435	910	3,332	1,321	302	100	187	731	12,879
Non-malignant	22	174	55	156	38	36	94	9	61	645
TOTAL	583	5,609	965	3,488	1,359	338	194	196	792	13,524

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All others	Total
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128	5,570
35	963
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19	196
7	104
30	154
108	858
931	12,879
61	645
992	13,524

cipal explanation for this disagreement lies in the coding rules of the Bureau of the Census and the nomenclature of physicians. A large proportion of the entries for cause of death of persons with cancer of the brain was merely "brain tumor." Unless definite information that the tumor is malignant is obtained, such entries are coded as "tumor of unspecified nature." On the case schedule, however, the physician was requested to state whether or not the tumor was malignant, the type of tumor and the method of diagnosis as well as the primary site. It is apparent that a considerable proportion of the deaths of persons with cancer of the brain are assigned a nonmalignant cause because of the absence of more specific information on the death certificate. This proportion is large enough to make the published statistics of very limited value and to warrant the return of every certificate with the cause of death entered as "brain tumor" for more definite information.

Of course, an accurate diagnosis of cancer of the brain is difficult to make prior to death. A few physicians maintain that brain tumors are malignant because of location; but whenever this question arose during the survey, reports were requested only for those cases with cancerous tissue. The validity of the diagnosis in the absence of a microscopic examination of tissue will be commented on later in this report.

It is not surprising that 10.7 per cent of the cases with skin cancer were assigned a nonmalignant cause of death. This form of cancer is relatively nonfatal and appears most frequently among aged persons whose chances of death from some nonmalignant cause rapidly approach certainty.

About one-fifth of the deaths of persons with cancer of the skin were attributed to cancer of sites classed in the "all other" category. This, again, results from the procedure followed in coding primary sites. Examination of the primary sites entered on the case schedules in the first cities where the survey was undertaken revealed that many sites were returned as "back," "hand," "neck," "chest," "abdomen," "leg," etc. According to the rules followed in coding causes of death such entries are coded as "all other." Experience indicated, however, that many of these were really cases of skin cancer. In order to obtain more definite information, physicians were requested to state the type of cancer and to preface all primary sites on the skin by "skin of." The absence of such information on the death certificate results in the allocation of many cases of skin cancer to the "all other" category.

Cancer of the bone is another diagnosis with only about 50 per cent agreement between the case report and the death certificate information. The percentage of such cases with a nonmalignant cause of death was slightly less than the aver-

TABLE 2

Percentage agreement of the primary site of cancer classed in broad groups reported in survey with that recorded on death certificates

Primary site reported in survey	Percentage of death certificates with: Same site	Nonmalignant cause
Buccal cavity	79.4	3.8
Digestive tract	92.6	3.1
Respiratory system	84.6	5.7
Genito-urinary system	87.2	4.5
Breast	85.8	2.8
Skin	42.6	10.7
Brain	46.3	48.5
Bones	51.5	4.6
Other malignant	51.5	7.7
Total	84.5	4.8

Table 3. Number of Cases of Cancer with the Same or Different Diagnosis on Case Schedule and Death Certificate for Cases Classed by Specific Detailed Primary Site[1]

Primary site on death certificate	Primary site on case schedule																			
	Lip	Tongue	Mouth	Jaw	Pharynx	Other buccal	Esophagus	Stomach	Intestines	Rectum, anus	Liver-biliary passage	Pancreas	Other digestive	Larynx	Lungs, pleura	Other respiratory	Uterus	Kidneys	Bladder	Prostate	Other genito-urinary	Total malignant
Lip	33																			
Tongue		241	3	1	1	6	2	1						1		1						
Mouth		3	34	4	1	7		1							1			1				
Jaw		1	3	48		8							1			1						
Pharynx		1	9	3	38	11	4	1			1			11		4						
Other buccal		2	11	2	8	30								1								
Esophagus		1		2		3	4	221	14	2			2	7	2	3				1		
Stomach																						
duodenum		1		1			20	1258	53	8	34	11	7	1	3	2	13	6	3	4	6	
Intestines					1			30	1047	115	7	4	2	1	4		12	4	3	5	11	
Rectum, anus		1			1		1	4	96	484	2						12	1	2	7	4	
Liver-biliary passage			2		3			34	30	5	446	17	2		2		4	4	2	5	5	
Pancreas								26	7	0	32	232	3		2	2	2	1		1		
Other digestive								3	6	1	5	1	60								1	
Larynx			4	1	4	1	3							230		1						
Lungs, pleura					1		3	5	2	2	5	1	1	3	602	47	6	4	3	4	3	
Other respiratory		1		2		1			1		1	1		6	104	27		2	1			
Uterus				1				9	11	4	2				2		1733	2	6		34	
Kidneys								1	1		2	1			1	2		171	3	1	1	
Bladder		1							3	2	4						0	3	430	27	2	
Prostate							2	1	1	3					3				30	343		
Other genito-urinary					1			6	14	5		3			3		25	1	3	1	430	
Total malignant	35	278	63	69	65	109	131	1425	1327	844	550	320	72	274	727	197	1844	230	510	523	524	
Non-malignant	8	2	2	1	2	7	6	53	22	23	27	17	8	3	43	7	52	17	18	48	23	
TOTAL	93	280	65	70	67	116	137	1980	1349	869	583	393	98	189	802	174	1896	253	528	571	547	

[1]The number of cases in the columns do not equal the total shown at the bottom since the number of cases with primary site in the breast, skin, brain, bones and all others as shown in Table 1 have been omitted.

age so that the difference arose from the entry of another primary site on the death certificate. About one-half of the cases for which lack of agreement existed are found in the "all other" category.

Tables 3 and 4 show the number and percentage of cases of cancer with the same diagnosis on the case schedule and death certificate when the diagnosis is given by detailed, specific sites. As would be expected there is less agreement on specific than on broad classes of sites. About three-fourths (77.3 per cent) of the diagnoses were the same on both the case schedule and the death certificate; as before, slightly less than 5 per cent of the cases had a nonmalignant cause of death.

The least agreement is shown for the sites "mouth" and "other buccal cavity"; this is not unexpected since these are vague diagnoses. Other sites with less than 75 per cent agreement are lip, jaw, pharynx, other digestive, lungs and pleura, other respiratory, and kidneys. In table 3 it will be seen that the primary site of 104 of the 602 cases with cancer of the lungs or pleura were classed as other respiratory on the death certificate. This arises from the fact that many physicians use the terms "cancer of the lung" and "bronchogenic cancer" synonymously. The coding rules, however, place "bronchogenic cancer" in the "other and unspecified" category. Consequently the published number of deaths from cancer of the lung is too small.

Table 5, which is a summary of the data in the previous tables, shows, for each broad primary site group from case reports, the percentage of diagnoses obtained from death certificates with the same, specific, primary site; with a dif-

ferent specific site but in the same broad group; with a primary site not in the same broad group; and with a nonmalignant cause of death. More than 40 per cent of the cases with a primary site on the skin, bones, or in the all other group had a diagnosis on the death certificate which placed the primary site in a different group. On the average, the highest percentage agreement was found for diagnoses of primary sites in the digestive tract, the genito-urinary system, and breast; more than 80 per cent of the case schedule and death certificate diagnoses were the same. However, when disagreement existed, cases with a primary site in the digestive tract had a death certificate diagnosis placing the primary site in the same broad group about twice as frequently as cases with a primary site in the genito-urinary system.

The greatest disagreement was found in Atlanta where 30.6 per cent of the cases had a diagnosis on the death certificate different from that on the case report (table 6). The highest percentage of cases with a nonmalignant cause of death (7.8 per cent) was also reported in Atlanta. The closest agreement, more than 80 per cent, existed in Dallas, Denver, and San Francisco. There was little variation in the percentage agreement in the other cities.

The above analysis should not necessarily be interpreted as indicating that between 20 and 25 per cent of the diagnoses on death certificates of persons with cancer are incorrect since it is not possible to state definitely that the diagnoses obtained in the survey are more accurate than those entered upon the death certificates. The presumption, however, is that the case diagnosis is probably the more accurate of the two since it indicates the reason for treating or observing the case prior to death. In some instances, though, a detailed autopsy made at the time of death may have resulted in a more accurate diagnosis.

About two-thirds (65 per cent) of the diagnoses reported in the survey were confirmed by a microscopic examination of tissue. The lowest proportion of confirmed diagnoses was found in the South with an average of 50 per cent; in the northern and western cities 69 and 67 per cent, respectively, of the diagnoses were confirmed by a microscopic examination of tissue. The greater prevalence of skin cancer in the South partially accounts for the larger proportion of

TABLE 4

Percentage agreement of diagnosis on case schedule and death certificate by detailed specific primary sites of cancer

Primary site on case schedule	Percentage of death certificates with: Same primary site	Nonmalignant cause
Lip	89.1	8.6
Tongue	80.6	1.1
Mouth	47.7	3.1
Jaw	68.6	1.4
Pharynx	56.7	3.0
Other buccal	46.3	6.5
Esophagus	86.4	1.8
Stomach, duodenum	88.8	2.8
Intestines	79.1	3.1
Rectum, anus	78.7	2.9
Liver, biliary passage	76.2	4.6
Pancreas	84.0	3.3
Other digestive	61.2	6.1
Larynx	79.4	2.6
Lungs, pleura	67.9	7.1
Other respiratory	55.7	4.0
Uterus	87.8	3.5
Kidneys	69.2	6.7
Bladder	85.6	3.0
Prostate	80.9	7.2
Other genito-urinary	75.4	4.2

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clinical diagnoses in that area since this form of cancer is frequently diagnosed without resort to biopsy.

The proportion of death certificates with diagnosis confirmed by a microscopic examination of tissue (33.5 per cent) was about one-half the corresponding proportion reported on the case schedules. Again, the lowest percentage, 27, was reported in the South while those in the North and West were 33 and 41 per cent, respectively.

It would seem that there should be closer agreement between the diagnosis on the case schedule and on the death certificate if both were confirmed by a microscopic examination of tissue. To test this assumption table 7 has been prepared to show the percentage agreement of the two diagnoses when both were microscopically confirmed. These data were available for 3,390 cases or about one-fourth of the number with a death certificate.

The agreement in diagnosis is only very slightly better than for the data presented before; 86.3 per cent as compared with 84.5 per cent when broad sites are used, and 78.4 per cent as compared with 77.3 per cent when specific sites are used. The percentage of cases with a nonmalignant cause of death is somewhat smaller, 3.2 instead of 4.8. Several of the sites, lip, mouth, skin, brain, and bones, still show less than 50 per cent agreement.

The fact that a small proportion of cases had a nonmalignant cause of death is not surprising since a few persons with cancer would be expected to die from some acute disease or accidental cause. If the reported percentage of nonmalignant causes is accepted as substantially correct, about 10 per cent of the diag-

Table 5. — Percentage distribution of cases reported in survey by type of diagnosis on death certificate and primary site group of diagnosis on case schedule

Primary site group from case schedule	Percentage of death records with diagnosis: Of same specific site	In same broad group but different specific site	In different group	Nonmalignant cause	Number of cases
Buccal cavity	62.9	16.5	16.8	3.8	583
Digestive tract	82.6	10.0	4.3	3.1	5,609
Respiratory system	68.0	15.6	9.7	5.7	965
Genito-urinary system	82.9	4.5	8.2	4.5	3,488
Breast	85.8	- a/	11.4	2.8	1,959
Skin	42.6	-	46.7	10.7	338
Brain	46.4	-	5.1	48.5	194
Bones	51.5	-	43.9	4.6	196
All other	51.5	-	40.8	7.7	792
Total	77.3	7.2	10.7	4.8	13,524

a/ The dash indicates that there were no subdivisions of the primary site group.

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asses disagree when a broad grouping of sites is used and slightly less than 20 per cent when specific sites are compared. It is possible that this disagreement results from the fact that many persons do not seek treatment until the cancer is so far developed than several sites are involved. Even with a microscopic examination of tissue, disagreement concerning the primary site is likely to arise when such cases are diagnosed by different physicians.

A special tabulation for Atlanta and Chicago showed that of the cases which were reported by more than one respondent, 26.5 and 33.4 per cent, respectively, disagreed as to the primary site. Such cases of disagreement, however, were a small proportion of the total, comprising less than 5 per cent in both cities. This reveals that physicians treating the same case do not always agree concerning the primary site of the cancer. Moreover, in many hospitals the tumor records have never been coordinated so that a report obtained from one department sometimes lists a primary site different from a report on the same case taken from another department. In some instances when the original cancer has been removed by surgery, and subsequent treatment is sought for a metastasis, the latter is reported instead of the former. Until all cancer cases are diagnosed prior to the development of metastases, some disagreement concerning the primary site is to be expected.

Part of the lack of agreement of the diagnosis of the primary site of cancer on the case report with that on the death certificate, even when both diagnoses are confirmed by a microscopic examination of tissue, arises from the fact that the same physician did not necessarily prepare both records. An indication of the importance of this factor in

TABLE 6

Percentage agreement of diagnosis on case schedule and on death certificate for cancer cases in selected cities

City	Percentage of death certificates: With same detailed primary site as case report	Percentage of death certificates: With non-malignant cause
South		
Atlanta	69.4	7.8
Birmingham	75.8	5.5
Dallas	81.8	2.4
Ft. Worth	75.0	5.2
New Orleans	77.6	5.4
West		
Alameda County	79.1	5.7
Denver	81.0	5.9
San Francisco	81.7	4.8
North		
Chicago	77.2	3.1
Detroit	77.4	5.2
Philadelphia	76.4	5.4
Pittsburgh	74.7	5.9

bringing about the disagreement may be obtained by comparing the primary site for cases when both the case report and the death certificate were prepared by the same physician. The information required to identify such cases was not on the punch cards so that it was necessary to make a hand tabulation. Table 8 presents the results of this tabulation for the cases reported in Dallas and Fort Worth, Texas, and Philadelphia, Pa.

When the primary sites are grouped into the broad categories shown in table 1, the percentage agreement between the site on the case report and that on the death certificate was 87 compared with 85 per cent shown in table 2. For specific primary sites, the percentage agreement in table 8 is 84 compared with 77 per cent in table 4. These data indicate that the major cause of the lack of agreement between the primary site on the

Table 7. Percentage Agreement of Diagnosis on Case Schedule and Death Certificate for Cases with a Microscopically Confirmed Diagnosis of Cancer.

Primary site of cancer on case schedule	Percentage of death certificates with: Same primary site		Non-malignant cause	
Buccal cavity	81.1		1.6	
	48.3	—	8.9	—
Lip		76.4		—
Tongue		25.0		—
Mouth		69.6		—
Jaw		73.9		4.3
Pharynx		57.1		—
Others				
Digestive tract	93.7		1.2	
		89.7		—
Esophagus		90.6		0.6
Stomach, duodenum		90.0		1.8
Intestines		80.4		0.8
Rectum, anus		82.6		1.7
Liver, biliary passage		80.6		1.9
Pancreas		62.2		5.4
Others				
Respiratory system	83.7		3.9	
		81.0		3.2
Larynx		55.1		4.4
Lungs, pleura		62.9		3.2
Others				
Genito-urinary system	92.0		2.1	
		91.8		1.1
Uterus		82.3		3.2
Prostate		88.2		0.6
Bladder		81.1		4.2
Kidneys		—		—
Others	83.0		3.3	
Breast	90.5		2.3	
Skin	44.0		4.8	
Brain	37.7		59.4	
Bones	45.0		0.0	
All others	61.7		6.0	
TOTAL	86.3a/		3.2	

a/ Based on broad groups of sites; 78.4 based on detailed sites.

case record and on the death certificate is the physician's failure to report consistently the same site as primary. Whether this is the result of lack of definite knowledge or of carelessness cannot be stated but it is significant that of 106 cases with a diagnosis confirmed by a microscopic examination of tissue, only 44 were reported to have had such a diagnosis when the death certificate was prepared. Although the above results are based upon the data for only three cities, there is no reason for believing that a tabulation of corresponding data for the remaining cities would alter the conclusions.

Table 9 presents an analysis of the cases from table 3 with a different diagnosis on the case schedule and death certificate. When these cases are classed by the primary site reported on the case record 51.6 per cent of those with a pri-

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TABLE 8

Percentage agreement of the primary site of cancer on case reports and on death certificates prepared by the same physician for different methods of diagnosis

Method of diagnosis	Number of cases	Broad groups of sites			Specific sites		
		Percentage in:			Percentage with:		
		Same group	Different group	Non-malignant group	Same site	Different site	Non-malignant cause
Microscopic on case report, microscopic on death certificate	44	84	11	5	84	11	5
Microscopic on case report, clinical on death certificate	62	84	11	5	77	18	5
Clinical on case report, clinical on death certificate	186	88	9	3	85	12	3
Clinical on case report, microscopic on death certificate	19	95	5	—	89	11	—
Total	311	87	10	3	84	13	3

mary cancer of the bone had a death certificate diagnosis which placed the primary site in the "all other" group. Similar percentages for cases with primary cancer of the skin and breast were 34.0 and 28.5, respectively. The entry on the death certificate of indefinite diagnoses such as leg, arm, and back, accounts for a large proportion of the shifts from cancer of the skin and bones to cancer of "all other" sites. Experience indicates that the entry of a secondary site, usually axillary or axillary region or glands, on the death certificates of persons with a primary cancer of the breast is responsible for most of the change in classification of such cases. These data support the belief that the disagreement results principally from carelessness in entering the cause of death on the death certificate.

The percentage agreement in this study is somewhat greater than that reported in a survey in Massachusetts (5). The procedure in the two studies is not precisely the same so that the results are not strictly comparable. The Massachusetts study reported agreement in 78 per cent of the cases when the sites were classed into broad groups and in 71 per cent of the cases when specific sites were compared.

In addition to the diagnosis it is also possible to compare the age reported in the survey with that entered on the death certificate. For this purpose, ages were grouped into 5-year age classes and the percentage of the ages falling in the same class on both schedule and death certificate was computed (table 10).

About three-fourths (74.7 per cent) of the ages were in agreement as defined above. This percentage was higher for whites than for the colored, 75.4 com-

pared with 66.1 per cent. Moreover, it was also greater for males than for females. Although there was somewhat better agreement concerning the extremely young and the very elderly ages, the variation throughout the age span was not great.

It seems likely that the age reported on the death certificate is more nearly correct than that reported in the survey. Many physicians maintain only very sketchy records of their patients and rely upon their memory for the history of any given case. Even if records were kept, the age thereon was undoubtedly the age at first diagnosis and consequently less than the age at the time of the survey. For this reason, whenever there were two or more reports for the same case which disagreed concerning the age, the oldest age reported was chosen as the age of the case. Although this procedure was arbitrary, it seemed as reasonable as any other method of choosing the age when the case reports disagreed. This rule may have increased slightly the lack of agreement between the ages since about 16 per cent of those reported in the survey were older than the corresponding age recorded on the death certificate, as compared with about 8 per cent which were older on the death certificate.

Summary

From data collected in a survey of the incidence of cancer in ten urban areas it is possible to compare the diagnosis obtained from physician or hospital records with that recorded on the death certificates for persons who died during the study year. Data were available for 13,524 cases.

When the primary site of cancer reported in the survey is grouped into nine broad classes, 84.5 per cent of the corresponding death certificate diagnoses fell in the same class as that reported in the survey. The closest agreement (92.6 per cent) was reported for cancer of the digestive tract. The least agreement occurred for cancer of the skin (42.6 per cent) brain cancer (46.3 per cent) and bone cancer (51.5 per cent).

Table 9

Percentage distribution of cases with a different diagnosis reported on the case record and on the death certificate by type of disagreement and primary site on case record

Primary site on case record	Diagnosis on death certificate				Number of cases
	Different specific site but in same broad group	Primary site in "all other" groups	Primary site in remaining groups	Neomalignant cause	
Buccal cavity	44.4	16.2	29.2	10.2	216
Digestive tract	57.4	11.8	12.9	17.9	975
Respiratory system	51.8	7.8	22.6	17.8	309
Genito-urinary system	26.2	16.9	30.9	26.0	899
Breast	—*	28.5	51.8	19.7	193
Skin	—	34.0	47.4	18.6	194
Brain	—	4.8	4.8	90.4	104
Bones	—	51.6	38.9	9.5	95
Total	36.2	16.8	25.3	21.7	2,685

* The dash indicates that there were no subdivisions in the primary site group. Cases with a primary site in the "all other" group are excluded.

Percentage agre... that enter...

Age on death certificate
Under 15
15–19
20–24
25–29
30–34
35–39
40–44
45–49
50–54
55–59
60–64
65–69
70–74
75–79
80–84
85–89
90–over
Total

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Number of cases
216
975
309
599
193
194
104
95
2,685

a. Cases with a

TABLE 10

Percentage agreement of age reported in survey with that entered on death certificate by color

Age on death certificate	White	Colored
Under 15	88.4	100.0
15–19	88.9	83.3
20–24	66.7	100.0
25–29	77.5	70.3
30–34	70.3	62.7
35–39	72.6	63.5
40–44	73.2	61.0
45–49	75.8	63.4
50–54	72.9	60.7
55–59	73.2	71.5
60–64	74.7	69.0
65–69	77.4	72.5
70–74	77.7	68.3
75–79	78.6	61.9
80–84	81.1	—
85–89	79.5	—
90–over	83.3	—
Total	75.4	66.1

A nonmalignant cause of death was recorded for 4.8 per cent of the cases. However, 48.5 per cent of the cases with cancer of the brain who died during the study year were assigned a nonmalignant cause of death. It is believed that this high percentage results from unspecific entries on death certificates which lead to the coding of the cause of death as nonmalignant.

A comparison of detailed, specific diagnoses reveals that 77.3 per cent of the causes of death agreed with the corresponding report obtained from the psyician or hospital which had treated the case. There was less than 60 per cent agreement for cases with cancer of the lip, mouth, pharynx, other buccal, and other respiratory sites.

For 3,390 cases the diagnosis on both the case record and the death certificate was reported to have been confirmed by a microscopic examination of tissue. The agreement in diagnosis, however, was only slightly greater for such cases than for all cases combined, 86.3 per cent when grouped by primary site into broad categories and 78.4 when specific diagnoses were compared.

For about three-fourths of the cases, the age obtained in the survey fell in the same 5-year age group as that recorded on the death certificate. The percentage agreement in age was greater for males than for females and for whites than for colored.

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