



Department of Health
and Human Services



Centers for Disease
Control and Prevention



Data Completeness and Quality Audits

Arizona Cancer Registry

Diagnosis Year: 2006

CDC CONTRACT NUMBER: 200-2006-19096

ACKNOWLEDGMENTS

The staff of the Data Completeness and Quality Audits Program would like to thank the Office Chief of the Office of Health Registries of the Arizona Cancer Registry, Georgia Armenta Yee, her staff, and the staff of the participating hospitals for their assistance with this audit. Its success was made possible by their generous and diligent efforts. We gratefully acknowledge their invaluable contribution to achieving standards of data quality and completeness in the collection of data on cancer.

We also thank the Centers for Disease Control and Prevention project officer, Mary Lewis, and Reda Wilson, State Program Consultant, for their participation in and guidance on the technical and administrative aspects of the audit.

Last but not least, we thank the ICF Macro Publications group for its contributions in preparing this report.

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I. INTRODUCTION

Since the beginning of the National Program of Cancer Registries (NPCR), the Division of Cancer Prevention and Control within the Centers for Disease Control and Prevention (CDC) has provided assistance to States funded under NPCR. This assistance includes support in developing and enhancing State cancer registries; continuing with effective registry operations; and monitoring the completeness, timeliness, and quality of data under the auspices of Public Law 102-515 (the National Cancer Registries Amendment Act). States are responsible for ensuring compliance with NPCR program standards for completeness, timeliness, and the quality of data reported to the central cancer registry.

From 1995 through 2000, with funding from CDC, the Public Health Institute (PHI) conducted audits of data completeness and quality through the Cancer Surveillance and Control Program (CSCP). The North American Association of Central Cancer Registries (NAACCR) acted as an advisor to PHI in the design, maintenance, and assessment of the CSCP.

From 2000 through 2005, Macro International Inc. conducted the data completeness and quality audits with funding from CDC, through the CSCP. As of October 1, 2006, Macro (now ICF Macro, an ICF International Company as of April 1, 2009) was awarded a 5-year contract to assess the completeness and accuracy of data of State central cancer registries under the auspices of NPCR. The Data Completeness and Quality Audits (DCQA) Program follows the guidelines set by CDC and NPCR in assessing the completeness and quality of data collected by State cancer registries, providing a comparison of the State's performance with NPCR States' average in an onsite post-audit presentation and recommending approaches that could result in improvement of the State cancer registry's data completeness and accuracy. During this 5-year contract, audits will be conducted in a total of 45 States, the District of Columbia, and Puerto Rico.

II. PURPOSE

The primary purpose of the NPCR DCQA is to assess the case completeness and level of quality of the data collected by NPCR-funded, statewide, population-based cancer registries. These data are a crucial part of cancer surveillance systems because they are used for planning, operating, funding, and evaluating cancer control programs. Complete and accurate data are essential for estimating variations in and changes among population subgroups over time. The audit assessment is based on the existence of the following:

- 1) Appropriate policies and procedures for data collection
- 2) Appropriate policies and procedures for assessment of data quality
- 3) Completeness and quality of data for all reportable cases within the central cancer registry, including hematopoietic and non-malignant central nervous system cases.

III. CONFIDENTIALITY AND SECURITY

All audit functions are performed under the pertinent confidentiality statutes. DCQA staff signed the necessary confidentiality agreements before they were given access to confidential material. Confidential data accessed by DCQA auditors during the audit were used only for the purpose of conducting the audit. Upon completion of the audit's data collection, analysis, and reporting activities, confidential data used during the audit process were either returned to the State or destroyed as required by the statement of disposition in the confidentiality agreement.

IV. MATERIALS AND METHODS

ELIGIBILITY FOR NPCR AUDIT

All States receiving funding from CDC for the operation of a central cancer registry are eligible for an NPCR audit.

Military and Veterans Administration hospitals are not included in this audit because they are not subject to State laws. All other hospitals that report more than 33 new cancer cases and that are required by Arizona State law to report cancer cases to the Arizona Cancer Registry (ACR) are eligible for participation in this audit.

DATA SOURCES

ACR prepared an extract file, a "master abstract file," of all reportable cases diagnosed in 2006. That file was a merged, unduplicated file—that is, it did not contain multiple facility reports for the same reportable malignancy. ACR also provided a master hospital list with the number of analytic cases (class of case 0, 1, or 2) of all reportable cases for each hospital. The list ensured that the hospital was placed in the appropriate caseload category.

DCQA staff used PC SAS software for the sampling. The PC-based NPCR-DCQA audit utility was used for record matching, statistical analysis, and report production. That utility, on laptop computers, was also used by DCQA auditors for record reabstraction and casefinding. Data completeness and accuracy rates were computed as discussed in the Casefinding and Data Quality sections.

By means of statistical evaluation, each facility was placed into a caseload category. The three categories were based on the total analytic cases reported by the hospitals in 2006. One-third of the hospitals with the highest annual reportable caseload were classified as high-caseload facilities, one-third of the hospitals with the lowest annual reportable caseload were classified as low-caseload facilities, and the remaining one-third were classified as medium-caseload facilities.

High caseload:	597 to 1,654 cases
Medium caseload:	181 to 521 cases
Low caseload:	42 to 176 cases

For casefinding, 6 months of casefinding sources were examined in the low-caseload facilities, 4 months of casefinding sources were examined in the medium-caseload facilities, and 3 months of casefinding sources were examined in the high-caseload facilities.

We assessed the reliability of ACR data by 1) performing electronic testing of required data elements to ensure compatibility with *Standards for Cancer Registries, Volume II: Data Standards and Data Dictionary, Eleventh Edition*, 2) reviewing existing information about the data and the system that produced them, and 3) interviewing agency officials knowledgeable about the data. We determined that the data were sufficiently reliable for the purposes of this report.

SELECTING HOSPITAL SAMPLES

Sample hospitals are selected using the probabilities proportional to size (PPS) method. The basic concept of PPS sampling is that the probability of selecting a hospital is proportional to its size. Therefore, when the PPS methodology is used to determine a sample, a hospital with 300 cases would have twice the probability of being selected that a hospital with 150 cases does.

If 10 hospitals are to be selected in a State with 2,000 cancer cases, the probability of selection for a hospital with 200 cases would be 1.0 (i.e., $200 \times 10 / 2000 = 1$) (see the Calculating Variances and Standard Errors appendix).

The chance of a hospital's being selected increases as the caseload of the hospital increases. For example, a hospital with 400 cases has a chance of being selected twice ($400 \times 10 / 2000 = 2$).

In a PPS sampling design, the expected number of "hits" for unit-*i*, $n(i)$, is proportional to the size measure, $S(i)$. The expected hits generalize the probability of selection for "with-replacement" designs in which a unit may be selected more than once. In traditional designs without replacement, the units with probability of selection greater than 1.0 are classified as certainty units. They are then set aside (selected with certainty) so that the without-replacement design can have single hits only.

The notation for a sample size of "n" units, selected out of the "N" units in the frame (or in a given stratum), is: $E n(i) = nS(i)/S(+)$

Here, $S(+)$ is the total size measure, i.e., the sum of the $S(i)$ over all N units in the frame. This approach allows for the multiple selection (multiple hits) of units that are very large, specifically units with size $S(i)$ larger than $S(+)/n$. A brief review of PPS designs is provided in Chromy (1979), and a catalog of 50 PPS procedures is provided in Brewer and Hanif (1982), section 1.6.

If a facility is selected more than once by the PPS model, samples for data quality are also increased accordingly. For example, in the hospital with 400 cases, record samples would be doubled.

SAMPLING FOR MEASURING DATA QUALITY

After a hospital was randomly selected, a fixed number of cases (33 records) were selected by means of a simple random sampling model. In statistics, a simple random sample is a group of subjects (a sample) chosen from a larger group (the population). Each subject from the population is chosen randomly and entirely by chance, such that each subject has the same probability of being chosen at any stage during the sampling process. The selection of a fixed number of cases with equal probabilities, coupled with PPS selection of hospitals, yields an overall sample with equal probabilities—that is, an approximately self-weighting sample. Self-weighting samples facilitate the analysis and enhance the statistical efficiency of sample estimates.

A total of 297 cases (9 facilities * 33 records) were reviewed to assess the data quality in sample facilities. This sample size was determined to achieve sufficient precision for an expected case completion rate of 95 percent.

CASEFINDING PROCESS

The level of case completeness during a selected period is assessed by independently casefinding cancer cases in sample facilities. DCQA auditors used an electronic audit program customized for this audit. For each of the participating hospitals, as many of the available sources as possible were audited for case completeness, including the following:

- Pathology reports (including autopsy, bone-marrow, and other specialized pathology reports)
- Non-gynecologic cytology reports
- Medical Record Disease Indices (MRDI)
- Surgical logbooks and same-day-surgery logbooks
- Outpatient clinic records
- Radiation therapy (RT) clinic logs
- Nuclear medicine logs
- Any other source in the hospital where patients with a reportable neoplasm were diagnosed and/or treated.

Reportable cases that are included in the casefinding activities were determined after reviewing the reporting practices, including reporting requirements, procedure manuals, and coding practices of the State.

After reconciliation of the queried potentially missed, unmatched cases, any new incident cancer case for the audit year that was not in the master extract file was considered a missed case. Overall completeness rates were computed, as well as rates for each caseload category. These rates were applied to the proportion of incident cancer cases in the caseload category for the State.

*Case Completeness Rate (%) = 100 - (Missed Cases/Total Number of Cases Identified) * 100*

*(Example: 100 - (15/1,613) * 100 = 99.1%)*

QUALITY ASSURANCE PROCESS

Reabstracting audits are done to assess the accuracy (agreement with source medical records) and reproducibility (agreement among data collectors) of registry data. The purposes of reabstracting and recoding studies are as follows:

- To standardize interpretation and abstracting of the medical record
- To estimate rates of agreement
- To identify problems in data collection and interpretation.

DCQA auditors reabstracted and recoded data from the source records (in most cases, the hospital medical record) and compared the codes with the data already in the central cancer registry to determine whether the codes matched exactly. Reabstracted cases became the standard against which the previously abstracted cases already in the central cancer registry were compared. Because the auditors were reviewing a medical record against a consolidated case—which might contain information from several other sources—precautions were taken so as not to assess the accuracy of the underlying medical record when attempting to measure the reproducibility of data collection and coding. The consolidated central registry data took precedence over the individual hospital record-level data during the reconciliation process, based on the possibility of the data being derived from multiple facilities.

Cases with queried, unmatched codes were returned to the central registry for reconciliation based on merged, consolidated information from any additional facilities. In some instances, abstracts with queries not able to be resolved at the central registry level were sent to the corresponding participating facility for further reconciliation. A code discrepancy was determined if the original central registry code did not exactly match the auditor's recode, based on information obtained from a review of the medical record at each participating facility.

Overall data accuracy rate estimates were computed, as well as rates for each caseload category. These rates were applied to the proportion of incident cases in the caseload category for the State.

*Data Accuracy (%) = Number of Data Elements Without Discrepancy * 100/Total Data Elements**

** Total Data Elements = Number of Records Reabstracted * Number of Data Elements Reviewed*

V. AUDIT WORK PLAN

MASTER EXTRACT FILE OF ALL REPORTABLE CASES

ACR prepared a master extract file of all reportable cases diagnosed in 2006 among Arizona residents. This master extract file contained consolidated records of multiple abstracts from different facilities for the same reportable case for all sites, including hematopoietic and non-malignant central nervous system cases.

ACR provided a master hospital list of all hospitals in the State. The number of analytic cases reported by each of the facilities was included. A total of 19,978 eligible cases were included in the master extract file submitted by ACR for the diagnosis year 2006. There were 48 eligible hospitals; a total of 6 hospitals with fewer than 33 reported cases were omitted from the sampling frame.

HOSPITAL AND CASE SAMPLES

A refinement was introduced in the hospital sampling methods to distinguish between large and small States. With this more flexible approach, small States could be assigned a smaller number of hospitals (n=6), and large States could be assigned a larger number of sample hospitals (n=12), which differs from the traditional uniform standard (n=9). Smaller hospital sample sizes are recommended in the smallest States because the pool of available hospitals is typically very small. Conversely, the largest States offer an abundance of hospitals for selection. Logistically, these two categories will balance out the data collection efforts. Statistically, the precision will be improved in the largest States by increasing sample sizes. The precision will not be materially affected in the smallest States for two reasons: 1) the number of frame hospitals (or total population hospitals) already limits the sample sizes, and 2) finite population corrections, which lead to smaller variances, are substantial for the small number of frame hospitals.

A total of 9 hospitals were selected by means of PPS modeling. Hospitals selected by caseload and the number of months audited were as follows:

Number of Hospitals Selected	Caseload	Number of Months Audited
4	High	3
2	Medium	4
3	Low	6

REABSTRACTING ACTIVITIES

Two DCQA auditors visited the nine hospitals selected in the random sample. The sample provided an unbiased, independent assessment of the quality of the data because the DCQA auditors had not previously been involved in the reporting or abstracting of any of the cases in the audit sample. The review was considered to be a blind study because the original code

provided by ACR in the extract file was not displayed until the auditor entered the recode based on the information contained in the source document (e.g., the hospital medical record or the radiation oncology medical record). In the event that the codes did not match, the software generated a discrepancy, and the auditor provided a reason for recode to support the different code chosen for that particular data field. This procedure was repeated for every data element included in the review.

One DCQA auditor was responsible for the reabstraction portion of the audit. The master file was uploaded to the NPCR-DCQA audit utility on laptop computers used by the DCQA auditors. The data were reabstracted into the NPCR-DCQA audit utility that had been customized for this audit.

To assess the quality of data, the auditors reabstracted the following data elements:

- 1) Demographic information, including:
 - a. *Date of birth (mm/dd/yyyy) (NAACCR—Birth Date)*
 - b. *Race (per ACR's classification) (NAACCR—Race 1)*
 - c. *Sex*

- 2) Pathology data characterizing the neoplasm, including:
 - a. *Primary site (first three digits of the International Classification of Diseases for Oncology, Third Edition [ICD-O-3] topography code)*
 - b. *Subsite (fourth digit of the ICD-O-3 topography code)*
 - c. *Laterality*
 - d. *Histology (first four digits of the ICD-O-3 morphology code)*
 - e. *Behavior (fifth digit of the ICD-O-3 morphology code)*
 - f. *Grade (sixth digit of the ICD-O-3 morphology code)*
 - g. *Date of diagnosis (mm/yyyy)*
 - h. *Sequence number (central registry) (NAACCR—Sequence Number—Central)*
 - i. *Collaborative stage extension (NAACCR—CS Extension)*
 - j. *Collaborative stage lymph nodes (NAACCR—CS Lymph Nodes)*
 - k. *Collaborative stage metastasis (NAACCR—CS Mets at DX)*

- l. Collaborative stage site-specific factor 1 (NAACCR—CS Site-Specific Factor 1) (Pleura)*
 - m. Collaborative stage site-specific factor 3 (NAACCR—CS Site-Specific Factor 3) (Prostate)*
 - n. Derived summary stage 2000 (NAACCR—Derived SS2000)*
- 3) Treatment data, including:
- a. Date of first course treatment (Commission on Cancer [CoC]) (NAACCR—Date of 1st Crs RX—CoC)*
 - b. Surgery of primary site (NAACCR—RX Summary Surg Prim Site)*
 - c. Regional lymph node surgery (NAACCR—RX Summary Scope Reg LN Sur)*
 - d. Surgery of other regional/distant site (NAACCR—RX Summary Surg Oth Reg/Dis)*
 - e. Radiation therapy (NAACCR—Rad—Regional RX Modality)*
 - f. Chemotherapy (NAACCR—RX Summary Chemo)*
 - g. Hormone therapy (NAACCR—RX Summary Hormone)*
 - h. Biological response modifier therapy (NAACCR—RX Summary BRM)*
 - i. Transplant/endocrine therapy (NAACCR—RX Summary Transplnt/Endocr)*
 - j. Other therapy (NAACCR—RX Summary Other)*

According to the current CDC NPCR contract, the *Collaborative Stage (CS) Site-Specific Factor 1* data element is to be reviewed only in pleura cases, and the *CS Site-Specific Factor 3* data element is to be reviewed only in prostate cases. There were 2 pleura cases randomly selected for review and 31 prostate cases randomly selected for review. Therefore, a total of 7,458 data elements were reviewed during the data quality portion of the audit (297 reabstracted cases * 25 data elements, plus 2 *CS Site-Specific Factor 1* data elements, plus 31 *CS Site-Specific Factor 3* data elements).

Each day when the reabstraction audit was completed for a facility, the database was saved in a password-protected Zip file and uploaded to the secure document server to ensure security and confidentiality and to serve as a backup. Likewise, each day the DCQA principal investigator, program manager, and statistician monitored the audit team's progress to identify potential problems in the audit process and resolve any issues with ACR program personnel.

CASEFINDING ACTIVITIES

One DCQA auditor performed the casefinding audit. As many of the following sources as possible were reviewed for each hospital:

- Pathology reports (including autopsy, bone-marrow, and other specialized pathology reports)
- Non-gynecologic cytology reports
- MRDI
- Surgical logbooks and same-day-surgery logbooks
- Outpatient clinic records
- RT clinic logs
- Nuclear medicine logs
- Any other source in the hospital where patients with a reportable neoplasm were diagnosed and/or treated.

When a reportable neoplasm that did not match the master extract file of reported cases within the specified diagnosis year was found in any of the above-mentioned casefinding sources, a new case accession was created and added to the casefinding audit database. The casefinding audit database contained all the cases that the auditors considered “potentially missed.”

At the end of each workday, the casefinding audit database was saved in a password-protected Zip file and uploaded to the secure document server for backup.

Immediately upon completion of the onsite audit, the director of the central cancer registry was briefed and given an overview of the audit. Only preliminary observations were provided. No final results were available because all queried cases (data discrepancies and potentially missed cases) had not yet been through the reconciliation process.

VI. RECONCILIATION

DCQA staff compiled the unmatched, potentially missed cases and data discrepancies. Both files were matched against the master extract file submitted by ACR. Data abstracts of the queried cases were provided to ACR via the secure document server in Microsoft Word format for initiation of reconciliation within 1 week of the onsite audit. ACR staff collaborated with hospital registry staff to reconcile queried data elements and potentially missed cases that did not match the master extract file. Possible missed cases may be the result of casefinding information on non-Arizona residents, nonreportable neoplasms, or diagnosis years found to be prior to 2006. Possible errors in data quality may be the result of either more complete information from a different facility, problems with record consolidation, or incomplete facility data transmission. At the completion of the reconciliation period, all queried case abstracts were returned to the designated DCQA staff auditor for analysis.

Potentially missed cases and data elements with discrepancies that could not be resolved after the reconciliation process were considered to be “missed cases” and “data quality errors.”

VII. RESULTS AND DISCUSSION

CASEFINDING

The number of cases identified as missed and the sources from which those cases were identified are shown in tables 1A and 1B below and in figures 1 and 2 (see Tables and Charts appendix). There were a total of 56 missed cases. Of these, 54 missed cases (96.4 percent) were identified in one casefinding source, and 2 missed cases (3.6 percent) were found in two casefinding sources. Of the 54 missed cases in one casefinding source, 44 (81.5 percent) were found in the pathology reports alone, followed by 10 missed cases (18.5 percent) in the MRDI alone. Of the 2 missed cases found in two casefinding sources, 1 (50.0 percent) was found in the MRDI and pathology reports and 1 (50.0 percent) in the MRDI and cytology reports.

Table 1A. Number of Missed Cases, by Casefinding Source—Summary Report

Total Missed Cases*	MRDI	Path	RT Log	Cyto	Autopsy	Op Log	Oth
56	12	45	0	1	0	0	0
Summary of missed cases by casefinding source: One source = 54 cases; two sources = 2 cases; three or more sources = none. * Some cases were missed in multiple sources. MRDI = Medical Record Disease Indices Path = Pathology Report RT Log = Radiation Therapy Clinic Log Cyto = Cytology Report Op Log = Surgery/Operation Log Oth = Other Sources							

Table 1B shows the number of missed cases by primary site found in each source reviewed. Among the 56 missed cases, digestive system cases were missed most often with 10 (17.9 percent), followed by urinary system with 9 (16.1 percent), breast with 7 (12.5 percent), non-malignant central nervous system and reportable hematopoietic diseases with 5 each (8.9 percent each), respiratory system and lymphoma with 4 each (7.1 percent each), skin, excluding basal and squamous and male genital system with 3 each (5.4 percent each), female genital system and endocrine system with 2 each (3.6 percent each), and bones and joints and brain and other nervous system with 1 each (1.8 percent each).

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Table 1B. Number of Missed Cases, by Body System and Casefinding Source—Detailed Report

Body System	Total Missed Cases per Site	No. of Missed Cases per Source	Missed Cases by No. of Sources	MRDI	Path	RT Log	Cyto	Autopsy	Op Log	Oth
Digestive System	10	10	1		X					
Respiratory System	4	4	1		X					
Bones and Joints	1	1	1		X					
Skin, Excluding Basal and Squamous	3	3	1		X					
Breast	7	7	1		X					
Female Genital System	2	2	1		X					
Male Genital System	3	3	1		X					
Urinary System	9	9	1		X					
Brain and Other Nervous System	1	1	1	X						
Non-Malignant Central Nervous System	5	5	1	X						
Endocrine System	2	2	1		X					
Lymphoma	4	3	1		X					
		1	2	X	X					
Reportable Hematopoietic Diseases	5	4	1	X						
		1	2	X			X			
MRDI = Medical Record Disease Indices Path = Pathology Report RT Log = Radiation Therapy Clinic Log Cyto = Cytology Report Op Log = Surgery/Operation Log Oth = Other Sources										

As shown in table 1C, the case ascertainment completeness for ACR was estimated at 95.6 percent (94.47 percent to 96.73 percent, with a 95-percent confidence interval of ± 1.13 percent). The medium-caseload facilities attained the highest case ascertainment completeness of 99.45 percent (98.38 percent to 100.52 percent, with a 95-percent confidence interval of ± 1.07 percent). The high-caseload facilities had a case ascertainment completeness of 96.26 percent (95.05 percent to 97.47 percent, with a 95-percent confidence interval of ± 1.21 percent), and the low-caseload facilities had a case ascertainment completeness of 87.01 percent (81.70 percent to 92.32 percent, with a 95-percent confidence interval of ± 5.31 percent).

Table 1C. Case Completeness, by Caseload Category

Caseload	Number of Found Cases	Number of Missed Cases	Number of Found and Missed Cases	Percentage Case Completeness	95% Confidence Interval
High	902	35	937	96.26	± 1.21
Medium	181	1	182	99.45	± 1.07
Low	134	20	154	87.01	± 5.31
Total	1,217	56	1,273	95.60	± 1.13

NPCR’s national standard for central cancer registry completeness states that “ninety-five percent of unduplicated, expected, malignant cases of reportable cancer occurring in State residents should be reported within 24 months of the close of each diagnosis year.”

ACR’s overall estimated case completeness is 95.6 percent for the cancer sites audited. ACR is to be commended for this excellent result.

DATA QUALITY

A total of 297 records were reabstracted for the data quality portion of the audit. As shown in table 2A, 132 reabstracted records were from the high-caseload facilities, 66 were from the medium-caseload facilities, and 99 were from the low-caseload facilities. Data discrepancies were identified in 144 records, representing 48.5 percent of all records reviewed. A total of 60 records with discrepancies were from the high-caseload facilities, representing 41.7 percent of all records with data discrepancies, 26 (18.1 percent) were from the medium-caseload facilities, and 58 (40.3 percent) were from the low-caseload facilities. A total of 153 records (51.52 percent) were error free. The medium-caseload facilities had the highest proportion of error-free records with 60.61 percent, followed by the high-caseload facilities with 54.55 percent and the low-caseload facilities with 41.41 percent.

Table 2A. Data Accuracy for Records Reviewed, by Hospital Caseload Category

Caseload	No. of Records Reabstracted	No. of Records With Discrepancy	No. of Records Without Discrepancy	Percentage of Records Error Free
High	132	60	72	54.55
Medium	66	26	40	60.61
Low	99	58	41	41.41
Total	297	144	153	51.52

Due to the proportional sampling procedure, four high-caseload facilities were randomly selected to participate in the audit. Of the 132 cases randomly selected to be reabstracted at the high-caseload facilities, 15 were prostate cases. There were no pleura cases randomly selected in the high-caseload facilities. This resulted in a total of 3,315 possible data elements that could have errors in this stratum alone (33 records reabstracted at each facility, 25 data elements each, plus 1 additional data element for each of the 15 prostate cases).

Two medium-caseload facilities were randomly selected to participate in the audit. Of the 66 cases randomly selected to be reabstracted, 12 were prostate cases. There were no pleura cases randomly selected in the medium-caseload facilities. This resulted in a total of 1,662 possible data elements that could have errors (33 records reabstracted at each facility, 25 data elements each, plus 1 additional data element for each of the 12 prostate cases).

Three low-caseload facilities were randomly selected to participate in the audit. Of the 99 cases randomly selected to be reabstracted, 4 were prostate cases and 2 were pleura cases. This resulted in a total of 2,481 possible data elements that could have errors (33 records reabstracted at each facility, 25 data elements each, plus 1 additional data element for each of the 4 prostate cases and 1 additional data element for each of the 2 pleura cases).

These factors should be considered when reviewing this final report because they affect the overall data discrepancy totals, the corresponding data accuracy rate, and the comparison of each.

Table 2B describes data elements with and without discrepancies. Of a total of 7,458 possible data elements that could have errors, only 351 data elements (4.71 percent) were found to have discrepancies. The resultant aggregate data accuracy rate was 95.29 percent. The medium-caseload facilities had the highest data accuracy rate with 97.05 percent, followed by the high-caseload facilities with a data accuracy rate of 96.77 percent and the low-caseload facilities with a data accuracy rate of 92.14 percent.

Table 2B. Data Accuracy, by Hospital Caseload Category

Caseload	No. of Critical Data Elements Reviewed	No. of Critical Data Elements With Discrepancy	No. of Critical Data Elements Without Discrepancy	Percentage of Critical Data Elements Error Free
High	3,315	107	3,208	96.77
Medium	1,662	49	1,613	97.05
Low	2,481	195	2,286	92.14
Total	7,458	351	7,107	95.29

As shown in table 2C, the overall data accuracy rate for ACR was estimated at 95.29 percent (94.81 percent to 95.77 percent, with a 95-percent confidence interval of ± 0.48 percent). The data accuracy rate for the medium-caseload facilities was 97.05 percent (96.24 percent to 97.86 percent, with a 95-percent confidence interval of ± 0.81 percent). The high-caseload facilities had a data accuracy rate of 96.77 percent (96.17 percent to 97.37 percent, with a 95-percent confidence interval of ± 0.60 percent), and the data accuracy rate for the low-caseload facilities was 92.14 percent (91.08 percent to 93.20 percent, with a 95-percent confidence interval of ± 1.06 percent).

Table 2C. Data Quality, by Caseload Category and Registry Status

Caseload	Percentage of Data Accuracy	95% Confidence Interval
High	96.77	± 0.60
Medium	97.05	± 0.81
Low	92.14	± 1.06
Total	95.29	± 0.48

The overall data accuracy rate for ACR was 95.29 percent for diagnosis year 2006. ACR is to be commended for this excellent result.

Table 3 and figures 3 through 6 in the Tables and Charts appendix describe discrepancies in data quality in the 27 critical data elements examined.

Of the total 351 discrepancies, respiratory system cases accounted for 100 (28.5 percent), followed by breast cases with 53 (15.1 percent), digestive system cases with 52 (14.8 percent), urinary system cases with 31 (8.8 percent), male genital system cases with 24 (6.8 percent), reportable hematopoietic diseases cases with 16 (4.6 percent), miscellaneous cases with 14 (4.0 percent), lymphoma cases with 12 (3.4 percent), oral cavity and pharynx and non-malignant central nervous system cases with 9 each (2.6 percent each), mesothelioma cases with 8 (2.3 percent), skin, excluding basal and squamous cases with 7 (2.0 percent), female genital system cases with 5 (1.4 percent), endocrine system cases with 4 (1.1 percent), Kaposi

sarcoma cases with 3 (0.9 percent), and soft tissue, including heart and brain and central nervous system cases with 2 each (0.6 percent each).

Of the 351 discrepancies, *Date of First Course RX (CoC)* accounted for the highest number with 56 (16.0 percent), followed by *CS Extension* with 29 (8.3 percent); *Grade* and *RX Summary Chemotherapy* with 28 each (8.0 percent each); *RX Summary Surgery Primary Site* with 27 (7.7 percent); *Derived SS2000* with 22 (6.3 percent); *RX Summary Scope Regional Lymph Node Surgery* with 21 (6.0 percent); *Histology* and *CS Lymph Nodes* with 18 each (5.1 percent each); *CS Metastasis at Diagnosis* with 15 (4.3 percent); *RX Summary Hormone* with 12 (3.4 percent); *Subsite* and *Radiation Regional RX Modality* with 11 each (3.1 percent each); *RX Summary Surgery Other Regional/Distant* with 8 (2.3 percent); *RX Summary Biological Response Modifier* with 7 (2.0 percent); *RX Summary Transplant/Endocrine* and *RX Summary Other* with 6 each (1.7 percent each); *Sequence Number—Central* and *Date of Diagnosis* with 5 each (1.4 percent each); *Laterality* with 4 (1.1 percent); *Race*, *Primary Site*, *Behavior*, and *CS Site-Specific Factor 3* with 3 each (0.9 percent each); and *Sex* and *Date of Birth* with 1 each (0.3 percent each).

RESPIRATORY SYSTEM (C30.0–C39.9)

Respiratory system cases had a total of 100 discrepancies, representing 28.5 percent of the total 351 discrepancies. All 100 discrepancies (100.0 percent) were found in lung and bronchus. A total of 59 medical records were reabstracted for respiratory system.

Of the 100 discrepancies, *Date of First Course RX (CoC)* accounted for 17 (17.0 percent), followed by *CS Extension* with 12 (12.0 percent); *RX Summary Chemotherapy* with 10 (10.0 percent); *Derived SS2000* with 8 (8.0 percent); *RX Summary Surgery Primary Site* and *CS Lymph Nodes* with 7 each (7.0 percent each); *Grade* and *Radiation Regional RX Modality* with 6 each (6.0 percent each); *Histology* with 5 (5.0 percent); *RX Summary Scope Regional Lymph Node Surgery* with 4 (4.0 percent); *CS Metastasis at Diagnosis* with 3 (3.0 percent); *Sequence Number—Central*, *Subsite*, *RX Summary Hormone*, *RX Summary Biological Response Modifier*, *RX Summary Transplant/Endocrine*, and *RX Summary Other* with 2 each (2.0 percent each); and *Date of Diagnosis*, *Primary Site*, and *Laterality* with 1 each (1.0 percent each).

LUNG AND BRONCHUS (C34.1–C34.9)

Date of First Course RX (CoC) had a total of 17 discrepancies:

- 1 case was recoded from 99/99/9999 (unknown) to 09/11/2006 based on operative note documentation of left upper lobe lobectomy on that date.
- 1 case was recoded from 99/99/9999 (unknown) to 07/18/2006 based on consult documentation that there was a recommendation for no treatment on that date.
- 1 case was recoded from 99/99/9999 (unknown) to 07/14/2006 based on discharge summary documentation that the patient would have no treatment and was referred to hospice care.

- 1 case was recoded from 99/99/9999 (unknown) to 03/07/2006 based on discharge summary documentation that the patient refused all treatment on that date.
- 1 case was recoded from 99/99/9999 (unknown) to 04/15/2006 based on history and physical documentation that the patient received Carboplatin and Camptosar as first course treatment on that date.
- 1 case was recoded from 99/99/9999 (unknown) to 09/18/2006 based on follow-up note documentation that the patient received Carboplatin and Taxol as first course treatment on that date.
- 1 case was recoded from 99/99/9999 (unknown) to 02/07/2006 based on follow-up note documentation that the patient received Cisplatin and Etoposide as first course treatment on that date.
- 1 case was recoded from 99/99/9999 (unknown) to 05/22/2006 based on follow-up note documentation that the patient received Carboplatin and Taxol as first course treatment on that date.
- 1 case was recoded from 99/99/9999 (unknown) to 09/99/2006 based on documentation that the patient received chemotherapy and radiation as first course treatment. The treatment date was estimated based on central registry merged data indicating that the patient received treatment in September; the exact date was unknown.
- 1 case was recoded from 99/99/9999 (unknown) to 03/99/2006 based on consult documentation that the patient received Carboplatin and Taxol as first course treatment on that date.
- 1 case was recoded from 00/00/0000 (none) to 05/99/2006 based on consult documentation that the patient received chemotherapy and radiation as first course treatment. The treatment date was estimated based on central registry merged data indicating that the patient received treatment in September; the exact date was unknown.
- 1 case was recoded from 12/21/2006 to 00/00/0000 (none) based on medical record documentation that a plan of first course treatment was not developed.
- 1 case was recoded from 08/04/2006 to 00/00/0000 (none) based on medical documentation that a plan of first course treatment was not developed.
- 1 case was recoded from 08/30/2006 to 00/00/0000 (none) based on medical record documentation that the patient opted to forgo further evaluation or treatment and then expired.
- 1 case was recoded from 12/04/2006 to 00/00/0000 (none) based on medical record documentation that no first course treatment was administered, although chemotherapy was recommended.
- 1 case was recoded from 99/99/9999 (unknown) to 00/00/0000 (none) based on medical record documentation that the patient received no first course treatment.

- 1 case was recoded from 99/99/9999 (unknown) to 00/00/0000 (none) based on medical record documentation that the patient expired prior to receiving recommended first course treatment.

CS Extension had a total of 12 discrepancies:

- 4 cases were recoded from 30 (localized, NOS) to 10 (confined to one lung) based on pathology report documentation of tumor confined to one lobe.
- 1 case was recoded from 99 (unknown) to 88 (not applicable) based on primary site recoded from C34 (lung) to C80.9 (unknown primary).
- 1 case was recoded from 10 (confined to one lung) to 76 (pleural tumor foci separate from direct pleural invasion) based on pathology report documentation of multiple pleural nodules that were positive for malignancy. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.
- 1 case was recoded from 70 (blood vessel(s), major (EXCEPT aorta and inferior vena cava, see codes 74 and 77)) to 73 (adjacent rib) based on chest computed axial tomography (CT) scan documentation of adjacent rib destruction.
- 1 case was recoded from 60 (direct extension to brachial plexus, inferior branches or NOS, from superior sulcus; chest (thoracic) wall; diaphragm; Pancoast tumor (superior sulcus syndrome), NOS; parietal pleura) to 72 (malignant pleural effusion; pleural effusion, NOS) based on chest CT scan documentation of pleural effusion.
- 1 case was recoded from 99 (unknown) to 10 (confined to one lung) based on operative note documentation of a lobectomy performed for a tumor confined to one lung.
- 1 case was recoded from 99 (unknown) to 57 (stated as T3, NOS) based on physician consult documentation of T3 stage disease.
- 1 case was recoded from 99 (unknown) to 20 (extension from other parts of lung to main stem bronchus, NOS; T2) based on physician consult documentation of T2 stage disease.
- 1 case was recoded from 99 (unknown) to 79 (pericardial effusion, NOS; malignant pericardial effusion) based on Positron Emission Tomography (PET) scan documentation of pericardial effusion. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

RX Summary Chemotherapy had a total of 10 discrepancies:

- 6 cases were recoded from 00 (none) to 03 (multiagent chemotherapy administered as first course therapy) based on physician notations that the patient received multiple chemotherapy agents as first course treatment.
- 3 cases were recoded from 00 (none) to 01 (chemotherapy, NOS) based on physician documentation that the patient received chemotherapy; no documentation regarding specific chemotherapy agents was found.

- 1 case was recoded from 00 (none) to 85 (chemotherapy was not administered because the patient died prior to planned or recommended therapy) based on physician report documentation that the patient expired prior to receiving planned chemotherapy.

Derived SS2000 had a total of 8 discrepancies:

- 1 case was recalculated from 1 (localized) to 7 (distant) based on *CS Extension* recode to 76 (pleural tumor foci separate from direct pleural invasion) according to pathology report documentation of multiple pleural nodules positive for malignancy.
- 1 case was recalculated from 2 (regional by direct extension) to 7 (distant) based on *CS Metastasis at Diagnosis* recoded to 40 (distant metastases except distant lymph node(s) (code 10)) based on physician discharge notation of stage IV disease.
- 1 case was recalculated from 4 (regional by both direct extension and lymph node involvement) to 7 (distant) based on *CS Extension* recoded to 73 (adjacent rib) according to chest CT scan documentation of adjacent rib destruction.
- 1 case was recalculated from 9 (unknown) to 4 (regional by both direct extension and lymph node involvement) based on *CS Extension* recoded to 79 (pericardial effusion, NOS; malignant pericardial effusion) according to PET scan documentation of pericardial effusion.
- 1 case was recalculated from 7 (distant) to 3 (regional lymph nodes involved) based on *CS Lymph Nodes* recoded to 20 (regional lymph nodes, ipsilateral) according to chest CT scan documentation of a mediastinal mass and no medical record or central registry documentation of distant metastasis.
- 1 case was recalculated from 7 (distant) to 9 (unknown) based on *Primary Site* recoded to C80.9 (unknown primary) due to a lack of medical record or central registry documentation to indicate a specific primary site.
- 1 case was recalculated from 9 (unknown) to 1 (localized) based on *CS Extension* recoded to 10 (localized) according to central registry documentation of localized disease and *Primary Site* recoded to C80.9 (unknown).
- 1 case was recalculated from 9 (unknown) to 4 (regional by both direct extension and lymph node involvement) based on *CS Lymph Nodes* recoded to 20 (regional lymph nodes, ipsilateral) according to chest CT scan documentation of mediastinal and hilar lymph nodes involved.

RX Summary Surgery Primary Site had a total of 7 discrepancies:

- 2 cases were recoded from 33 (lobectomy with mediastinal lymph node dissection) to 30 (resection of lobe or bilobectomy, but less than the whole lung) based on operative note documentation of lymph node dissection.

- 1 case was recoded from 30 (resection of lobe or lobectomy, but less than the whole lung) to 33 (lobectomy with mediastinal lymph node dissection) based on pathology report documentation of a mediastinal lymphadenectomy performed in conjunction with a lobectomy.
- 1 case was recoded from 20 (excision or resection of less than one lobe, NOS) to 21 (wedge resection) based on operative report documentation of a wedge resection performed.
- 1 case was recoded from 00 (none) to 99 (unknown) due to a lack of medical record documentation regarding first course treatment following patient referral to Mayo Clinic for surgery; unknown if carried out.
- 1 case was recoded from 00 (none) to 98 (not applicable) based on *Primary Site* recoded to C80.9 (unknown primary) due to a lack of medical record documentation to indicate primary site.
- 1 case was recoded from 00 (none) to 33 (lobectomy with mediastinal lymph node dissection) based on medication record documentation of a lobectomy with a mediastinal lymph node dissection.

CS Lymph Nodes had a total of 7 discrepancies:

- 1 case was recoded from 99 (unknown) to 60 (contralateral/bilateral mediastinal/hilar, or ipsilateral/contralateral scalene or supraclavicular lymph nodes) based on PET scan documentation of extensive mediastinal and supraclavicular adenopathy.
- 1 case was recoded from 99 (unknown) to 20 (regional lymph nodes, ipsilateral) based on chest CT scan documentation of mediastinal and hilar lymph nodes involved. This caused a corresponding discrepancy in *Derived SS2000*.
- 1 case was recoded from 99 (unknown) to 00 (none) based on pathology documentation of two lymph nodes removed; both were negative for metastasis.
- 1 case was recoded from 99 (unknown) to 88 (not applicable) based on *Primary Site* recoded to C80.9 (unknown primary) due to a lack of documentation regarding primary site.
- 1 case was recoded from 60 (contralateral/bilateral mediastinal/hilar, or ipsilateral/contralateral scalene or supraclavicular lymph nodes) to 20 (regional lymph nodes, ipsilateral) based on chest CT scan documentation of a large right mediastinal mass. This caused a corresponding discrepancy in *Derived SS2000*.
- 1 case was recoded from 50 (regional lymph nodes, NOS) to 20 (regional lymph nodes, ipsilateral) based on pathology report documentation of removal of multiple mediastinal lymph nodes that were positive for metastasis.
- 1 case was recoded from 00 (none) to 20 (regional lymph nodes, ipsilateral) based on pathology report documentation of removal of left pleural lymph nodes positive for metastasis.

Grade had a total of 6 discrepancies:

- 4 cases were recoded from 3 (poorly differentiated) to 9 (unknown). All 4 cases were recoded due to a lack of pathology report or other medical record documentation regarding a specific tumor grade.
- 2 cases were recoded from 2 (moderately differentiated) to 9 (unknown). Of these, 1 case was recoded due to a lack of pathology report documentation regarding grade; 1 case was recoded based on grade information obtained from a biopsy of a metastatic site (FORDS Manual, p. 96).

Radiation Regional RX Modality had a total of 6 discrepancies:

- 2 cases were recoded from 00 (none) to 98 (other, NOS) based on physician documentation that the patient received radiation therapy, and no documentation regarding the specific treatment modality.
- 1 case was recoded from 00 (none) to 99 (unknown) based on physician consult documentation that noted “planning possible chemotherapy/radiation.” No other information was available regarding whether the patient received treatment.
- 1 case was recoded from 00 (none) to 25 (photons (11–19 MV)) based on physician documentation of radiation modality treatment of 11–19 MV photons administered as part of first course treatment.
- 1 case was recoded from 00 (none) to 24 (photons (6–10 MV)) based on physician documentation of radiation modality treatment of 6–10 MV photons administered as part of first course treatment.
- 1 case was recoded from 00 (none) to 20 (external beam, NOS) based on physician documentation of external beam radiation administered as first course treatment, and no documentation of modality.

Histology had a total of 5 discrepancies:

- 1 case was recoded from 8041 (small cell carcinoma, NOS) to 8140 (adenocarcinoma, NOS) based on cytology report documentation of adenocarcinoma and physician consult documentation that noted “probably adenocarcinoma” (FORDS Manual, p. 3).
- 1 case was recoded from 8046 (non-small cell carcinoma) to 8070 (squamous cell carcinoma, NOS) based on pathology report documentation that noted “favor squamous cell carcinoma.”
- 1 case was recoded from 8070 (squamous cell carcinoma, NOS) to 8071 (squamous cell carcinoma, keratinizing, NOS) based on pathology report documentation of keratinizing squamous cell carcinoma.
- 1 case was recoded from 8140 (adenocarcinoma, NOS) to 8046 (non-small cell carcinoma) based on pathology report documentation of non-small cell carcinoma.

- 1 case was recoded from 8140 (adenocarcinoma, NOS) to 8255 (adenocarcinoma with mixed subtypes) based on pathology report documentation of adenocarcinoma with papillary and bronchioloalveolar features.

RX Summary Scope Regional Lymph Node Surgery had a total of 4 discrepancies:

- 1 case was recoded from 0 (none) to 1 (biopsy or aspiration of regional lymph node, NOS) based on physician operative note documentation of biopsy of mediastinal mass performed.
- 1 case was recoded from 0 (none) to 3 (number of regional nodes removed unknown or not stated) based on operative report documentation of a lobectomy with lymph nodes removed, and no documentation of the exact number.
- 1 case was recoded from 0 (none) to 4 (1 to 3 regional lymph nodes removed) based on operative report documentation of lobectomy with mediastinal lymphadenectomy; two lymph nodes were removed.
- 1 case was recoded from 0 (none) to 9 (unknown) based on *Primary Site* recoded to C80.9 (unknown primary) due to a lack of medical record or central registry documentation regarding primary site.

CS Metastasis at Diagnosis had a total of 3 discrepancies:

- 1 case was recoded from 00 (none) to 99 (unknown) due to a lack of documentation regarding complete patient assessment of locally advanced disease. The presence or absence of metastasis could not be determined.
- 1 case was recoded from 40 (distant metastasis, NOS) to 88 (not applicable) based on *Primary Site* recoded to C80.9 (unknown primary) due to a lack of medical record or central registry documentation regarding a specific primary site. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.
- 1 case was recoded from 99 (unknown) to 00 (none) based on PET scan and brain scan documentation that was negative for distant metastasis.

Sequence Number—Central had a total of 2 discrepancies:

- 1 case was recoded from 00 (one malignant or in situ primary only in the patient's lifetime) to 02 (second of two or more independent malignant or in situ primaries) based on history and physical documentation that the patient also has prostate cancer.
- 1 case was recoded from 00 (one malignant or in situ primary only in the patient's lifetime) to 03 (third of three or more independent malignant or in situ primaries) based on physician consult documentation that the patient had a previous primary malignancy of the cervix and a previous primary malignancy of the vulva.

Subsite had a total of 2 discrepancies:

- 1 case was recoded from C34.1 (upper lobe, lung) to C34.3 (lower lobe, lung) based on operative report documentation of a left lower lobe lobectomy performed.
- 1 case was recoded from C34.9 (lung, NOS) to C34.3 (lower lobe, lung) based on operative report documentation of a large left lower lobe mass with extension into the left upper lobe.

RX Summary Hormone had a total of 2 discrepancies. Both cases were recoded from 99 (unknown) to 00 (none) based on physician documentation. Of these, 1 case was recoded based on discharge summary documentation that only chemotherapy had been recommended; 1 case was recoded based on discharge summary documentation that the patient refused further workup or treatment.

RX Summary Biological Response Modifier had a total of 2 discrepancies. Both cases were recoded from 99 (unknown) to 00 (none). Of these, 1 case was recoded based on discharge summary documentation that only chemotherapy had been recommended; 1 case was recoded based on discharge summary documentation that the patient refused further workup or treatment.

RX Summary Transplant/Endocrine had a total of 2 discrepancies. Both cases were recoded from 99 (unknown) to 00 (none) based on physician documentation. Of these, 1 case was recoded based on discharge summary documentation that only chemotherapy was recommended; 1 case was recoded based on discharge summary documentation that the patient refused further workup or treatment.

RX Summary Other had a total of 2 discrepancies. Both cases were recoded from 9 (unknown) to 0 (none) based on physician documentation. Of these, 1 case was recoded based on discharge summary documentation that only chemotherapy was recommended; 1 case was recoded based on discharge summary documentation that the patient refused further workup or treatment.

Date of Diagnosis had 1 discrepancy, which was recoded from 07/12/2006 to 06/12/2006 based on chest CT scan documentation that noted “the mass in the left lower lobe is suspicious for malignancy.”

Primary Site had 1 discrepancy, which was recoded from C34.9 (lung, NOS) to C80.9 (unknown primary) due to a lack of medical record or central registry documentation regarding a specific primary site.

Laterality had 1 discrepancy, which was recoded from 9 (paired site, but lateral origin unknown) to 0 (organ is not considered to be a paired site) based on *Primary Site* recoded to C80.9 (unknown primary) due to a lack of medical record or central registry documentation to indicate a specific primary site.

BREAST (C50.0–C50.9)

Breast cases had a total of 53 discrepancies, representing 15.1 percent of the total 351 discrepancies. A total of 44 medical records were reabstracted for breast.

Of the 53 discrepancies, *Grade* and *RX Summary Scope Regional Lymph Node Surgery* accounted for 6 each (11.3 percent each), followed by *Histology* with 5 (9.4 percent); *Subsite*, *Date of First Course RX (CoC)*, *RX Summary Chemotherapy*, and *RX Summary Hormone* with 4 each (7.5 percent each); *RX Summary Surgery Primary Site* with 3 (5.7 percent); *Sequence Number—Central*, *CS Extension*, *CS Lymph Nodes*, *CS Metastasis at Diagnosis*, *Derived SS2000*, and *RX Summary Surgery Other Regional/Distant* with 2 each (3.8 percent each); and *Date of Birth*, *Race*, *Sex*, *Behavior*, and *Date of Diagnosis* with 1 each (1.9 percent each).

Grade had a total of 6 discrepancies:

- 2 cases were recoded from 4 (undifferentiated, anaplastic) to 3 (poorly differentiated) based on medical record documentation of grade III/III (FORDS Manual, p. 14).
- 1 case was recoded from 3 (poorly differentiated) to 2 (moderately differentiated or intermediate) based on pathology report documentation of grade II/III (FORDS Manual, pp. 13–14).
- 1 case was recoded from 3 (poorly differentiated) to 2 (moderately differentiated or intermediate) based on pathology report documentation of intermediate grade (FORDS Manual, p. 14).
- 1 case was recoded from 3 (poorly differentiated) to 2 (moderately differentiated or intermediate) based on pathology report documentation of Nottingham grade II/III (FORDS Manual, p. 14).
- 1 case was recoded from 2 (moderately differentiated or intermediate) to 3 (poorly differentiated) based on pathology report documenting high grade, Bloom-Richardson 3 of 3 (FORDS Manual, p. 14).

RX Summary Scope Regional Lymph Node Surgery had a total of 6 discrepancies:

- 2 cases were recoded from 5 (4 or more regional lymph nodes removed) to 6 (sentinel node biopsy and code 3, 4, or 5 at same time, or timing not stated) based on pathology report documentation of an excision of the sentinel lymph node, as well as an axillary lymph node dissection.
- 1 case was recoded from 4 (1–3 regional lymph nodes removed) to 2 (sentinel lymph node biopsy) based on pathology report documentation of three sentinel lymph nodes removed. No other documentation regarding other lymph node removal was found.
- 1 case was recoded from 2 (sentinel lymph node biopsy) to 5 (4 or more regional lymph nodes removed) based on pathology report documentation of 13 negative lymph nodes and no documentation of sentinel lymph node excision.

- 1 case was recoded from 2 (sentinel lymph node biopsy) to 4 (1–3 regional lymph nodes removed) based on central registry documentation that pathology report noted excision of three deep axillary lymph nodes and no documentation that any of these were sentinel lymph nodes.
- 1 case was recoded from 0 (none) to 2 (sentinel lymph node biopsy) based on pathology report documentation of sentinel lymph node excision.

Histology had a total of 5 discrepancies:

- 1 case was recoded from 8523 (duct mixed with other types of carcinoma) to 8510 (medullary carcinoma, NOS) based on pathology report documentation of invasive ductal carcinoma with medullary features.
- 1 case was recoded from 8521 (infiltrating ductular carcinoma) to 8500 (infiltrating duct carcinoma) based on pathology report documentation of infiltrating ductal carcinoma.
- 1 case was recoded from 8520 (lobular carcinoma, NOS) to 8500 (infiltrating duct carcinoma) based on pathology report documentation of infiltrating ductal carcinoma.
- 1 case was recoded from 8507 (intraductal micropapillary carcinoma) to 8523 (duct mixed with other types of carcinoma) based on pathology documentation of ductal carcinoma in situ, cribriform and micropapillary types.
- 1 case was recoded from 8050 (papillary carcinoma) to 8523 (duct mixed with other types of carcinoma) based on outside consult documentation of ductal carcinoma in situ, papillary and cribriform patterns.

Subsite had a total of 4 discrepancies:

- 1 case was recoded from .9 (breast, NOS) to .2 (upper-inner quadrant) based on mammography report documentation of a mass in the right breast at the 2–3 o'clock position.
- 1 case was recoded from .9 (breast, NOS) to .1 (central portion of breast) based on mammography report documentation of a mass in the medial area.
- 1 case was recoded from .3 (lower-inner quadrant) to .5 (lower-outer quadrant) based on mammography report documentation of calcifications in the right lower-outer quadrant, subsequently found to be malignant.
- 1 case was recoded from .1 (central portion of breast) to .8 (overlapping lesion of breast) based on breast ultrasound documentation of a mass at the 6 o'clock position.

Date of First Course RX (CoC) had a total of 4 discrepancies:

- 1 case was recoded from 99/99/9999 (unknown) to 02/18/2006 based on medical record medication sheet and discharge summary documentation of administration of Arimidex on 02/18/2006.

- 1 case was recoded from 11/17/2006 to 10/25/2006 based on documentation of an excisional on that date; the biopsy was followed by reexcision with no residual cancer.
- 1 case was recoded from 08/03/2006 to 08/14/2006 based on pathology report documentation of a needle biopsy only, followed by lumpectomy and sentinel lymph node excision on 08/14/2006.
- 1 case was recoded from 07/18/2006 to 06/29/2006 based on pathology report documentation on 06/29/2006 that no residual disease was found.

RX Summary Chemotherapy had a total of 4 discrepancies:

- 2 cases were recoded from 00 (none, chemotherapy was not part of the planned first course of therapy) to 88 (chemotherapy was recommended, but it is unknown if it was administered). Of these, 1 case was recoded based on history and physical report documentation of insertion of an infusaport device for planned chemotherapy; 1 case was recoded based on medical record admit note documentation that noted the patient was “pre-chemo”; it was unknown whether the chemotherapy was administered.
- 1 case was recoded from 99 (it is unknown whether a chemotherapeutic agent(s) was recommended or administered because it is not stated in patient record) to 00 (none, chemotherapy was not part of the planned first course of therapy) based on medical record documentation that no chemotherapy was administered or planned.
- 1 case was recoded from 99 (it is unknown whether a chemotherapeutic agent(s) was recommended or administered because it is not stated in patient record) to 00 (none, chemotherapy was not part of the planned first course of therapy) based on history and physical report documentation of a simple mastectomy performed, and medical record documentation that hormone therapy was a possibility. No documentation regarding chemotherapy as part of first course treatment was found.

RX Summary Hormone had a total of 4 discrepancies:

- 2 cases were recoded from 00 (none, hormone therapy was not part of the planned first course of therapy) to 01 (hormone therapy administered as first course therapy). Of these, 1 case was recoded based on inpatient medication sheet documentation that the patient received Tamoxifen; 1 case was recoded based on medication sheet documentation that the patient received Arimidex.
- 1 case was recoded from 99 (it is unknown whether a hormonal agent(s) was recommended or administered because it is not stated in patient record) to 00 (none, hormone therapy was not part of the planned first course of therapy) based on medical record documentation that the patient received no hormone treatment.

- 1 case was recoded from 00 (none, hormone therapy was not part of the planned first course of therapy) to 87 (hormone therapy was not administered. It was recommended by the patient's physician, but this treatment was refused by the patient, a patient's family member, or the patient's guardian. The refusal was noted in the patient record) based on central registry documentation that the patient was given a prescription for Arimidex but did not take it due to concerns about side effects.

RX Summary Surgery Primary Site had a total of 3 discrepancies:

- 1 case was recoded from 23 (reexcision of the biopsy site for gross or microscopic residual disease) to 22 (lumpectomy or excisional biopsy) based on pathology report documentation of a needle biopsy only, followed by lumpectomy and sentinel lymph node excision.
- 1 case was recoded from 22 (lumpectomy or excisional biopsy) to 41 (total simple mastectomy without removal of uninvolved contralateral breast) based on operative report and pathology report documentation of a right mastectomy with sentinel lymph node excision performed.
- 1 case was recoded from 50 (modified radical mastectomy) to 51 (modified radical mastectomy without removal of uninvolved contralateral breast) based on pathology report documentation of a left mastectomy only, and no documentation regarding plans to remove the contralateral breast.

Sequence Number—Central had a total of 2 discrepancies:

- 1 case was recoded from 01 (first of two or more independent malignant or in situ primaries) to 00 (one malignant or in situ primary only in the patient's lifetime) due to a lack of medical record or central registry documentation regarding a subsequent primary malignancy.
- 1 case was recoded from 00 (one malignant or in situ primary only in the patient's lifetime) to 02 (second of two or more independent malignant or in situ primaries) based on history and physical report documentation of a previous breast primary in 2003.

CS Extension had a total of 2 discrepancies:

- 1 case was recoded from 99 (unknown extension, primary tumor cannot be assessed; not documented in patient record) to 10 (confined to breast tissue and fat including nipple and/or areola, localized, NOS) based on operative report and pathology report documentation that the tumor was confined to the breast; all seven lymph nodes were negative.
- 1 case was recoded from 00 (in situ: noninfiltrating, intraepithelial; intraductal without infiltration; lobular neoplasia) to 10 (confined to breast tissue and fat including nipple and/or areola; localized, NOS) based on pathology report documentation of invasive ductal carcinoma, confined to the breast.

CS Lymph Nodes had a total of 2 discrepancies:

- 1 case was recoded from 99 (unknown; not stated; regional lymph node(s) cannot be assessed; not documented in patient record) to 00 (none; no regional lymph node involvement, including ITCs detected by immunohistochemistry or molecular methods ONLY) based on operative report and pathology report documentation of the tumor confined to the breast; all seven lymph nodes were negative.
- 1 case was recoded from 60 (axillary/regional lymph node(s), NOS; lymph nodes NOS) to 25 (movable axillary lymph node(s), ipsilateral, positive with more than micrometastasis [i.e., at least one metastasis greater than 2 mm]) based on pathology report documentation of metastatic cancer in six/seven lymph nodes, with the largest lymph node measured at 1 cm. The lymph node metastasis was not fixed or matted.

CS Metastasis at Diagnosis had a total of 2 discrepancies. Both cases were recoded from 99 (unknown if distant metastasis; distant metastasis cannot be assessed; not documented in patient record) to 00 (none). Of these, 1 case was recoded based on operative report and pathology report documentation of tumor confined to the breast, all seven lymph nodes negative; no evidence of metastasis according to physician documentation. 1 case was recoded based on medical record documentation of reconstruction performed based on localized extent of disease.

Derived SS2000 had a total of 2 discrepancies:

- 1 case was recalculated from 9 (unknown) to 1 (localized) based on operative report and pathology report documentation of the malignancy confined to the breast; all seven lymph nodes were negative and, according to physician documentation, there was no other evidence of metastasis.
- 1 case was recalculated from 0 (in situ) to 1 (localized) based on pathology report documentation of invasive ductal carcinoma, confined to the breast.

RX Summary Surgery Other Regional/Distant had a total of 2 discrepancies:

- 1 case was recoded from 5 (combination of codes; any combination of surgical procedures 2, 3, or 4) to 0 (none) based on central registry documentation that no surgery to other regional/distant sites had been performed.
- 1 case was recoded from 2 (nonprimary surgical procedure to other regional sites (resection of other site)) to 0 (none) due to a lack of medical record or central registry documentation to support surgery to a regional or distant site.

Date of Birth had 1 discrepancy, which was recoded from 10/19/1924 to 10/17/1924 based on medical record patient registration documentation of 10/17/1924 as the date of birth.

Race had 1 discrepancy, which was recoded from 03 (American Indian, Aleutian, or Eskimo) to 99 (unknown) due to a lack of any medical record or central registry documentation regarding a specific race.

Sex had 1 discrepancy, which was recoded from 1 (male) to 2 (female) based on medical record documentation of the patient as female.

Behavior had 1 discrepancy, which was recoded from 2 (in situ and/or carcinoma in situ) to 3 (invasive) based on pathology report documentation of infiltrating ductal carcinoma.

Date of Diagnosis had 1 discrepancy, which was recoded from 01/11/2006 to 02/24/2006 due to a lack of medical record documentation for the earlier date; subsequently diagnosed with breast cancer on 02/24/2006.

DIGESTIVE SYSTEM (C15.0–C26.9)

Digestive system cases had a total of 52 discrepancies, representing 14.8 percent of the total 351 discrepancies. Of these, colon had 23 (44.2 percent), followed by rectum with 10 (19.2 percent), rectosigmoid junction with 9 (17.3 percent), pancreas with 8 (15.4 percent), and stomach and anus with 1 each (1.9 percent each). A total of 43 medical records were reabstracted for digestive system.

Of the 52 discrepancies, *Date of First Course RX (CoC)* accounted for 10 (19.2 percent), followed by *RX Summary Chemotherapy* and *CS Lymph Nodes* with 6 each (11.5 percent each); *RX Summary Surgery Primary Site* with 5 (9.6 percent); *CS Extension, Metastasis at Diagnosis*, and *Derived SS2000* with 4 each (7.7 percent each); *Grade* with 3 (5.8 percent); *RX Summary Scope Regional Lymph Node Surgery*, *RX Surgery Other Regional/Distant*, and *Radiation Regional RX Modality* with 2 each (3.8 percent each); and *Race, Date of Diagnosis, Subsite*, and *Histology* with 1 each (1.9 percent each).

COLON (C18.0–C18.9)

Colon cases had 23 discrepancies, 44.2 percent of the discrepancies found in the digestive system. Of these, *CS Lymph Nodes* accounted for 4 (17.4 percent), followed by *RX Summary Surgery Primary Site* and *RX Summary Chemotherapy* with 3 each (13.0 percent each); *Grade, Date of First Course RX (CoC)*, and *Derived SS2000* with 2 each (8.7 percent each); and *Race, Subsite, Histology, RX Summary Scope Regional Lymph Node Surgery, RX Summary Surgery Other Regional/Distant, CS Extension*, and *CS Metastasis at Diagnosis* with 1 each (4.3 percent each).

CS Lymph Nodes had a total of 4 discrepancies:

- 1 case was recoded from 10 (regional lymph nodes all colon sites) to 00 (none, no regional lymph node involvement) based on pathology report documentation that all lymph nodes were negative for metastasis. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

- 1 case was recoded from 20 (regional lymph nodes for specific subsites) to 30 (regional lymph nodes, NOS) based on pathology report documentation of 1 of 10 metastatic regional lymph nodes.
- 1 case was recoded from 80 (lymph nodes, NOS) to 45 (stated as N2 pathologic) based on medical record documentation of physician pathologic stage N2.
- 1 case was recoded from 00 (none, no regional lymph node involvement) to 99 (unknown, not stated) due to a lack of medical record documentation regarding the presence or absence of lymph node metastasis.

RX Summary Surgery Primary Site had a total of 3 discrepancies:

- 1 case was recoded from 80 (colectomy, NOS) to 40 (subtotal colectomy/hemicolectomy [total right or left colon and a portion of transverse colon]) based on operative pathology report documentation of a right colectomy performed.
- 1 case was recoded from 30 (partial colectomy, segmental resection) to 40 (subtotal colectomy/hemicolectomy [total right or left colon and a portion of transverse colon]) based on documentation of a right colectomy performed.
- 1 case was recoded from 00 (none) to 30 (partial colectomy, segmental resection) based on operative and pathology report documentation of a sigmoid colon resection performed.

RX Summary Chemotherapy had a total of 3 discrepancies:

- 1 case was recoded from 00 (none) to 01 (chemotherapy, NOS) based on physician notation documentation that the patient received chemotherapy and no further documentation regarding specific type of chemotherapy.
- 1 case was recoded from 99 (unknown) to 01 (chemotherapy, NOS) based on the history and physical report documentation that the patient received outpatient chemotherapy and no further documentation regarding specific type of chemotherapy.
- 1 case was recoded from 00 (none) to 88 (chemotherapy was recommended, unknown if it was administered) based on oncology consult documentation of a recommendation of chemotherapy but no medical record or central registry documentation that it was carried out.

Grade had a total of 2 discrepancies:

- 1 case was recoded from 1 (well differentiated) to 2 (moderately differentiated) based on pathology report documentation of moderately differentiated.
- 1 case was recoded from 3 (poorly differentiated) to 9 (unknown) due to a lack of pathology report documentation of tumor grade. No other grade information was found in the medical record.

Date of First Course RX (CoC) had a total of 2 discrepancies:

- 1 case was recoded from 99/99/9999 (unknown) to 08/25/2006 based on operative report documentation of a sigmoid colon resection procedure performed on 08/25/2006.
- 1 case was recoded from 05/25/2006 to 05/24/2006 based on operative report documentation of the resection procedure date.

Derived SS2000 had a total of 2 discrepancies:

- 1 case was recalculated from 3 (regional lymph nodes involved) to 1 (localized only) based on *CS Lymph Nodes* recoded to 00 (none, no regional lymph node involvement) according to pathology report documentation of negative lymph nodes.
- 1 case was recalculated from 3 (regional lymph nodes involved) to 7 (distant) based on *CS Metastasis at Diagnosis* recoded to 40 (distant metastases except distant lymph node[s]) based on a chest CT scan documentation of metastatic disease in the lung.

Race had 1 discrepancy, which was recoded from 03 (American Indian) to 01 (White) based on patient registration form documentation of Hispanic.

Subsite had 1 discrepancy, which was recoded from .9 (colon, NOS) to .2 (ascending colon) based on operative and pathology report documentation of a malignant mass in the right colon.

Histology had 1 discrepancy, which was recoded from 8140 (adenocarcinoma, NOS) to 8263 (adenocarcinoma in a tubulovillous adenoma) based on pathology report documentation of adenocarcinoma arising in a tubulovillous adenoma.

RX Summary Scope Regional Lymph Node Surgery had 1 discrepancy, which was recoded from 0 (none) to 5 (4 or more regional lymph nodes removed) based on operative and pathology report documentation of a sigmoid resection with excision of 11 regional lymph nodes.

RX Summary Surgery Other Regional/Distant had 1 discrepancy, which was recoded from 2 (nonprimary surgical procedure to other regional sites) to 0 (none) due to a lack of medical record documentation regarding a surgical procedure of a regional or distant site performed.

CS Extension had 1 discrepancy, which was recoded from 20 (muscularis propria invaded) to 50 (invasion of/through serosa) based on pathology report documentation of tumor extension into the serosal surface.

CS Metastasis at Diagnosis had 1 discrepancy, which was recoded from 99 (unknown if distant metastasis, not documented in patient record) to 40 (distant metastases except distant lymph node[s]) based on chest CT scan documentation of metastasis to the lung. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

RECTUM (C20.9)

Rectum cases had 10 discrepancies, 19.2 percent of the discrepancies found in the digestive system. Of these, *Date of First Course RX (CoC)* accounted for 3 (30.0 percent), followed by *Date of Diagnosis*, *RX Summary Surgery Primary Site*, *RX Summary Surgery Other Regional/Distant*, *Radiation Regional RX Modality*, *RX Summary Chemotherapy*, *CS Lymph Nodes*, and *CS Metastasis at Diagnosis* with 1 each (10.0 percent each).

Date of First Course RX (CoC) had a total of 3 discrepancies:

- 1 case was recoded from 99/99/9999 (unknown) to 09/27/2006 based on medical record documentation of synchronous radiation and chemotherapy started on 09/27/2006.
- 1 case was recoded from 05/02/2006 to 00/00/0000 (none) based on medical record documentation of a biopsy only and no other treatment planned or given.
- 1 case was recoded from 07/22/2006 to 08/29/2006 based on medical record documentation of synchronous radiation and chemotherapy started on 08/29/2006.

Date of Diagnosis had 1 discrepancy, which was recoded from 07/22/2006 to 08/02/2006 based on oncology consult documentation of a diagnostic biopsy performed on 08/02/2006.

RX Summary Surgery Primary Site had 1 discrepancy, which was recoded from 00 (none) to 50 (total proctectomy) based on documentation of an abdominoperineal resection.

RX Summary Surgery Other Regional/Distant had 1 discrepancy, which was recoded from 9 (unknown) to 3 (nonprimary surgical procedure to distant lymph node[s]) based on documentation of paracolonc lymph nodes removed. Paracolonc lymph nodes are considered distant for rectal primaries.

Radiation Regional RX Modality had 1 discrepancy, which was recoded from 00 (none) to 25 (photons [11–19 MV]) based on documentation of chemoradiation 09/27/2006 with 11–19 MV photons and 5-FU.

RX Summary Chemotherapy had 1 discrepancy, which was recoded from 00 (none) to 02 (single agent chemotherapy) based on documentation of chemotherapy 5-FU on 09/27/2006.

CS Lymph Nodes had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none, no regional lymph node involvement) based on abdomen and pelvis CT scan documentation of no evidence of metastatic disease.

CS Metastasis at Diagnosis had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on abdomen and pelvis CT scan documentation of no evidence of metastatic disease.

RECTOSIGMOID JUNCTION (C19.9)

Rectosigmoid junction cases had 9 discrepancies, 17.3 percent of the discrepancies found in the digestive system. Of these, 1 each (11.1 percent each) was found in *Date of First Course RX (CoC)*, *RX Summary Surgery Primary Site*, *RX Summary Scope Regional Lymph Node Surgery*, *Radiation Regional RX Modality*, *RX Summary Chemotherapy*, *CS Extension*, *CS Lymph Nodes*, *CS Metastasis at Diagnosis*, and *Derived SS2000*.

Date of First Course RX (CoC) had 1 discrepancy, which was recoded from 99/99/9999 (unknown) to 08/24/2006 based on documentation of neoadjuvant chemotherapy and radiation started on 08/24/2006.

RX Summary Surgery Primary Site had 1 discrepancy, which was recoded from 00 (none) to 30 (wedge or segmental resection; anterior resection) based on operative and pathology report documentation of a low anterior resection performed.

RX Summary Scope Regional Lymph Node Surgery had 1 discrepancy, which was recoded from 0 (none) to 5 (4 or more regional lymph nodes removed) based on pathology report documentation of six paracolic lymph nodes removed.

Radiation Regional RX Modality had 1 discrepancy, which was recoded from 00 (none) to 25 (photons [11–19 MV]) based on radiation therapy documentation of 11–19 MV.

RX Summary Chemotherapy had 1 discrepancy, which was recoded from 00 (none) to 01 (chemotherapy, NOS) based on hematology oncology consult documentation that the patient began chemoradiation therapy.

CS Extension had 1 discrepancy, which was recoded from 99 (unknown extension) to 50 (invasion of/through serosa) based on pathology report documentation of T4 as well as perforation of the muscularis propria with involvement of the adipose tissue and involvement of the serosa. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

CS Lymph Nodes had 1 discrepancy, which was recoded from 99 (unknown; not stated) to 10 (regional lymph nodes—rectosigmoid: paracolic/pericolic, perirectal, rectal, nodule[s] or foci in pericolic fat/adjacent mesentery/mesocolic fat) based on pathology report documentation of metastasis to four of six paracolic lymph nodes. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

CS Metastasis at Diagnosis had 1 discrepancy, which was recoded from 99 (unknown if distant metastasis) to 00 (none) based on physician staging of M0.

Derived SS2000 had 1 discrepancy, which was recalculated from 9 (unknown) to 4 (regional by both direct extension and ipsilateral regional lymph node[s] involved) based on *CS Extension* recoded to 50 (invasion of/through serosa) and *CS Lymph Nodes* recoded to 10 (regional lymph nodes—rectosigmoid: paracolic/pericolic, perirectal, rectal, nodule[s] or foci in pericolic

fat/adjacent mesentery/mesocolic fat) according to pathology report documentation of invasion of the serosa and involvement of paracolon lymph nodes.

PANCREAS (C25.0–C25.9)

Pancreas cases had 8 discrepancies, 15.4 percent of the discrepancies found in the digestive system. Of these, *Date of First Course RX (CoC)* and *CS Extension* accounted for 2 each (25.0 percent each), followed by *Grade*, *RX Summary Chemotherapy*, *CS Metastasis at Diagnosis*, and *Derived SS2000* with 1 each (12.5 percent each).

Date of First Course RX (CoC) had a total of 2 discrepancies:

- 1 case was recoded from 00/00/0000 (none) to 99/99/9999 (unknown) based on hematology oncology note documentation of planned palliative chemotherapy; unknown if carried out.
- 1 case was recoded from 03/30/2006 to 04/13/2006 based on documentation of gemcitabine started on the later date.

CS Extension had a total of 2 discrepancies:

- 1 case was recoded from 73 (gallbladder, liver [including porta hepatis]) to 10 (confined to pancreas) based on abdomen/pelvis CT scan documentation of a mass in the tail of the pancreas with probable metastatic discontinuous lesions in the liver (CS Manual, Part II, p. 229, Note 2).
- 1 case was recoded from 99 (unknown extension) to 10 (confined to pancreas) based on operative report documentation of a mass confined to pancreas. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

Grade had 1 discrepancy, which was recoded from 3 (poorly differentiated) to 9 (unknown) due to a lack of grade information available in the medical record or the central registry.

RX Summary Chemotherapy had 1 discrepancy, which was recoded from 00 (none) to 88 (chemotherapy was recommended, but it is unknown if it was administered) based on hematology oncology progress note documentation of planned chemotherapy (gemcitabine); unknown if carried out.

CS Metastasis at Diagnosis had 1 discrepancy, which was recoded from 99 (unknown if distant metastasis) to 40 (distant metastases except distant lymph node[s]) based on abdomen/pelvis CT scan documentation of discontinuous lesions in the liver, probably metastatic disease.

Derived SS2000 had 1 discrepancy, which was recalculated from 9 (unknown) to 1 (localized) based on *CS Extension* recoded to 10 (confined to pancreas) based on operative report documentation of the primary malignancy confined to pancreas.

STOMACH (C16.0–C16.9)

Stomach cases had 1 discrepancy, 2.0 percent of the discrepancies found in the digestive system. This single discrepancy (100.0 percent) was found in *Date of First Course RX (CoC)* and was recoded from 99/99/9999 (unknown) to 08/18/2006 based on medical record documentation on 08/18/2006 that no treatment was recommended; the patient was referred to hospice care.

ANUS (C21.0)

Anus cases had 1 discrepancy, 2.0 percent of the discrepancies found in the digestive system. This single discrepancy (100.0 percent) was found in *Date of First Course RX (CoC)* and was recoded from 02/16/2006 to 02/14/2006 based on pathology and operative report documentation of an abdominal perineal resection performed on 02/14/2006.

URINARY SYSTEM (C64.9–C68.9)

Urinary system cases had a total of 31 discrepancies, representing 8.8 percent of the total 351 discrepancies. Of these, bladder had 17 (54.8 percent), followed by kidney with 12 (38.7 percent) and renal pelvis with 2 (6.5 percent). A total of 28 medical records were reabstracted for urinary system.

Of the 31 discrepancies, *Date of First Course RX (CoC)* accounted for 6 (19.4 percent), followed by *Grade, RX Surgery Primary Site, and CS Extension* with 5 each (16.1 percent each); *Histology* and *Derived SS2000* with 2 each (6.5 percent each); and *Race, Subsite, Behavior, CS Metastasis at Diagnosis, RX Summary Scope Regional Lymph Node Surgery, and RX Summary Biological Response Modifier* with 1 each (3.2 percent each).

BLADDER (C67.0–C67.9)

Bladder cases had 17 discrepancies, 54.8 percent of the discrepancies found in the urinary system. Of these, *CS Extension* accounted for 3 (17.6 percent), followed by *Grade, Date of First Course RX (CoC), Derived SS2000, and RX Summary Surgery Primary Site* with 2 each (11.8 percent each) and *Subsite, Histology, Behavior, CS Metastasis at Diagnosis, RX Summary Scope Regional Lymph Node Surgery, and RX Summary Biological Response Modifier* with 1 each (5.9 percent each).

CS Extension had a total of 3 discrepancies:

- 1 case was recoded from 99 (extension unknown; not documented in patient record) to 20 (muscle [muscularis] invaded, NOS) based on pathology report documentation of focal invasion of the muscular bladder wall. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

- 1 case was recoded from 99 (extension unknown; not documented in patient record) to 01 (papillary transitional cell carcinoma, stated to be non-invasive; papillary non-infiltrating) based on pathology report documentation of papillary transitional cell carcinoma without evidence of invasion. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.
- 1 case was recoded from 41 (extension to perivesical fat [microscopic]) to 40 (adventitia; perivesical fat/tissue, NOS; periureteral fat/tissue; extension to/through serosa (mesothelium); peritoneum) based on central registry confirmation of cystoprostatectomy pathology report documentation of infiltration into fibroadipose tissue.

Grade had a total of 2 discrepancies:

- 1 case was recoded from 9 (unknown) to 3 (poorly differentiated) based on pathology report documentation of papillary transitional cell carcinoma, grade 2/3 (FORDS Manual, p. 97).
- 1 case was recoded from 1 (well differentiated) to 2 (moderately differentiated) based on pathology report documentation of low grade (FORDS Manual, p. 13).

Date of First Course RX (CoC) had a total of 2 discrepancies:

- 1 case was recoded from 99/99/9999 (unknown) to 07/24/2006 based on 07/24/2006 operative and pathology report documentation of a transurethral resection of bladder tumor (TURBT).
- 1 case was recoded from 11/06/2006 to 11/02/2006 based on 11/16/2006 history and physical documentation of a TURBT performed 2 weeks previously.

Derived SS2000 had a total of 2 discrepancies:

- 1 case was recalculated from 9 (unknown) to 1 (localized) based on *CS Extension* recoded to 20 (muscle [muscularis] invaded, NOS) according to pathology report documentation of focal invasion of the muscular bladder wall.
- 1 case was recalculated from 7 (distant) to 0 (in situ) based on *CS Extension* recoded to 01 (papillary transitional cell carcinoma, stated to be non-invasive; papillary non-infiltrating) according to pathology report documentation of papillary transitional cell carcinoma without evidence of invasion.

RX Summary Surgery Primary Site had a total of 2 discrepancies:

- 1 case was recoded from 27 (excisional biopsy) to 22 (electrocautery) based on operative report documentation of a TURBT and cauterization with electrode performed.
- 1 case was recoded from 00 (none) to 27 (excisional biopsy) based on operative and pathology report documentation of a TURBT performed.

Subsite had 1 discrepancy, which was recoded from .9 (bladder, NOS) to .6 (ureteric orifice) based on operative report documentation of a large bladder tumor of the right ureteral orifice.

Histology had 1 discrepancy, which was recoded from 8120 (transitional cell carcinoma, NOS) to 8130 (papillary transitional cell carcinoma) based on pathology report documentation of papillary transitional cell carcinoma.

Behavior had 1 discrepancy, which was recoded from 3 (invasive) to 2 (in situ) based on pathology report documentation of papillary transitional cell carcinoma with no evidence of invasion.

CS Metastasis at Diagnosis had 1 discrepancy, which was recoded from 40 (distant metastases, NOS) to 00 (none) based on radiographic imaging report documentation (chest and abdominal/pelvis CT scans) of the absence of metastasis.

RX Summary Scope Regional Lymph Node Surgery had 1 discrepancy, which was recoded from 4 (1–3 regional lymph nodes removed) to 5 (4 or more regional lymph nodes removed) based on pathology report documentation of 18 regional lymph nodes removed.

RX Summary Biological Response Modifier had 1 discrepancy, which was recoded from 00 (none) to 01 (immunotherapy administered as first course therapy) based on operative report documentation of TURBT followed by a 6-week course of Bacillus Calmette-Guerin.

KIDNEY (C64.9)

Kidney cases had 12 discrepancies, 38.7 percent of the discrepancies found in the urinary system. Of these, *Date of First Course RX (CoC)* accounted for 4 (33.3 percent), followed by *Grade* with 3 (25.0 percent), *CS Extension* and *RX Summary Surgery Primary Site* with 2 each (16.7 percent each), and *Histology* with 1 (8.3 percent).

Date of First Course RX (CoC) had a total of 4 discrepancies:

- 1 case was recoded from 99/99/9999 (unknown) to 11/12/2006 based on discharge summary documentation that the patient declined surgery and opted for hospice care.
- 1 case was recoded from 99/99/9999 (unknown) to 08/18/2006 based on 08/18/2006 operative report documentation of a radical nephrectomy performed.
- 1 case was recoded from 99/99/9999 (unknown) to 07/25/2006 based on discharge summary documentation stating that a treatment decision of hospice care was made on 07/25/2006.
- 1 case was recoded from 99/99/9999 (unknown) to 06/26/2006 based on 06/26/2006 operative pathology report documentation of a left radical nephrectomy.

Grade had a total of 3 discrepancies. All 3 discrepancies were recoded from 3 (poorly differentiated) to 9 (unknown). Of these, 1 case was recoded based on grade information

obtained from a biopsy of a metastatic site (FORDS Manual, p. 96); 2 cases were recoded due to a lack of medical record documentation regarding a specific grade.

CS Extension had a total of 2 discrepancies:

- 1 case was recoded from 99 (unknown extension) to 10 (invasive cancer confined to kidney cortex and/or medulla) based on radical nephrectomy operative and pathology report documentation of a tumor confined to the kidney.
- 1 case was recoded from 30 (localized, NOS) to 10 (invasive cancer confined to kidney cortex and/or medulla) based on operative and pathology report documentation of a tumor confined to the kidney without capsular penetration and with clear margins.

RX Summary Surgery Primary Site had a total of 2 discrepancies. Both discrepancies were recoded from 00 (none) to 50 (radical nephrectomy) based on operative procedure documentation of a radical nephrectomy performed.

Histology had 1 discrepancy, which was recoded from 8312 (renal cell carcinoma, NOS) to 8310 (clear cell carcinoma, NOS) based on pathology report documentation of renal cell carcinoma, clear cell type.

RENAL PELVIS (C65.9)

Renal pelvis cases had 2 discrepancies, 6.5 percent of the discrepancies found in the urinary system. Of these, 1 each (50.0 percent each) was found in *Race* and *RX Summary Surgery Primary Site*.

Race had 1 discrepancy, which was recoded from 99 (unknown) to 01 (White) based on medical record face sheet documentation of race as Caucasian.

RX Summary Surgery Primary Site had 1 discrepancy, which was recoded from 70 (any nephrectomy in continuity with the resection of other organs) to 50 (radical nephrectomy) based on operative and pathology report documentation of a radical nephrectomy only with no indication of surgical removal of additional sites.

MALE GENITAL SYSTEM (C60.0–C63.9)

Male genital system cases had a total of 24 discrepancies, representing 6.8 percent of the total 351 discrepancies. All 24 discrepancies (100.0 percent) were found in the prostate. A total of 31 medical records were reabstracted for male genital system.

Of the 24 discrepancies, *Date of First Course RX (CoC)* accounted for 4 (16.7 percent), followed by *CS Site-Specific Factor 3* with 3 (12.5 percent); *RX Summary Surgery Primary Site*, *RX Summary Scope Regional Lymph Node Surgery*, *RX Summary Hormone*, and *CS Metastasis at Diagnosis* with 2 each (8.3 percent each); and *Date of Diagnosis*, *Laterality*, *Radiation Regional*

RX Modality, RX Summary Biological Response Modifier, RX Summary Transplant/Endocrine, RX Summary Other, CS Extension, CS Lymph Nodes, and Derived SS2000 with 1 each (4.2 percent each).

PROSTATE (C61.9)

Date of First Course RX (CoC) had a total of 4 discrepancies:

- 1 case was recoded from 99/99/9999 (unknown) to 06/27/2006 based on discharge summary documentation that noted the patient received casodex and will also be given lupron every 3 months.
- 1 case was recoded from 99/99/9999 (unknown) to 02/99/2006 based on 03/05/2006 history and physical report documentation that noted the patient had had prostate surgery for prostate cancer; the date of first treatment was estimated to have taken place in February, prior to the subsequent admission on 03/05/2006.
- 1 case was recoded from 99/99/9999 (unknown) to 01/99/2006 based on medical record documentation that noted the patient declined treatment sometime during the month of January following his diagnosis and opted for non-proven herbal supplements (FORDS Manual, p. 129, second bullet).
- 1 case was recoded from 04/09/2006 to 00/00/0000 (none) based on medical record documentation that noted the patient did not return for further diagnostic investigation and/or treatment planning.

CS Site-Specific Factor 3 had a total of 3 discrepancies:

- 1 case was recoded from 098 (prostatectomy performed, but not considered first course of treatment) to 097 (no prostatectomy done within first course of treatment) based on medical record documentation that noted the patient opted to pursue treatment with herbal supplements.
- 1 case was recoded from 097 (no prostatectomy done within first course of treatment) to 096 (unknown if prostatectomy done) based on history and physical report documentation of prostate surgery performed but unknown if prostatectomy performed.
- 1 case was recoded from 000 (in situ; non-invasive; intraepithelial) to 023 (involves both lobes) based on prostatectomy pathology report documentation of involvement in both lobes of the prostate.

RX Summary Surgery Primary Site had a total of 2 discrepancies:

- 1 case was recoded from 99 (unknown) to 00 (none) based on the discharge summary report documentation of casodex begun 06/27/2006 to be followed by lupron every 3 months; no other treatment was planned.

- 1 case was recoded from 00 (none) to 90 (surgery, NOS) based on the history and physical report documentation of prostate surgery for prostate cancer. No further information regarding a specific surgery was found.

RX Summary Scope Regional Lymph Node Surgery had a total of 2 discrepancies:

- 1 case was recoded from 9 (unknown) to 0 (none) based on medical record documentation that noted no surgery was performed.
- 1 case was recoded from 0 (none) to 9 (unknown) based on history and physical report documentation that noted prostate surgery was performed; no medical record information regarding information on the removal of regional lymph nodes was found.

RX Summary Hormone had a total of 2 discrepancies:

- 1 case was recoded from 99 (unknown) to 01 (hormone therapy administered as first course therapy) based on discharge summary report documentation of casodex started on 06/27/2006, to be followed by lupron every 3 months.
- 1 case was recoded from 00 (none) to 01 (hormone therapy administered as first course therapy) based on medical record documentation of a physician recommendation of hormone therapy with subsequent treatment with lupron.

CS Metastasis at Diagnosis had a total of 2 discrepancies:

- 1 case was recoded from 99 (unknown; not documented in patient record) to 00 (none) based on medical record documentation that noted the patient received treatment for localized disease (CS Manual, Part I, p. 14).
- 1 case was recoded from 12 (distant lymph node[s]) to 35 (metastasis in bones (30) plus distant lymph node[s] [11 or 12]) based on medical record documentation of a biopsy-proven metastatic retroperitoneal lymph node, as well as bone metastasis.

Date of Diagnosis had 1 discrepancy, which was recoded from 11/01/2006 to 09/28/2006 based on the history and physical report documentation of a positive biopsy on 09/28/2006.

Laterality had 1 discrepancy, which was recoded from 4 (bilateral involvement, side of origin unknown, stated to be a single primary) to 0 (not paired site) because prostate is not considered to be a paired organ (FORDS Manual, p. 11).

Radiation Regional RX Modality had 1 discrepancy, which was recoded from 00 (no radiation treatment) to 99 (unknown) based on a radiation oncology note that radiation therapy was recommended but patient chose to wait 3 months before proceeding. There was no further documentation on whether the radiation therapy was done.

RX Summary Biological Response Modifier had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on discharge summary report documentation of hormonal treatment with casodex; no other treatment planned.

RX Summary Transplant/Endocrine had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on discharge summary report documentation of hormonal treatment with casodex; no other treatment planned.

RX Summary Other had 1 discrepancy, which was recoded from 9 (unknown) to 0 (none) based on discharge summary report documentation of hormonal treatment with casodex; no other treatment planned.

CS Extension had 1 discrepancy, which was recoded from 45 (extension to seminal vesicle[s] [Stage C2]) to 24 (clinically apparent tumor confined to prostate, NOS Stage B, NOS) based on radiation oncology consult documentation of a positive biopsy and bilateral enlargement of the prostate with no documentation of seminal vesicle involvement. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

CS Lymph Nodes had 1 discrepancy, which was recoded from 99 (unknown, not stated; not documented in patient record) to 00 (none) due to a lack of medical record documentation of lymph node status. The patient had T1 prostate cancer, and treatment administered was applicable to localized disease (CS Manual, Part I, p. 14, Coding “None” vs. “Unknown” section).

Derived SS2000 had 1 discrepancy, which was recalculated from 2 (regional by direct extension) to 1 (localized) based on *CS Extension* recoded to 24 (clinically apparent tumor confined to prostate, NOS Stage B, NOS) based on oncology consult documentation of bilateral enlargement of the prostate as well as a positive prostate biopsy with no medical record or central registry documentation of seminal vesicle involvement.

REPORTABLE HEMATOPOIETIC DISEASES (C42.0–C42.4)

Reportable hematopoietic diseases cases had a total of 16 discrepancies, representing 4.6 percent of the total 351 discrepancies. All 16 discrepancies (100.0 percent) were found in bone marrow. A total of 21 medical records were reabstracted for reportable hematopoietic diseases.

Of the 16 discrepancies, *Date of First Course RX (CoC)* and *RX Summary Chemotherapy* accounted for 3 each (18.8 percent each), followed by *Grade, Histology* and *RX Summary Surgery Other Regional/Distant* with 2 each (12.5 percent each) and *RX Summary Hormone, RX Summary Biological Response Modifier, RX Summary Transplant/Endocrine, and RX Summary Other* with 1 each (6.3 percent each).

BONE MARROW (C42.1)

Date of First Course RX (CoC) had a total of 3 discrepancies:

- 1 case was recoded from 99/99/9999 (unknown) to 04/13/2006 based on 04/13/2006 discharge summary documentation that noted the patient was determined not to be a candidate for any treatment and was discharged to hospice care.
- 1 case was recoded from 99/99/9999 (unknown) to 03/15/2006 based on medical record documentation of deoxyadenosine initiated on 03/15/2006.
- 1 case was recoded from 09/07/2006 to 00/00/0000 (none) due to a lack of medical record documentation regarding a treatment plan and no indication the patient received any treatment.

RX Summary Chemotherapy had a total of 3 discrepancies:

- 1 case was recoded from 99 (unknown) to 87 (chemotherapy was not administered. It was recommended by the patient's physician, but this treatment was refused by the patient, a patient's family member, or the patient's guardian. The refusal was noted in patient record) based on medical record documentation that the patient declined all treatment (FORDS Manual, p. 173, fourth bullet).
- 1 case was recoded from 00 (none) to 87 (chemotherapy was not administered. It was recommended by the patient's physician, but this treatment was refused by the patient, a patient's family member, or the patient's guardian. The refusal was noted in patient record) based on medical record documentation that the patient was offered chemotherapy; the patient declined and opted for hospice care.
- 1 case was recoded from 00 (none) to 02 (single agent chemotherapy) based on medical record documentation of a physician order to administer deoxyadenosine.

Grade had a total of 2 discrepancies. Both discrepancies were recoded from 6 (B cell; pre-B; B-precursor) to 9 (unknown) due to a lack of medical record or central registry documentation regarding a specific grade.

Histology had a total of 2 discrepancies:

- 1 case was recoded from 9823 (B-cell chronic lymphocytic leukemia/small lymphocytic lymphoma) to 9891 (acute monoblastic leukemia) based on pathology consult documentation of acute monoblastic leukemia.
- 1 case was recoded from 9860 (myeloid leukemia, NOS) to 9867 (acute myelomonocytic leukemia, FAB M4) based on supplemental pathology report documentation of acute myelomonocytic leukemia FAB M4.

RX Summary Surgery Other Regional/Distant had a total of 2 discrepancies. Both discrepancies were recoded from 9 (unknown) to 0 (none) based on medical record documentation that noted no surgery of regional or distant sites was performed or planned.

RX Summary Hormone had 1 discrepancy, which was recoded from 99 (unknown) to 87 (hormone therapy was not administered. It was recommended by the patient's physician, but this treatment was refused by the patient, a patient's family member, or the patient's guardian. The refusal was noted in patient record) based on medical record documentation that the patient declined all treatment (FORDS Manual, p. 175, eighth bullet).

RX Summary Biological Response Modifier had 1 discrepancy, which was recoded from 99 (unknown) to 87 (immunotherapy therapy was not administered. It was recommended by the patient's physician, but this treatment was refused by the patient, a patient's family member, or the patient's guardian. The refusal was noted in patient record) based on medical record documentation that the patient declined all treatment (FORDS Manual, p. 179, fourth bullet).

RX Summary Transplant/Endocrine had 1 discrepancy, which was recoded from 99 (unknown) to 87 (hematologic transplant and/or endocrine surgery/radiation was not administered. It was recommended by the patient's physician, but this treatment was refused by the patient, a patient's family member, or the patient's guardian. The refusal was noted in patient record) based on medical record documentation that the patient declined all treatment (FORDS Manual, p. 182, seventh bullet).

RX Summary Other had 1 discrepancy, which was recoded from 9 (unknown) to 0 (none) based on medical record documentation that the patient declined all treatment and was subsequently discharged to hospice care.

MISCELLANEOUS (C80.9)

Miscellaneous cases had a total of 14 discrepancies, representing 4.0 percent of the total 351 discrepancies. All 14 discrepancies (100.0 percent) were found in unknown primary. There were a total of 7 medical records reabstracted for miscellaneous.

Of the 14 discrepancies, *Date of First Course RX (CoC)* accounted for 2 (14.3 percent), followed by *Primary Site, Laterality, Grade, Histology, RX Summary Surgery Primary Site, RX Summary Scope Regional Lymph Node Surgery, RX Summary Surgery Other Regional/Distant, RX Summary Chemotherapy, CS Extension, CS Lymph Nodes, CS Metastasis at Diagnosis, and Derived SS2000* with 1 each (7.1 percent each).

UNKNOWN PRIMARY (C80.9)

Date of First Course RX (CoC) had a total of 2 discrepancies:

- 1 case was recoded from 02/99/2006 to 02/12/2006 based on medical record documentation of surgery performed on 02/12/2006.

- 1 case was recoded from 99/99/9999 (unknown) to 07/99/2006 based on physician documentation of a chemotherapy regimen of Carboplatin and Taxol initiated in July 2006.

Primary Site had 1 discrepancy, which was recoded from C80.9 (unknown primary) to C56.9 (ovary, NOS) based on discharge summary documentation that noted a malignancy, “most likely ovarian origin.”

Laterality had 1 discrepancy, which was recoded from 0 (organ is not considered to be a paired site) to 3 (only one side involved, right or left origin not specified) based on *Primary Site* recoded to C56.9 according to discharge summary documentation that noted a malignancy, “most likely ovarian origin,” and “patient had previous unilateral oophorectomy.”

Grade had 1 discrepancy, which was recoded from 3 (poorly differentiated) to 9 (unknown) based on grade information obtained from a biopsy of a metastatic site (FORDS Manual, p. 96).

Histology had 1 discrepancy, which was recoded from 8046 (non-small cell carcinoma) to 8140 (adenocarcinoma, NOS) based on pathology consult documentation of adenocarcinoma.

RX Summary Surgery Primary Site had 1 discrepancy, which was recoded from 98 (all unknown and ill-defined disease sites, with or without surgical treatment) to 00 (none) based on *Primary Site* recoded to C56.9 according to physician discharge summary documentation that noted a malignancy, “most likely ovarian origin.”

RX Summary Scope Regional Lymph Node Surgery had 1 discrepancy, which was recoded from 9 (unknown or not applicable) to 0 (none) based on *Primary Site* recoded to C56.9 based on physician discharge summary documentation that noted “most likely ovarian origin.”

RX Summary Surgery Other Regional/Distant had 1 discrepancy, which was recoded from 4 (nonprimary surgical procedure to distant site) to 1 (nonprimary surgical procedure performed) based on documentation of a surgical procedure performed on a patient with unknown primary. Per FORDS Manual page 142 (electronic version), assign code 1 if any surgery is performed to treat tumors of unknown or ill-defined primary sites.

RX Summary Chemotherapy had 1 discrepancy, which was recoded from 00 (none) to 03 (multiagent chemotherapy administered as first course therapy) based on documentation that the patient received Carboplatin and Taxol as first course treatment.

CS Extension had 1 discrepancy, which was recoded from 88 (not applicable for this site) to 75 (peritoneal implants, NOS) based on *Primary Site* recoded to C56.9 based on physician discharge summary documentation that noted “most likely ovarian origin” and “patient has peritoneal carcinomatosis.” This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

CS Lymph Nodes had 1 discrepancy, which was recoded from 88 (not applicable for this site) to 99 (unknown) based on *Primary Site* recoded to C56.9 based on physician discharge summary

documentation that noted “most likely ovarian origin” and no documentation of lymph node status in patient record.

CS Metastasis at Diagnosis had 1 discrepancy, which was recoded from 88 (not applicable for this site) to 99 (unknown if distant metastasis) due to a lack of documentation to indicate distant disease.

Derived SS2000 had 1 discrepancy, which was recalculated from 9 (unknown extension) to 7 (distant extension) based on *Primary Site* recoded to C56.9 according to discharge summary documentation that noted “most likely ovarian origin” and “patient has peritoneal carcinomatosis.”

LYMPHOMA (C77.0–C77.9, C73.9)

Lymphoma cases had a total of 12 discrepancies, representing 3.4 percent of the total 351 discrepancies. Of these, lymph nodes had 9 (75.0 percent), followed by small intestine with 2 (16.7 percent) and bone marrow with 1 (8.3 percent). A total of 12 medical records were reabstracted for lymphoma.

Of the 12 discrepancies, *RX Summary Chemotherapy*, *CS Extension*, and *Derived SS2000* accounted for 2 each (16.7 percent each), followed by *Sequence Number—Central, Subsite, Grade, Histology, Date of First Course RX (CoC)*, and *RX Summary Scope Regional Lymph Node Surgery* with 1 each (8.3 percent each).

LYMPH NODES (C77.0–C77.9)

Lymph nodes cases had 9 discrepancies, 75.0 percent of the discrepancies found in lymphoma. Of these, *RX Summary Chemotherapy*, *CS Extension*, and *Derived SS2000* accounted for 2 each (22.2 percent each), followed by *Subsite, Grade, and Date of First Course RX (CoC)* with 1 each (11.1 percent each).

RX Summary Chemotherapy had a total of 2 discrepancies:

- 1 case was recoded from 01 (chemotherapy, NOS) to 03 (multi-agent chemotherapy) based on documentation of chemotherapy agents velcade, cladribine, and rituxan administered.
- 1 case was recoded from 01 (chemotherapy, NOS) to 88 (chemotherapy was recommended, unknown if administered) based on medical record admission documentation of port placement for planned chemotherapy but no documentation of chemotherapy administered.

CS Extension had a total of 2 discrepancies:

- 1 case was recoded from 99 (unknown extension) to 20 (involvement of two or more lymph node regions on the same side of the diaphragm) based on CT scan documentation of extensive retroperitoneal and mesenteric adenopathy with no other lymph node involvement noted. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.
- 1 case was recoded from 99 (unknown extension) to 30 (involvement of lymph node regions on both sides of the diaphragm) based on PET scan documentation of involvement of cervical, mediastinal, retroperitoneal, iliac, and inguinal lymph nodes and a negative bone marrow biopsy. This discrepancy caused a corresponding discrepancy in *Derived S2000*.

Derived SS2000 had a total of 2 discrepancies:

- 1 case was recalculated from 9 (unknown) to 5 (regional, NOS) based on *CS Extension* recoded to 20 (involvement of two or more lymph node regions on the same side of the diaphragm) based on CT scan documentation of extensive retroperitoneal and mesenteric adenopathy with no other lymph node involvement noted.
- 1 case was recalculated from 9 (unknown) to 7 (distant) based on *CS Extension* recoded to 30 (involvement of lymph node regions on both sides of the diaphragm) based on PET scan documentation of involvement of cervical, mediastinal, retroperitoneal, iliac, and inguinal lymph nodes.

Subsite had 1 discrepancy, which was recoded from .4 (lymph nodes of inguinal region or leg) to .8 (lymph nodes of multiple regions) based on hematology oncology consult documentation of multiple lymph node regions (mediastinal, axillary, and retroperitoneal) involved.

Grade had 1 discrepancy, which was recoded from 6 (B cell; pre-B; B-precursor) to 9 (unknown) due to a lack of medical record or central registry documentation regarding specific grade.

Date of First Course RX (CoC) had 1 discrepancy, which was recoded from 11/29/2006 to 00/00/0000 (none) based on medical record documentation that no treatment was planned or initiated on 11/29/2006 or anytime thereafter.

SMALL INTESTINE (C17.9)

Small intestine cases had 2 discrepancies, 16.7 percent of the discrepancies found in lymphoma. Of these, 1 each (50.0 percent each) was found in *Histology* and *RX Summary Scope Regional Lymph Node Surgery*.

Histology had 1 discrepancy, which was recoded from 9690 (follicular lymphoma, NOS) to 9695 (follicular lymphoma, grade 1) based on pathology report documentation of follicular lymphoma, grade 1.

RX Summary Scope Regional Lymph Node Surgery had 1 discrepancy, which was recoded from 0 (none) to 3 (number of regional lymph nodes removed unknown or not stated) based on pathology report documentation of multiple mesenteric lymph nodes removed, number not specified.

BONE MARROW (C42.1)

Bone marrow cases had 1 discrepancy, 8.3 percent of the discrepancies found in lymphoma. This single discrepancy (100.0 percent) was found in *Sequence Number—Central*, which was recoded from 00 (one malignant or in situ primary only in the patient's lifetime) to 02 (second of two or more independent malignant or in situ primaries) based on discharge summary documentation that noted the patient had a history of prostate cancer diagnosed 10 years ago.

ORAL CAVITY (C00.0–C14.8)

Oral cavity cases had a total of 9 discrepancies, representing 2.6 percent of the total 351 discrepancies. Of these, cheek mucosa had 7 (77.8 percent), followed by floor of mouth, NOS with 2 (22.2 percent). A total of 7 medical records were reabstracted for oral cavity.

Of the 9 discrepancies, 1 each (11.1 percent each) was found in *Primary Site, Laterality, Grade, Histology, Date of First Course RX (CoC), RX Summary Surgery Primary Site, RX Summary Scope Regional Lymph Node Surgery, CS Extension, and Derived SS2000*.

CHEEK MUCOSA (C06.0)

Cheek mucosa cases had 7 discrepancies, 77.8 percent of the discrepancies found in oral cavity. Of these, 1 each (14.3 percent each) was found in *Primary Site, Laterality, Grade, Histology, Date of First Course RX (CoC), CS Extension, and Derived SS2000*.

Primary Site had 1 discrepancy, which was recoded from C06.0 (cheek mucosa) to C44.3 (skin of other and unspecified parts of face) based on history and physical report documentation of melanoma of the left cheek.

Laterality had 1 discrepancy, which was recoded from 0 (organ is not considered to be a paired site) to 2 (origin of primary is left) based on *Primary Site* recoded to C44.3 (skin of other and unspecified parts of face) according to history and physical documentation of melanoma of the left cheek.

Grade had 1 discrepancy, which was recoded from 2 (moderately differentiated) to 9 (unknown) due to a lack of medical record or central registry documentation regarding specific grade information.

Histology had 1 discrepancy, which was recoded from 8720 (malignant melanoma, NOS) to 8743 (superficial spreading melanoma) based on operative note documentation that noted the patient was originally diagnosed with superficial spreading melanoma.

Date of First Course RX (CoC) had 1 discrepancy, which was recoded from 02/15/2006 to 01/99/2006 based on medical record documentation of an excisional biopsy performed in January 2006, followed by a wide excision on 02/12/2006 that was negative for residual disease.

CS Extension had 1 discrepancy, which was recoded from 65 (subcutaneous soft tissue of cheek) to 99 (unknown extension) based on *Primary Site* recoded to C44.3 (skin of other and unspecified parts of face) according to history and physical documentation of melanoma of the left cheek and no documentation regarding extent of disease from initial biopsy in 2006. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

Derived SS2000 had 1 discrepancy, which was recoded from 2 (regional by direct extension only) to 9 (unknown if extension or metastasis) based on no documentation of extent of disease from original biopsy in 2006.

FLOOR OF MOUTH, NOS (C04.9)

Floor of mouth, NOS cases had 2 discrepancies, 22.2 percent of the discrepancies found in oral cavity. Of these, 1 each (50.0 percent each) was found in *RX Summary Surgery Primary Site* and *RX Summary Scope Regional Lymph Node Surgery*.

RX Summary Surgery Primary Site had 1 discrepancy, which was recoded from 27 (excisional biopsy) to 42 (radical excision of tumor with resection in continuity with mandible (marginal, segmental, hemi-, or total resection) based on pathology report and operative report documentation of left hemi-mandibulectomy with resection of left floor of mouth, anterior tongue base, and ventral surface tumor and selective modified radical neck dissection.

RX Summary Scope Regional Lymph Node Surgery had 1 discrepancy, which was recoded from 0 (none) to 5 (4 or more regional lymph nodes removed) based on pathology documentation of modified radical neck dissection of 11 lymph nodes.

NON-MALIGNANT CENTRAL NERVOUS SYSTEM (C70.0–C72.9, C75.1)

Non-malignant central nervous system cases had a total of 9 discrepancies, representing 2.6 percent of the total 351 discrepancies. Of these, meninges had 6 (66.7 percent), followed by brain; spinal cord, cranial nerves, and other parts of central nervous system; and other endocrine glands and related structures with 1 each (11.1 percent each). A total of 10 medical records were reabstracted for non-malignant central nervous system.

Of the 9 discrepancies, 1 each (11.1 percent each) was found in *Subsite*, *Behavior*, *Date of First Course RX (CoC)*, *RX Summary Chemotherapy*, *RX Summary Hormone*, *RX Summary Biological Response Modifier*, *RX Summary Transplant/Endocrine*, *RX Summary Other*, and *CS Metastasis at Diagnosis*.

MENINGES (C70.0–C70.9)

Meninges cases had 6 discrepancies, 66.7 percent of the discrepancies found in the non-malignant central nervous system. Of these, 1 each (16.7 percent each) was found in *Date of First Course RX (CoC)*, *RX Summary Hormone*, *RX Summary Biological Response Modifier*, *RX Summary Transplant/Endocrine*, *RX Summary Other*, and *CS Metastasis at Diagnosis*.

Date of First Course RX (CoC) had 1 discrepancy, which was recoded from 99/99/9999 (unknown) to 10/11/2006 based on 10/11/2006 discharge summary documentation that no surgery or any other treatment was recommended.

RX Summary Hormone had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on discharge summary documentation that no surgery or other treatment was recommended.

RX Summary Biological Response Modifier had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on discharge summary documentation that no surgery or other treatment was recommended.

RX Summary Transplant/Endocrine had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on discharge summary documentation that no surgery or other treatment was recommended.

RX Summary Other had 1 discrepancy, which was recoded from 9 (unknown) to 0 (none) based on discharge summary documentation that no surgery or other treatment was recommended.

CS Metastasis at Diagnosis had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on medical record documentation of benign meningioma.

BRAIN (C71.0–C71.9)

Brain cases had 1 discrepancy, 11.1 percent of the discrepancies found in the non-malignant central nervous system. This single discrepancy (100.0 percent) was found in *Behavior* and was recoded from /1 (uncertain whether benign or malignant) to /3 (malignant, primary site) based on neurosurgeon follow-up note documentation that noted “patient’s encephala is due to tectal astrocytoma, low grade.”

SPINAL CORD, CRANIAL NERVES, AND OTHER PARTS OF CENTRAL NERVOUS SYSTEM (C72.0–C72.9)

Spinal cord, cranial nerves, and other parts of central nervous system cases had 1 discrepancy, 11.1 percent of the discrepancies found in the non-malignant central nervous system. This single discrepancy (100.0 percent) was found in *Subsite* and was recoded from .1 (cauda equina) to .0 (spinal cord) based on pathology documentation of myxopapillary ependymoma (ICD-0-3, p. 137, histology/site code).

OTHER ENDOCRINE GLANDS AND RELATED STRUCTURES (C75.0–C75.9)

Other endocrine glands and related structures cases had 1 discrepancy, 11.1 percent of the discrepancies found in the non-malignant central nervous system. This single discrepancy (100.0 percent) was found in *RX Summary Chemotherapy* and was recoded from 99 (unknown) to 00 (none) based on medical record documentation that noted no chemotherapy was recommended or administered.

MESOTHELIOMA (C38.4)

Mesothelioma cases had a total of 8 discrepancies, representing 2.3 percent of the total 351 discrepancies. Pleura accounted for all 8 discrepancies (100.0 percent). There were a total of 2 medical records reabstracted for mesothelioma.

Of the 8 discrepancies, 1 each (12.5 percent each) was found in *Date of First Course RX (CoC)*, *RX Summary Surgery Primary Site*, *Radiation Regional RX Modality*, *RX Summary Hormone*, *RX Summary Biological Response Modifier*, *RX Summary Transplant/Endocrine*, *RX Summary Other*, and *CS Metastasis at Diagnosis*.

Date of First Course RX (CoC) had 1 discrepancy, which was recoded from 09/05/2006 to 09/14/2006 based on the 09/14/2006 discharge summary documentation of hospice care as the treatment of choice.

RX Summary Surgery Primary Site had 1 discrepancy, which was recoded from 90 (surgery, NOS) to 00 (none) based on discharge summary documentation of a biopsy only and the patient's decision to begin hospice care.

Radiation Regional RX Modality had 1 discrepancy, which was recoded from 00 (no radiation treatment) to 99 (unknown) due to a lack of medical record documentation of either a recommendation for radiation therapy or that radiation therapy had been administered.

RX Summary Hormone had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on the 09/14/2006 discharge summary documentation of the patient's decision to be referred to a hospice program.

RX Summary Biological Response Modifier had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on discharge summary documentation of the patient's decision to be referred to a hospice program.

RX Summary Transplant/Endocrine had 1 discrepancy, which was recoded from 99 (unknown) to 00 (none) based on 09/14/2006 discharge summary documentation of the patient's decision to be referred to a hospice program.

RX Summary Other had 1 discrepancy, which was recoded from 9 (unknown) to 0 (none) based on discharge summary documentation of the patient's decision to be referred to hospice care.

CS Metastasis at Diagnosis had 1 discrepancy, which was recoded from 00 (none) to 99 (unknown if distant metastasis, not documented in medical record) due to a lack of medical record stage documentation of the presence or absence of metastatic disease.

SKIN, EXCLUDING BASAL AND SQUAMOUS (C44.0–C44.9)

Skin, excluding basal and squamous cases had a total of 7 discrepancies, representing 2.0 percent of the total 351 discrepancies. Of these, *Date of First Course RX (CoC)* and *RX Summary Scope Regional Lymph Node Surgery* accounted for 2 each (28.6 percent each), followed by *Date of Diagnosis*, *CS Extension*, and *Derived SS2000* with 1 each (14.3 percent each). There were a total of 8 medical records reabstracted for skin, excluding basal and squamous.

Date of First Course RX (CoC) had a total of 2 discrepancies:

- 1 case was recoded from 10/09/2006 to 09/99/2006 based on medical record admission assessment documentation of an excisional biopsy performed in September 2006; date of first course of treatment was estimated.
- 1 case was recoded from 08/29/2006 to 08/01/2006 based on general surgical note documentation of a punch biopsy performed on 08/01/2006.

RX Summary Scope Regional Lymph Node Surgery had a total of 2 discrepancies:

- 1 case was recoded from 5 (4 or more regional lymph nodes removed) to 7 (sentinel node biopsy and code 3, 4, or 5 at different times) based on operative report and pathology report documentation of a sentinel lymph node biopsy on 08/11/2006 followed by axillary lymph node dissection on 08/24/2006.
- 1 case was recoded from 4 (1–3 lymph nodes removed) to 2 (sentinel lymph node biopsy) based on operative and pathology report documentation of a sentinel lymph node biopsy only performed.

Date of Diagnosis had 1 discrepancy, which was recoded from 10/15/2006 to 08/26/2006 based on pathology report documentation of lentigo maligna of the left neck on 08/26/2006.

CS Extension had 1 discrepancy, which was recoded from 99 (unknown extension) to 40 (localized, NOS) based on operative and pathology report documentation of no residual melanoma following local excision in the physician office, as well as physician staging form documentation of T1. This discrepancy caused a corresponding discrepancy in *Derived SS2000*.

Derived SS2000 had 1 discrepancy, which was recalculated from 9 (unknown) to 1 (localized) based on *CS Extension* recoded to 40 (localized, NOS) according to operative and pathology report documentation of no residual melanoma following local excision in the physician office, as well as physician staging form documentation of T1.

FEMALE GENITAL SYSTEM (C51.0–C58.9)

Female genital system cases had a total of 5 discrepancies, representing 1.4 percent of the total 351 discrepancies. Of these, cervix uteri had 4 (80.0 percent), followed by ovary with 1 (20.0 percent). There were a total of 5 medical records reabstracted for female genital system.

Of the 5 discrepancies, *Date of First Course RX (CoC)* accounted for 2 (40.0 percent), followed by *Grade*, *RX Summary Surgery Primary Site*, and *RX Summary Chemotherapy* with 1 each (20.0 percent each).

CERVIX UTERI (C53.0–C53.9)

Cervix uteri cases had 4 discrepancies, 80.0 percent of the discrepancies found in the female genital system. Of these, *Grade*, *Date of First Course RX (CoC)*, *RX Summary Surgery Primary Site*, and *RX Summary Chemotherapy* accounted for 1 each (25.0 percent each).

Grade had 1 discrepancy, which was recoded from 3 (poorly differentiated) to 9 (unknown) due to a lack of medical record or central registry documentation regarding a specific grade.

Date of First Course RX (CoC) had 1 discrepancy, which was recoded from 99/99/9999 (unknown) to 12/08/2006 based on 12/08/2006 discharge summary documentation of hospice as the treatment of choice (FORDS manual, p. 129, second bullet).

RX Summary Surgery Primary Site had 1 discrepancy, which was recoded from 27 (cone biopsy) to 40 (total hysterectomy [simple, pan-] with removal of tubes and/or ovary) based on operative and pathology report documentation of a vaginal hysterectomy with a bilateral salpingo-oophorectomy.

RX Summary Chemotherapy had 1 discrepancy, which was recoded from 99 (unknown) to 87 (chemotherapy refused) based on discharge summary documentation that noted the patient refused the recommended chemotherapy and opted for referral to hospice care.

OVARY (C56.9)

Ovary cases had 1 discrepancy, 20.0 percent of the discrepancies found in the female genital system. This single discrepancy (100.0 percent) was found in *Date of First Course RX (CoC)* and was recoded from 99/99/9999 (unknown) to 03/11/2006 based on the 03/11/2006 discharge summary documentation that noted the patient opted for referral to hospice care.

ENDOCRINE SYSTEM (C73.9–C75.9)

Endocrine system cases had a total of 4 discrepancies, representing 1.1 percent of the total 351 discrepancies. All 4 discrepancies (100.0 percent) were found in thyroid gland. There were a total of 8 medical records reabstracted for endocrine system.

Of the 4 discrepancies, *RX Summary Surgery Primary Site*, *RX Summary Scope Regional Lymph Node Surgery*, *Radiation Regional RX Modality*, and *CS Lymph Nodes* accounted for 1 each (25.0 percent each).

THYROID GLAND (C73.9)

RX Summary Surgery Primary Site had 1 discrepancy, which was recoded from 23 (lobectomy with isthmus) to 50 (total thyroidectomy) based on operative and pathology report documentation of a left lobectomy on 01/18/2006, followed by a completion thyroidectomy on 01/30/2006.

RX Summary Scope Regional Lymph Node Surgery had 1 discrepancy, which was recoded from 9 (unknown) to 3 (number of regional nodes removed unknown or not stated; regional lymph nodes removed, NOS) based on operative and pathology report documentation of excision of multiple lymph nodes; the exact number of lymph nodes removed was not specified.

Radiation Regional RX Modality had 1 discrepancy, which was recoded from 00 (no radiation treatment) to 60 (radioisotopes, NOS) based on radiographic imaging documentation of Iodine-131 administered.

CS Lymph Nodes had 1 discrepancy, which was recoded from 13 (cervical nodes [other than those in central compartment]) to 15 (mediastinal, NOS) based on operative and pathology report documentation of a mediastinal lymph node dissection positive for metastasis.

KAPOSI SARCOMA (C44.7, C06.8)

Kaposi sarcoma cases had a total of 3 discrepancies, representing 0.9 percent of the total 351 discrepancies. Of these, skin of leg had 2 (66.7 percent), followed by overlapping lesion of other and unspecified parts of mouth with 1 (33.3 percent). There were a total of 2 medical records reabstracted for Kaposi sarcoma.

Of the 3 discrepancies, *Subsite*, *Date of First Course RX (CoC)*, and *RX Summary Hormone* accounted for 1 each (33.3 percent each).

SKIN OF LEG (C44.7)

Skin of leg cases had 2 discrepancies, 66.7 percent of the discrepancies found in Kaposi sarcoma. Of these, *Date of First Course RX (CoC)* and *RX Summary Hormone* accounted for 1 each (50.0 percent each).

Date of First Course RX (CoC) had 1 discrepancy, which was recoded from 05/26/2006 to 00/00/0000 (none) based on medical record documentation of a biopsy only and no documentation regarding further treatment or a treatment plan.

RX Summary Hormone had 1 discrepancy, which was recoded from 01 (hormone therapy, NOS) to 00 (none) based on medical record documentation of non-cancer directed prednisone therapy. No other hormone therapy was administered.

OVERLAPPING LESION OF OTHER AND UNSPECIFIED PARTS OF MOUTH (C06.8)

Overlapping lesion of other and unspecified parts of mouth cases had 1 discrepancy, 33.3 percent of the discrepancies found in Kaposi sarcoma. This single discrepancy (100.0 percent) was found in *Subsite* and was recoded from .8 (overlapping lesion of other and unspecified parts of mouth) to .2 (retromolar area) based on operative and pathology report documentation of a cancerous lesion of the retromolar trigone.

SOFT TISSUE, INCLUDING HEART (C49.0–C49.9, C38.0)

Soft tissue, including heart cases had a total of 2 discrepancies, representing 0.6 percent of the total 351 discrepancies. Both discrepancies (100.0 percent) were found in soft tissue of arm. There were a total of 2 medical records reabstracted for soft tissue, including heart.

SOFT TISSUE OF ARM (C49.1)

Soft tissue of arm cases had 2 discrepancies, 100.0 percent of the discrepancies found in soft tissue, including heart. Of these, *Grade* and *Date of First Course RX (CoC)* accounted for 1 each (50.0 percent each).

Grade had 1 discrepancy, which was recoded from 4 (undifferentiated) to 9 (unknown) due to a lack of medical record or central registry documentation regarding a specific grade.

Date of First Course RX (CoC) had 1 discrepancy, which was recoded from 05/99/2006 to 05/19/2006 based on documentation of an excisional biopsy performed on 05/19/2006.

BRAIN AND OTHER CENTRAL NERVOUS SYSTEM (C70.0–C72.9)

Brain and other central nervous system cases had a total of 2 discrepancies, representing 0.6 percent of the total 351 discrepancies. Of these, 1 each (50.0 percent each) was found in *Grade* and *RX Summary Surgery Other Regional/Distant*. There were a total of 7 medical records reabstracted for brain and other central nervous system.

Grade had 1 discrepancy, which was recoded from 1 (well differentiated) to 2 (moderately differentiated) based on pathology report documentation of low grade (FORDS manual, p. 13).

RX Summary Surgery Other Regional/Distant had 1 discrepancy, which was recoded from 9 (unknown) to 0 (none) based on medical record documentation of surgery of the primary site without any indication that additional surgery of a regional or distant site was performed, or necessary, for the stage 1 disease.

VIII. CONCLUSION AND RECOMMENDATIONS

ACR had an overall case completeness rate of 95.6 percent for all cancer sites audited and is to be commended for this excellent result.

ACR's overall data accuracy rate was 95.3 percent and commendable. ACR is encouraged to continue conducting visual editing to improve data quality in the State, in addition to reviewing basic abstracting principles.

The DCQA auditors noted a few issues that affect the quality of the cancer data collected at ACR, as discussed below:

- 1) *Date of First Course RX (CoC)* had 56 discrepancies, 16.0 percent of all discrepancies. Respiratory system and digestive system cases accounted for 48.2 percent of the discrepancies in this data element. In 33.3 percent of these cases, the information to accurately code this data element was obtained from dictated reports such as operative reports, physician consult reports, discharge summaries, and history and physical reports.
- 2) *CS Extension* had 29 discrepancies, 8.3 percent of all discrepancies. Respiratory system cases accounted for 41.4 percent of the discrepancies in this data element. In 41.7 percent of these cases, the information to accurately code this data element was found in pathology report documentation. 25.0 percent of the respiratory system cases were recoded based on information obtained from imaging report documentation. In order to accurately code this data element, it is essential to review all dictated reports, with emphasis on pathology reports and radiographic imaging reports.
- 3) *Grade* had 28 discrepancies, 8.0 percent of all discrepancies. Breast and respiratory system cases accounted for 42.9 percent of the discrepancies in this data element. Of these, 50.0 percent were recoded based on application of the rules and information found in the grade conversion tables on pages 13 and 14 of the FORDS Manual, including Nottingham conversion and Bloom-Richardson conversion information.
- 4) *RX Summary Chemotherapy* had 28 discrepancies, 8.0 percent of all discrepancies. Respiratory system and digestive system cases accounted for 57.1 percent of the discrepancies in this data element. In 68.8 percent of these cases, the information to accurately code this data element was found in physician progress note documentation. A careful review of all physician progress notes will help decrease the discrepancies in this data element.
- 5) *RX Summary Surgery Primary Site* had 27 discrepancies, 7.7 percent of all discrepancies. Respiratory system cases accounted for 25.9 percent of the discrepancies in this data element. In 28.6 percent of these cases, the information to accurately code this data element was found in dictated reports (operative reports and pathology reports).

- 6) *Derived SS2000* had 22 discrepancies, 6.3 percent of all discrepancies. Respiratory system cases accounted for 36.4 percent of the discrepancies in this data element. In 50.0 percent of these cases, the information to accurately code this data element was obtained by a careful review of radiographic imaging report documentation. *Derived SS2000* is directly linked to the values assigned to the Collaborative Stage data elements. A review of the Collaborative Staging rules, with special emphasis on the digestive system and respiratory system, will help reduce the number of *Derived SS2000* discrepancies.
- 7) *RX Summary Scope Regional Lymph Node Surgery* had 21 discrepancies, 6.0 percent of all discrepancies. Respiratory system and breast cases accounted for 47.6 percent of the discrepancies in this data element. Of these, 66.7 percent were recoded based on information found in pathology reports. In order to accurately code this data element it is essential to review all documentation in the medical record pertaining to lymph node excision, with emphasis on pathology report information.
- 8) *Histology* had 18 discrepancies, 5.1 percent of all discrepancies. Respiratory system and breast cases accounted for 55.6 percent of the discrepancies in this data element. Of these, 90.0 percent of the discrepancies were recoded based on pathology report documentation.
- 9) *CS Lymph Nodes* had 18 discrepancies, 5.1 percent of all discrepancies. Respiratory system and breast cases accounted for 72.2 percent of the discrepancies in this data element. In 38.5 percent of these cases, the information for this data element was obtained from the pathology report. Careful attention to pathology report documentation will help decrease the discrepancies in this data element.
- 10) *CS Metastasis at Diagnosis* had 15 discrepancies, 4.3 percent of all discrepancies. Digestive system and respiratory system cases accounted for 46.7 percent of the discrepancies found in this data element. 57.1 percent of these cases were recoded based on information obtained from radiographic imaging reports.

RECOMMENDATIONS

In summary, our recommendations are as follows:

- 1) Provide a review of abstracting practices with a focus on:
 - a. Coding *Date of First Course RX (CoC)* with special emphasis on respiratory and digestive cases
 - b. Reviewing Collaborative Stage rules, with emphasis on coding *CS Extension*, *CS Lymph Nodes*, and *CS Metastasis at Diagnosis* of respiratory system and digestive cases. Pay particular attention to information contained in pathology reports and radiographic imaging reports.

- c. Reviewing all medical record documentation to assign *Grade*, paying particular attention to pathology reports, with an emphasis on use of grade conversion tables found in the FORDS Manual
- d. Reviewing all surgical procedures and the coding rules that apply to *RX Summary Surgery Primary Site* and *RX Summary Scope Regional Lymph Node Surgery*

IX. AUDIT TEAM

The following individuals participated in the ACR audit:

ICF Macro DCQA:

- 1) Don McMaster, M.S., M.B.A.
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Principal Investigator
- 3) Brenda Lange, CTR
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- 4) Qiming He, Ph.D.
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- 5) Wei Wei, M.S.
Programmer/Analyst
- 6) Janice Gregoire, M.S.H.S., CTR
Quality Assurance Specialist
- 7) Kathy Tinney, CTR
Quality Assurance Specialist
- 8) Brenda Whitesell, CTR
Quality Assurance Specialist
- 9) Stephanie Garner
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- 10) Rick Piet
Editor

Arizona Cancer Registry:

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Office of Health Registries
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Operations Section Manager
- 3) Kara Lockett, M.P.H., CTR
Training Section Manager

CDC:

- 1) Mary Lewis, CTR
Contract Project Officer
- 2) Reda Wilson, M.P.H., R.H.I.T., CTR
State Program Consultant

The ACR audit was conducted by Kathy Tinney, CTR, and Brenda Whitesell, CTR, of ICF Macro, from February 2 through February 13, 2009. All members of the audit team are trained professionals in the areas of cancer registry operations and management.

APPENDIX

TABLES AND CHARTS

Table 3. Data Accuracy, by Site Group

Site Group	Oral Cavity and Pharynx	Digestive System	Respiratory System	Soft Tissue, Including Heart	Skin, Excluding Basal and Squamous	Breast	Female Genital System	Male Genital System	Urinary System	Eye and Orbit	Brain and Other Nervous System	Non-Malignant Central Nervous System	Endocrine System	Lymphoma	Reportable Hematopoietic Diseases	Mesothelioma	Kaposi Sarcoma	Misc.	Total	Accuracy Rate (%) ¹
No. Rec.	7	43	59	2	8	44	5	31	28	1	7	10	8	12	21	2	2	7	297	
Race	7	42	59	2	8	43	5	31	27	1	7	10	8	12	21	2	2	7	294	99.0
Sex	7	43	59	2	8	43	5	31	28	1	7	10	8	12	21	2	2	7	296	99.7
DOB	7	43	59	2	8	43	5	31	28	1	7	10	8	12	21	2	2	7	296	99.7
Seq	7	43	57	2	8	42	5	31	28	1	7	10	8	11	21	2	2	7	292	98.3
Dx Date	7	42	58	2	7	43	5	30	28	1	7	10	8	12	21	2	2	7	292	98.3
Site	6	43	58	2	8	44	5	31	28	1	7	10	8	12	21	2	2	6	294	99.0
Subsite	7	42	57	2	8	40	5	31	27	1	7	9	8	11	21	2	1	7	286	96.3
Lat	6	43	58	2	8	44	5	30	28	1	7	10	8	12	21	2	2	6	293	98.7
Grade	6	40	53	1	8	38	4	31	23	1	6	10	8	11	19	2	2	6	269	90.6
Hist	6	42	54	2	8	39	5	31	26	1	7	10	8	11	19	2	2	6	279	93.9
Beh	7	43	59	2	8	43	5	31	27	1	7	9	8	12	21	2	2	7	294	99.0
RX Date CoC	6	33	42	1	6	40	3	27	22	1	7	9	8	11	18	1	1	5	241	81.1
RX SPS	6	38	52	2	8	41	4	29	23	1	7	10	7	12	21	1	2	6	270	90.9
RX SRLS	6	41	55	2	6	38	5	29	27	1	7	10	7	11	21	2	2	6	276	92.9
RX SORD	7	41	59	2	8	42	5	31	28	1	6	10	8	12	19	2	2	6	289	97.3
RX Mod	7	41	53	2	8	44	5	30	28	1	7	10	7	12	21	1	2	7	286	96.3
RX Chemo	7	37	49	2	8	40	4	31	28	1	7	9	8	10	18	2	2	6	269	90.6
RX Hormone	7	43	57	2	8	40	5	29	28	1	7	9	8	12	20	1	1	7	285	96.0
RX BRM	7	43	57	2	8	44	5	30	27	1	7	9	8	12	20	1	2	7	290	97.6
RX Trans	7	43	57	2	8	44	5	30	28	1	7	9	8	12	20	1	2	7	291	98.0
RX Other	7	43	57	2	8	44	5	30	28	1	7	9	8	12	20	1	2	7	291	98.0
CS Ext	6	39	47	2	7	42	5	30	23	1	7	10	8	10	21	2	2	6	268	90.2

Site Group	Oral Cavity and Pharynx	Digestive System	Respiratory System	Soft Tissue, Including Heart	Skin, Excluding Basal and Squamous	Breast	Female Genital System	Male Genital System	Urinary System	Eye and Orbit	Brain and Other Nervous System	Non-Malignant Central Nervous System	Endocrine System	Lymphoma	Reportable Hematopoietic Diseases	Mesothelioma	Kaposi Sarcoma	Misc.	Total	Accuracy Rate (%) ¹
CS Lymph	7	37	52	2	8	42	5	30	28	1	7	10	7	12	21	2	2	6	279	93.9
CS Mets	7	39	56	2	8	42	5	29	27	1	7	9	8	12	21	1	2	6	282	94.9
CS SSF1																2			2	100.0
CS SSF3								28											28	90.3
Derived SS2000	6	39	51	2	7	42	5	30	26	1	7	10	8	10	21	2	2	6	275	92.6

Key: DOB=Date of Birth, Seq=Sequence Number, Dx Date=Diagnosis Date, Site=Primary Site, RX Date CoC=Date of 1st Crs RX—CoC, RX SPS=RX Summ—Surg Prim Site, RX SRLS=RX Summ—Scope Reg LN Sur, RX SORD=RX Summ—Surg Other Reg/Dis, RX Mod=Rad—Regional RX Modality, RX Chemo=RX Summ—Chemo, RX Hormone=RX Summ—Hormone, RX BRM=RX Summ—BRM, RX Trans=RX Summ—Transplnt/Endocr, RX Other=RX Summ—Other, CS Ext=Collaborative Stage Extension, CS Lymph=Collaborative Stage Lymph Nodes, CS Mets=Collaborative Stage Metastasis at Diagnosis, CS SSF1=Collaborative Stage Site-Specific Factor 1, CS SSF3=Collaborative Stage Site-Specific Factor 3

¹ Accuracy Rate (%)=Number of Data Elements w/o Discrepancy x 100/Total Data Elements
Total Data Elements=Number of Records Reabstracted x Number of Data Elements Reviewed

Figure 1. Distribution of Missed Cases, by Site Group

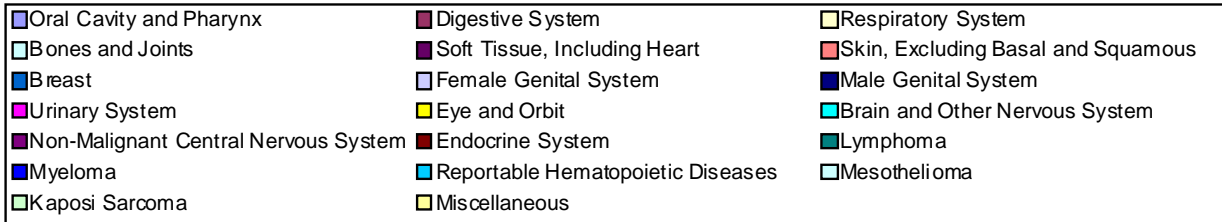
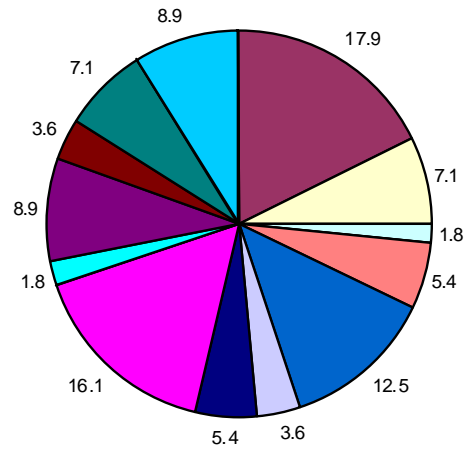


Figure 2. Distribution of Missed Cases, by Casefinding Source

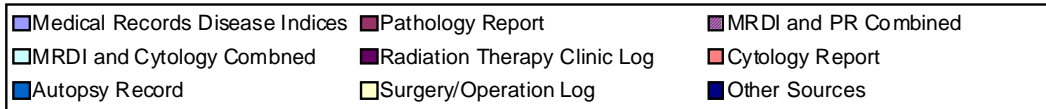
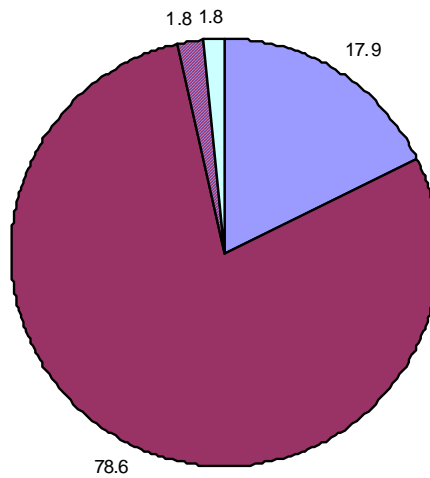


Figure 3. Distribution of Records Without Discrepancies, by Site Group

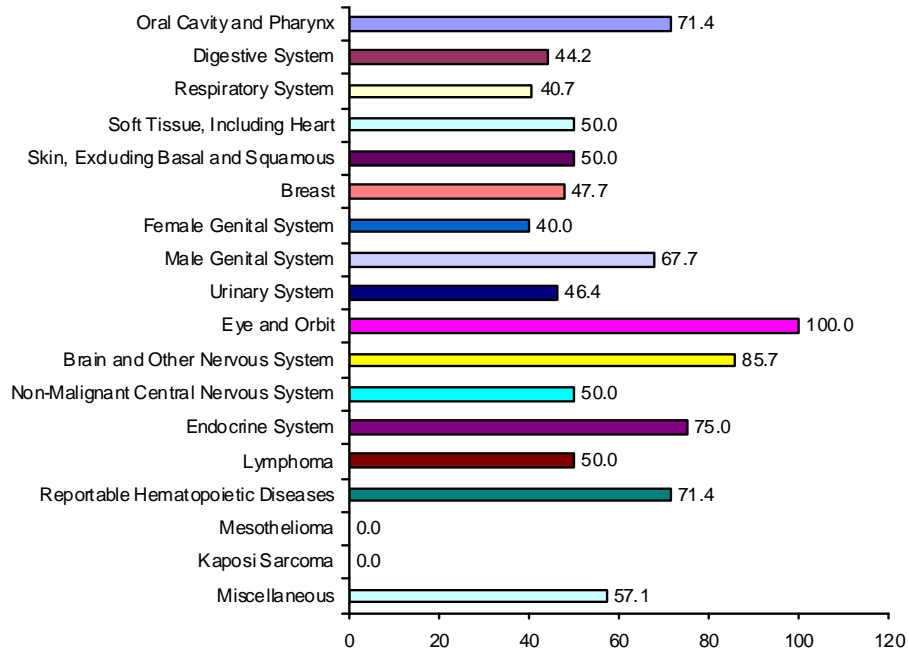


Figure 4. Distribution of Data Elements Without Discrepancies, by Site Group

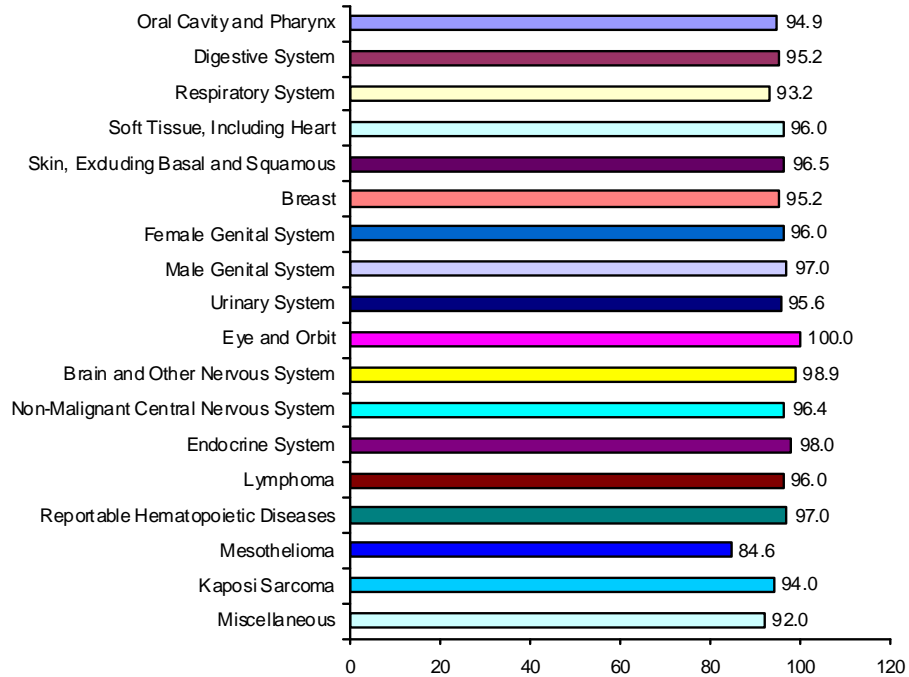
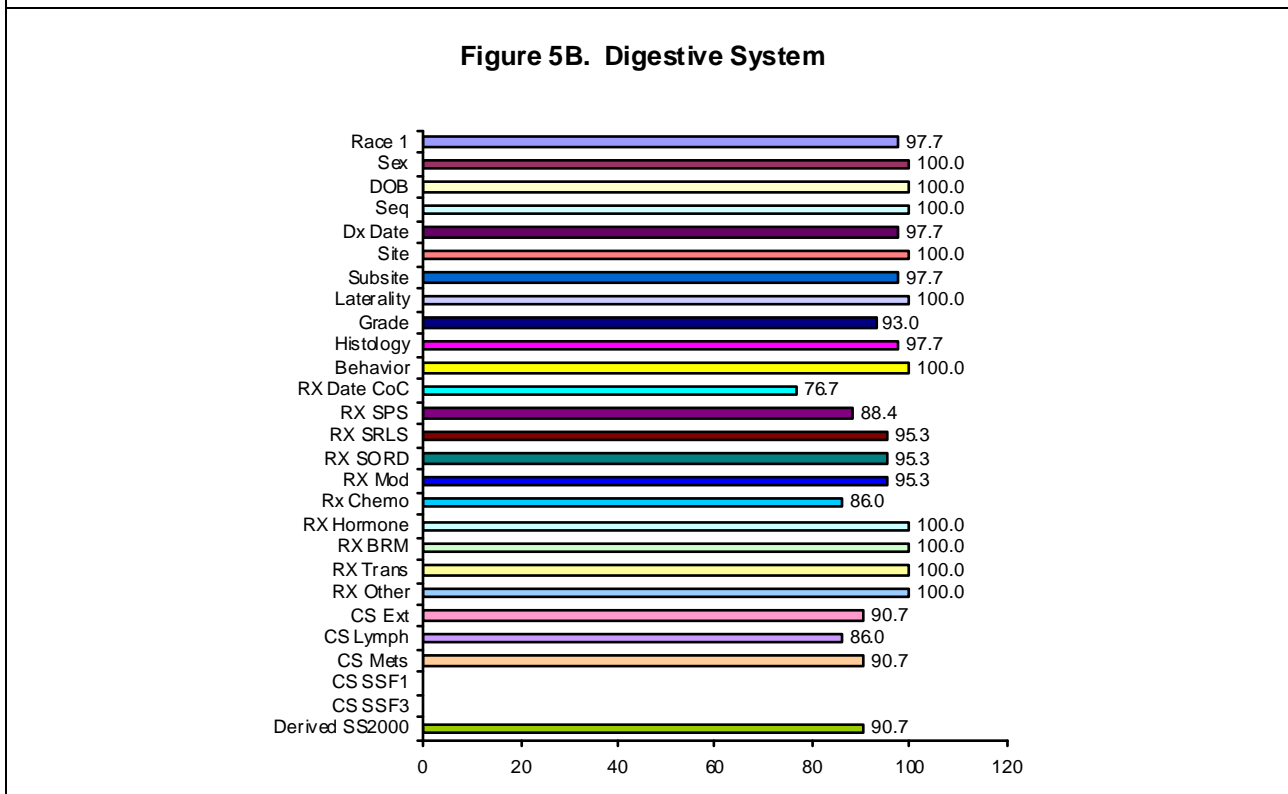
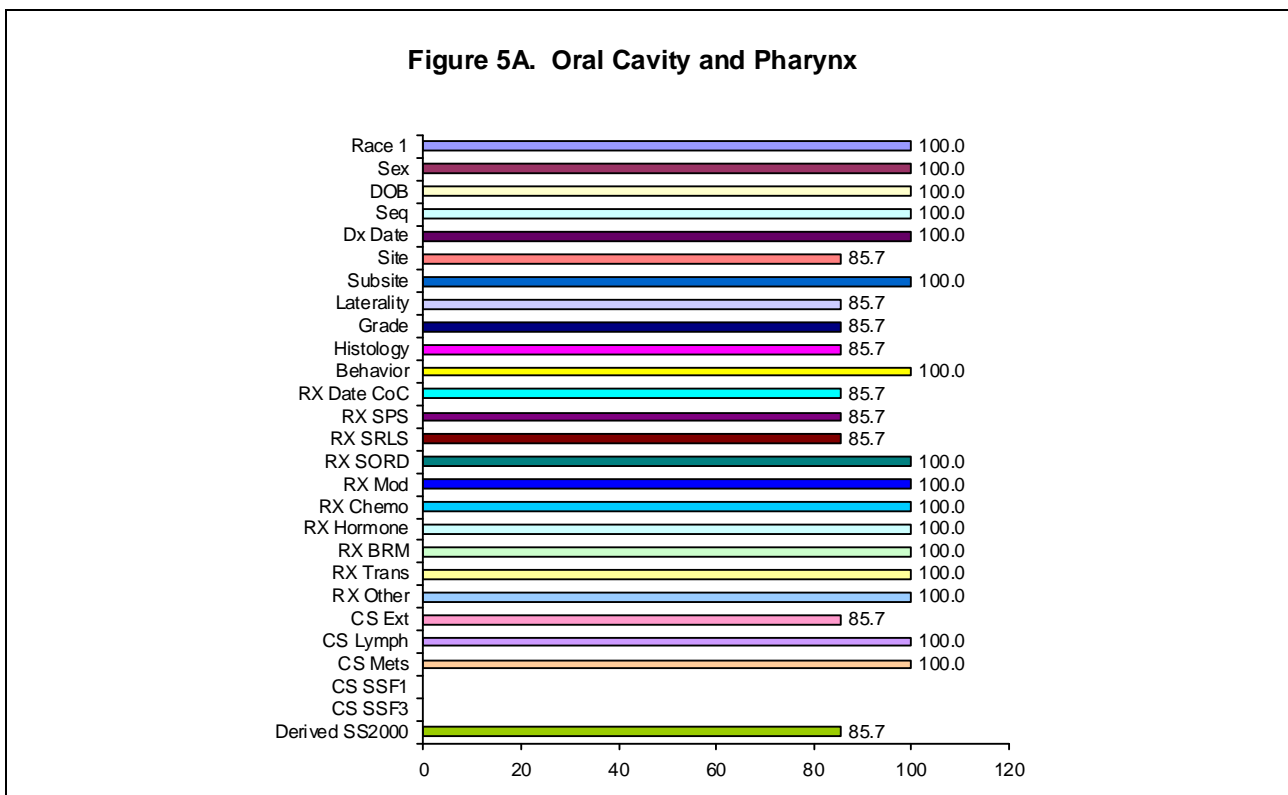
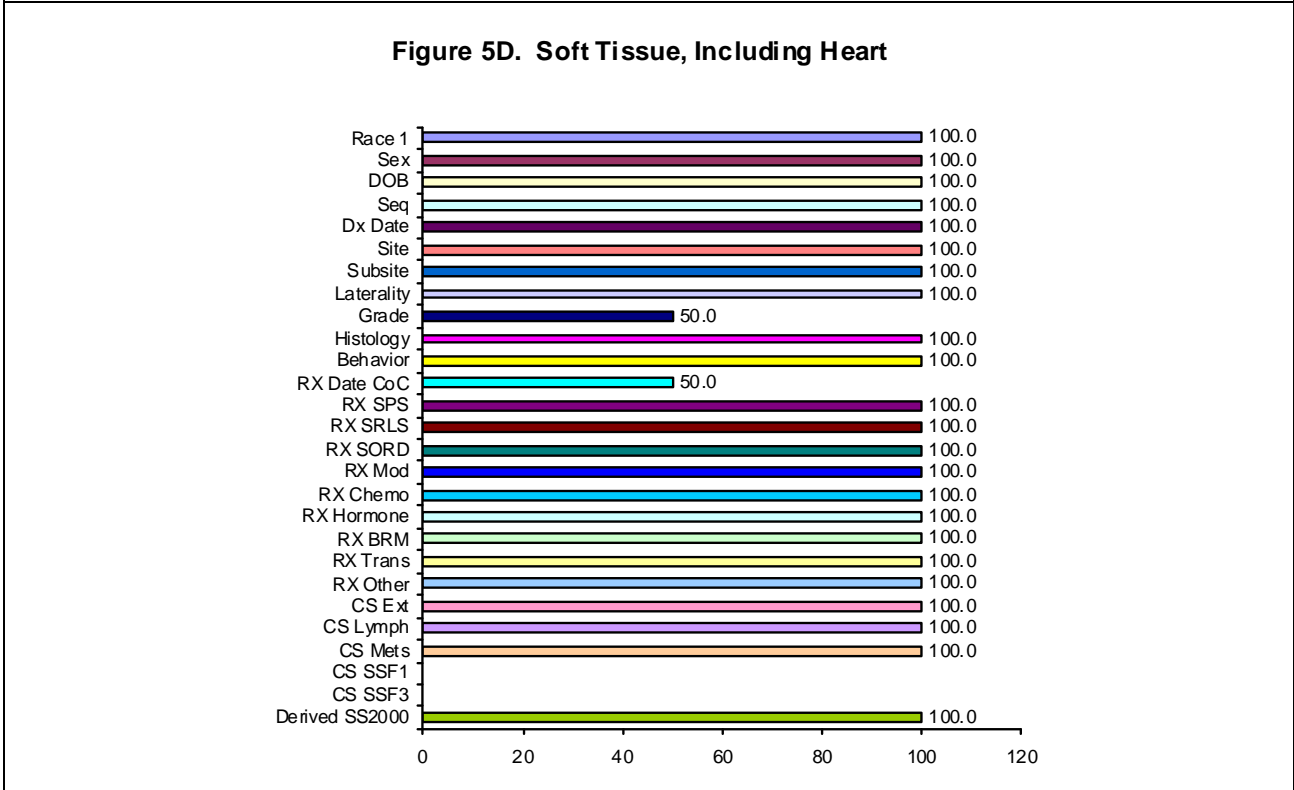
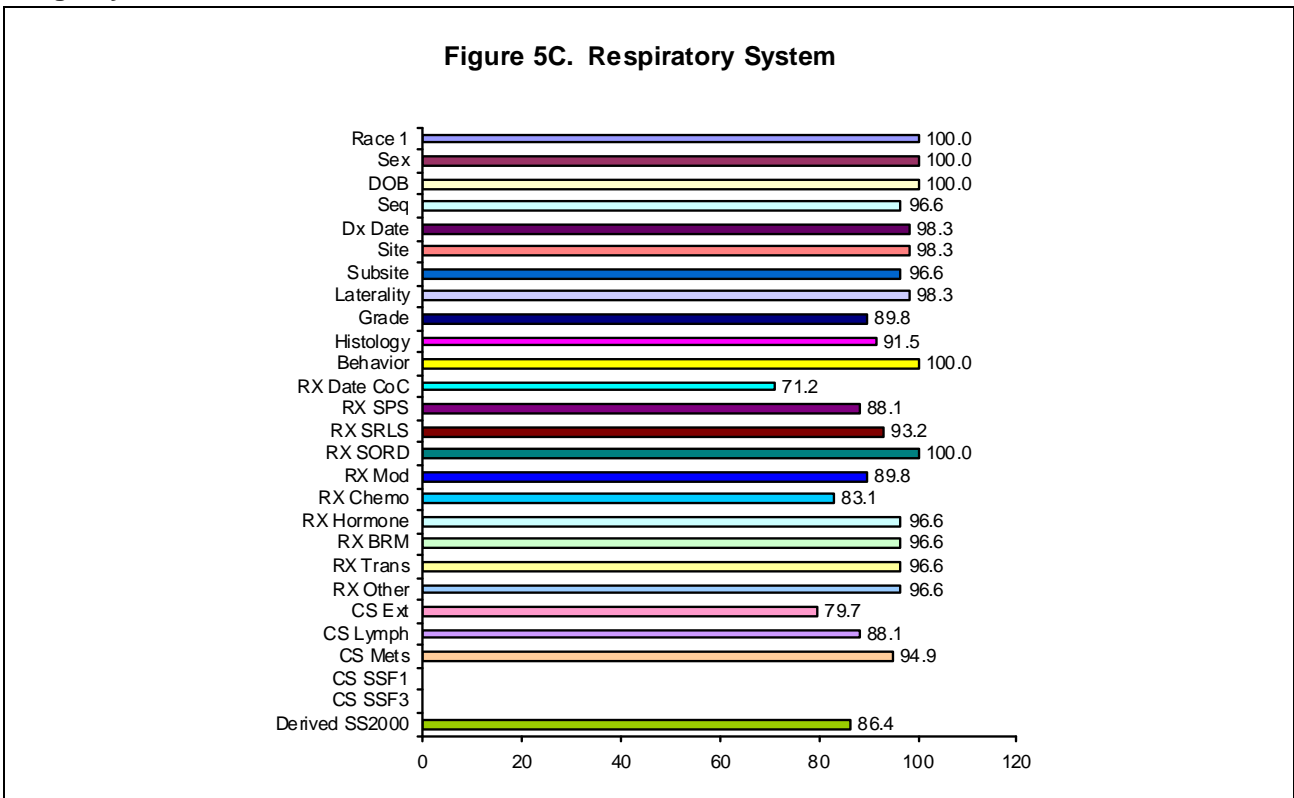


Figure 5. Data Accuracy Rates, by Site Group for Diagnosis Year 2006—Arizona Cancer Registry



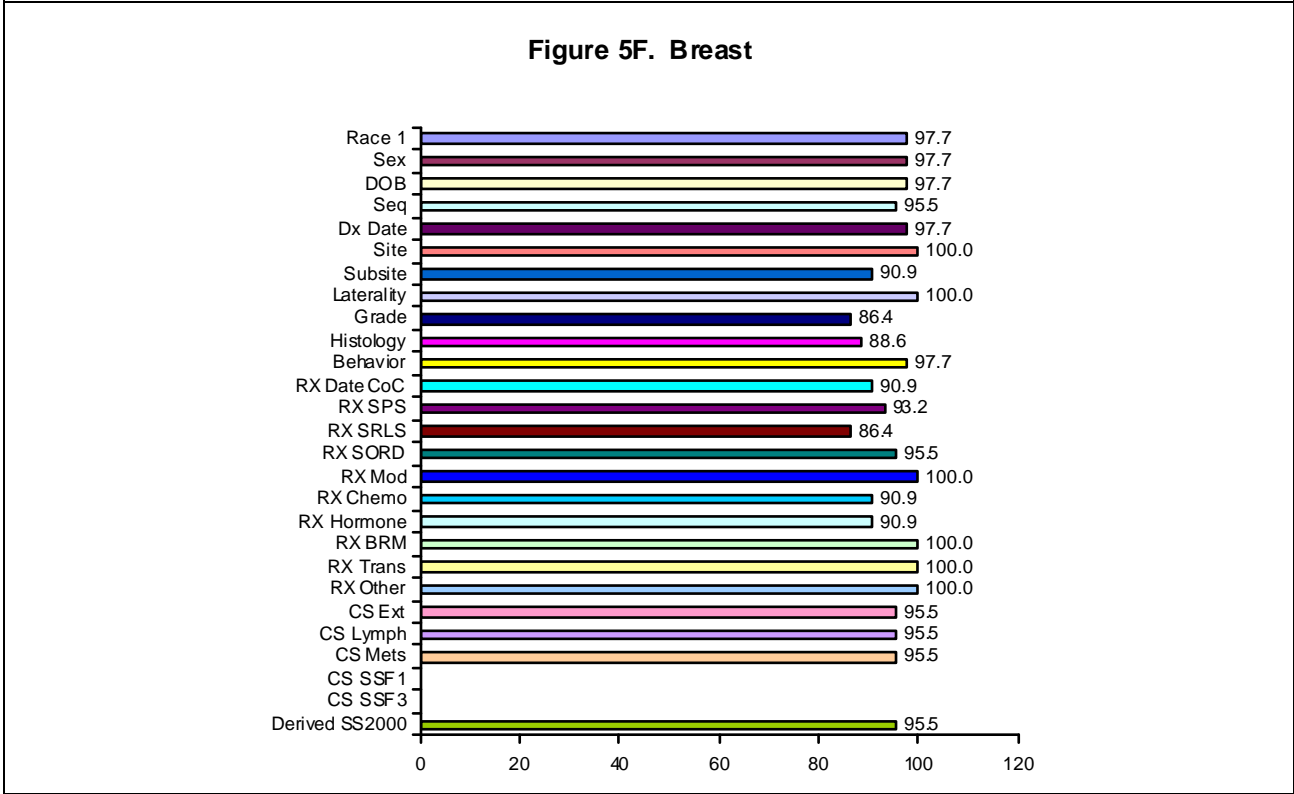
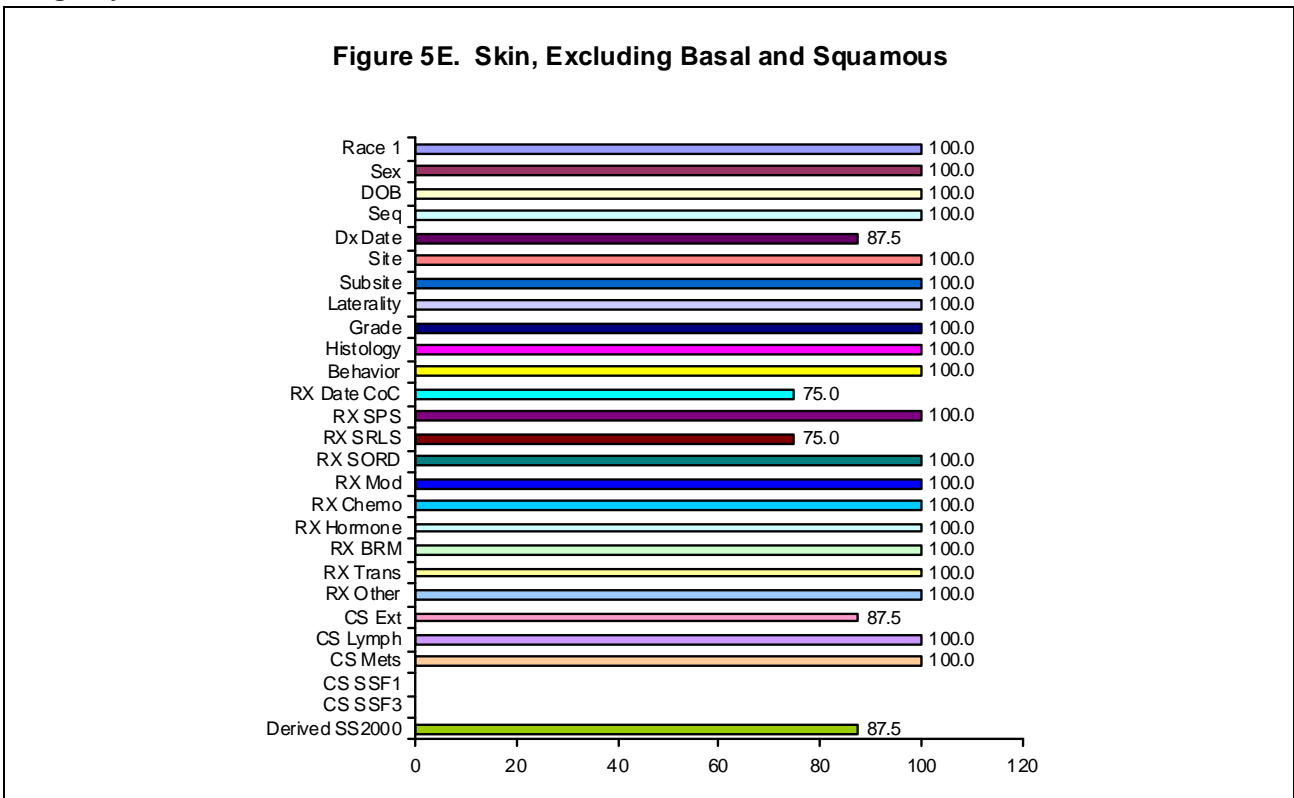
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Figure 5, cont. Data Accuracy Rates, by Site Group for Diagnosis Year 2006—Arizona Cancer Registry



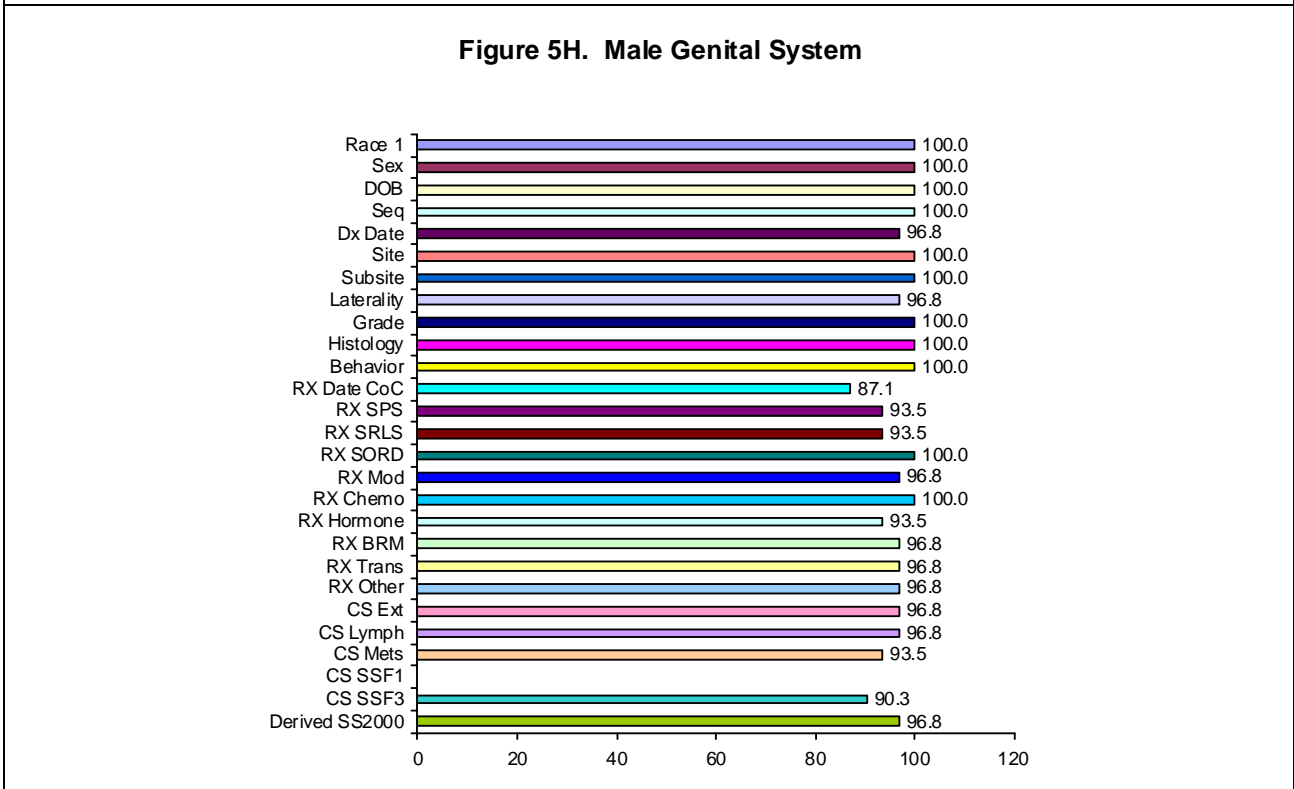
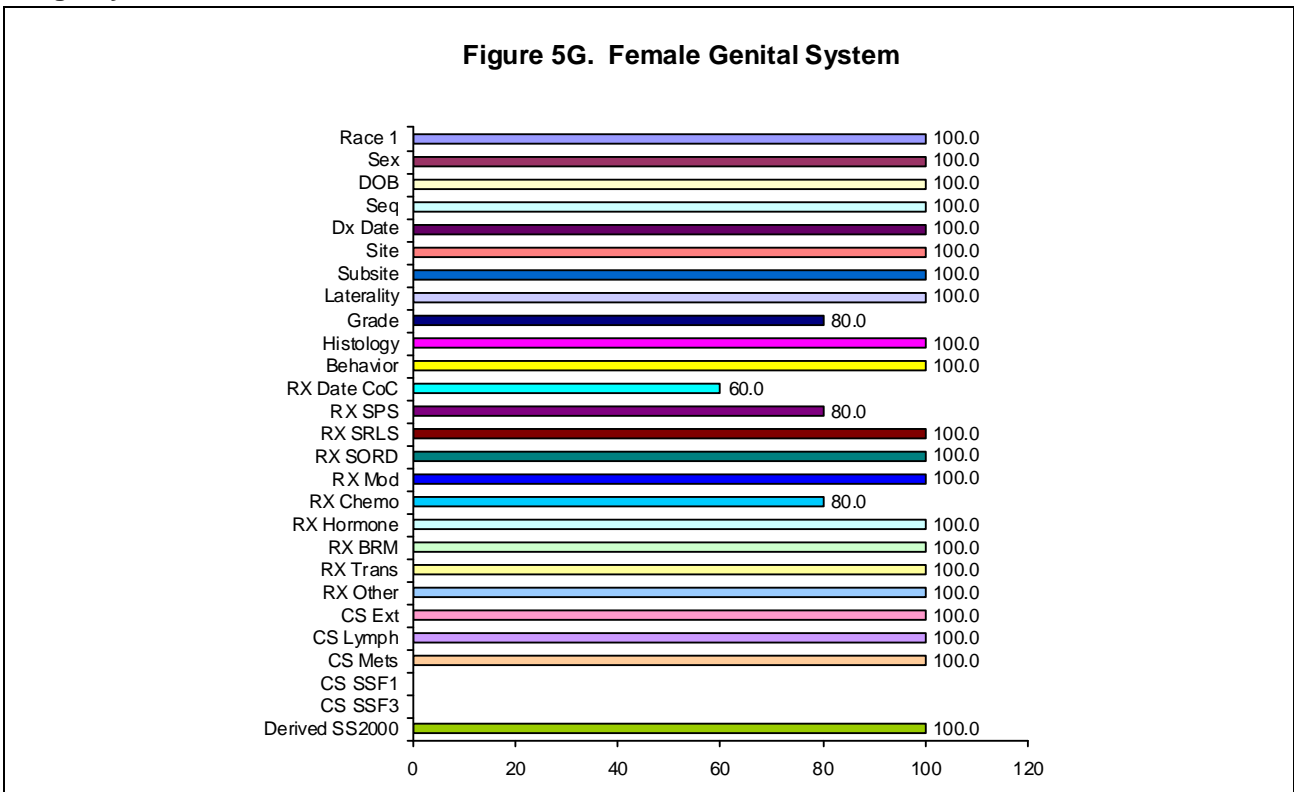
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Figure 5, cont. Data Accuracy Rates, by Site Group for Diagnosis Year 2006—Arizona Cancer Registry



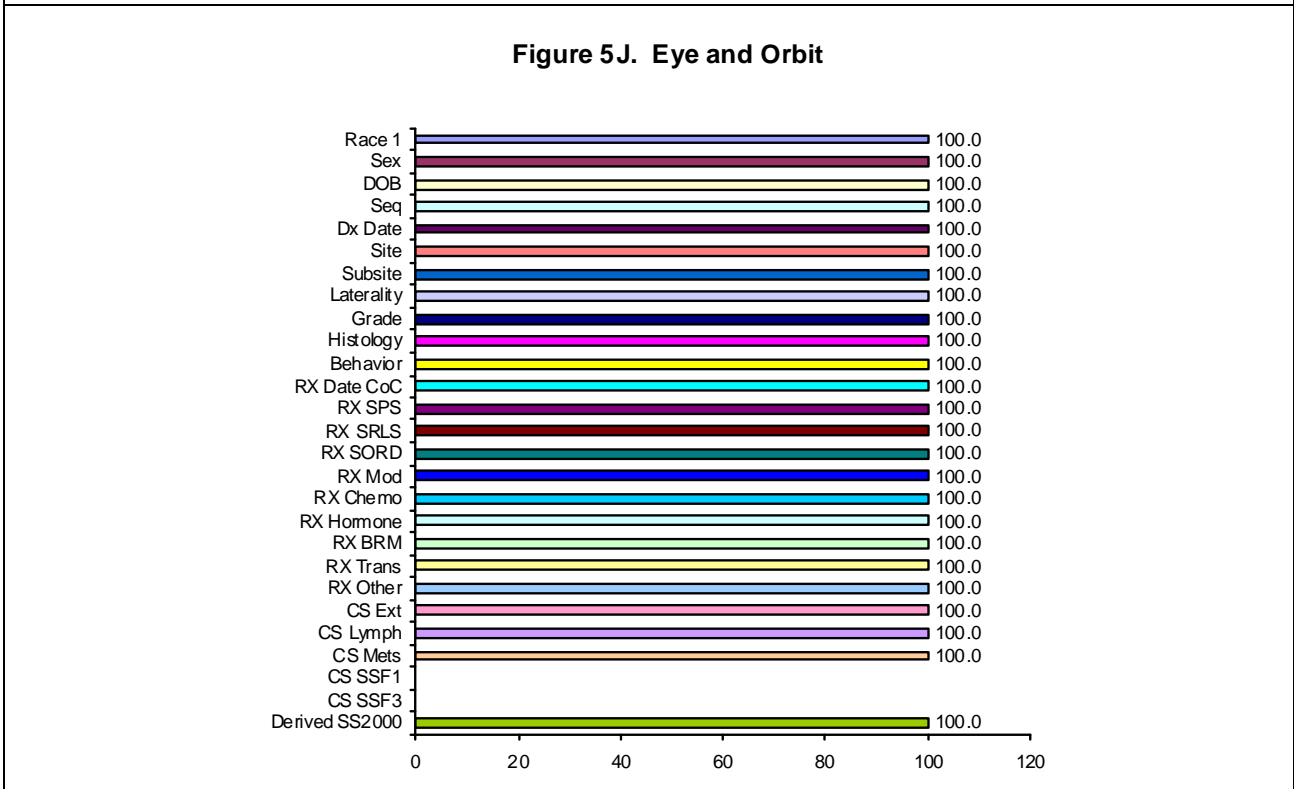
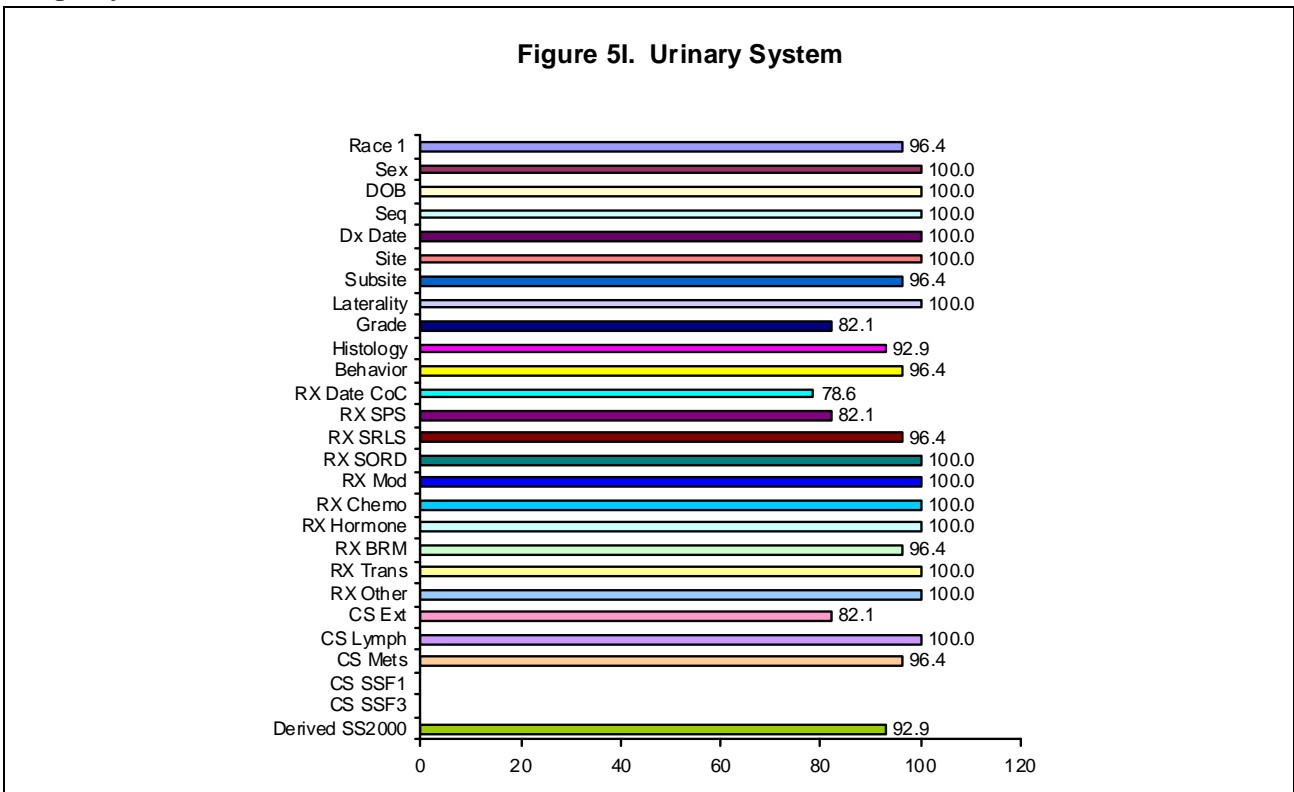
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Figure 5, cont. Data Accuracy Rates, by Site Group for Diagnosis Year 2006—Arizona Cancer Registry



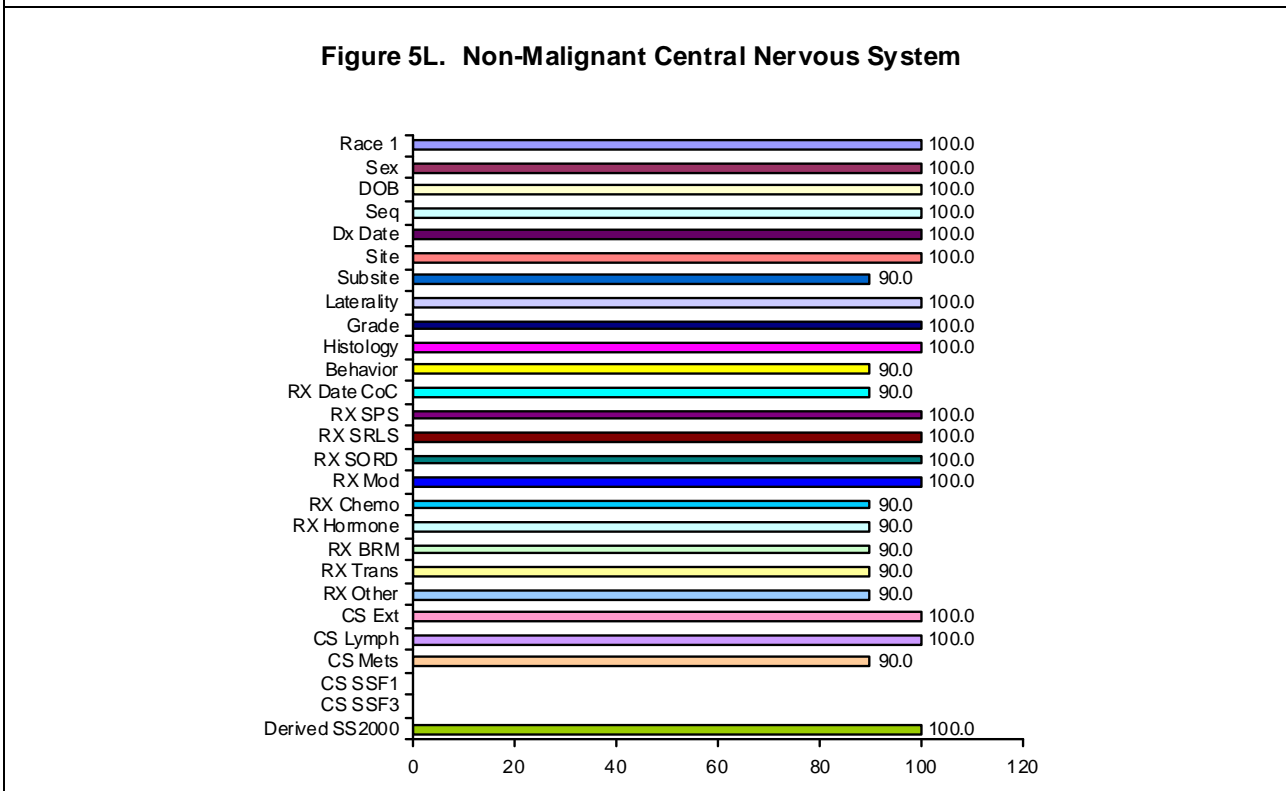
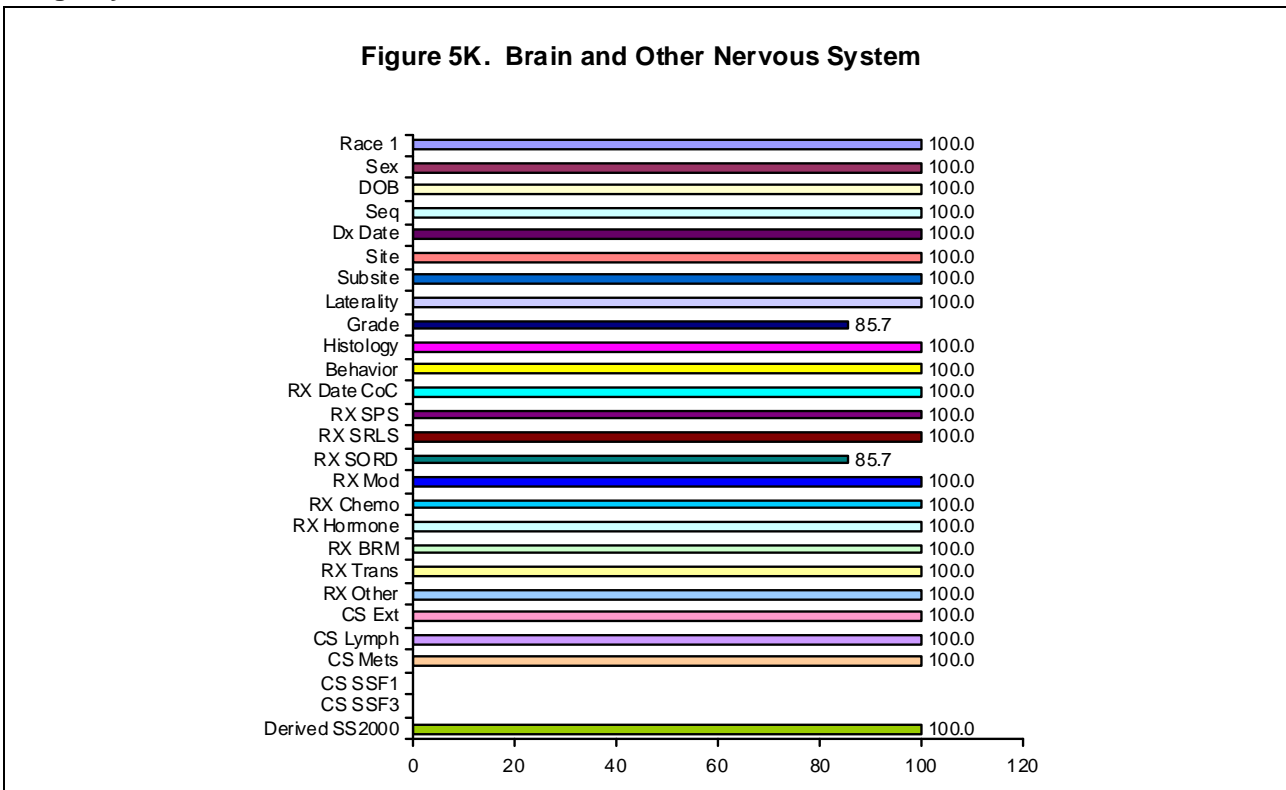
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Figure 5, cont. Data Accuracy Rates, by Site Group for Diagnosis Year 2006—Arizona Cancer Registry



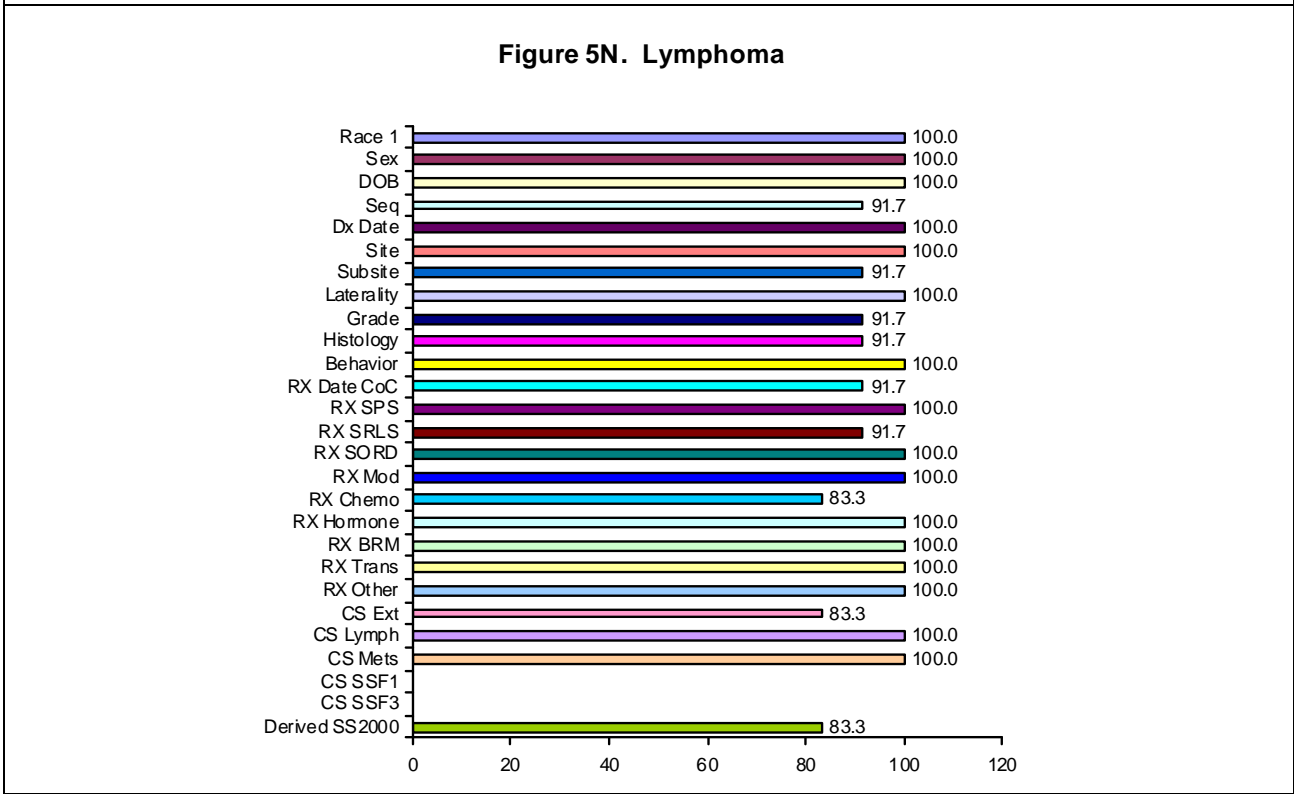
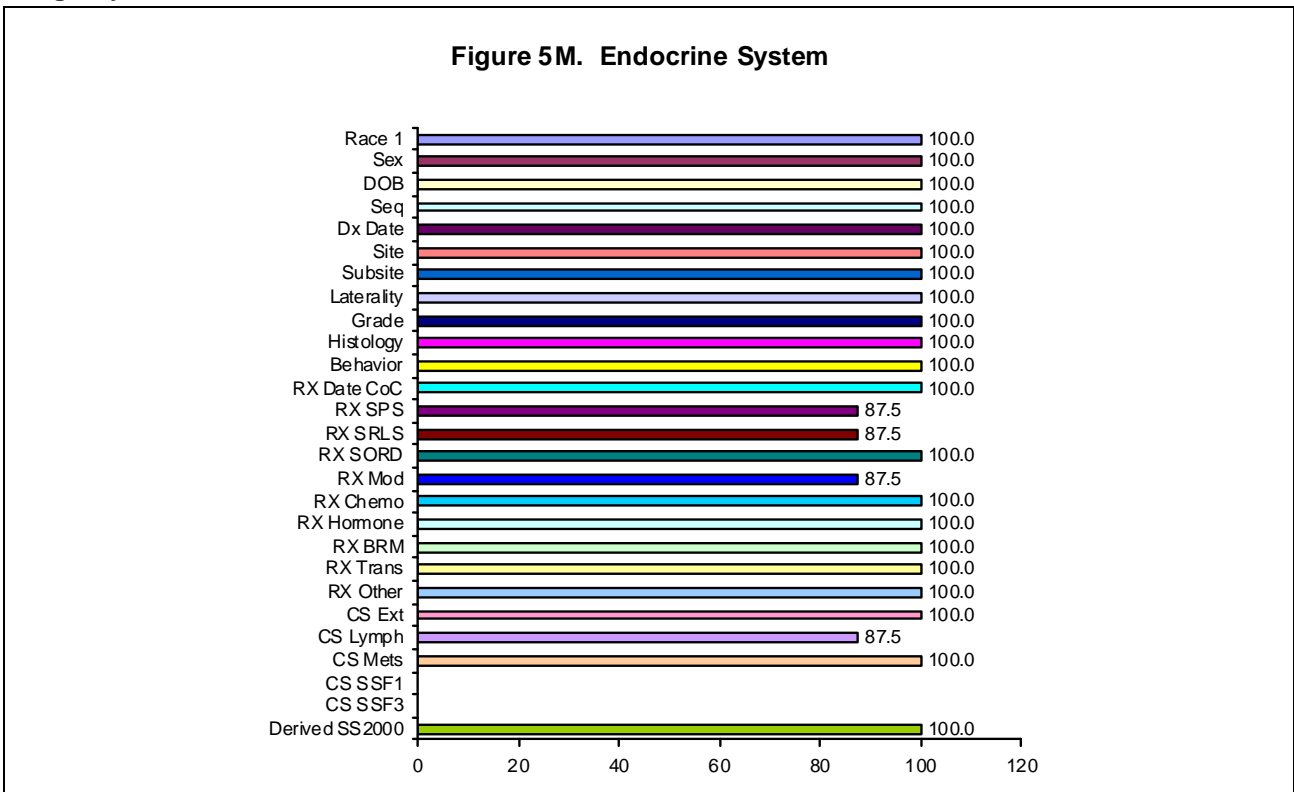
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Figure 5, cont. Data Accuracy Rates, by Site Group for Diagnosis Year 2006—Arizona Cancer Registry



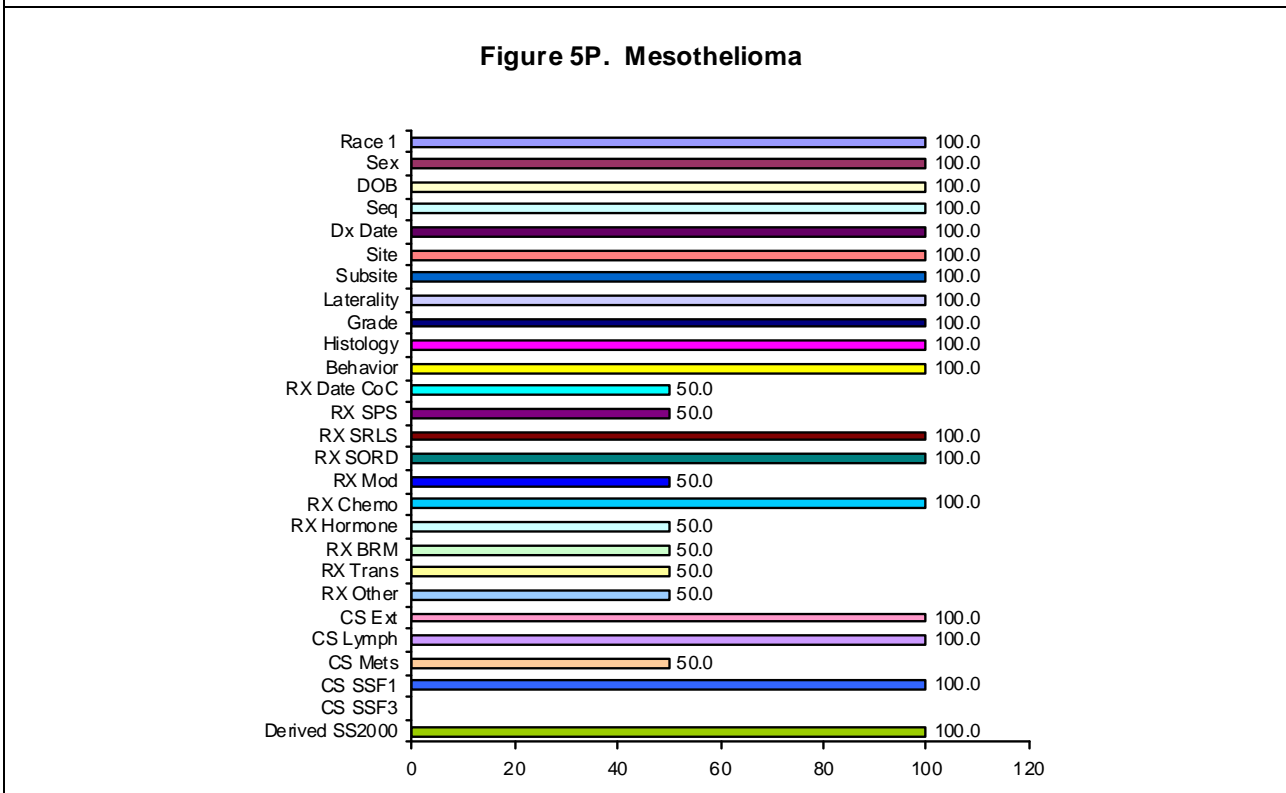
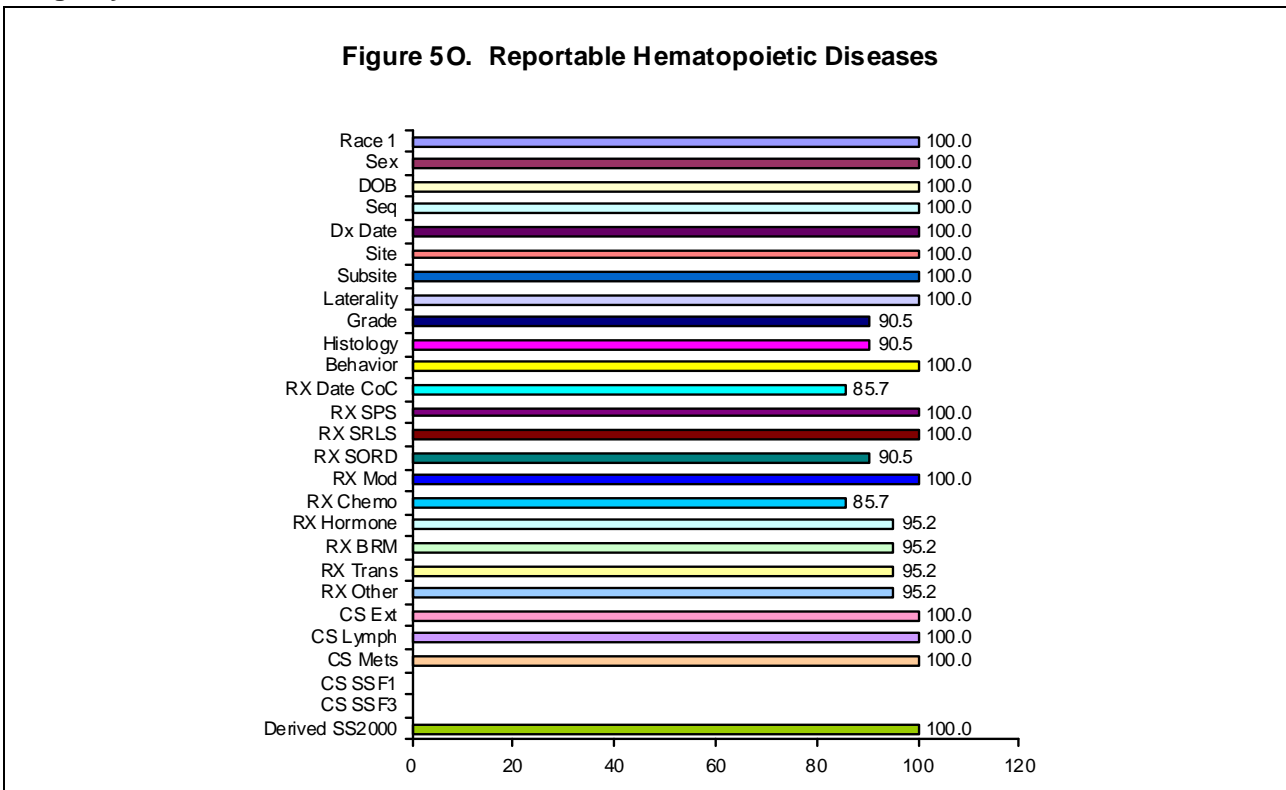
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Figure 5, cont. Data Accuracy Rates, by Site Group for Diagnosis Year 2006—Arizona Cancer Registry



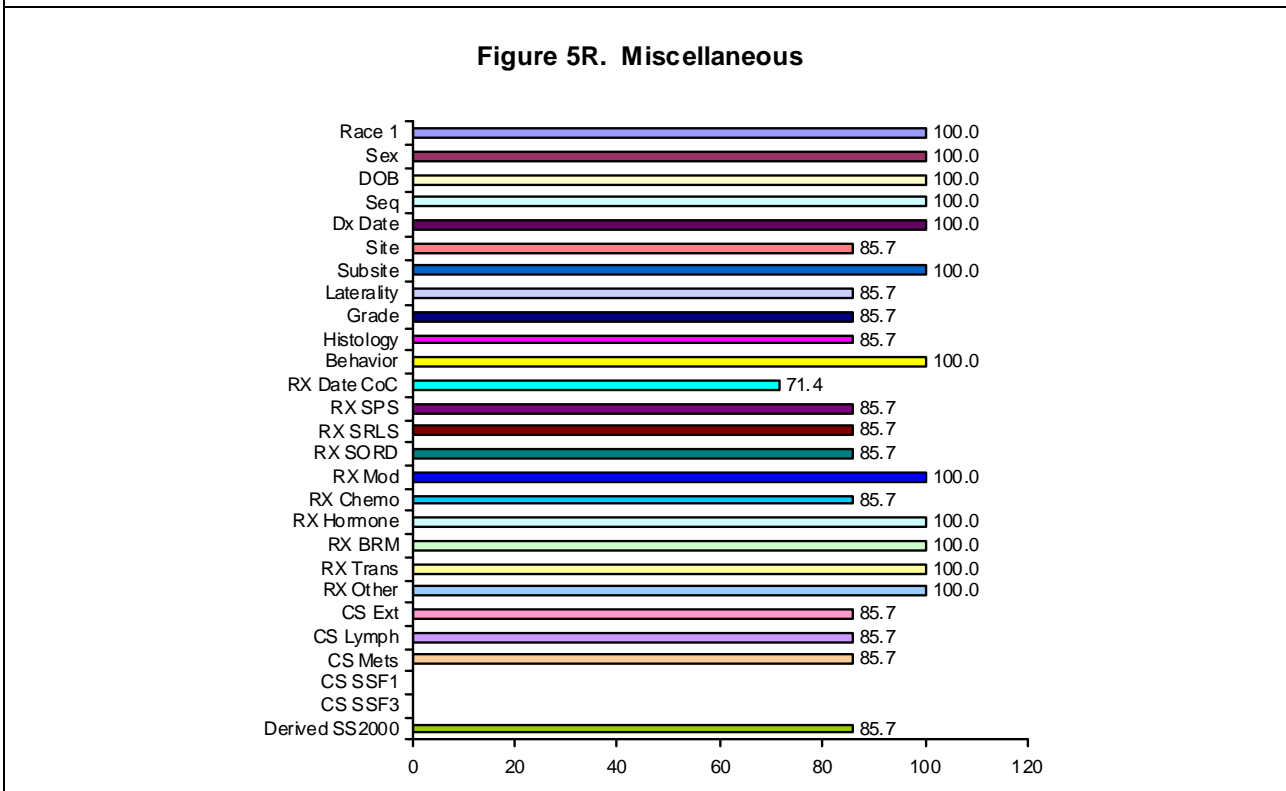
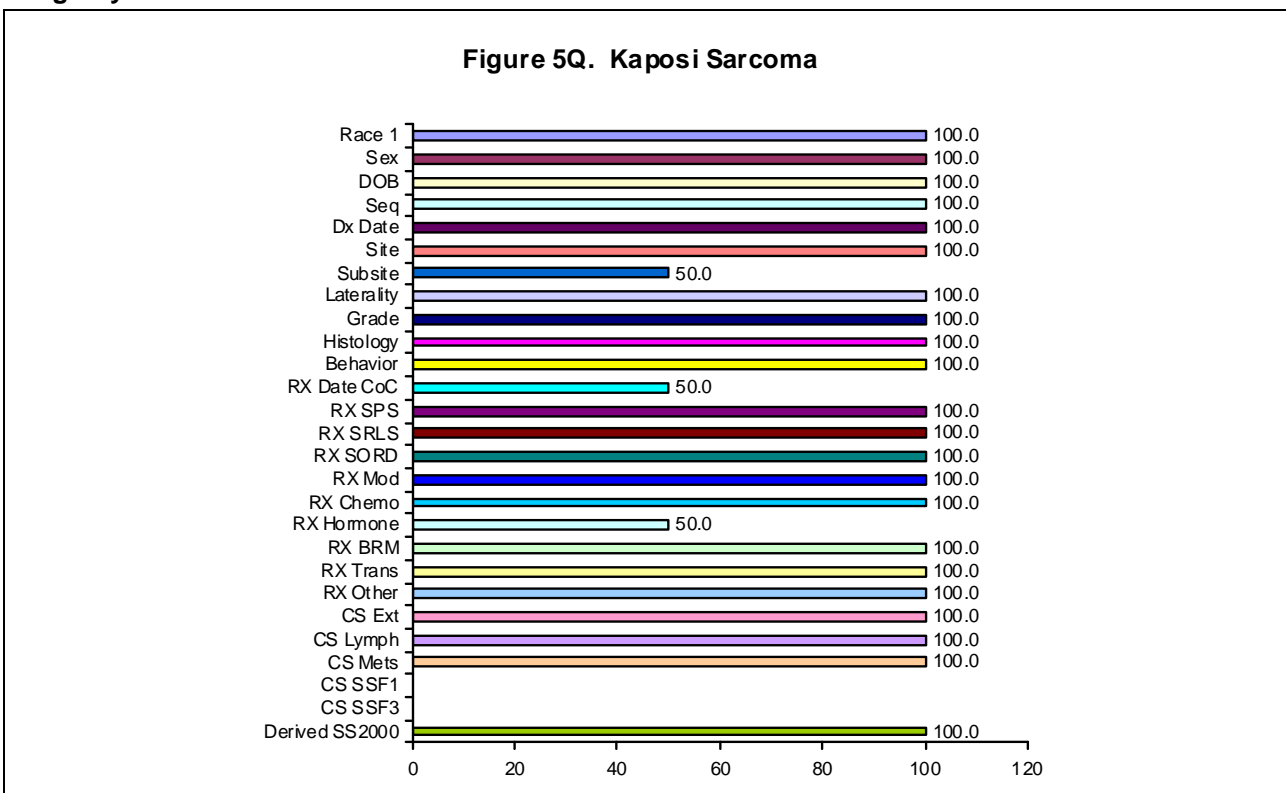
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Figure 5, cont. Data Accuracy Rates, by Site Group for Diagnosis Year 2006—Arizona Cancer Registry



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Figure 5, cont. Data Accuracy Rates, by Site Group for Diagnosis Year 2006—Arizona Cancer Registry



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Figure 6. Comparison of Data Accuracy Rates of Selected Data Elements, by Site Group— Arizona Cancer Registry (2006)

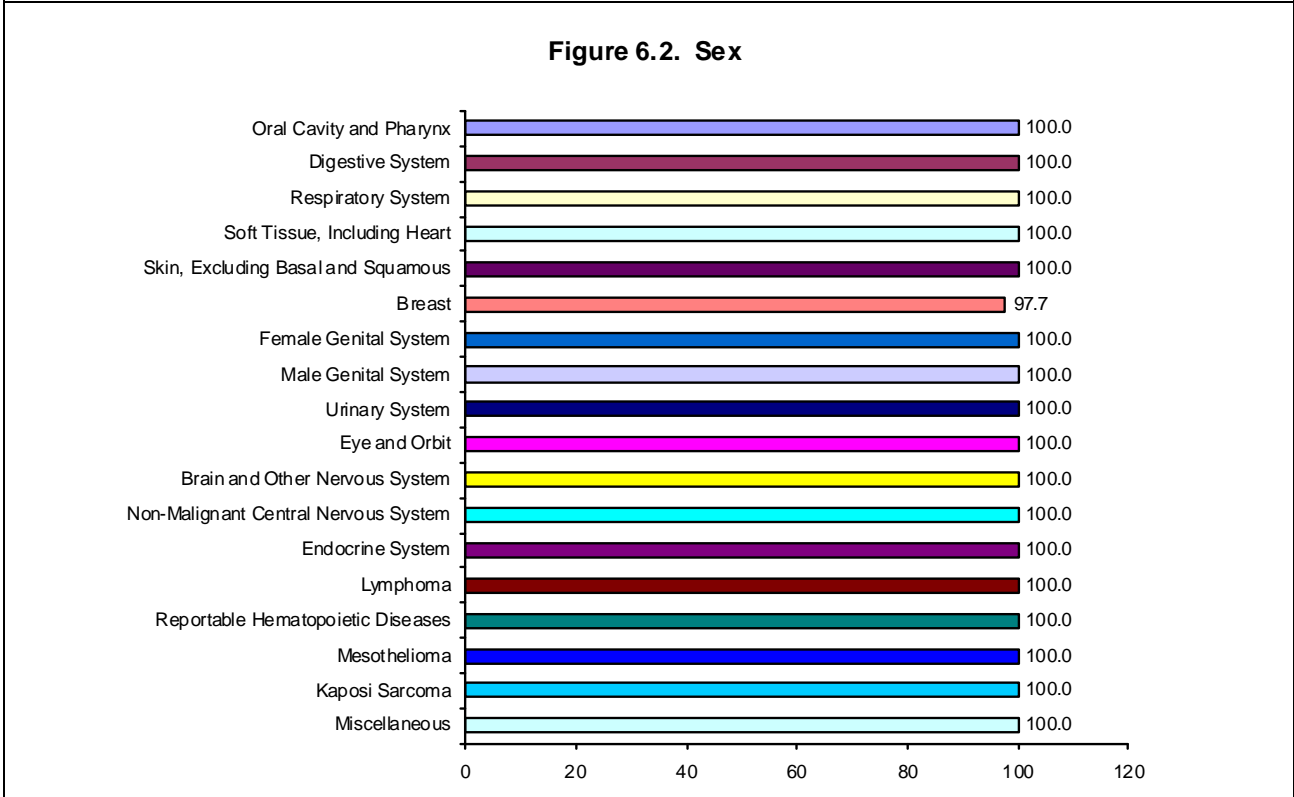
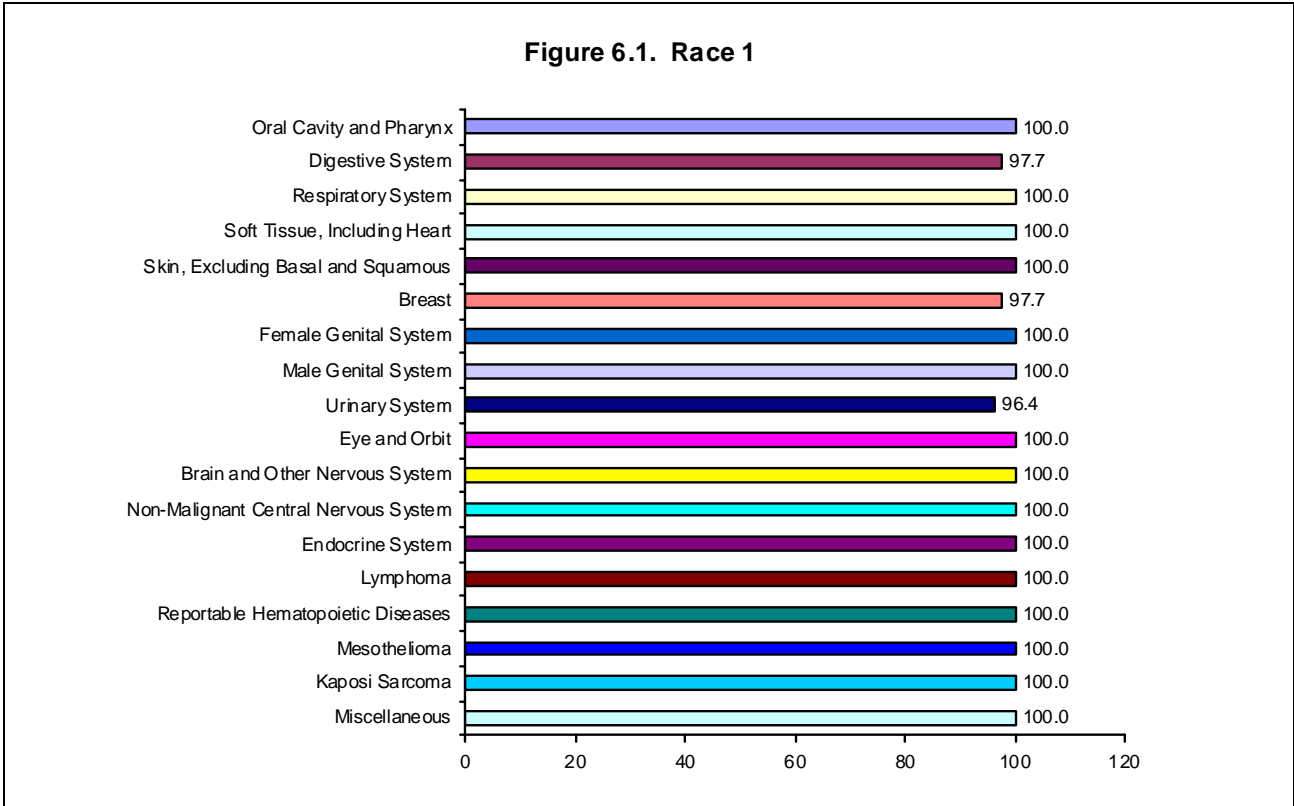


Figure 6, cont. Comparison of Data Accuracy Rates of Selected Data Elements, by Site Group—Arizona Cancer Registry (2006)

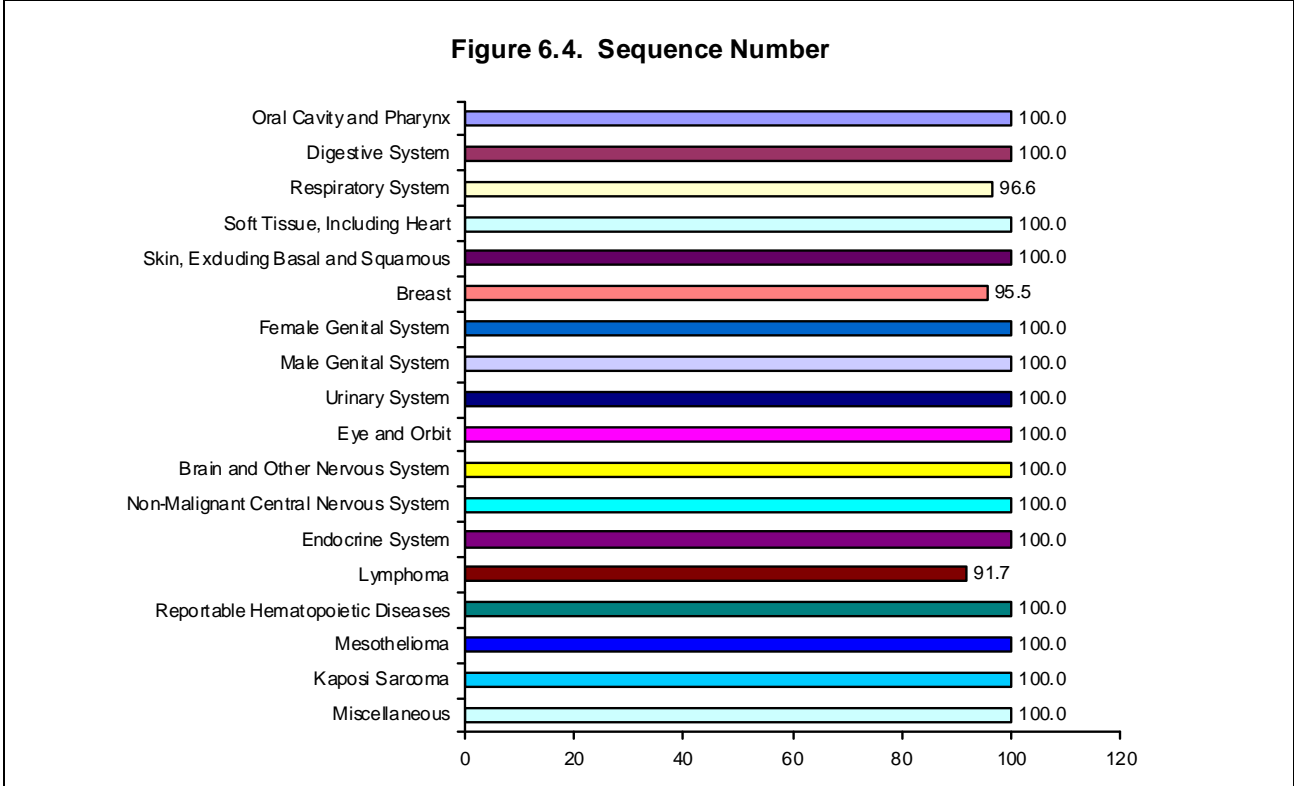
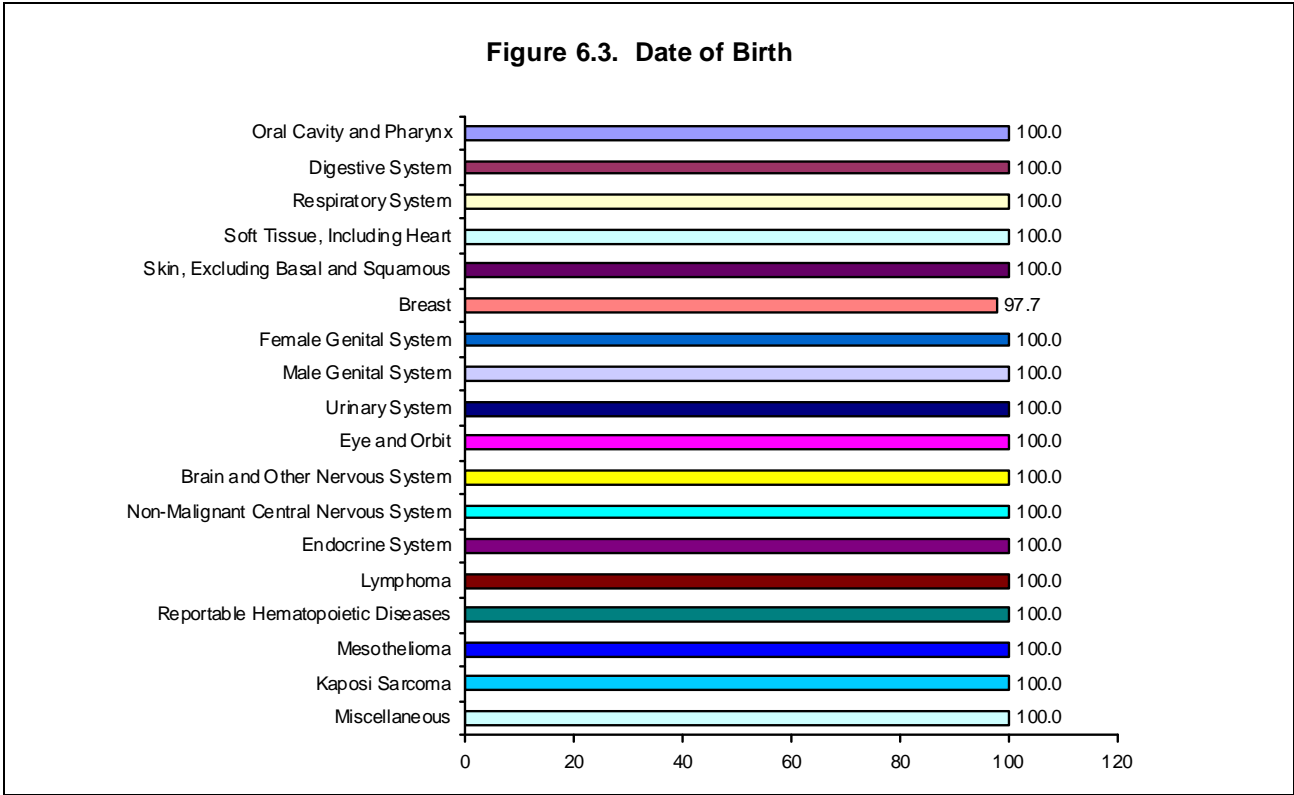


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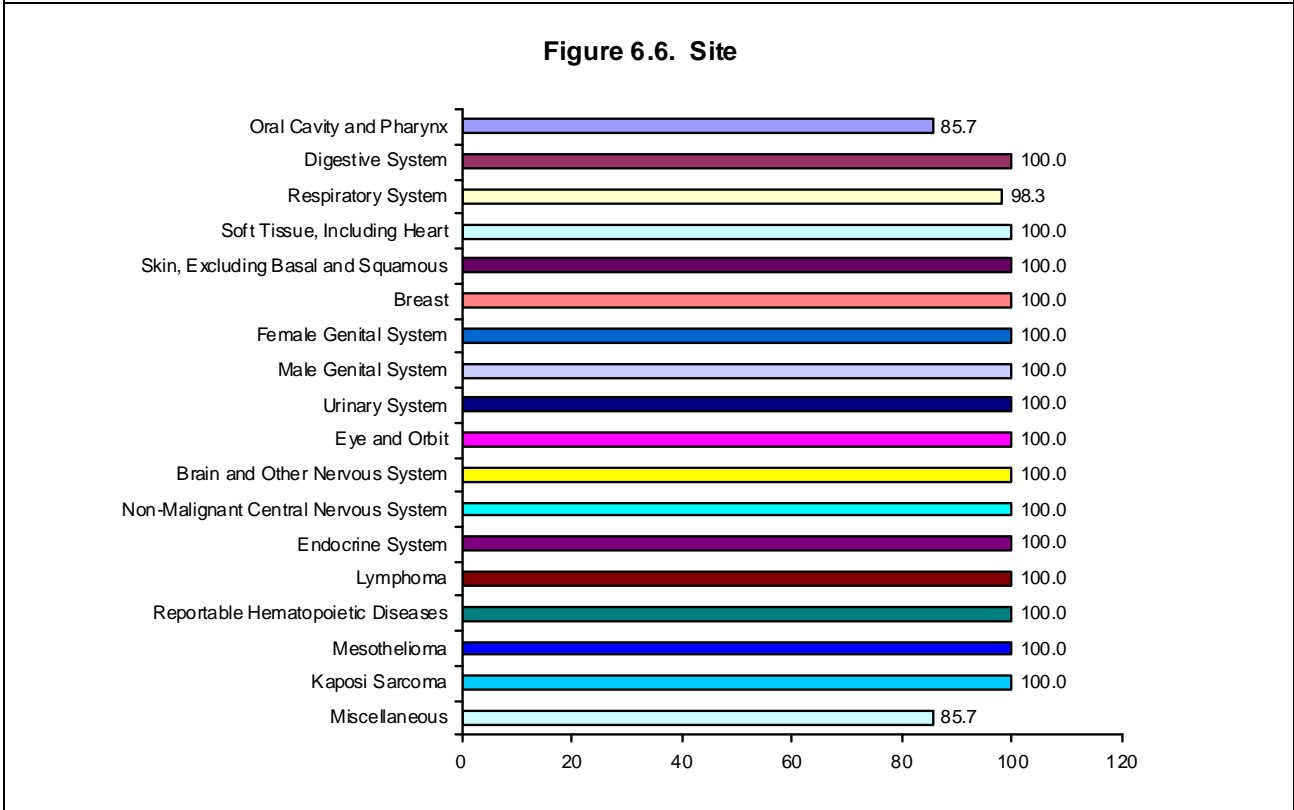
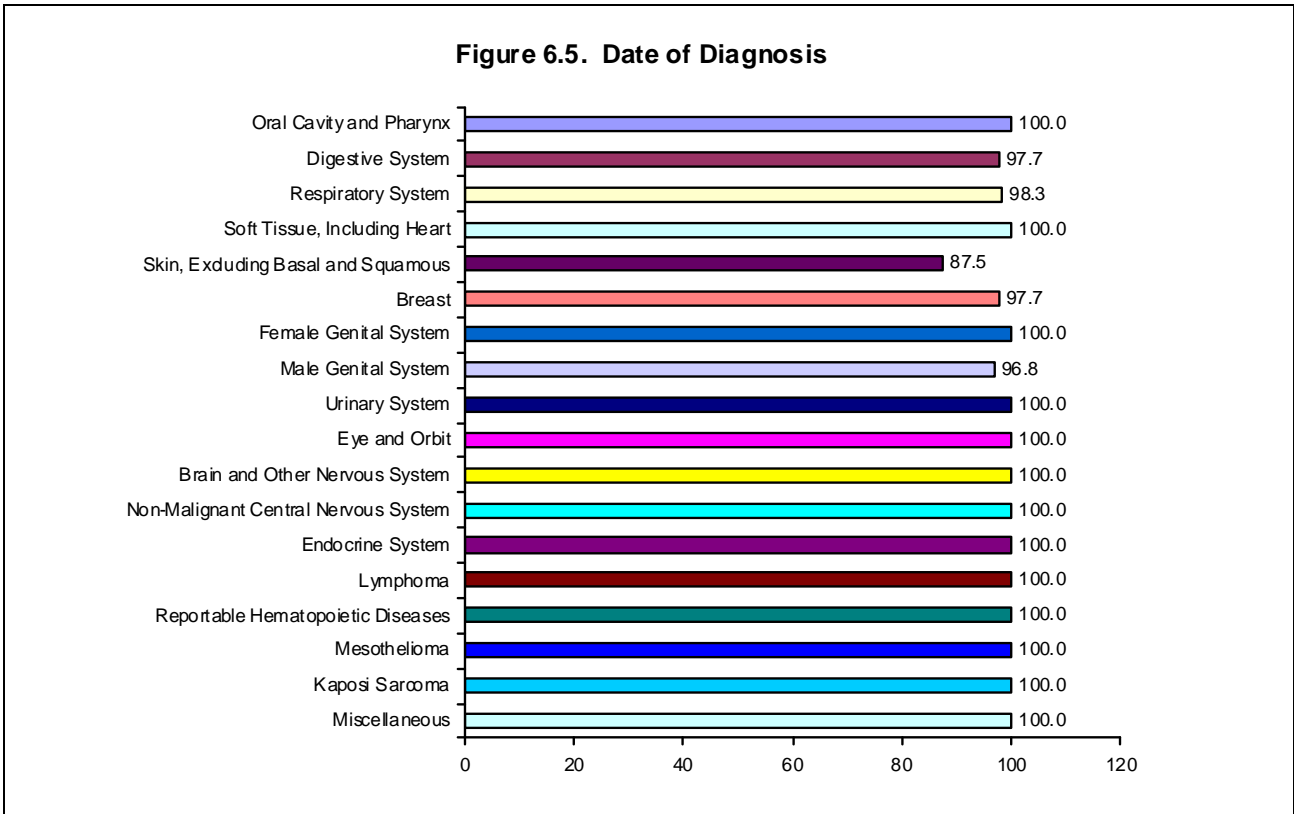


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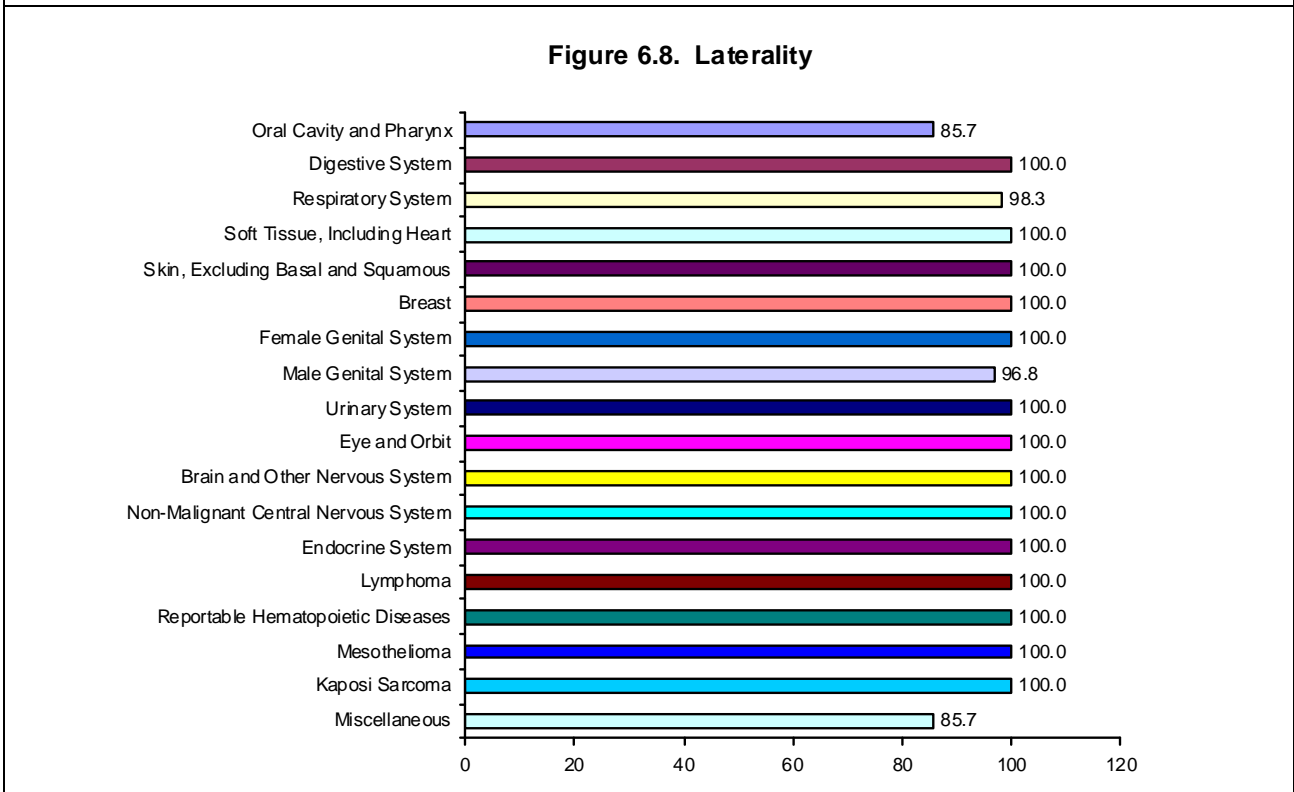
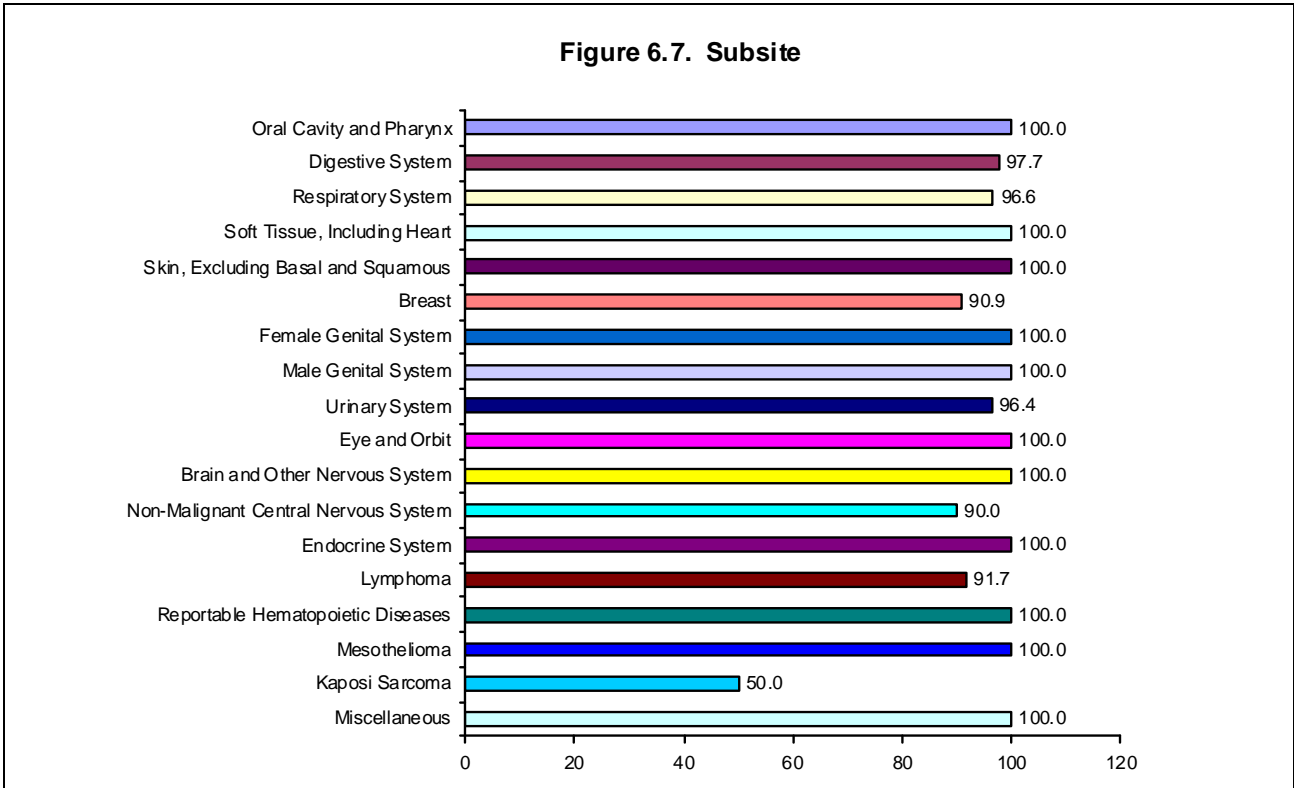


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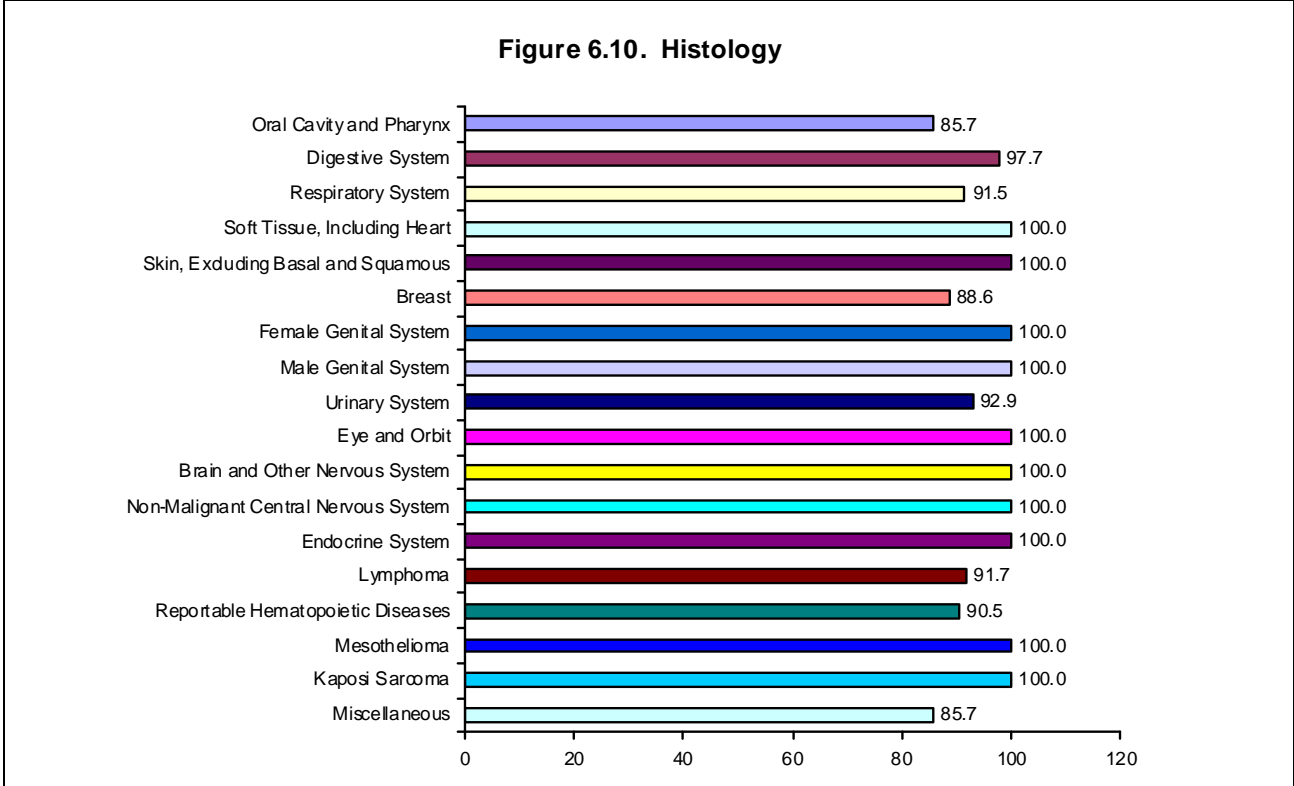
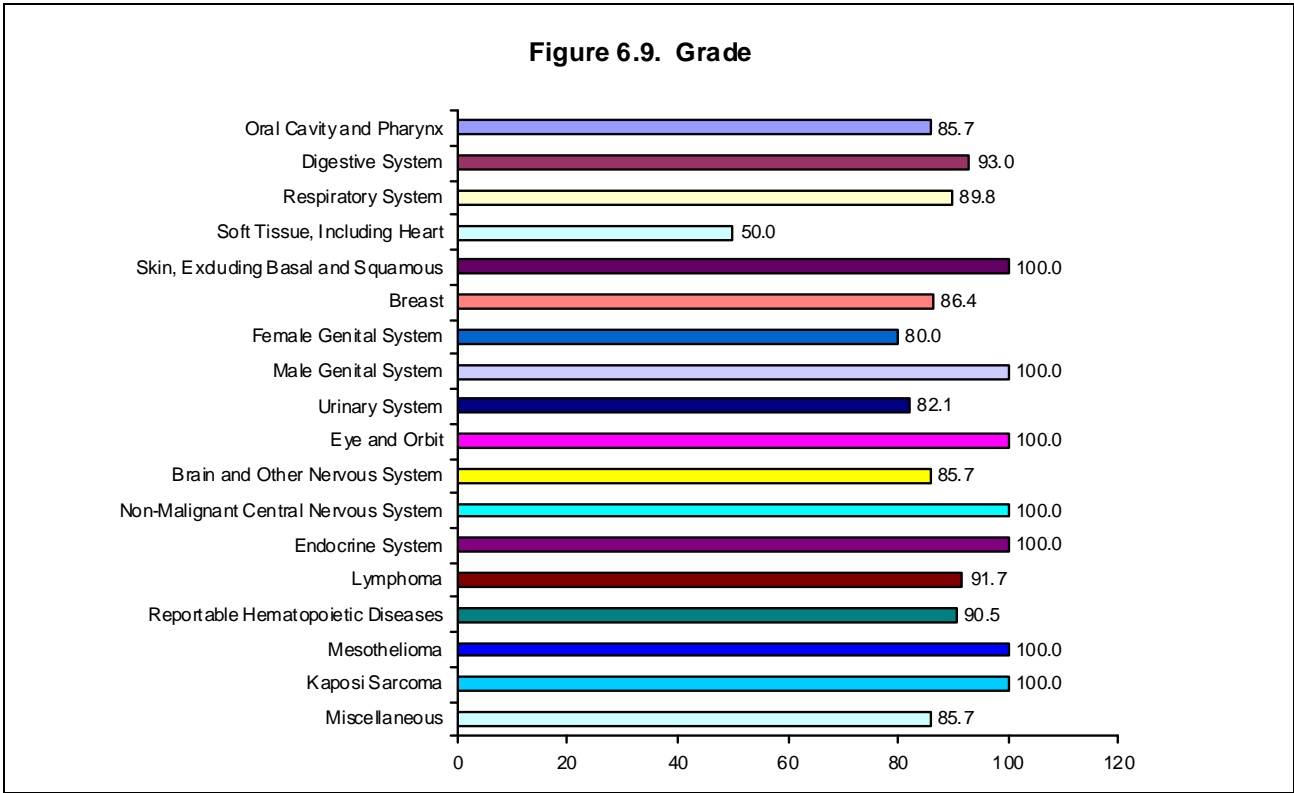


Figure 6, cont. Comparison of Data Accuracy Rates of Selected Data Elements, by Site Group—Arizona Cancer Registry (2006)

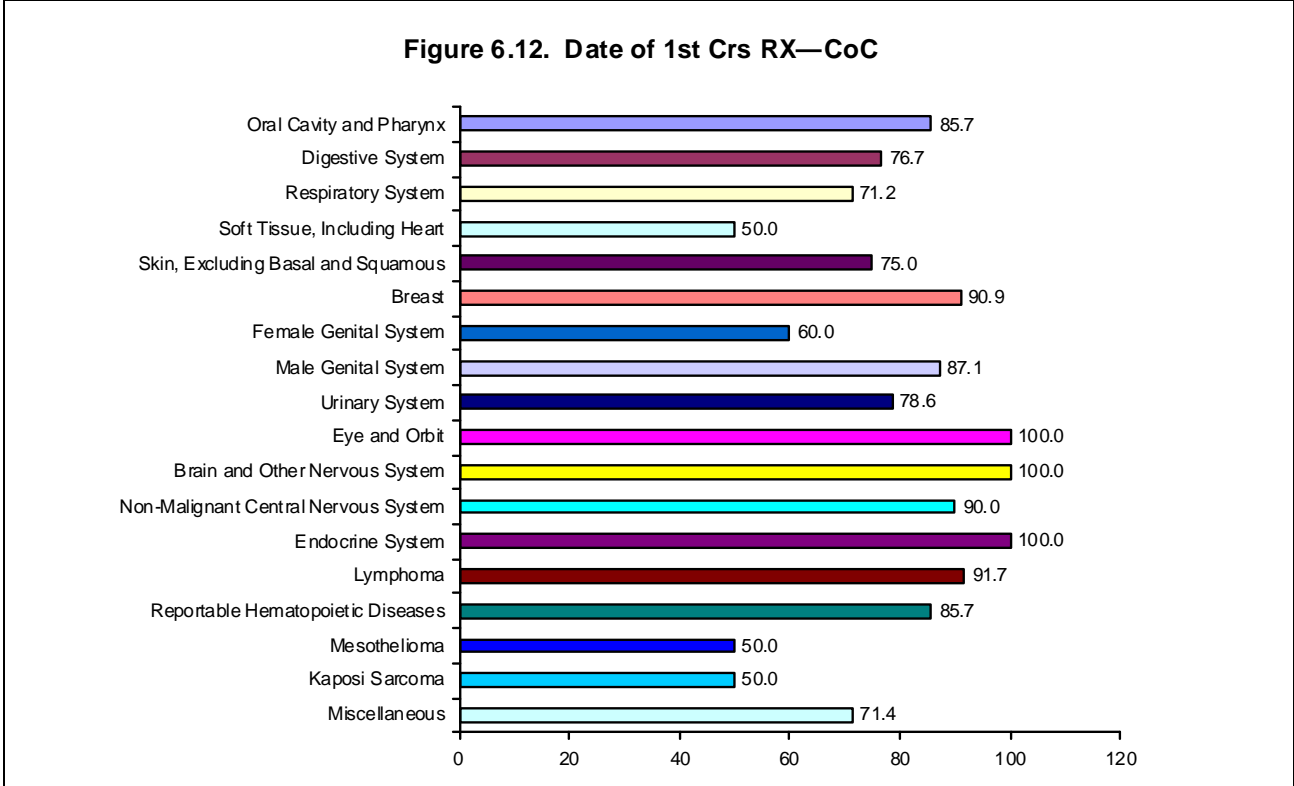
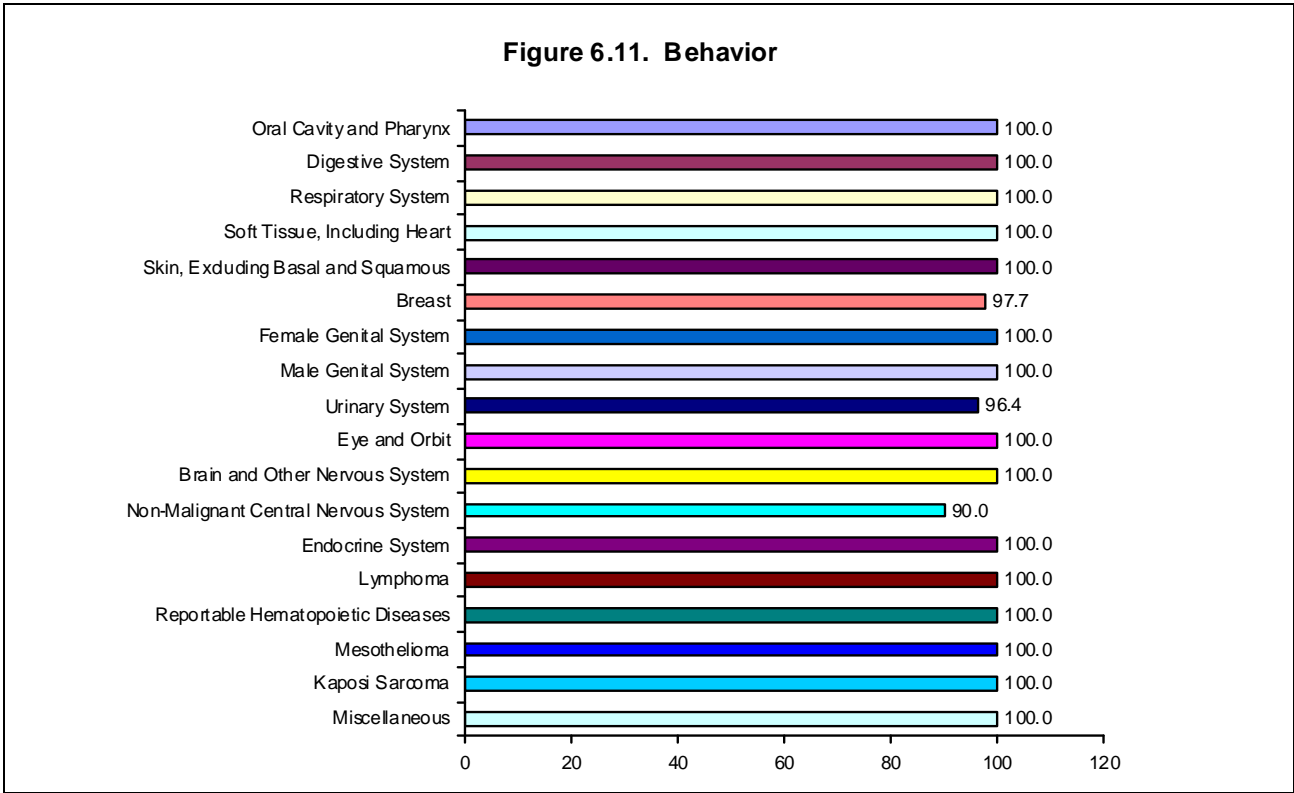


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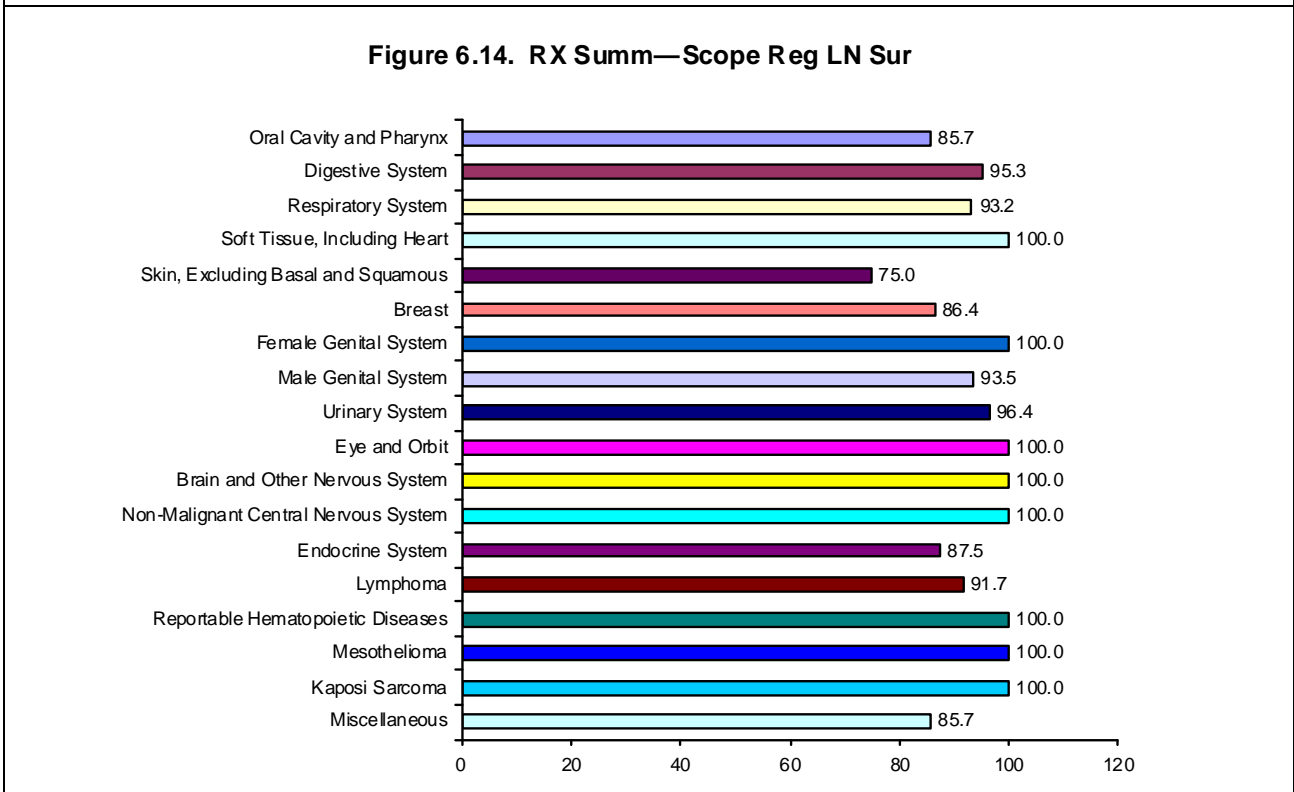
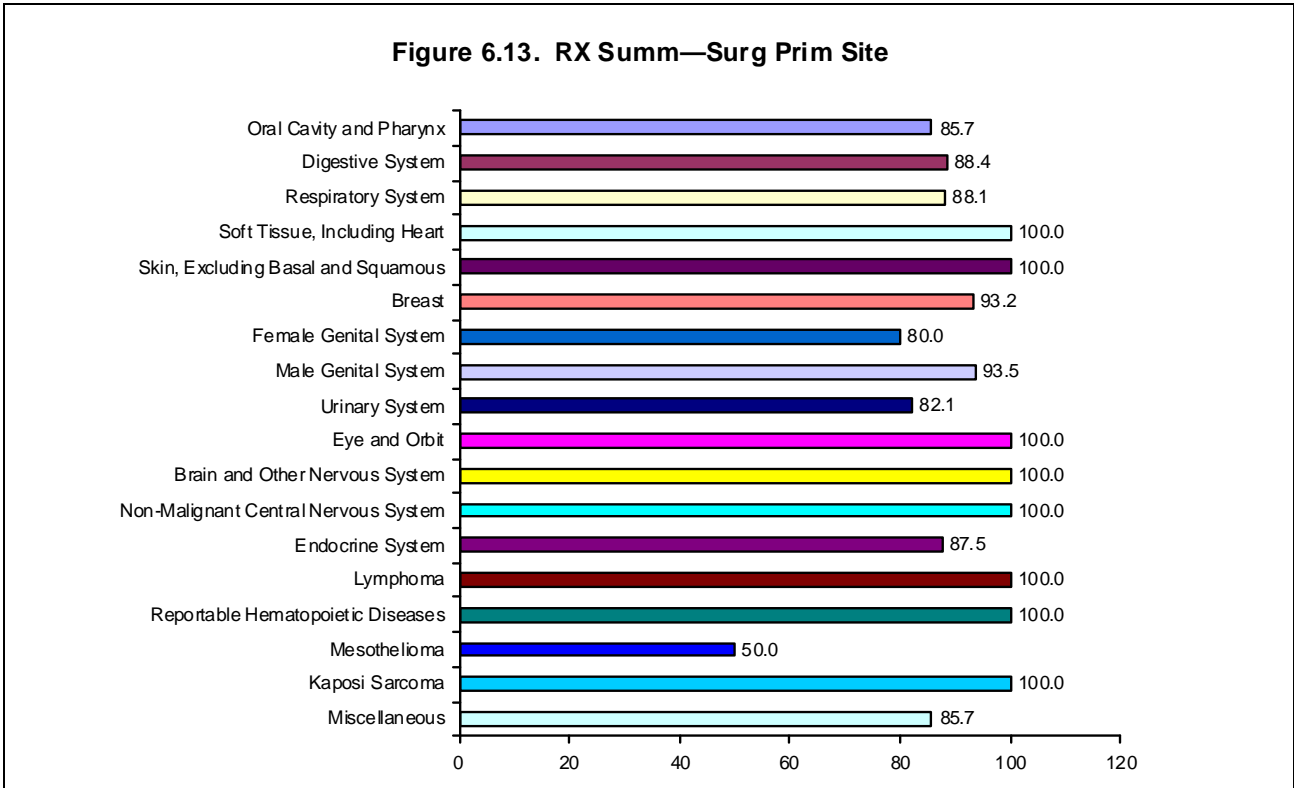


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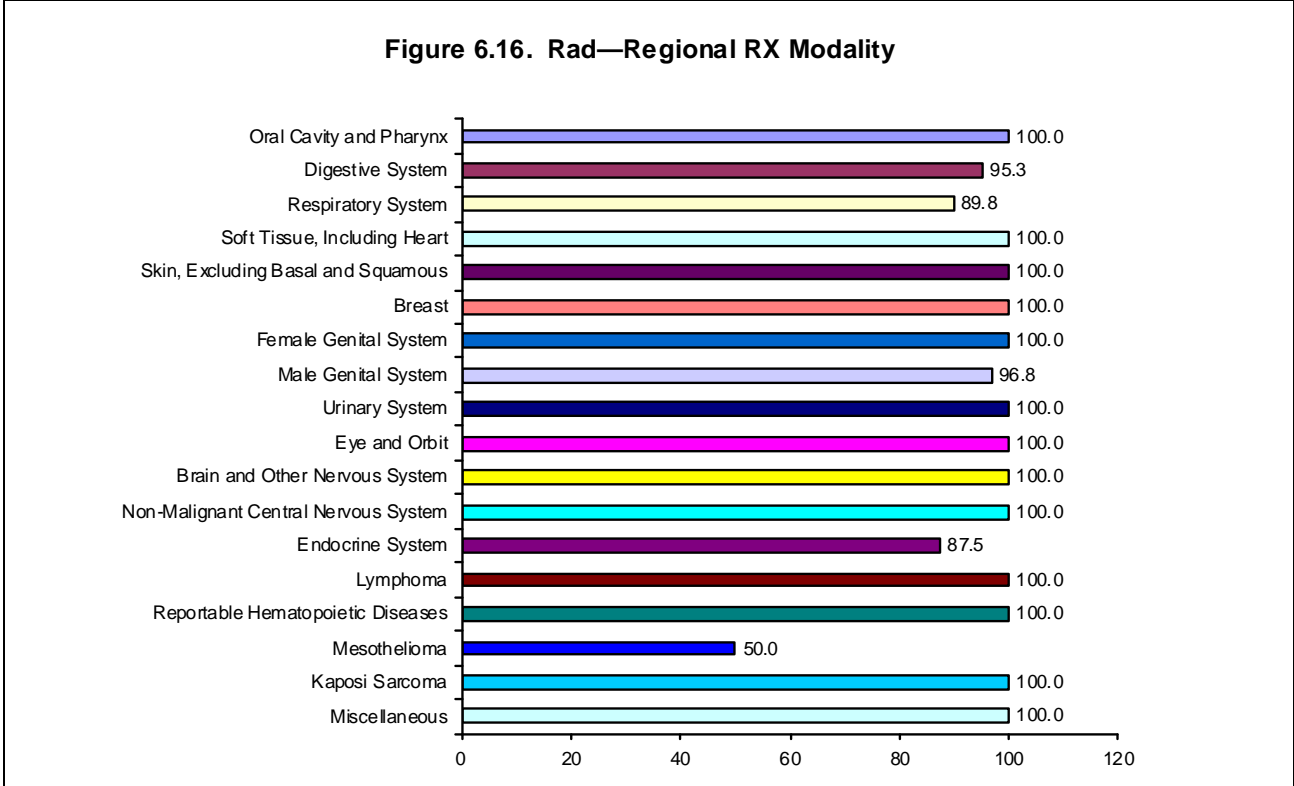
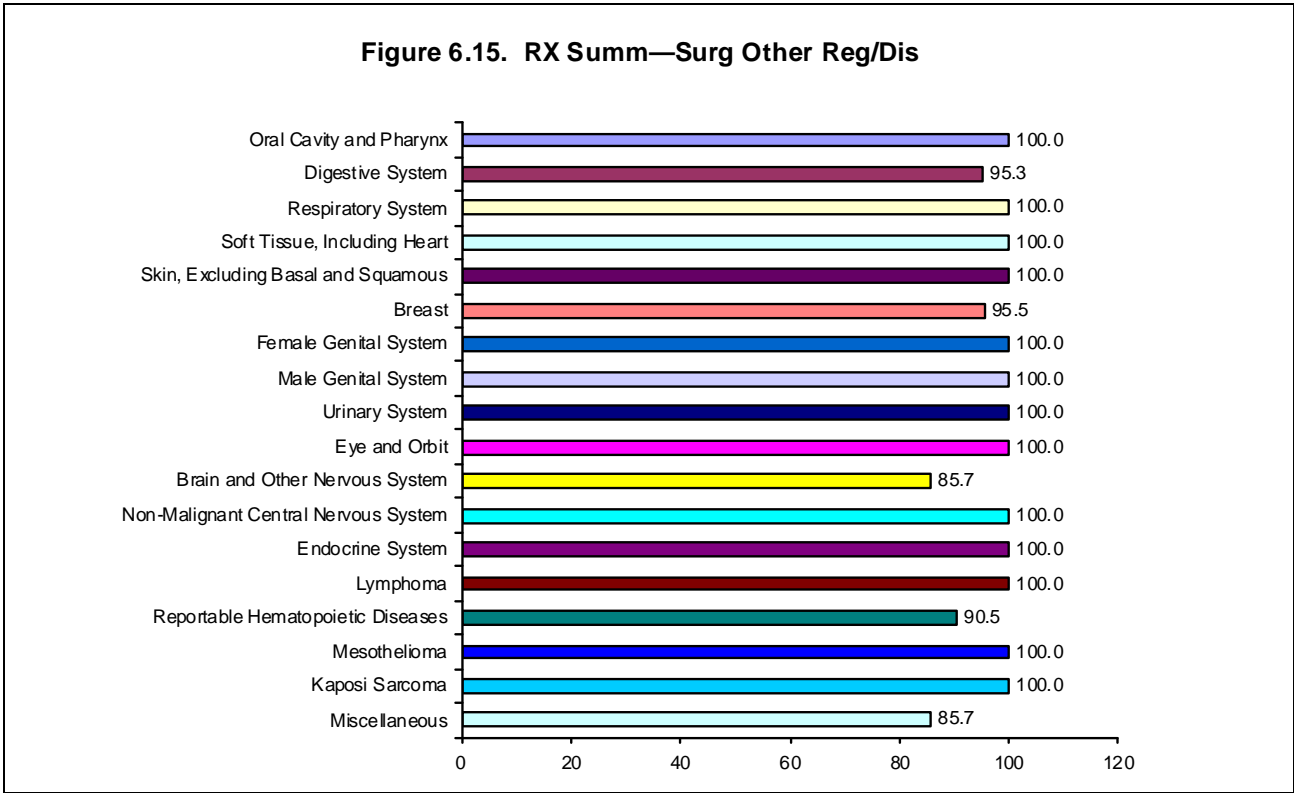


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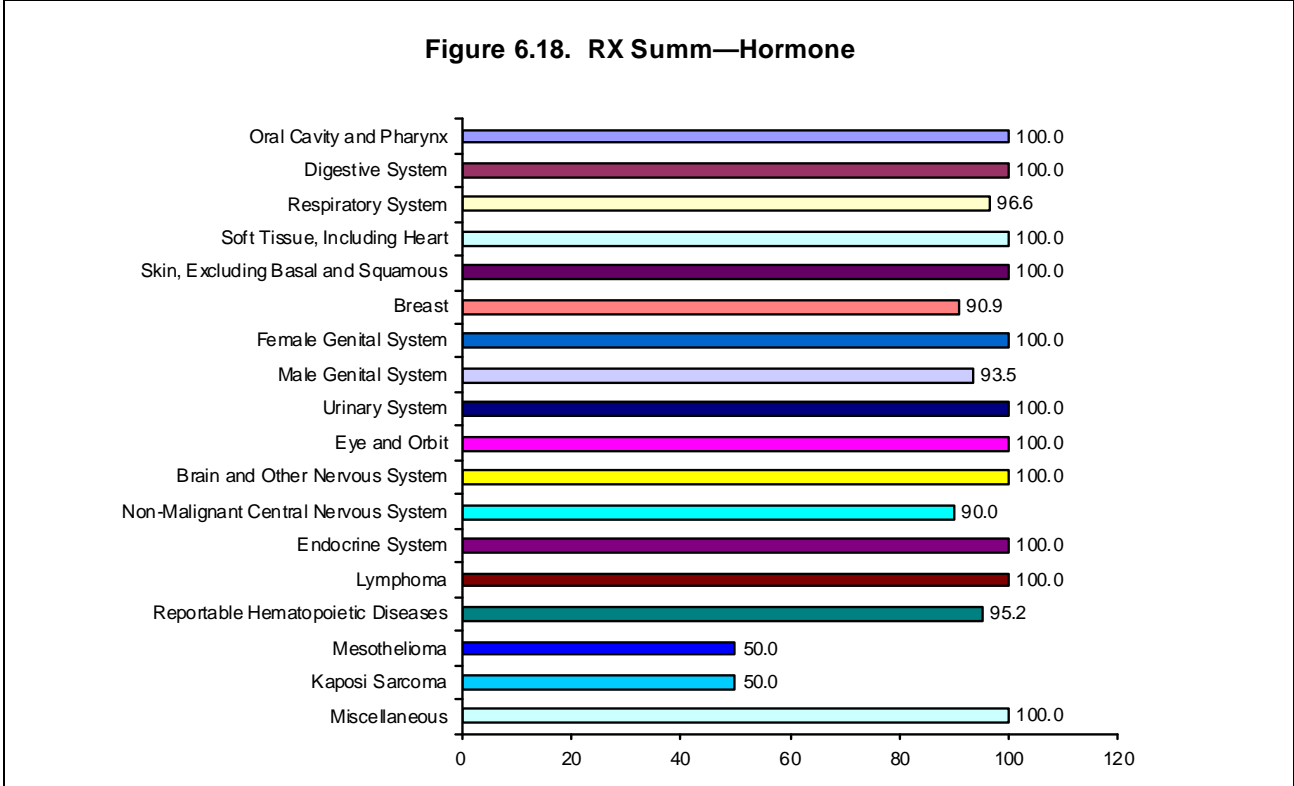
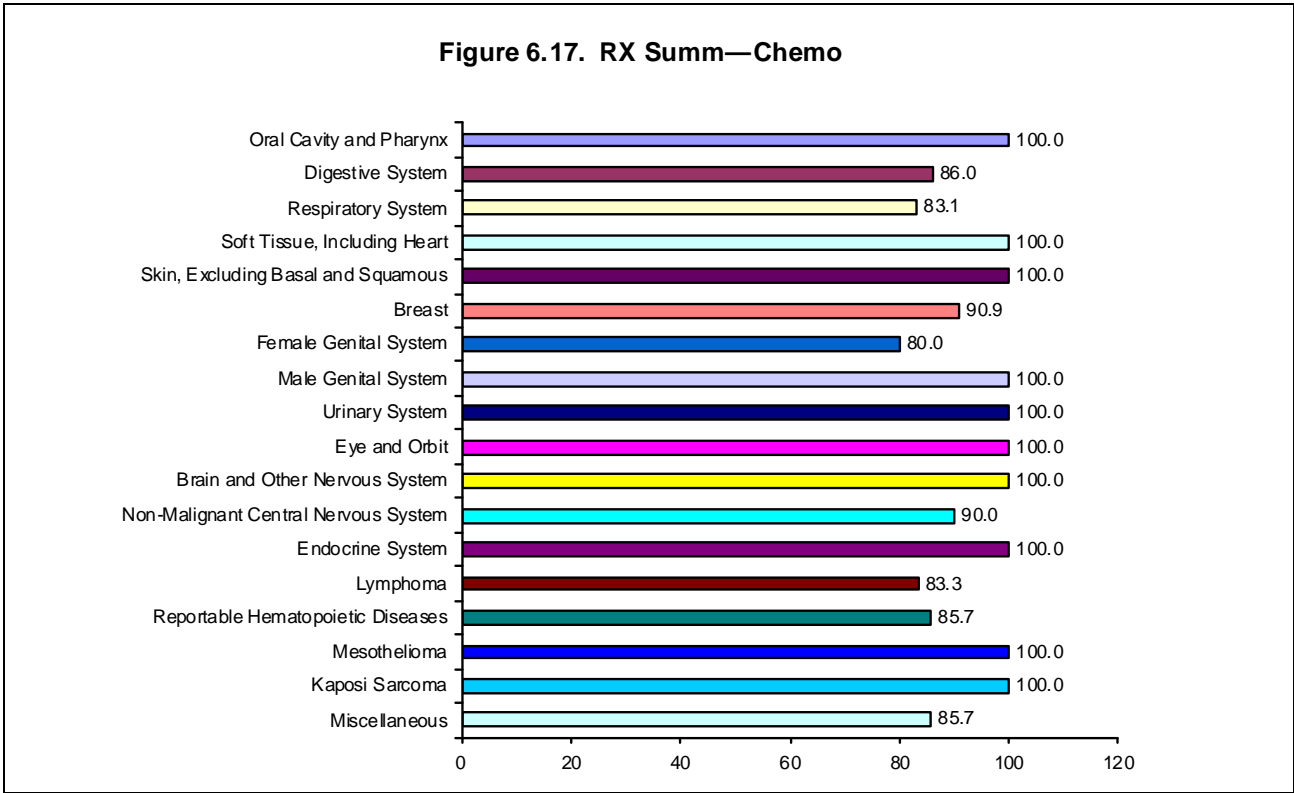


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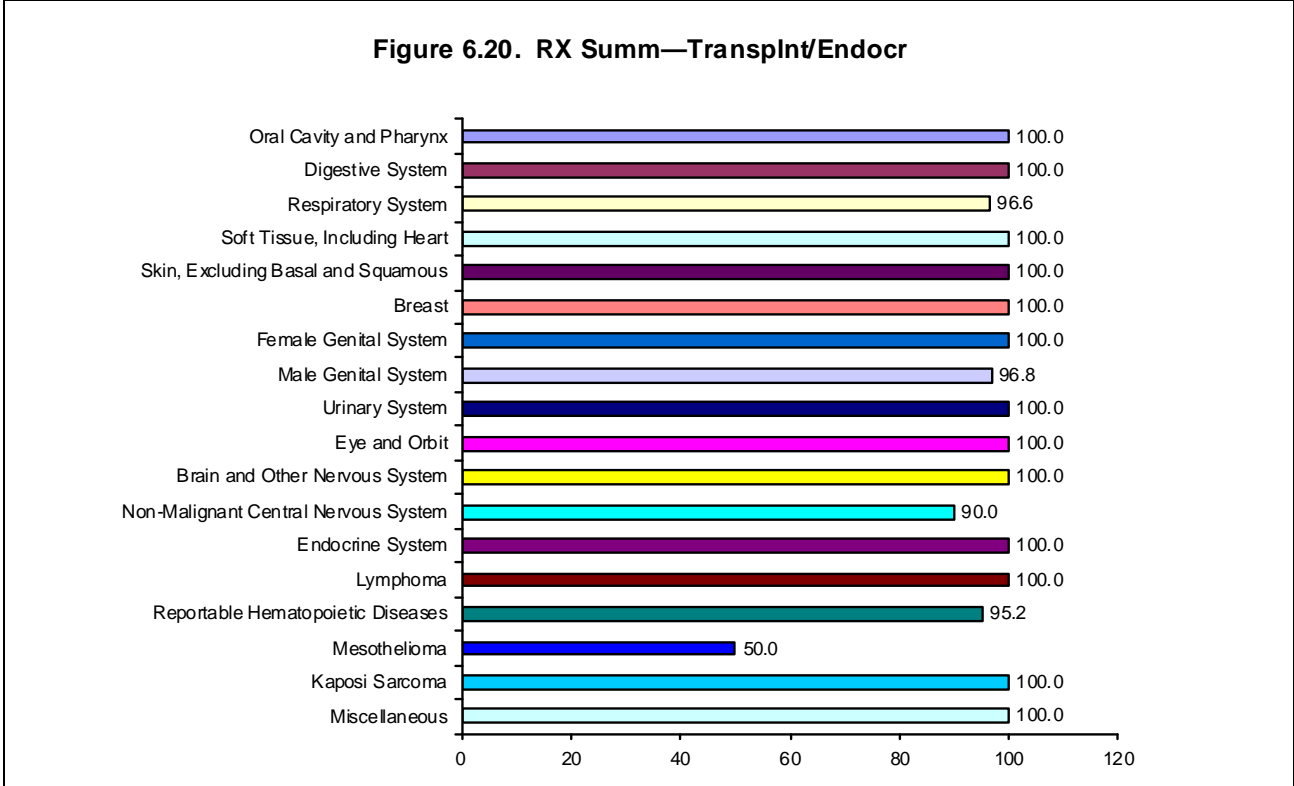
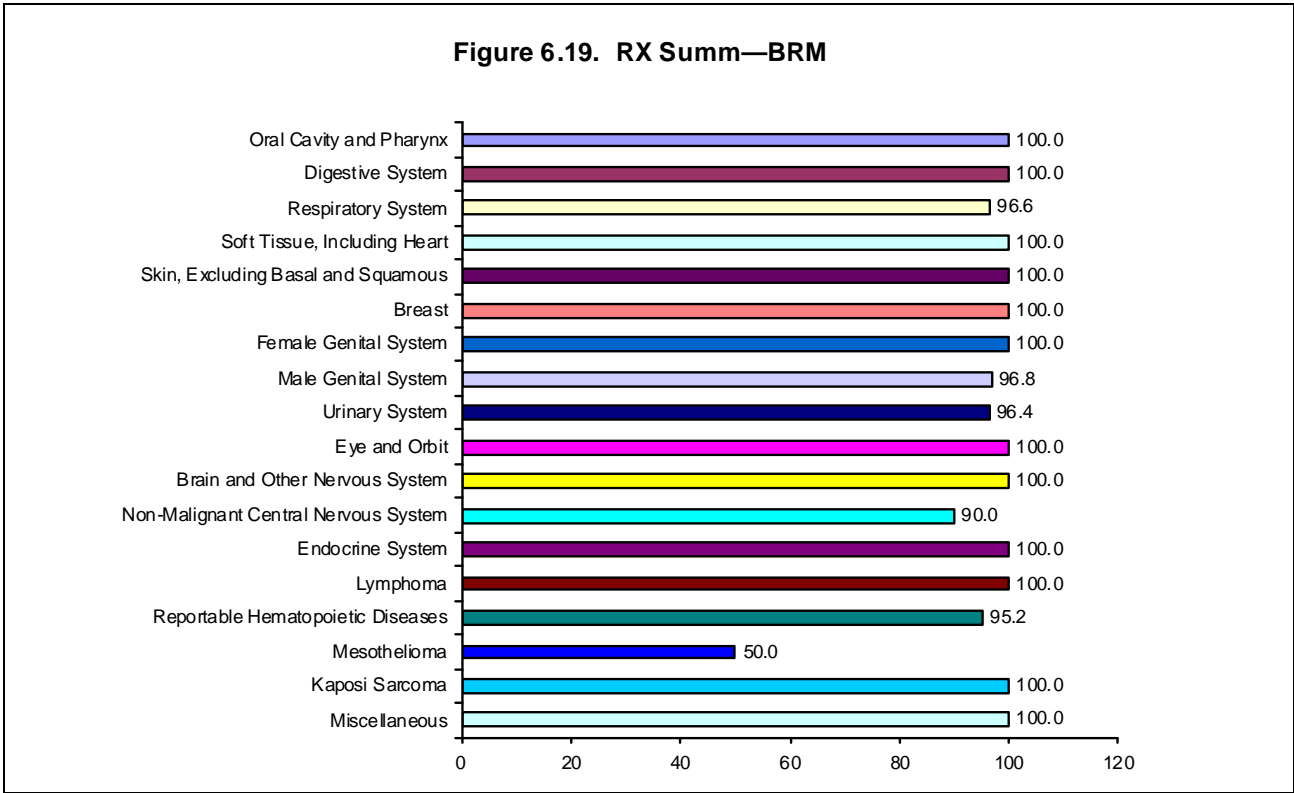


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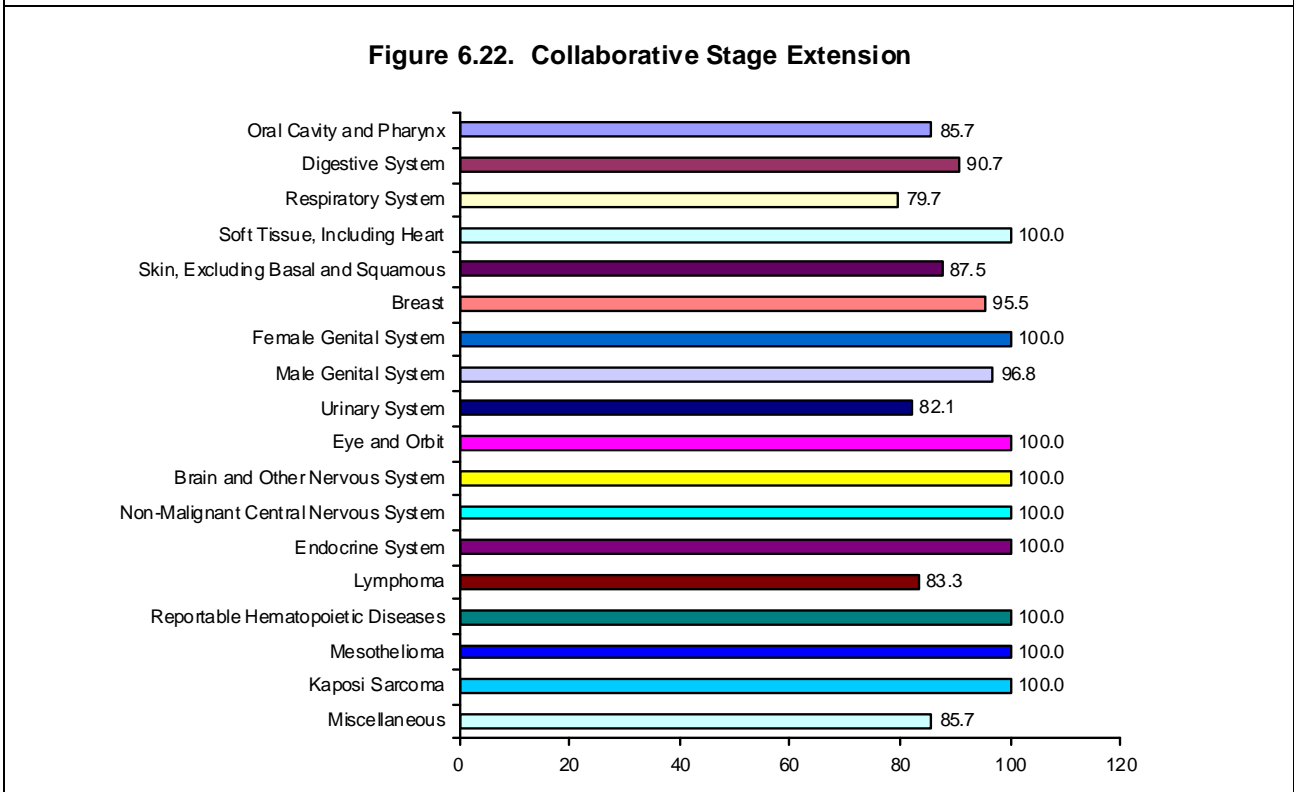
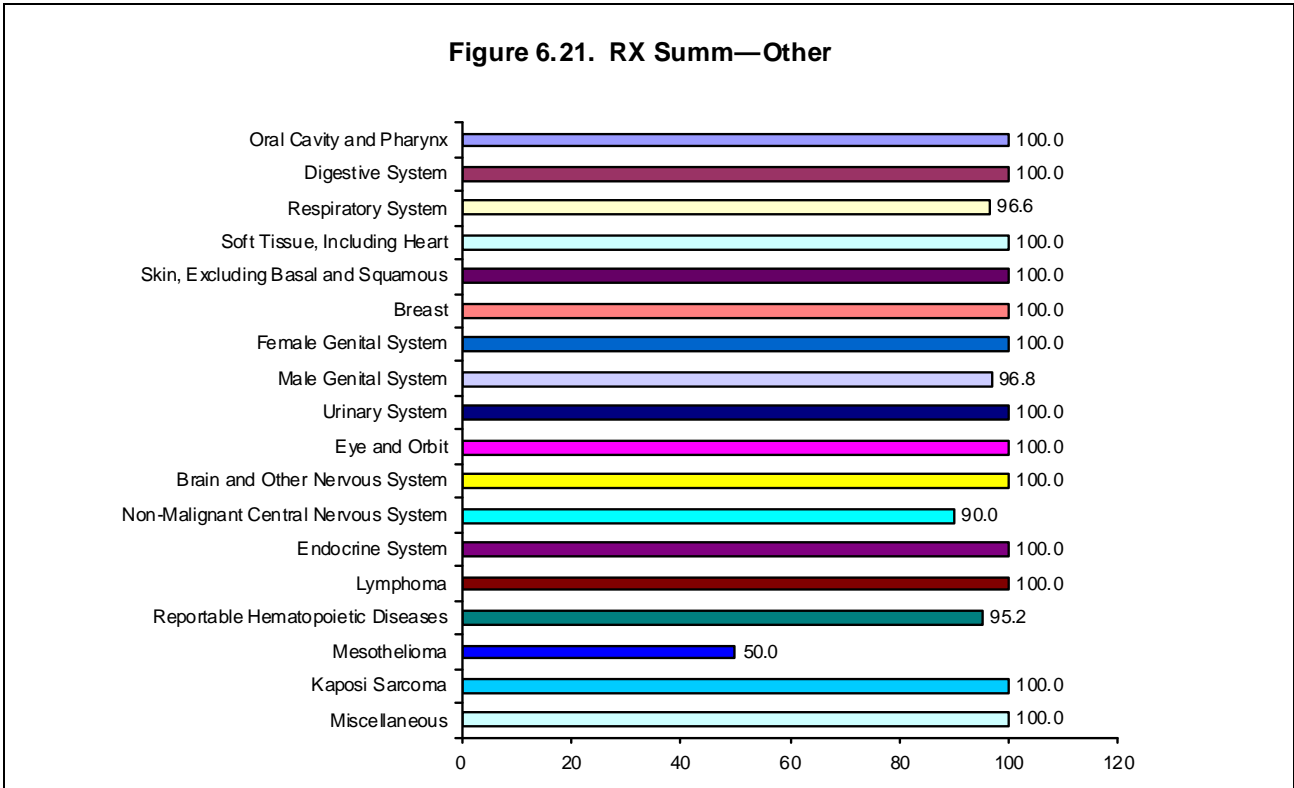


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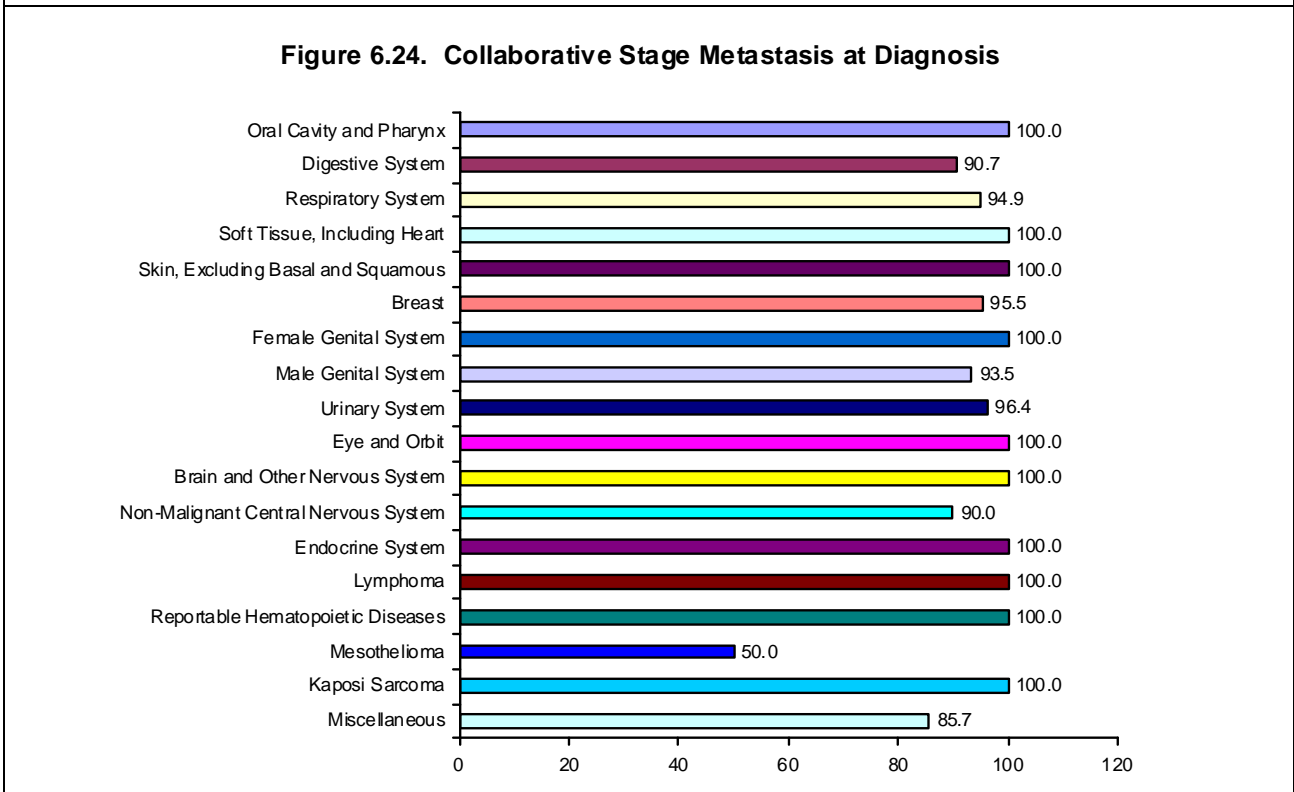
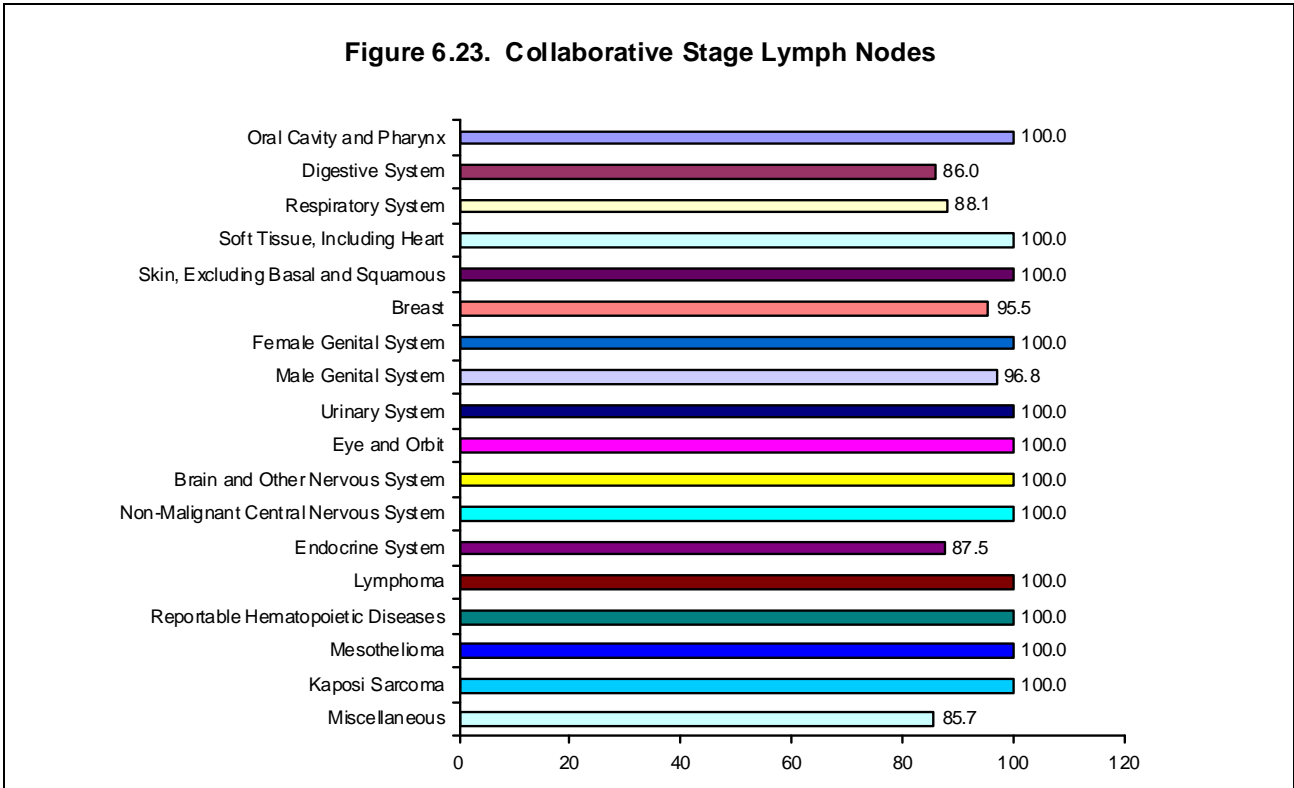


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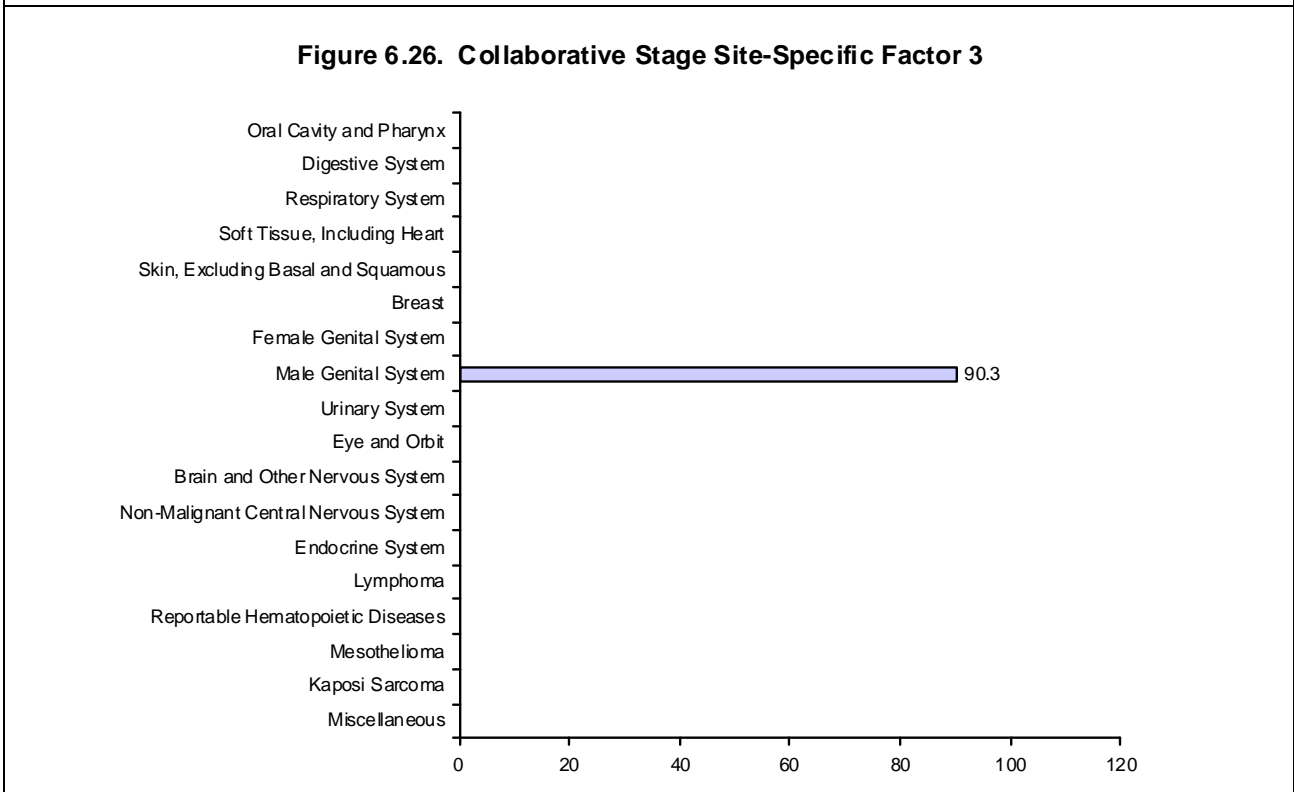
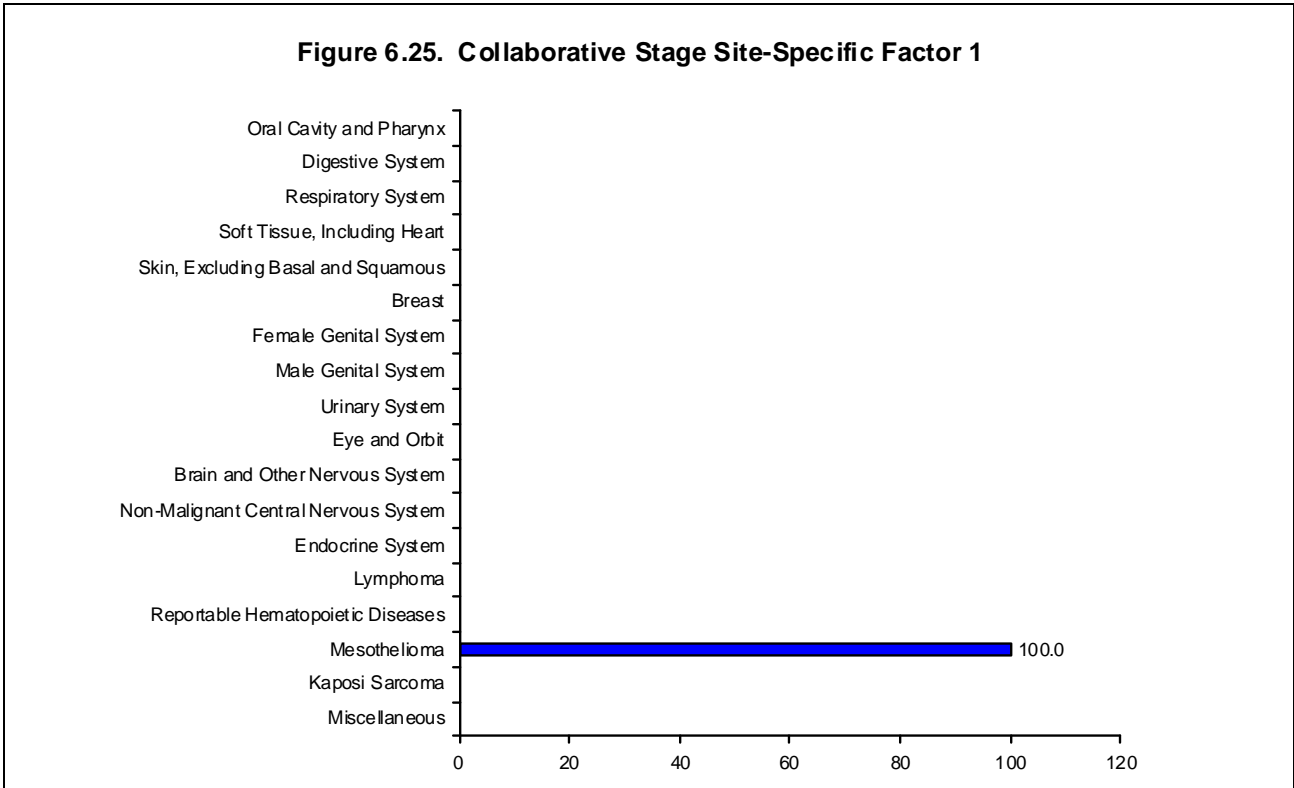
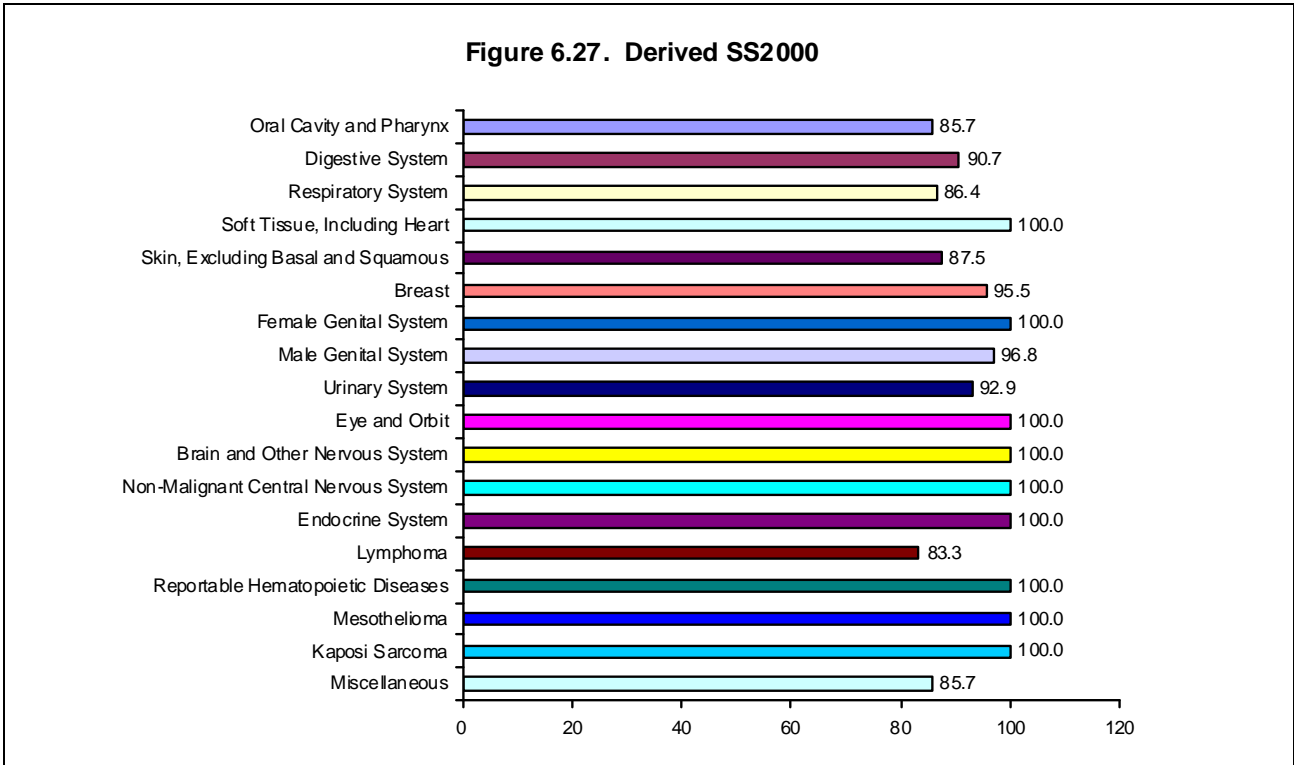


Figure 6, cont. Comparison of Data Accuracy Rates of Selected Data Elements, by Site Group—Arizona Cancer Registry (2006)



APPENDIX

CALCULATING VARIANCES AND STANDARD ERRORS

Calculating Variances (V) and Standard Errors (SE)

The variance of a stratified estimate of the proportion is: $V(p) = \sum \{W(h)^2\}V(h)$.

Here, $V(h)$ is the variance of $p(h)$, and can be expressed as:

$$\{(N(h)-n(h))/n(h)\} * \{p(h)(1-p(h))/(n(h)-1)\}$$

The number of eligible cases in stratum- h ($h=1, 2, 3$) is denoted by $N(h)$, and the total State caseload (eligible cases) is $N = N(1) + N(2) + N(3)$. Stratum weights, $W(h)=N(h)/N$, are the share of each stratum in the total caseload.

In both scenarios—completeness and data quality assessment—rates are first calculated within each stratum to generate stratum-level estimates, $p(h)$. The variance of $p(h)$ is designated by $V(h)$, and its square root is the standard error, $se(h)$.

The variance $V(h)$ is calculated as: $p(h)*\{1-p(h)\}/n(h)$.

The sample hospitals are selected with probabilities proportional to size (PPS) from the sampling frame. Then hospitals are divided into three categories, or strata (high, medium, and low), based on caseload. In each sample hospital, a fixed number of cases are reviewed regardless of the category. This design yields a self-weighting sample in each stratum, i.e., cases are selected with equal probabilities so that sampling weights are equal within each stratum.

First, the total number of cases in each caseload facility qualified for the audit is summed. Then the proportion of cases in each caseload category is calculated based on total number of cases in the sampling frame, generating the weight for each stratum.

The weighted estimate of the proportion is: $p = \sum W(h)*p(h)$

where all the sums are over all three strata, and strata are indexed by “ h ” (1, 2, 3).

This is the simple random sampling variance for a proportion in the stratum- h sample of size $n(h)$.

Overall estimates are then $p = \sum W(h)*p(h)$ (sum over all three strata); their variances are computed as: $V(p) = \sum \{W(h)^2\}V(h)$.

$$SE = \sqrt{\text{Variance}}$$

The standard error, $se(p)$, is the square root of this variance and provides the basis for confidence intervals.

For case completeness rates, the denominator (n) is the cases reviewed for the number of months reviewed plus number of missed cases per category (stratum).

For data quality assessment, the denominator (n) is the number of records reviewed.

Reference: Cochran, 1977, Chapter 5.

APPENDIX
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