



Cancer Registry Management Reports: Design and Interpretation



Cancer Registry Management Reports: Design and Implementation is provided by the National Program of Cancer Registries (NPCR) to help central cancer registries (CCRs) meet the NPCR program standards.

CANCER REGISTRY MANAGEMENT REPORTS

Design and Interpretation

Original materials prepared by the staff of the North American Association of Central Cancer Registries (NAACCR) under contract 200-95-0929 with the Centers for Disease Control and Prevention (CDC).

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The original materials for this presentation were developed by NAACCR under contract with CDC in 1998. The content was reviewed and updated by NPCR and the NPCR Logistics Committee in 2006.

Training Objectives

To enable the participant to:

- **Discuss importance and use of management reports in the central cancer registry (CCR)**
- **Identify points in data flow where management reports are appropriate**
- **Identify most important types of reports**

Training Objectives 2

- **Suggest how to capture data for management reports**
- **Interpret management reports suggesting further action when needed**
- **Discuss the importance of providing management reports to facilities**

Definition

➤ Management Reports

- Reports based on summarized CCR data that provide information about how well the surveillance system and its processes are working

How COMPLETE?

How ACCURATE?

How TIMELY?

Management reports will not tell you about the status of cancer in the population. Rather, these reports are used to provide information about the status and operation of the data collection and surveillance system.

Types of Management Reports

- **Count**
- **Calculate**
- **Cross-tabulation**
- **Chart & Graphs**
- **Compare**
- **Control**



Management reports can range from simple counts to complicated statistical analysis. They can be prepared with pencil and paper or be produced with sophisticated statistical software. In their simplest format, the reports can provide descriptive information about the system, such as the quantity of work moving through the registry (counts). More complex reports can compare actual counts against expected values, or cross tabulate one set of values against another. They can include calculations of summary statistics, such as percentages, means, and medians. Displaying management information in charts and graphs for visual impact is very useful.

Management information can be used to trigger actions or interventions to improve system response. This constitutes the control function.

Existing Standards

- **National Program of Cancer Registries (NPCR) Standards 2007**
- **North American Association of Central Cancer Registries (NAACCR) Standards**
 - **NAACCR Vol. III Standards for Completeness, Quality, Analysis, and Management of Data**



- In 2007, the National Program of Cancer Registries or NPCR revised their standards and included management reports in the section on Administration.
- The NPCR standards include a requirement for management reports, but leaves the selection of the type of reports to the discretion of the CCR to meet individual needs.
- NAACCR has had standards for management reports for several years, but the wording has changed over the years.
- NAACCR's standards for completeness, quality analysis, and management of data include requirements and recommendations for management reports. This is found in Standards for Cancer Registries Vol. III. We'll discuss this further later.
- The NAACCR Management Report standards state that CCRs should produce management reports with a frequency that will facilitate monitoring the operations of the registry.
- NPCR also supports these standards.

Standards for Management Reports ₂

- **NAACCR (continued)**
 - **Examples of possible reports include:**
 - **Number of tumor records reported by facility and other sources**
 - **Differences between the number of records expected and the number received for each facility**
 - **Number of cases from all sources by month and year of diagnosis**
 - **Distribution of tumors by year of diagnosis and site**

The NAACCR standards include examples of possible management reports. They are:

- A table presenting the number of tumor records reported for each reporting facility and for other sources of tumors, such as death certificate only (DCO) cases or physician-only cases. These should be reported collectively by month and year reported, or for DCO cases, by month and year of death.
- A table presenting the difference between the number of tumor records expected from each reporting facility and the number received. By ordering the table in descending order with the facility with the largest deficit on top, this report helps to allocate registry resources to the area with the greatest impact.
- A table presenting the tumors from all reporting sources by month and year of diagnosis.
- A table presenting the distribution of tumors by year of diagnosis and by site for comparison with other registries.

Standards for Management Reports ₃

- **Examples of possible reports (continued)**
 - **Number of tumors by process completed, by date received**
 - **Interval between diagnosis data and date abstracted, and between diagnosis date and date tumor record entered in CCR system, by facility**
 - **Status of follow-up by facility and diagnosis year for CCRs collecting patient follow-up**

- A table presenting the number of tumors by registry process completed such as number of abstracts inspected or visually reviewed, or the number in suspense, by date received in the CCR to monitor workflow.
- A table showing the interval between diagnosis date and date abstracted and between diagnosis date and the date the tumor record was entered in the CCR system, by facility to show timeliness of abstracting and CCR processing.
- Tables showing the status of follow-up by facility and by diagnosis year and for subpopulations of interest such as specific age groups for CCRs collecting patient follow-up.

Standards for Management Reports ₄

- **NAACCR (continued)**
 - **Standard 5.6.3: Standards for Reports to Facilities**
 - **The CCR's data processing should enable a variety of routine reports for all facilities submitting tumor records to the registry**
 - **Reports can be transmitted electronically or in paper form**

NAACCR Standard 5.6.3 describes reports to facilities. This standard says that the CCRs processing system should enable a variety of routine reports for all facilities submitting tumor records to the registry. The standard also indicates that reports can be transmitted to the facilities electronically or in paper form.

Standards for Management Reports ₅

- **NAACCR (continued)**
 - **Standard 5.6.3.1: Reports for Monitoring Workflow and Completeness**
 - **Standard 5.6.3.2 Comparison Data**
 - **Standard 5.6.3.3 Requests for Information from Facilities and Physicians**

NAACCR Standard 5.6.3.1 describes the need for reports that monitor workflow and completeness to provide information to the reporting facilities about their caseload or their reporting completeness. The standard suggests the need for immediate or very rapid acknowledgement of the CCR's receipt of the tumor record submission, to include information such as the date received, and number of tumor records received. This will allow the facility to verify that the tumor records sent were received, and that they were readable. A table presenting the number of tumor records from the facility by month and year of admission is suggested.

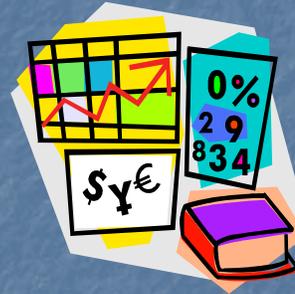
Subsequent standards address the need for CCRs to provide comparison data to reporting facilities for use in their annual reports and case-specific information when requested by facilities or physicians.

Types of Reports

- **Complete Data vs. Exception Data**

- **Tables vs. Graphs**

- **Ad Hoc vs. Scheduled Reports**



Management reports can be designed to provide comprehensive management data or to spotlight aspects of the process. For example, a monthly hospital activity report could list all hospitals and data about the submission from each. Alternatively, a report could be designed to list only hospitals whose activities vary from the expected by a predetermined amount such as a difference of more than 10 percent from the expected number of cases submitted. The exception report is especially useful if there are large numbers of hospitals or activities being compared. Another method is to produce the full report, but label the exceptions in some way, such as with shading, highlighting, or symbols.

Tables will usually provide information in more detail, enabling complex analysis. Graphs are often easier to understand. Graphs are better to show a particular point. Some people are more visual, while others are more numerically oriented. A combination of data tables and charts can meet the styles of more people to improve understanding of the information.

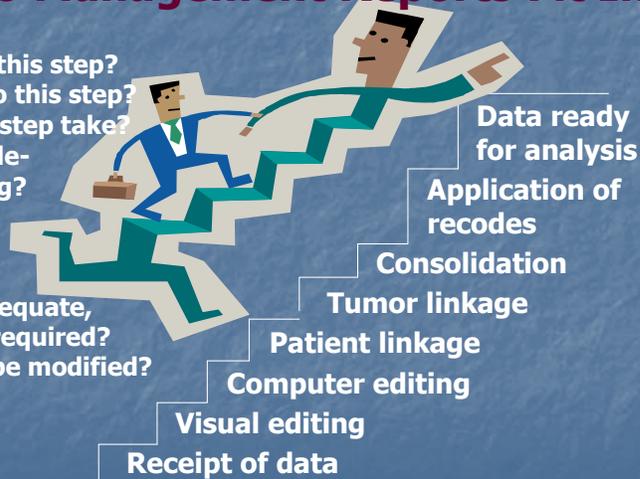
Ideally, the CCR should produce regularly scheduled reports of various kinds that monitor all routine steps in data collection and processing. Ad hoc reports can supplement scheduled reports when questions or problems arise. In the absence of automatically generated reports, ad hoc reports should be prepared by CCR staff.

**REPORTS FOR
CENTRAL
REGISTRY
INTERNAL USE**

Registry Processing Steps

Where Do Management Reports Fit In?

- How many "in" to this step?
- How many "out" to this step?
- How long will this step take?
- Are there any bottlenecks in processing?
- Does performance differ among groups of cases?
- Is performance adequate, or is intervention required?
- Can performance be modified?



This diagram shows a representation of the steps involved in routine CCR data management and processing. At each point in the process, management reports can be useful. They can answer the questions listed on the slide. How many "in" to this step? How many "out" to this step? How long will this step take? Are there any bottlenecks in processing?

Does performance differ among groups of cases?

The processing steps from receipt of cases through record consolidation are collectively referred to as suspense processing in this discussion, because data are often kept in a suspense file separate from the master data base until these steps are completed.

Facility-Reporter List

- **Maintained Electronically**
- **Database Management**
 - **Reporter profiles**
 - **Contact information**
 - **Facility ID number**
 - **Primary contact person**
 - **Other relevant information**
 - **Update as new information is provided**
 - **Minimum of annually**
 - **Mail merge capability preferable**

It is important for the CCR to maintain information on all facilities and other reporters. Facility and physician lists can be maintained separately or together. For maximum usefulness, this list should be maintained electronically, preferably in a database. The database should contain all of the needed contact information, the facility identification number, the name of the primary contact person, and any other relevant information for that reporter.

Information should be updated when new information is provided, such as notification of a change of address or change of primary contact person. In addition, facility and physician addresses, telephone numbers, and other information should be checked and updated annually.

It is very useful if the database has a mail merge function so that communication can be generated using information from the database.

Receipt of Case Reports ₁

Useful Management Report Measures

➤ **Completeness Reports**

- **Number and percentage of cases received by facility**
 - **By month of receipt**
 - **By month of diagnosis**
- **Number and percent of cases received vs. expected**



The CCR must monitor the volume of incoming cases reported from each facility on a routine basis to assure complete and timely cancer registry data.

Receipt of Case Reports ₂

Simplest Type of Report - COUNTS

- Most basic report is of counts, such as counts of case reports by facility by diagnosis year and month or by month reported
- Next step, compare actual counts to expected cases



The most basic report is a count of cases received in a specified time. This can be broken down by reporting source. These counts can then be compared with the number of cases expected.

Receipt of Case Reports ₃

Sample Report 1: Counts by Facility, by Month Received

State Cancer Registry, Number of Case Reports Received, All Diagnosis Years, by Hospital, by Month

	Jan 2006	Feb 2006	Mar 2006	Apr 2006
Hospital X	80	63	82	0
Hospital Y	25	23	27	28
Hospital Z	0	0	50	0

(As of September 2007)

This report presents simple counts of cases received by month, cross tabulated by facility. Data for this table could be captured via computer reports. Data can be imported or copied into a spreadsheet such as Microsoft Excel. Tables and graphs can then be created by the software.

As shown in the report, Hospital Z is not transmitting cases evenly over time. Hospital X's reporting is also fluctuating, but not as much. However, unless we know what to expect of each facility, this information can be difficult to interpret. For example, the CCR may have negotiated with Hospital Z for quarterly rather than monthly submissions, so that no cases were expected in January and February.

Receipt of Case Reports ₄

Sample Report 2: Counts by Facility, by Month Diagnosed

State Cancer Registry, Number of Case Reports Received, by Hospital, by Month of Diagnosis

	Jan 2006	Feb 2006	Mar 2006	Apr 2006
Hospital A	10	5	8	12
Hospital B	25	23	30	28
Hospital C	120	89	53	0

(As of September 2007)

This report shows counts of cases received **by month of diagnosis**, cross tabulated by hospital. Hospital C appears to be behind in reporting because the counts for March and April are very low. However, unless we know what to expect this can also be difficult to interpret.

Receipt of Case Reports ₅

Sample Report 3: Counts by Facility, Month Diagnosed, Compared with Expected

State Cancer Registry, Case Reports Received, by Hospital and
Month Diagnosed, Counts and Percentages of Expected
Received

	Jan 1996	Feb 1996	March 1996	Total Rec'd Qtr. 1	Expected Qtr. 1	% of Expected Received
Hospital A	10	5	8	23	25	92%
Hospital B	25	23	30	78	75	104%
Hospital C	120	89	53	262	360	73%

This report goes beyond counts to add a comparison of the number of cases received with the number of expected the first quarter. The expected number for quarter 1 can be obtained by taking one fourth of the total number of cases expected for the year. If actual numbers of the cases reported by facility are available by month or quarter from previous years, they can be used to establish the expected values.

The report also adds a calculation of the percentage of expected case reports received. Combining three months of data minimizes the effect of monthly fluctuations in reporting. This calculation can be performed by the spreadsheet.

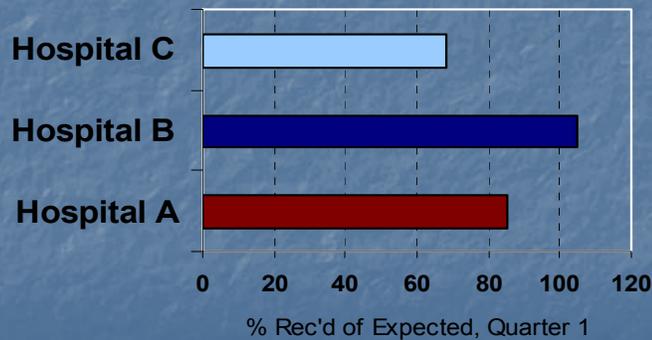
Hospital C appears to be under-reported, since it has reported only 73 percent of the expected caseload for the first quarter. Hospital B has reported more than the expected number of cases in the first quarter.

These types of reports should be produced and monitored on a regular basis such as monthly or quarterly. Regular monitoring allows the CCR to address any problems in a timely manner instead of being surprised at the end of the year when completeness calculations are low.

Receipt of Case Reports ₆

Chart of Sample Report 3

State Cancer Registry, Case Reports Received by Hospital
Percentages of Expected, Quarter 1



(As of September 2006)

This is a visual presentation of the data from the previous slide. A visual presentation can be easier to understand, especially if the CCR is comparing large numbers of hospitals. In this way, a facility reporting less than the expected number of cases can be identified immediately.

The chart's X axis goes above 100 (120) to accommodate Hospital B's value of 104 percent. Hospital B has submitted **more** cases than expected for the first quarter. If this pattern continues, the CCR may need to reevaluate the expected numbers for Hospital B. Perhaps its caseload has been underestimated and needs to be updated.

Timeliness Reports ₁

Data Items Needed to Assess and Improve Timeliness

Data Item Name	CCR or Facility Report	Required by
Date of Diagnosis	Facility	NPCR, COC, SEER
Date of First Contact	Facility	NPCR, COC
Date Report Exported	Facility, CCR	NPCR, COC
Date Report Received	Facility, CCR	NPCR,
Date Case Loaded	CCR	NPCR
Date Tumor Record Available	CCR	NPCR

These are the data items that can be used to measure timeliness of both reporting facilities and internal case management by the CCR.

NAACCR defines **Date Case Report Exported** as the date the facility exports the file to the CCR. However, this definition may vary among registries and software providers.

Date Case Report Loaded is defined as the date the tumor report is loaded into the CCR processing file for initiation of quality control activities.

Date Tumor Record Available is the date the demographic and tumor identification information on a single primary or reportable neoplasm, compiled from one or more source records, or from one or more facilities, is available in the CCR database to be counted as an incident tumor.

Timeliness Reports ₂

➤ Timeliness Reports

- For CCR
 - Dates reflecting CCR activity and measuring timely CCR processing
 - Intervals after case is received in CCR
- For facilities
 - Intervals reflecting facility activity
 - Number and percentage of cases received from the facility
 - Interval between specified dates
 - ◆ By date of diagnosis or date of first contact

For the CCR, the time between **Date Report Received** and **Date Tumor Record Available** is the total time the CCR took to process the case. Using **Date of first contact** and **Date Tumor Record Available** can measure overall timeliness of reporting.

Facility timeliness reports must be based on individual records, not on consolidated data.

Date of Diagnosis may be appropriate for class of case 0, 1 and 6, but would not be appropriate for class of cases 2 and 3 when the diagnosis is actually made at another facility. If the CCR needs to select one date field for all timeliness reports, **Date of first contact** may be more appropriate.

Timeliness Reports ₃

Sample Report 1: Cases by Diagnosis Date and Date Reported

	Jan 03	Feb 03	Mar 03	Apr 03	May 03	Jun 03	Total
00/000	5	2	4	2	2	5	20
09/03	1	0	0	1	1	2	5
10/03	11	4	15	10	8	10	58
11/03	2	1	0	0	0	1	4
12/03	0	6	7	6	4	0	23
01/04	1	0	9	12	6	0	28
02/04	13	12	16	14	13	6	74
03/04	246	149	103	171	111	122	902
99/99	2	1	0	0	1	1	5
Total	281	175	154	216	146	147	1119

Columns specify the month of diagnosis. Rows specify the month cases are received at the CCR. Each table cell contains the number of cases diagnosed in the month given by the column and received by the state in the month given by the row.

This table is based on reporting guidelines requiring cases to be reported to the CCR within 6 months of the date of diagnosis.

Unusable records: 25

Usable records: 1,094

On time: 34 (3%)

Late: 1,060 (97%)

This is a simple table, but use of colors adds good visual effect.

The cases that are late can be further grouped into categories such as:

7 to 9 months past date of diagnosis (1 to 3 months late): 208 (19%)

10 to 12 months past date of diagnosis (4 to 6 months late): 445 (41%)

13 to 18 months past date of diagnosis (7 to 12 months late): 408 (37%)

More than 18 months past date of diagnosis (more than 12 months late): 0

Timeliness Reports ₄

Sample Report 2: Cases by number of months late by year of diagnosis

State Cancer Registry

6/30/2006

Acc Year	<4 mos		4-6 mos		>6 mos		Avg mos	Total cases
	#	%	#	%	#	%		
2000	64	20%	47	15%	207	15%	7.8	318
2001	314	88%	26	7%	18	5%	2.7	358
2002	313	93%	9	3%	13	4%	2.4	335
2003	335	86%	31	8%	22	6%	3.1	388
2004	210	53%	138	35%	46	12%	4.5	394
2005	113	31%	199	55%	49	14%	4.7	361

Percent Complete (2005) 91.6%, target percent (2005) 91.7%

Another approach to monitoring timeliness is to use a computer program to calculate the time between the **Date of First Contact** and **Date Case Received**. Each case is can be marked with a lag time value and the number of cases above and below a set threshold can be reviewed easily . When the percentage of cases beyond the acceptable time lag increases to a certain point, action must be taken to reduce this number to acceptable timeliness standards.

This table lists the lag time in categories for the number of months and for the year of diagnosis.

CCR Completeness Reports₁

Sample Report 1: Total Cases Received by Site and Year

State Cancer Registry		6/30/2006			
Site	2005	2004	2003	2002	2001
Total all sites	17200	28264	28718	26273	26920
Breast	2997	4939	4725	4622	4763
Prostate	2172	4007	4556	4055	4192
Lung	2213	3656	3566	3385	3603
Colorectal	1806	3186	2886	3027	3072
Melanoma	1087	1574	2065	1948	1467
Cervix	166	275	431	204	227
Leukemia	395	707	601	565	646

This table reports case counts by site and year.

It appears that casefinding for 2005 is incomplete.

Melanoma: The CCR started collecting data from dermatologist offices in 2002. Notice the increase in cases for 2002 and 2003. There is a decrease in 2004. What is happening here?

Cervix: Note the increase to almost two times as many cases as in previous years. What is happening in this instance?

CCR Completeness Reports₂

Sample Report 2: Percent Cases by Site and Year

State Cancer Registry 6/30/2006

Site	2005	2004	2003	2002	2001
Total all sites	17200	28264	28718	26273	26920
Breast	17.4%	17.4%	16.4%	17.5%	17.7%
Prostate	12.6%	14.2%	15.9%	15.4%	15.6%
Lung	12.8%	12.9%	12.4%	12.9%	13.4%
Colorectal	10.5%	11.3%	10.0%	11.5%	11.4%
Melanoma	6.3%	5.6%	7.2%	7.4%	5.4%
Cervix	.9%	1.0%	1.5%	.7%	.8%
Leukemia	2.3%	2.5%	2.1%	2.2%	2.3%

This table reports percentages instead of counts.

Melanoma: As mentioned, CCR started collecting data from dermatologist offices in 2002 and we noticed the increase in cases for 2002 and 2003. Even with the smaller numbers, this can also be seen with the change in percentages.

Cervix: On the previous slide, we saw that there were almost two times as many cases as in previous years that would alert the CCR to investigate. However, because of the small number of cases, it is not so obvious when looking at percentages.

CCR Completeness Reports₃

Sample Report 3: CCR Comparison of Total Unduplicated Cases to National Percentages

State Cancer Registry, Comparison of Total Unduplicated Cases to National Percentages: 2003.

	Breast	Prostate	Lung	Colo-rectal	Melanoma	Cervix
CCR	16.4%	15.9%	12.4%	10.0%	7.2%	1.5%
NPCR	16.3%	13.5%	13.8%	11.2%	5.0%	.9%

Includes in-situ and invasive

This table compares the CCR's percentages by site with a national percentage to determine if the pattern seen is what might be expected. If there are any variances, the CCR might want to investigate the reason for the increase. In this case, it appears that this CCR has an elevated incidence of invasive cervical cancer.

The CCR would need to look at their cervix cases to see if there are any reporting irregularities. Perhaps the majority of these cases were identified by pathology reports only, and review of source documents indicate that coding errors were made on in-situ cases.

When following close internal review, and the increase seen appears to be valid, further studies may need to be designed to determine the reason for the increase.

CCR Completeness Reports₄

Sample Report 4: Analysis of Death Certificate Follow-Back

State Cancer Registry, Analysis of Death Certificate Follow-Back: 2003 Cases.

	# 1 st letters	#New cases	%	# 2 nd letters	# New cases	%
Hosp with Registry	1000	200	20	300	50	17
Hosp No Registry	800	480	60	100	50	50
Physician	1600	690	43	200	180	90
NH	300	180	45			
Coroner	180	50	28			
Other	120	80	66			

Based on 4,000 non-matched cases

This report looks at death certificate follow back activities. Second letters are the result of a first contact identifying another facility as the source of the case. An example would be when a physician is contacted with a first letter and responds that the patient was seen at a specific hospital. That hospital is then contacted with the second letter. The percent represents the percentage of letters sent that resulted in a new case.

This report shows where primary casefinding may not be complete. The report shows a large number of letters were sent to hospitals with a registry. However, the percentage of new cases identified from them were fairly low. This was true even when the facility was identified by another source that resulted in a second follow back letter. On the other hand, letters sent to hospitals without a registry identified a high percentage of cases at 60 percent for the first letters and 50 percent when the facility was identified by another source. Based on these findings, the CCR may want to provide additional training in casefinding procedures for these facilities. Further analysis may also need to be done to identify specific facilities needing additional training. In addition, physician reporting in this state may also need to be improved.

This report can be monitored annually to identify any changes and identify where casefinding may need to be improved.

Suspense Processing ₁

Useful Management Report Measures

- Status report of cases in process
- How long does processing take?

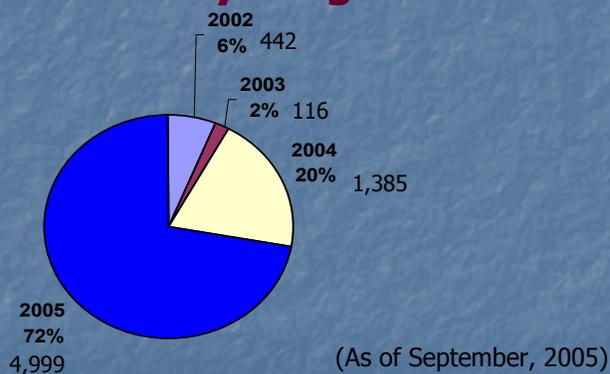


Reports on cases in process, or suspense processing, can be very helpful in identifying **processing** bottlenecks by showing where cases are in the process, and how long it takes case reports to move through the system.

If this information is not available from the registry software, other manual logs using commercial software such as Microsoft Excel might need to be maintained such as keeping a log of all incoming data submissions by reporting facility on a spreadsheet. When new data is submitted on disc or paper form, the number of reports is logged in for that facility with the date received. This process can also be used to record paper pathology report submissions.

Suspense Processing 2

Sample Report 1: Pie Chart of Suspense Cases by Diagnosis Year



This is a simple pie chart illustrating the distribution of all cases in a CCR's suspense file. It shows that approximately three-fourths of the cases awaiting processing are from the current year. However, more than one-fourth of the suspense cases are from earlier years, and more than 1,300 cases from 2004 are awaiting processing. Since the report was run in September 2005, the registry would most likely be concerned with completing the processing of 2004 and earlier cases, so that the data for these years could be completed and released. A report like this could be used to prioritize the work of the QC staff.

Suspense Processing ₃

Sample Report 2: Suspense Report

State Registry: Suspense Status Report by Diagnosis Year

	<2002	2003	2004	2005	Total
In QC	28	5	762	3493	4288
Await reply	38	2	54	102	194
In Editing	99	16	378	504	937
In Linkage	87	18	87	328	520
In Consol.	192	75	164	572	1003
Total	442	116	1385	4999	6942

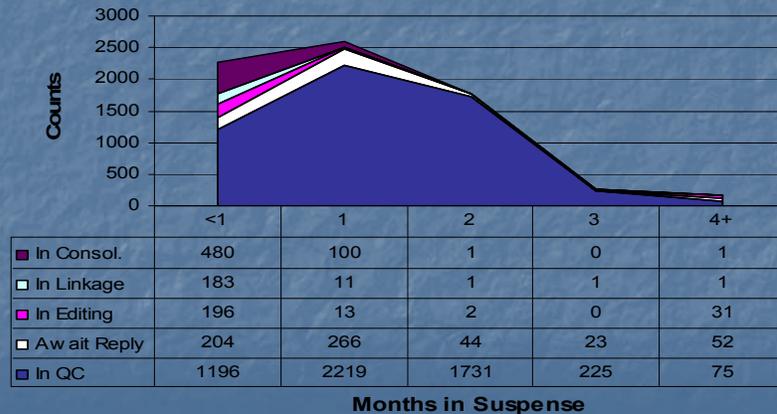
(As of September 2007)

This table shows the status of cases in process from the previous slide in more detail, breaking down each year's cases by processing step.

Suspense Processing 4

Sample Report 3: Suspense Aging Report

State Cancer Registry, Suspense Aging Report



(As of September 2007)

This is a very complex report showing how long individual cases have been awaiting processing, measured in months in the suspense system. Data was collected by having the computer system date-stamp each case as it entered the suspense system, and then calculate the number of months between that date and the current date. The report shows a frequency distribution of months by the processing step in which the case is waiting. Each CCR might have its own set of applicable processing steps to monitor. The data table printed below the graph shows that 1,196 cases (204+196+183+480) have been in suspense less than 1 month. Of these, 1,196 are in the QC process, for visual editing. A total of 163 cases have been in suspense for four or more months. The CCR manager could use this report to identify backlogs in processing, prioritizing work, and to modifying procedures. For example, 119 cases (44+23+52) have been in suspense for greater than 1 month and are awaiting reply from a hospital query. The CCR could decide to discontinue waiting and process the case "as is." This graph was created in Microsoft® Excel.

Staff Management Reports

Staff name	Number of facilities							
Staff #1	Sm	Med	Lrg	VL	XRT	ASC	phys	Total
	20	11	9	17	6	2	10	75
	Number of cases							
	100	500	1000	3500	50	10	25	5185
Staff #2	Number of facilities							
	10	15	24	5	7	3	15	148
	Number of cases							
	50	650	2500	1200	75	15	35	4525

Management reports can also be used to distribute work assignments equitably. Tables can be created for staff with similar responsibilities, such as QC staff. These tables can be updated on a regular basis and work assignments changed as reporting changes. Other activities might include number of records consolidated on a daily or monthly basis.

Visual Editing ₁

Useful Management Report Measures

- **Percent Cases with any error vs. no error**
- **Percent Cases requiring query to reporting facility**
- **Error rates**
 - **By data item**
 - **By facility**
 - **Over time**



Most CCR programs provide an edit summary report giving the number of cases with errors, the total number of cases in the batch, and another report that gives the total number of errors by edit name. The information from these reports can be entered into a spreadsheet to calculate some of the needed information. Some CCRs also send a case to a 'special' suspense file when a query is sent to the reporting facility. A check of the cases in this file would give the information needed for the second example.

If the CCR's computer system cannot capture and calculate these data automatically, visual editing reports can be difficult and time-consuming to prepare. They require that staff keep track of errors and queries manually, and then compile and present the data. The CCR might consider preparing these reports on a sampling basis, such as counting all errors in a one month period and then repeating the process at a later time for comparison.

Visual Editing 2

Sample Report 1: Error Summary

State Cancer Registry, Visual Editing Error Summary,
Quarter 1, 2005

	Cases Rec'd	# with errors	% with errors
Hospital A	23	5	22%
Hospital B	103	48	47%
Hospital C	262	158	60%

(As of September 2007)

Here is a sample of a very simple report on visual editing activity that could be produced manually. Even though the counts may be collected manually, the results should be recorded on a spreadsheet.

For each hospital. The report shows the number and percentage of cases from those received in the first quarter that had any errors detected on visual review. Hospital C shows the highest percentage of cases with errors, at 60 percent.

This report raises a lot of questions for a CCR manager. What error rate should I expect? What level of error is acceptable? Do these hospitals have more or fewer errors than in the past? Which data items contribute the most errors? Can we improve the error rate?

Visual Editing ₃

Sample Report 2: Batch Summary Report

Report for Hospital Y: 183 Cases Submitted February 2005

Data Item	# W/errors	% W/errors
Address at Diagnosis	4	2%
Stage	38	21%
Site-specific	19	10%
Morphology	11	6%
Behavior	0	0%
Grade	29	16%

Comment: The grade errors all involve Gleason's grading for prostate cancers. The stage discrepancies involved several sites.

This is an example of a visual editing report for a single batch of cases submitted from one facility. This report could also have been prepared manually. A report like this could be used by the CCR to monitor the quality of work from this facility and also to identify areas where additional training might be useful. As noted by the comment, training in Gleason's grading of prostate cancer would be appropriate for Hospital Y.

These reports are useful feedback when provided to the reporting facility.

Computer Editing ₁

Useful Management Report Measures

- Average number of errors per case
- Number of edits triggered
- Number of errors per edit
 - By batch
 - By facility
 - By software vendor
 - Over time



When the CCR captures and retains the results of computer edits, it can monitor error rates over time. This type of monitoring can be used to:

- Identify data items that are consistently problematic, so training can target the problem areas
- Evaluate whether training is improving data quality
- Identify errors that may be consistent across cases from one vendor
- Ensure data quality is improving

When vendor problems are identified, working directly with the vendor to fix the problem may be more efficient than working with each hospital user individually.

Computer Editing 2

Sample Report 1: Error Summary

State Cancer Registry, Edit Error Summary, Quarter 1, 2005

	Cases Rec'd	# with errors	% with errors
Hospital A	23	3	13%
Hospital B	103	5	5%
Hospital C	262	107	41%

(As of September 2007)

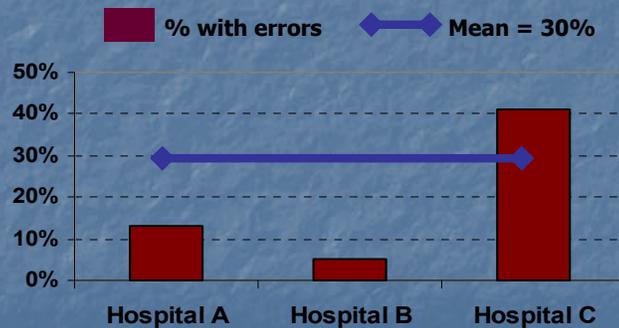
Here is a sample of a very simple report on computer editing activity that could be produced manually. For each hospital, the table shows the number of case reports received in the first quarter along with the number and percent age of errors detected by the computer edit program.

Hospital C at 41percent shows a high percentage of cases with errors detected.

Computer Editing ₃

Chart of Sample Report 1

Percentage of Case Reports with Edit Errors
Quarter 1, 2005 by Hospital



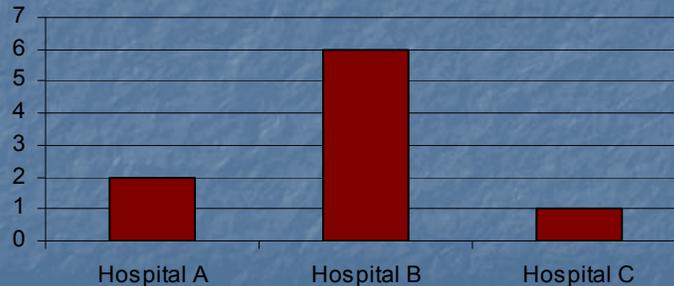
This graph of the percentage of case reports with edit errors, uses data shown in the previous slide. A graph makes it easier to identify hospitals that are better or worse than average. The mean percentage of cases with errors in this data set is 30 percent. Hospital C's percentage is worse than average. However, this average is skewed due to the high percentage of errors for one facility. If there are a large number of facilities, this probably would not impact the average significantly, but it would if there are a small number of facilities. In the case of a small number of facilities with one outlier, it would probably be better to use the median instead of the average. You would also want to include the total number of facilities, and the range of values.

A better option is for the CCR to set a standard for errors and use the standard to measure all facilities. Also, separate reports might be generated by type of reporting facilities such as hospitals with a registry, hospitals without registries and non-hospital sources.

Computer Editing 4

Sample Report 2: Number of Edits with Any Edit Error by Quarter by Hospital

Number of Edits with Edit Error,
Quarter 1, by Hospital



This graph shows a different measure of data quality for each hospital, the number of specific edits that triggered at least one error, by hospital.

Ideally, each hospital would have the same edits on its computer as the CCR has in its system. The hospital would apply the edits to correct any errors before submitting data, so errors would not be detectable by computer at the CCR. By looking at the number of specific edits which triggered any error, the CCR may identify deficiencies in the software used by the facility; for example some edits may be missing from the software, or are not being run by the registry.

Computer Editing 5

Sample Report 3: Edit Error Summary

Hospital X: 108 Cases Submitted August 22, 2005

	# of Errors	% Errors
Type of reporting source invalid	64	59%
Sequence number invalid	7	6%
Behavior code invalid	1	1%
Grade and histology conflict	1	1%
Sequence number, site, morphology conflict	3	3%
Site and morphology conflict	8	7%
COD and ICD code conflict	38	35%
Impossible site and morphology	1	1%
Surgery and Diagnosis confirm conflict	3	3%
Total	126	

This is a summary report of errors detected by computer editing of one batch of 108 cases submitted by Hospital X on August 22, 2005, as produced by the NPCR-EDITS program. The edit error report could also include a detailed listing of each case with errors (not included here).

The report shows that nine different edits found at least one error. The most frequent error was with the item "Type of Reporting Source," with 59 percent of cases having an invalid code.

When provided to the reporting hospital, reports like this are very useful feedback.

This same report could be maintained in a spreadsheet with a column for each data submission for the diagnosis year. Then, the CCR could see if the reporting facility consistently fails the same edit. Maintaining separate spreadsheets for each facility in the same workbook would also allow the CCR to have a statewide total to see if there are consistencies across the state or within specific regions.

Linkage & Consolidation ₁

Useful Management Report Measures

- Total number of case reports, patients, and tumors that result
- Ratio of case reports to tumors
- Ratio of tumors to patients



While the number of cancer cases or tumors occurring in the population is the measure of epidemiologic interest, the CCR manager also needs to assess workload. Workload is best measured by the number of case reports that must be processed by the system. Allocation of staff and computer resources relates to the number of records received in the CCR.

The ratio of case reports to tumors may change over time. Many CCRs have experienced the ratio increasing with the addition of pathology reporting and as patients are seen in several diagnostic and treatment facilities for their disease. Even if the number of these cases remains the same, the workload may **increase**. These statistics can be useful when requesting additional resources for the CCR.

Linkage & Consolidation ₂

Sample Report 1: Counts of Patients, Tumors, and Case Reports

State Cancer Registry, Cases Diagnosed 2005
Number of Case Reports, Tumors, and Patients

Case reports	1,318
Tumors	1,000
Patients	950
Ratio of Case Reports to Tumors = 1.3	
(As of September 2007)	

This simple report shows the results of linkage and consolidation on 1,318 case reports that the CCR received as of September 2007 for cancers diagnosed in 2005. One thousand tumors were represented in 950 patients. The ratio of case reports to tumors was 1.3.

CAPTURING DATA FOR MANAGEMENT REPORTS

Capturing Data: How and When?

➤ **Manual: count by hand**

10784.36
5784
2.71372
9÷1

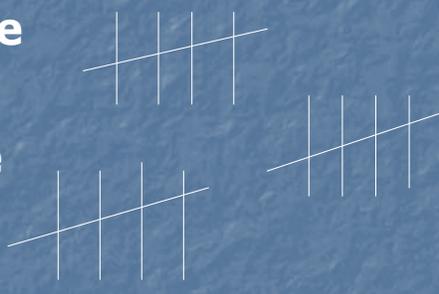
➤ **Computer: retrospective**

➤ **Computer: in real time, "on the fly," immediately**



Data for management reports can be captured in many ways depending on the sophistication of the registry software.

Manual: Count by Hand

- **Slow, inaccurate**
 - **Not flexible**
 - **Labor-intensive**
 - **Example: add up edit errors by item, by facility, and by abstractor, for last year**
- 
- The image shows three hand-drawn tally marks. The first is a vertical line with three horizontal strokes across it, representing the number 3. The second is a vertical line with four horizontal strokes across it, representing the number 4. The third is a vertical line with five horizontal strokes across it, representing the number 5.

Creating management reports manually is always an option when the computer system does not have reports in place. Examples include:

- Counting all incoming abstracts, keeping a log, and preparing monthly summary reports by hand using a spreadsheet.
- Reviewing edit error reports for the last six months and hand-tabulating the numbers of errors by item, by facility, by abstractor, or by any other item of interest.

Given the amount of labor needed to prepare such reports by hand, it is unlikely that a CCR relying on manual means could have more than occasional reports.

Computer: Retrospective

➤ **If data is available, fast, and accurate**

➤ **Flexible**

➤ **Minimal labor involved**



If the raw data, such as error counts or counts of cases received, for management reports are not already available from the registry software system, use a general-purpose database, spreadsheet, or statistics package to create reports. Examples include:

- Prepare counts and error rates by item and facility for the last six months from stored edit reports on the computer
- Prepare frequency distributions by facility and month for the time period of interest from the “Date Case Received” recorded on each computerized abstract.

If your registry software does not produce management reports of interest, you may be able to create extract files of the necessary data to use as input to another program for creating the reports.

Computer "On the Fly"

- **Instant and accurate**
- **Flexible**
- **Minimal labor involved**
- **Provides fastest feedback**



Ideally, the CCR's computer system should capture data about system operation as it performs its tasks. The system can count errors, compare values, and calculate rates and percentages. Thus, management reports can be an integral part of routine processing.

The system can also be designed to save these data in a cumulative database so that they are available for further analysis at a later date. For example, the CCR could compare error rates in June 2005 with those of June 2004.

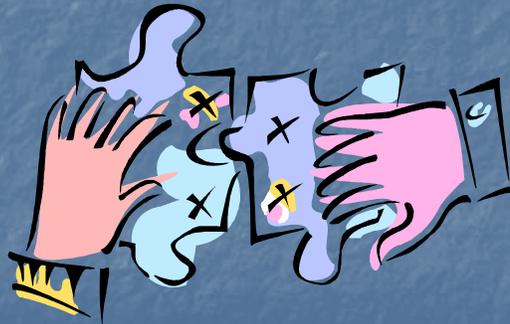
If you use registry software that was not designed with this feature, you may have difficulty incorporating this sort of data collection.

REPORTS FOR FACILITY USE

Why Submit Reports to Facilities?

➤ **Feedback for Quality Improvement**

➤ **Service**



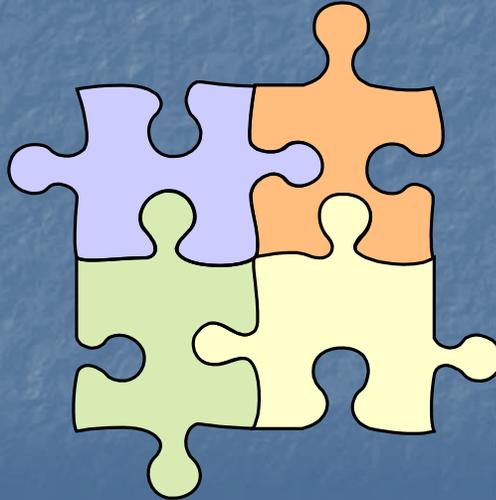
The CCR surveillance system works best when those who are preparing and submitting data are motivated to produce the most timely and complete data possible. Even when cancer reporting is mandated by law, the CCR relies on the voluntary cooperation and goodwill of its reporting facilities for smooth operation and quality data. Providing data to the facilities so that the data flow becomes two-way is an effective way to build cooperation.

Management reports often serve the purpose of closing the quality improvement loop, and improving timeliness and accuracy of data.

Other reports can be provided as a service to local facilities so that the hospitals are customers and users of the data as well as suppliers.

Type of Reports for Feedback

- **Inconsistency reports**
- **Computer edits**
- **Information from case merges (consolidation)**

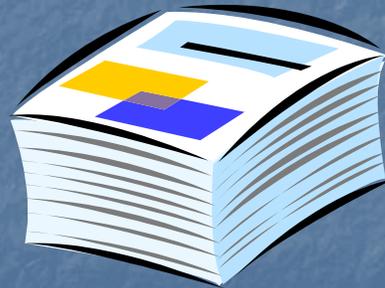


This slide lists several types of reports that can be provided to facilities to improve data quality. Reports from computer edits and visual edits can be used in the CCR to correct errors in the data. Providing reports back to the reporting facilities as well allows the registrars to learn from their mistakes, and prevent future errors making future CCR procedures more efficient. It also allows the registrars an opportunity to correct any errors or assumptions the CCR has made. Sometimes the CCR can introduce inaccuracies into the data during their error correction process, and the hospital registrar can review and correct the CCR's mistakes.

Type of Reports That Provide a Service

➤ Follow up assistance

➤ Comparison data



The CCR can be of great value to hospital registries by providing follow-up information on registered cases and comparison data the hospitals can use in their own reports. Both examples help the facility meet requirements of the American College of Surgeons, Commission on Cancer.

Assistance in Follow-Up

➤ Death Clearance

- Date and cause of death
- Death certificate file number
- Other data



The CCR may be able to share results of death clearance with reporting facilities by providing them with information on the death of a registered patient. In some states, release of information may be restricted by the Vital Statistics office, so the CCR must ascertain what information they are authorized to rerelease to facilities.

Assistance in Follow Up ₂

➤ Shared follow-up on living patients

- Sources
 - Subsequent admissions at other facilities
 - Other linkage: motor vehicles, voter registration
- Hospital agreements

It may also be possible to share follow-up information obtained from one source with another source that has also reported the case. This benefits the facilities by reducing the number of follow-up inquiries they must send out. Sharing of follow-up information must be approached carefully, and discussed with all facilities concerned as well as legal advisors of the CCR, since release of information may be legally restricted. It may require that participating hospitals sign agreements that specifically allow limited sharing of follow-up information with other facilities.

The CCR may also obtain follow-up from linkages it performs with other databases, such as the Motor Vehicle Department or voter registration records.

Comparison Data

- **Local and/or state comparison data**
 - **Site/stage distribution**
 - **Special tabulations**
 - **County/parish**
 - **Zip code**
 - **Census tract**
 - **Timeliness: 1-2 years out of sync**
 - **Confidentiality concerns**

The CCR can provide valuable comparison data to facilities, such as site and stage distributions of cases for a local area or the entire state, either routinely or upon request. However, expertise is required to provide the most appropriate comparison data. The reports should be prepared or reviewed by someone with statistical and epidemiological knowledge. Care must be taken to preserve the confidentiality of not only the individual patients, but also the individual hospitals and physicians. Hospitals receiving the data should be cautioned regarding interpretation of the results. For example, the statewide data may be one or two years older than the hospital's data, so that comparisons might be from different years.

Sharing Mechanism

- **Electronic download**
 - **Accession number, medical record, sequence number**
- **Paper list**
- **Copies of death certificates**

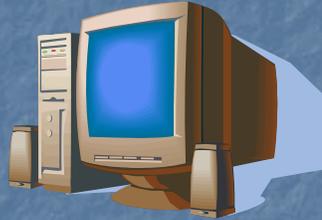
Data or reports can be provided to reporters in different media. Paper reports can be mailed and reports can be e-mailed or accessed through the Internet. When follow-up data on individual cases are downloaded to facilities, it is essential that the data be identified accurately by numbers that the hospital uses in its database, such as the hospital's accession number and medical record number.

Copies of death certificates may be useful to the hospitals, but their distribution may be prohibited by Vital Statistics, and the CCR may not have enough staff to produce copies.

Remember to transmit confidential patient information using a secure method.

How to Provide Feedback

- Paper, phone, site visit, e-mail

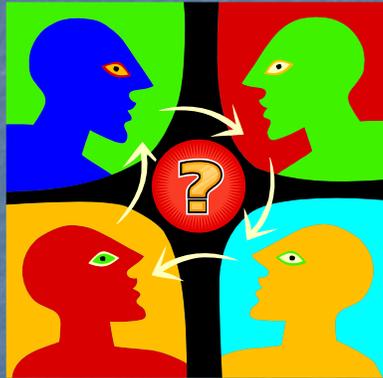


- What do you expect the hospital to do?

Feedback can be provided by telephone, e-mail, or in person. In any case, make sure to inform the staff at the hospital of the CCR's expectations of them.

Questions for Discussion

- **Should the hospital registry change its database to match the CCR?**
- **How responsive will the hospital registrar be to CCR editing?**



In preparing the CCR policies and procedures for providing feedback data to reporters, there are several questions to consider. It may be most appropriate to discuss these issues with reporters before policies and procedures are decided. It will also be helpful to discuss these issues with other CCRs that have implemented these types of activities successfully.