RESEARCH ARTICLE

Qualitative Improvement Methods Through Analysis of Inquiry Contents for Cancer Registration

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Abstract

Background: In Korea, the national cancer database was constructed after the initiation of the national cancer registration project in 1980, and the annual national cancer registration report has been published every year since 2005. Consequently, data management must begin even at the stage of data collection in order to ensure quality. **Objectives:** To determine the suitability of cancer registries' inquiry tools through the inquiry analysis of the Korea Central Cancer Registry (KCCR), and identify the needs to improve the quality of cancer registration. **Methods:** Results of 721 inquiries to the KCCR from 2000 to 2014 were analyzed by inquiry year, question type, and medical institution characteristics. Using Stata version 14.1, descriptive analysis was performed to identify general participant characteristics, and chi-square analysis was applied to investigate significant differences in distribution characteristics by factors affecting the quality of cancer registration data. **Results:** The number of inquiries increased in 2005–2009. During this period, there were various changes, including the addition of cancer registration items such as brain tumors and guideline updates. Of the inquirers, 65.3% worked at hospitals in metropolitan cities and 60.89% of hospitals had 601–1000 beds. Tertiary hospitals had the highest number of inquiries (64.91%), and the highest number of questions by type were 353 (48.96%) for histological codes, 92 (12.76%) for primary sites, and 76 (10.54%) for reportable. Conclusions: A cancer registration inquiry system is an effective method when not confident about codes during cancer registration, or when confronting cancer cases in which previous clinical knowledge or information on the cancer registration guidelines are insufficient.

Keywords: Cancer registration- data collection- examination questions- inquiry system

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Introduction

Cancer registration is an information system designed for the collection, management, storage, and analysis of data from people diagnosed with cancer. Cancer patients' demographic information and essential information about characteristics and treatment of tumors are collected (Zachary et al., 2015). In Korea, the national cancer database was constructed after the initiation of the national cancer registration project in 1980, and the annual national cancer registration report has been published every year since 2005. The Cancer Incidence in 5 Continents, Volume 9, published by the International Agency for Research on Cancer in 2007, included national cancer statistics and those from 8 regional cancer registries in Korea, improving the quality of cancer registration data from Korea (Annual Report of Cancer Statistics in Korea in 2012, 2014). As such, data management must begin even at the stage of data collection in order to ensure quality.

Accurate, complete, and timely cancer data can contribute to cancer management as evidence for cancer research, evaluation, and surveillance (Das, 2009; Steliarova et al., 2015). Representative indicators to evaluate the quality of cancer registration include comparability, completeness, validity, and timeliness, and various efforts should be made for accurate cancer registration during data collection to improve the indicators (Bray and Parkin, 2009; Larsen et al., 2009). To date, cancer registration staffs in hospitals have consulted the Korea Central Cancer Registry (KCCR) for desired information over the phone or using the inquiry corner of the homepage during cancer registration. Inquiries during cancer registration are largely related to cancer registration system or cancer registration staff. Inquiries about the cancer registration system indicate that issues remain unresolved by the guidelines or related training provided by the KCCR. Specifically, cancer registration items might be added, or cancer registration staff might be uninformed of changes and additions to tumor classification codes, which are critical for cancer registration. Moreover, utilizing an inquiry system, if present in a data collection system, can help improve the collected data's accuracy

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(Ortega et al., 2014). This function may not be used in cases of poor accessibility, delayed responses, or weak interaction (Boo et al., 2013). For cancer registration staffs, factors including the absence of devoted cancer registration staff, poor expertise, and insufficient training can cause cancer registration inquiries and lower the quality of cancer registration data (Boo et al., 2014).

Therefore, this study analyzed cancer registration inquiries to the KCCR and its responses, to investigate the inquiry functions in cancer registration and factors affecting the quality of cancer registration data.

Materials and Methods

Inquiry data on cancer registration obtained through the inquiry corner of the KCCR homepage from 2000 to 2014 were used. During that period, 721 questions were asked. Questions were divided into 9 types: subject of cancer registration (reportability); primary site (topography); histological diagnosis (histology); behavior; the Surveillance, Epidemiology, and the End Results Program (SEER) summary stage; most valid basis of diagnosis; first course of treatment; multiple primary tumors; and others. Questions with a low frequency or those about administrative procedures were categorized as "others." For response data that could be assigned ICD-O-3 (Fritz, 2000) and SEER summary stage codes (Adamo and Ruhl, 2015), codes used for responses were applied. Inquiry years were divided as 2000–2004, 2005–2009, and 2010–2014. In 2014, 170 hospitals were national cancer registration hospitals, comprising 32 hospitals with 100–300 beds, 66 with 301–600 beds, 59 with 601–1,000 beds, and 13 with 1001 or more beds (Subramanian et al., 2016).

Analysis

Inquiry data from all 721 cases were compared depending on inquiry year, question type, and characteristics of the hospitals where inquirers were working. Descriptive analysis was performed to identify general characteristics of inquiries based on frequencies and percentages. A chi-square analysis was conducted to investigate significant differences in distribution characteristics by factors affecting quality of cancer registration data. The significance level was set to 10% for both sides. Stata version 14.1 (Stata Corp., College Station, Texas, USA) was used for all statistical analyses. MS Excel charting was used to investigate differences in inquiry contents depending on number of beds in hospitals.

Results

Inquiry general characteristics

The highest number of inquiry cases was between 2008 and 2010. Approximately 65% of the inquirers worked in hospitals in metropolitan cities. The largest number of cases was in the 601–1000 beds category with 439 cases (60.89%), followed by 177 cases with 1001 or more beds (24.55%), and 92 cases with 301–600 beds (12.76%). The hospital type with the highest numbers were tertiary hospitals with 468 cases (64.91%) and the question type with the highest numbers were histology with 353 cases (48.96%) (Table 1).

Detailed characteristics by period

The highest number of questions in a period was 370 cases in 2005–2009, followed by 285 cases in 2010–2014 and 66 cases in 2000–2004 (Table 2). For question type by period, histology accounted for about half of all questions in all three periods, and there was no significant difference in distribution by year (P = .29). However, rates of questions for histology and multiple primaries gradually

Table 1. Inquiry General Characteristics

Variable	Subcategory	Frequency	Percentage
	Total	721	100.0
Inquiry year	2000	10	1.39
	2001	23	3.19
	2002	5	0.69
	2003	8	1.11
	2004	20	2.77
	2005	28	3.88
	2006	28	3.88
	2007	55	7.63
	2008	142	19.69
	2009	117	16.23
	2010	122	16.92
	2011	25	3.47
	2012	25	3.47
	2013	81	11.23
	2014	32	4.44
Question type	Histology	353	48.96
	Primary site	92	12.76
	Reportability	76	10.54
	Summary stage	64	8.88
	Behavior	47	6.52
	Multiple primaries	32	4.44
	First course of treatment	29	4.02
	Most valid basis of diagnosis	25	3.47
	Others	3	0.42
Location	Seoul	257	35.64
	Metropolitan cities	214	29.68
	Other regions	250	34.67
Hospital type	Tertiary hospital	468	64.91
	General hospital	245	33.98
	Hospital	8	1.11
Number of beds	1,001 or more	177	24.55
	601–1,000	439	60.89
	301–600	92	12.76
	100–300	13	1.8
Regional cancer center hospital	No	612	84.88
	Yes	109	15.12

Table 2. Question Type by Period

Question type	2000–2004		2005–2009		2010–2014		Total	
	N	%	N	%	N	%	N	%
Histology	29	43.94	172	46.49	152	53.33	353	48.96
Primary site	9	13.64	57	15.41	26	9.12	92	12.76
Reportability	4	6.06	43	11.62	29	10.18	76	10.54
Summary stage	6	9.09	36	9.73	22	7.72	64	8.88
Behavior	6	9.09	22	5.95	19	6.67	47	6.52
Multiple primaries	2	3.03	16	4.32	14	4.91	32	4.44
First course of treatment	6	9.09	10	2.70	13	4.56	29	4.02
Most valid basis of diagnosis	4	6.06	12	3.24	9	3.16	25	3.47
Others	0	0.00	2	0.54	1	0.35	3	0.42
Total	66	100.00	370	100	285	100.00	721	100.00
			P = 0.29					

increased compared to other question types.

Questions for histology were found in 353 cases (48.96%), corresponding to the highest number (Table 3). When 343 cases were analyzed (10 cases with no answers in the corresponding ICD-O-3 code were excluded), the histological diagnosis groups with the highest numbers of questions were as follows: adenoma and adenocarcinoma (814–838) with 122 cases (35.57%); ductal and lobular neoplasms (850–854) with 30 cases (8.75%); cystic, mucinous, and serous neoplasms (844–849) with 28 cases (8.16%); Hodgkin's and non-Hodgkin's lymphomas (959–972) with 20 cases (5.83%); and epithelial neoplasms (801–804) with 18 cases (5.25%). Cross-analysis of histological code groups by inquiry year with the three period groups showed a significant difference in distribution of questions by histological codes by period group ($P < .01$).

When 90 cases of response data were analyzed, excluding 2 inquiry cases without the primary site code, the highest ranking primary sites were as follows: digestive organs with 20 cases (22.22%); lymph nodes with 14 cases (15.56%); hematopoietic and reticuloendothelial systems with 8 cases (8.89%); and eye, brain, and other parts of the central nervous system with 8 cases (8.89%) (Table 4). Cross-analysis of primary site by the three periods found no significant difference in the distribution ($P = .11$). The highest number of questions in 2000–2004 and 2005–2009 were for digestive organs, whereas respiratory system and intrathoracic organs had the highest number in 2010–2014. Hematopoietic and reticuloendothelial systems consistently showed a high number of questions during all periods. Most questions were about the stomach, large intestine, liver, and pancreas (digestive organs); lung and intrathoracic organs (respiratory system); and bone marrow, the primary site of leukemia in the hematopoietic and reticuloendothelial systems. The most frequent questions were for the top 10 common cancers.

A total of 127 cases were in 19 combinations of specific primary sites and histology comprised (Table 5). For the combination of C16 (stomach) and 82113 (tubular adenocarcinoma), questions involved asking for histological codes to be given differently depending on differentiation, such as well or moderately differentiated adenocarcinoma, while questions for the combination of C16 (stomach) and 84903 (signet ring cell carcinoma) were for cases with inconsistent histological results from different tests, or about codes for histological sites with complex morphologies. Most questions for the combination of C18 (colon) and 81403 (adenocarcinoma), and of C18 (colon) and 82102 (adenocarcinoma in situ in adenomatous polyp), were for cases about different histological results from multiple tests, or about codes for tissues with complex behavior such as adenocarcinoma in tubular adenoma. The combination of C18 (colon) and 82403 (carcinoid tumor) was not yet included in ICD-O-3, though it was often used by clinicians, such as for neuroendocrine tumors. However, this was mostly found after 2009 along with behavior questions.

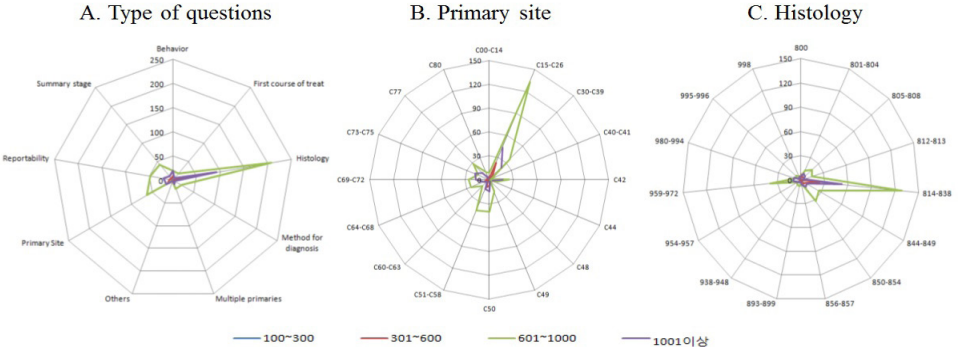

Figure 1. Analysis of Inquiry by Number of Beds

Table 3. Histology Question Analysis

Category	Description	Frequency	%	2000	2005	2010
800	Neoplasms, NOS	8	2.33	-	5	3
801–804	Epithelial neoplasms, NOS	18	5.25	3	6	9
805–808	Squamous cell neoplasms	14	4.08	3	6	5
809–811	Basal cell neoplasms	2	0.58	-	1	1
812–813	Transitional cell papillomas and carcinomas	8	2.33	-	7	1
814–838	Adenomas and adenocarcinomas	122	35.57	7	51	64
839–842	Adnexal and skin appendage neoplasms	3	0.87	-	2	1
844–849	Mucoepidermoid neoplasms	28	8.16	5	16	7
850–854	Ductal and lobular neoplasms	30	8.75	1	15	14
855	Acinar cell neoplasms	5	1.46	-	4	1
856–857	Complex epithelial neoplasms	10	2.92	2	8	-
858	Thymic epithelial neoplasms	4	1.17	-	-	4
859–867	Specialized gonadal neoplasms	1	0.29	-	1	-
880	Soft tissue tumors and sarcomas, NOS	3	0.87	-	2	1
881–883	Fibromatous neoplasms	6	1.75	-	4	2
885–888	Lipomatous neoplasms	2	0.58	-	1	1
893–899	Complex mixed and stromal neoplasms	6	1.75	1	2	3
900–903	Fibroepithelial neoplasms	1	0.29	-	1	-
904	Synovial-like neoplasms	1	0.29	-	-	1
906–909	Germ cell neoplasms	6	1.75	-	2	4
910	Trophoblastic neoplasms	2	0.58	2	-	-
912–916	Blood vessel tumors	1	0.29	-	-	1
918–924	Osseous and chondromatous neoplasms	3	0.87	-	3	-
935–937	Miscellaneous tumors	1	0.29	-	-	1
938–948	Gliomas	7	2.04	-	1	6
949–952	Neuroepitheliomatous neoplasms	3	0.87	1	-	2
953	Meningiomas	2	0.58	-	2	-
954–957	Nerve sheath tumors	3	0.87	-	2	1
959–972	Hodgkin's and non-Hodgkin's lymphomas	20	5.83	1	12	7
973	Plasma cell tumors	1	0.29	-	-	1
975	Neoplasms of histiocytes and accessory lymphoid cells	3	0.87	1	-	2
976	Immunoproliferative diseases	1	0.29	-	1	-
980–994	Leukemia	8	2.33	-	6	2
995–996	Chronic myeloproliferative disorders	5	1.46	-	4	1
997	Other hematologic disorders	1	0.29	-	-	1
998–999	Myelodysplastic syndromes	4	1.17	1	1	2
Total		343	100	28	166	149

P < .01

Questions for C22 (liver) were for histological codes when different histological results were obtained from sites and when adenocarcinoma or cholangiocarcinoma were identified in the biliary track. Questions for C50 (breast) were for codes in cases in which behaviors were different in one tissue, histological results were different between bilateral breasts, histological results in a time series were different, or site-specific factors were mentioned in histological results.

Questions for C72 (spinal code, cranial nerve, and other parts of central nervous system) and 95600 (neurilemmoma) were for morphology codes to identify reportability after brain tumor registration. Most questions for C73 (thyroid) and 82603 (thyroid papillary carcinoma) were for cases to assign 82603 (thyroid papillary carcinoma) or 80503 (papillary carcinoma) codes for papillary carcinoma in the thyroid.

The first and second most common questions were for histology and primary site respectively, in both general and tertiary hospitals. There were more questions for reportability in general hospitals and for summary stage in tertiary hospitals. On the other hand, there were significant

Table 4. Analysis of Question by Primary Site

Category	Description	Frequency	Percentage	2000–2004	2005–2009	2010–2014
C00-C14	Lip, oral cavity, and pharynx	2	2.22	-	1	1
C15-C26	Digestive organs	20	22.22	3	15	2
C30-C39	Respiratory system and intrathoracic organs	5	5.56	-	1	4
C40-C41	Bones, joints, and articular cartilage	3	3.33	2	-	1
C42	Hematopoietic and reticuloendothelial systems	8	8.89	1	5	2
C44	Skin	2	2.22	-	2	-
C48	Retroperitoneum and peritoneum	2	2.22	-	1	1
C49	Connective, subcutaneous, and other soft tissues	6	6.67	1	2	3
C50	Breast	5	5.56	-	3	2
C51-C58	Female genital organs	4	4.44	1	2	1
C60-C63	Male genital organs	3	3.33	1	1	1
C64-C68	Urinary tract	1	1.11	-	-	1
C69-C72	Eye, brain, and other parts of central nervous system	8	8.89	-	7	1
C73-C75	Thyroid and other endocrine glands	4	4.44	-	3	1
C77	Lymph nodes	14	15.56	-	11	3
C80	Unknown primary site	3	3.33	-	1	2
Total		90	100.00	9	55	26
		P = 0.11				

differences in question type by number of beds (P = .06). Summary stage questions accounted for 46.15% of questions from hospitals with 100–300 beds. Additionally, the most common question from hospitals with at least 300 beds was for histology, followed by primary site, reportability, and stage. There were significant differences in question type depending on hospital designation as a regional cancer center (P = .09). Questions for histology were asked more frequently from hospitals both with and without designation as a regional cancer center. Hospitals that were not regional cancer centers had about five times more questions (4.58%: 0.92%) for first

Table 5. Common Histological Code Questions for Specific Primary Sites

Topography	Morphology	Description	2000–2004	2005–2009	2010–2014	Total
C16	82113	Tubular adenocarcinoma	0	6	0	6
	84903	Signet ring cell carcinoma	0	3	2	5
C18	81403	Adenocarcinoma	0	4	5	9
	82102	Adenocarcinoma in situ in adenomatous polyp	0	6	3	9
	82403	Carcinoid tumor	0	1	4	5
C20	82401	Carcinoid tumor of uncertain malignant potential	1	3	2	6
C22	81603	Cholangiocarcinoma	2	1	3	6
	81703	Hepatocellular carcinoma	1	0	5	6
C42.1	99643	Hypereosinophilic syndrome	0	4	1	5
	99893	Myelodysplastic syndrome	2	3	1	6
C50	85003	Infiltrating ductal carcinoma	1	7	3	11
	85073	Invasive micropapillary carcinoma	0	3	3	6
C67	81302	Papillary transitional cell carcinoma, non-invasive	0	3	2	5
C72	95600	Neurilemmoma, schwannoma	0	5	2	7
C73	82603	Papillary carcinoma of thyroid	1	6	1	8
	83403	Papillary adenocarcinoma, follicular variant	0	3	3	6
	83413	Papillary microcarcinoma	1	0	5	6
C77	95903	Malignant lymphoma	0	6	2	8
	96803	Malignant lymphoma, large B-cell, diffuse	0	4	3	7
		Total	9	68	50	127

Table 6. Analysis of Inquiries by the Affiliated Hospital of the Inquirers Institution

Question type	Hospital type				Number of beds								Designation as regional cancer center			
	Tertiary hospital	(%)	General hospital	(%)	100–300	(%)	301– 600	(%)	601–1000	(%)	1001 or more	(%)	No	(%)	Yes	(%)
Behavior	17	7	30	6.42	0	0	8	8.7	20	4.64	19	10.73	41	6.7	6	5.5
First course of treatment	13	5.35	16	3.43	0	0	6	6.52	18	4.18	5	2.82	28	4.58	1	0.92
Histology	109	44.86	240	51.39	4	30.77	49	53.26	204	47.33	92	51.98	286	46.73	67	61.47
Others	2	0.82	1	0.21	0	0	0	0	20	4.64	4	2.26	23	3.76	2	1.83
Method for diagnosis	13	5.35	11	2.36	1	7.69	3	3.26	19	4.41	9	5.08	26	4.25	6	5.5
Multiple primaries	7	2.88	25	5.35	0	0	1	1.09	1	1	1	0.56	78	12.75	14	12.84
Primary Site	34	13.99	57	12.21	1	7.69	12	14.13	61	14.15	16	9.04	71	11.6	5	4.59
Reportability	22	9.05	53	11.35	1	7.69	7	7.61	47	10.9	20	11.3	56	9.15	8	7.34
Summary stage	28	11.52	35	7.49	6	46.15	5	5.43	41	9.51	11	6.21	3	0.49	0	0
Total	245	100	468	100	13	100	92	100	431	100	177	100	612	100	109	100
	P = 0.06				P = 0.06								P = 0.09			

Table 7. Analysis of Utilization of Inquiry System by Number of Beds

Number of beds	100–300	301–600	601–1,000	1,001 or more	Total
Cancer registration hospital (%)	32 (18.8)	66 (38.8)	59 (34.7)	13 (7.6)	170 (100)
Number of questions (%)	13 (1.8)	92 (12.8)	439 (60.9)	177 (24.5)	721 (100)
Number of hospitals questioned (except duplicated questioned hospital)	6	30	45	13	94
Inquiry performance rate (%)	(6.4)	(31.9)	(47.9)	(13.8)	(100)

course of treatment and about two times more questions for reportability (11.6%: 4.59%) than those designated as regional cancer centers (Table 6). Hospitals with 601–1000 beds asked the highest number of questions. As of 2014, 94 (55.3%) out of 170 hospitals subjected to cancer registration had asked questions. Hospitals with 601–1000 and 1001 or more beds had much more questions relative to the total number of cancer registration hospitals; smaller hospitals had fewer questions (Table 7).

For questions on histology, the highest number of questions was for 814–838 (adenomas and adenocarcinomas) in all sizes of hospitals. Questions with the highest numbers from hospitals with 601–1,000 and 1001 or more beds were for 959–972 (Hodgkin's and non-Hodgkin's lymphomas), 850–854 (ductal and lobular neoplasms), and 844–849 (cystic, mucinous, and serous neoplasms). Inquiries with the highest numbers for primary site were for C15–C26 (digestive organs) and C51–C58 (female genital organs) in all sizes of hospitals. In addition, hospitals with 1000 or more beds asked questions mostly for C73–C75 (thyroid and other endocrine glands) and C42 (hematopoietic and reticuloendothelial systems). Hospitals with 601–1,000 beds had questions mostly for C50 (breast), C30–C39 (respiratory and intrathoracic organs), C77 (lymph nodes), and C69–C72 (eye, brain, and other parts of central nervous system) (Figure 1).

Discussion

Sometimes cancer registration staffs are not confident about the codes to be given during cancer registration. They may encounter medical records of cancer patients in which their clinical knowledge or information on the cancer registration guidelines are insufficient for completing the task of coding. In this regard, the cancer registration inquiry system will be a highly effective consultation method, contributing to improved quality of collected cancer registration data.

The National Program of Cancer Registries in the Unites States recommends operation of a cancer inquiry response system as one of the major activities to be focused on at cancer registration sites (Subramanian et al., 2016). This study found that the number of inquiries on cancer registration gradually increased every year in

Korea. In particular, the number of inquiries increased whenever cancer registration items were added or changed. For example, in 2005, this included the addition of brain tumor. Then, in 2012, these included diagnosis path, laterality, differentiation, metastasized site and the guidelines were revised. In 2013, the Collaborative Stage project was executed. Therefore, the inquiry system of the National Cancer Registration Center functioned as a communication channel with cancer registration hospitals as intended. However, this inquiry system is currently operated by a closed system where questions can be asked only by signing up as a member and logging in to the website of the training center for cancer registration. Moreover, answers are given only to the inquirer, making it difficult to share inquiry results. The system should be improved to share inquiry information and develop an open system like the inquiry system of the SEER Program in the United States (Bernal, 2011).

There were a number of inquiries on histology from hospitals of all sizes regardless of hospital type, except from those with 100–300 beds. There were many inquiries for specific histological codes in certain primary sites. This finding is consistent with the results of a report that indicated if insufficient information about histology classification was provided for liver and intrahepatic duct carcinoma, papillary carcinoma of thyroid, and colonic neuroendocrine tumor, or the terms used by clinicians and pathologists were inconsistent, this could lead to choosing incorrect codes for cancer registration (Brewster, 2002; Altekruse et al., 2011; Kay, 2013). If the same questions are asked repeatedly, it will be necessary to add and announce new guidelines reflecting the opinions of an expert committee and to institute a training program.

Most primary site inquiries were for digestive organs (C15–C26); lymph nodes (C77); hematopoietic and reticuloendothelial systems (C42), and eye, brain, and other parts of the central nervous system (C69–C72). There were more inquiries for eye, brain, and other parts of the central nervous system (C69-C72) in 2005–2009, which may be due to expansion of the scope to benign brain tumor for cancer registration. Questions for lymph nodes (C77) and hematopoietic and reticuloendothelial systems (C42) were continuously asked, which may be due to changes in the codes on the classification system and terms. Specifically, it was found that continuous training and related information must be provided for cancer registration staff to deliver accurate information on items updated or added to the cancer registration system.

In the interaction between cancer registration hospitals and the National Cancer Registration Center for accurate cancer registration information, large cancer registration hospitals had more inquiries when compared with small hospitals. Therefore, the National Cancer Registration Center should make efforts to interact with hospital staff through evaluation of participation in training by cancer registration staff and quality of cancer registration data. In the analysis of question type by hospital, there were a number of questions to be reported for cancer registration from general hospitals, which reflects the characteristics that a significant number of cancer patients only had initial diagnosis in general hospitals without specific examination and moved to tertiary hospitals; therefore, there might be a lack of clinical information to make a decision for cancer registration, or general hospital staff might have insufficient knowledge for cancer registration. Questions for the summary stage accounted for 46.15% of questions from hospitals with 100–300 beds, whereas larger hospitals commonly had more questions on histological codes. Furthermore, tertiary hospitals had more questions for diagnosis methods, which might reflect that they were applying various advanced surgeries, treatments, and examinations more than general hospitals.

There were differences depending on designation as a regional cancer center. A significantly higher number of questions for first course of treatment and reportability in non-designated hospitals seem to be due to a lack of cancer registration experience. Therefore, focusing on frequent inquiry items from general hospital staff and providing training that includes missing information related to cancer registration would be beneficial. In order to increase the accuracy of cancer registration and improve performance, describing cases of the most common or frequent questions in the cancer registration guidelines to provide staff with opportunities for indirect experiences is necessary. It is also necessary to improve training by focusing on questions that pertain to increasing trends. Regardless of hospital type, number of beds, and designation as a regional cancer center hospital, items with the highest number of inquiries by cancer registration staff were histology and primary site. In the long term, it is necessary to provide students with opportunities to experience various cases of cancer registration during cancer registration-related training courses in colleges. Furthermore, it is an effective way to improve quality by training cancer registration staff for cases with frequent questions before working with cancer registration.

In this study, it was difficult to identify characteristics of individual inquirers because information about experiences and knowledge of each individual inquirer could not be ascertained. Therefore, it was not possible to determine the relationship between cancer registration inquiries and the experiences or skill level of individual inquirers.

Consistency and accuracy of response to inquiry greatly affect the quality and reliability of cancer registration data, increasing the ability to activate an interaction between the National Cancer Registration Center and cancer registration staff in hospitals. If clear information cannot be provided in response to an inquiry, or if response time lengthens, this might affect data quality. Therefore, an expert committee should be established that can rapidly respond to inquiries, and it is necessary to prepare related procedures. This would link cancer registration staff of medical institutions extracting cancer registration data with cancer registration centers that collect and manage the data, and enable active sharing of information that will be able to bring about expansion and advancement of the National Cancer Registration Project.

Conflicts of interest
None declared.

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