

Chapter 12: Consolidating Data

A core function of a central cancer registry is to consolidate cancer data from multiple sources for the same patient. SEER*DMS builds a CTC from the first abstract or pathology report received. Other records are linked and consolidated as they become available. These include additional pathology reports, abstracts with information from other facilities, and subsequent abstracts from the diagnosing facility. Data from all sources are consolidated so that the CTC contains comprehensive data for diagnosis, staging, and treatment.

In SEER*DMS, consolidated data for a registrant are stored in the Patient Set. The SEER*DMS Patient Set Editor includes features specifically designed for consolidation:

- **Demo Info** – Use this tool to confirm patient-level linkage. This popup provides a quick view of demographic fields (name, SSN, date of birth, and other identifiers).
- **View Source Data** - Use the source data viewer to compare coded data items on source records to the same fields in the Patient Set. To save time and avoid potential keying errors, use this tool to update the Patient Set while reviewing all source data.
- **Record Linkages** – Use the Record Linkages popup to complete tumor level matching and linkage. This popup shows diagnostic information and text for each record and allows you to link a record to a CTC; or create a new CTC from the record.
- **Compare Treatment** - Use the Course Page to compare the values on individual treatment reports to the summarized treatment values.
- **Review Changes** - Review a list of fields changed in the Consolidation task.

Features of the Patient Set Editor specifically for consolidation are described in this chapter. Other features of the editor are described in Chapter 11: *The Patient Set Editor*.

The Patient Set Editor is a flexible tool that does not impose a specific sequence of steps or restrict the methods that you use to consolidate data. However, it is recommended that you follow the practices and guidelines described in this chapter. The steps to consolidate data in SEER*DMS are listed below. If you are a new user, refer to the “cheat sheet” on the next page as you work on tasks. Five basic steps for consolidation:

1. Confirm that all data pertain to the same patient. (Demo Info)
2. Link pending records to the appropriate part of the Patient Set. (Record Linkages)
3. Update consolidated data items to the best values. (View Source Data)
4. Resolve edits and visually edit core data items per your registry’s coding guidelines.
5. Save and confirm your changes.

In this chapter, you’ll learn about:

- Consolidating Data in SEER*DMS
- Consolidation Workflow
- Consolidation Rules
- Manual Consolidate Tasks
- Confirm Patient-level Matching
- Record Linkages
- Updating Patient Set Data (Source Data Viewer)
- Consolidating CTC Data
- Saving and Closing the Consolidation Task

Reference Sheet: Consolidating Data in SEER*DMS

Complete these steps to consolidate data in SEER*DMS:

1. **Open Demo Info and confirm that all data are for the same person.** Quickly confirm the results of the matching task before starting consolidation.
2. **Use the Record Linkages tool to link pending records to data in the Patient Set.** Review each record to determine whether the data are related to an existing CTC or represent a new CTC. Records may be linked to a CTC or may remain linked at the patient level. If a record represents a new CTC, then you may create a new CTC.
3. **Update the demographic page of the Patient Set with data from new records.** Use the Source Data Viewer to review and resolve discrepancies between pending records and the Patient Set. Values from all records are shown so you can identify the source of a data item. You may view values from all records or only view differences.
4. **Update the CTC data with the best record data.** Review all text before proceeding (text is displayed in the right panel or can be opened in the Text Viewer).
 - a. **Consolidate data on the main CTC page.** Review supporting text and use the Source Data Viewer to review data on the pending records. You may manually modify fields or copy values from the record. Do not set the Review flag on the CTC page until all treatment and facility pages are reviewed (the CTC review flag may clear warnings on the Facility, TX, and Summary TX pages).
 - b. **Consolidate data on the Staging page.** Review supporting text and use the Source Data Viewer to review data on the pending records.
 - c. **Review newly created Facility pages and new Admissions on existing pages.** These pages are not created in registries that started using SEER*DMS after 2017. Review data and resolve edits as needed for admissions in the Patient Set. Links to new pages are shown in bold. If new admissions were added to an existing Facility page, the Facility link would not be bold.
 - d. **Review newly created Treatment data pages (TX and TXr links).** Compare coded data to supporting text, compare values to the facility's admission data, and resolve edit errors. Links to newly created TX and TXr pages are shown in bold. You may use the Course Page to compare one TX or TXr to another.
 - e. **Review the Summary TX data page.** Review the summary treatment data on the Course page. The Summary TX values are set by a polisher. If the polisher identified missing or conflicting data, the review flag associated with that treatment modality will be set to 0 (Needs Review) and an edit will fail. You can compare all TX and TXr data in the Course Page. If changes are made in the underlying treatment data, the polishers will update the summary fields.
5. **Save the Patient Set and Exit the Consolidate Task.**
 - a. Check the "Confirm Consolidation is Completed for these Records" box for each record that you consolidated. Do not check the box if you did not complete that record's consolidation.
 - b. When you exit the task: If there are pending records then the Patient Set will stay in a Consolidate task. If there are no pending records but edits are failing, then a Resolve Patient Set Errors task will be created. If there are no pending records and no failing edits, then the Patient Set will exit the workflow.

Consolidation Workflow

Consolidation begins after a source record is matched against patient data and linked to a patient set. Consolidation starts with an automated task that is triggered immediately after a record is linked. Sequence of events:

- Record is **linked** to a patient set.
- Patient-level **consolidation**.
- CTC matching and linkage – record is **linked** to a CTC.
- CTC-level **consolidation**.

Consolidation begins with an automated task that applies field-specific auto-consolidation rules and registry-specific workflow rules. A manual task is required if a field-specific rule returns “manual review required”. This is often referred to as the “rule fails” in the help text for auto-consolidation rules. A manual task is also required if the registry’s workflow always requires a manual review for a new record. This is a “forced review” and is not common for abstract records, but a few registries require a forced review for the first abstract received from a facility for a case. Some registries require a forced review for pathology reports so that pathology report text is reviewed by registry staff. Forced reviews can be limited by other criteria, for example, these may be required until the current reporting year is complete. Manual reviews for failed auto-cons rules and forced reviews are completed in Consolidate worklist tasks.

The automated consolidation task is triggered immediately after a record is linked. Patient-level consolidation rules are executed after a record is linked to a Patient Set. CTC-level consolidation rules are executed after a record is linked to a CTC. Auto-consolidation rules attempt to complete the consolidation of one or two data items, if the data items require manual review, then the rule is said to have “failed”. If the rule fails, then the data items for that rule require a manual review.

Manual reviews are required for these reasons:

- To complete patient-level consolidation. That is, to resolve discrepancies identified by an auto-consolidation rule for a patient-level field.
- To complete the CTC-level matching and linkage of pending records
- To complete CTC-level consolidation. This is required when a CTC-level auto-consolidation rule fails.
- To review patient set data when all records were auto-linked and all auto-consolidation rules executed successfully, but registry rules require a manual review of newly linked records. A “forced” review is required based on the registry’s specifications.

After matching, SEER*DMS will attempt to auto-link the record and auto-consolidate the record’s demographic and/or CTC information into the Patient Set. CTC-level auto-consolidation is in place according to registry rules and is occurring in an increasing amount for any record type with relevant fields.

Manual consolidate tasks will be created if there are failures during the automated consolidate tasks. For example, if there is a conflict in a data item during the auto-consolidation, a manual Consolidate task is created.

CTC matching and auto-consolidation rules are documented in the SEER*DMS help system.

Consolidation Rules

Rules to auto-consolidate data items are documented in the SEER*DMS help system (use the Help > Consolidation Rules menu). Rules are defined by the registry in consultation with IMS staff; or they are defined by the SEER*DMS Consolidation Workgroup. Workgroup members include registry, NCI, and IMS staff.

The help text documents the rule logic and conditions that trigger a manual review. In SEER*DMS, a rule is said to “fail” if a manual review is required. That is a bit of a misnomer, the logic simply ends with “manual review required” as the result.

Each rule ignores values that a user previously reviewed and rejected. Consider this example for a fictional field:

- The user completes a task to review a discrepancy between values A and B. The user sets the consolidated value to A.
- The B value is flagged as rejected.
- Later, SEER*DMS will not require a manual review if a new record with value B is received and linked to the CTC.

Rejected values are shown in SEER*DMS with a strike-through font style in the View Source Data pages. The strike-through is shown when you leave the field.

Notes related to rejected values:

- A change was deployed in 2023 related to rejected values. It was reviewed by registries starting in late March. It was turned on at a different time in each registry when approved by the registry manager. Until this change was deployed, the only values flagged as rejected were values considered to be a discrepancy with other values (per the auto-consolidation rule’s logic). Users could not flag values as rejected until this change was adopted by the registry (see technical support issue 11962).
- The reject flag on a value can be removed by selecting that value from one of the source records; or typing that value into the patient set field.

Manual Consolidate Tasks

The SEER*DMS Patient Set Editor includes features specifically designed for manually consolidating data. The Patient Set Editor is a flexible tool. It does not impose a specific sequence of steps or restrict the methods that you use to consolidate data; however, it is recommended that you follow the practices and guidelines described in this chapter. The general steps to consolidation are:

1. Confirm that all data pertain to the same patient.
2. Link pending records to the appropriate part of the Patient Set.
3. Update the (summarized) Patient Set Data with the new information.
4. Resolve Patient Set errors, either as part of consolidation or in a Resolve Patient Set Errors (RPSE) task.

These steps, along with the features and tools used for Consolidation are described in more detail below.

Demographic Information: Confirm Patient-level Matching

The first step of manual consolidation is to use the Demographic Information viewer to confirm that the data being consolidated matches the Patient. The Demographic Information viewer shows many of the fields used in patient-level matching and is always available, not just during a consolidate task. Use this viewer to compare values on all of the Patient Set’s source records.

Open the Demographic Information window by clicking Demo Info or pressing Alt+D. The popup is only available if there is at least one source record linked to the patient set. If you are in a Consolidate task, the pending records will be listed separately at the top.

Demographic Information															PDF
Type	Facility	First	Mid	Last	Suf	Maiden	Alias	SSN	DOB	Sex	Med Rec #	Race	Birth Place	Hisp	Marit
Pending Records															
NAACCR Abstract ⓘ	FAC-1000	HELENA	TIERRA	SMITH				372-10-5914	09-18-1940	2	5413687	02 88 88 88 88		0	3
Patient Set															
NAACCR Abstract ⓘ	FAC-1000	HELEN	TIERRA	SMITH				372-10-5914	09-18-1940	2		02 88 88 88 88		0	3

[Close](#)

Values that differ between records and the Patient Set will be highlighted. In the example above, the first name on the pending NAACCR abstract differs from the Patient Set value. Medical Record Number values on records values are not compared to values in the Patient Set. A value in the Med Rec # column will be highlighted if it differs from a value on another record from the same facility. For the Seattle registry, accession number is shown in the Med Rec # column if major record subtype is Pathology Rpt.

Click Close or press Alt+C to close the Demographic Information viewer. To open a PDF with this information, click the PDF link in the upper right corner. You may keep the PDF open so that you can see this information while you review other pages in the Patient Set.


Record Linkages

Reportable abstracts, path reports, and other records with cancer diagnosis, treatment, or staging data need to be linked and consolidated at the CTC level. SEER*DMS automatically runs a CTC matching algorithm after a new record is linked to a Patient Set. CTC matching algorithms are defined by record type and are documented on the Matching help page.

If a record is a definite match to a single CTC, SEER*DMS will auto-link the record to that CTC. If the match results require a manual review, the record will be linked at the patient level and a manual Consolidate task will be created. In the Consolidate task, you may use the Record Linkages tool or the record menu to link pending records to the appropriate CTC. This section describes the Record Linkages tool. Instructions for using the record menu are included in the *Linking Records to CTCs* section of *Chapter 11: Patient Set Editor*.

Use the Record Linkages tool to:

- Review basic diagnostic items for each CTC.
- Link a record to an existing CTC.
- Create a new CTC from a record.
- Move a record from one CTC to another.
- View supporting text.
- View Solid Tumor or MP/H rules used in the automatic CTC matching task.

Click **Record Linkages** in the Patient Set header, or press Alt+X. You can drag the record linkages window to another part of the screen or to another monitor by clicking any part of the title bar or the Move icon in the upper left corner . Click **Reset Position** at the top of the screen to send the window back to the default position.

All records linked to the Patient Set are displayed. Use the **Action** drop-down in each row to link the record to a CTC, create a CTC, move the record to a different CTC, link the record at the patient level, or unlink (remove) the record from the Patient Set.

As you click a record's row, text and other data for that record will be shown in the Record Information section on the right side of the screen. There are four tabs:

- Record Information – the record ID is shown in the header of this tab. This tab shows a summary of the record including import information, patient identifiers, and the core diagnostic data items.
- Text Tab – This tab shows the supporting text provided on the record.
- Audit Log – A list of the events in the record's audit log.
- CTC Matching – SEER*DMS executes the SEER Solid Tumor Rules and Multiple Primary algorithms as part of CTC matching. The results of these algorithms are shown on the CTC Matching tab.

To link a record to an existing CTC, select **Link to CTC** from the Action dropdown and select the appropriate CTC from the list. If the record represents a new CTC, then select **Create CTC from this Record**. If the record should be kept at the Patient Level (for example, an HL7 that is waiting for an abstract), then select **Link at Patient Level**. If you determine that the record does not pertain to this patient at all, select **Unlink from Patient Set on Save**. A record that you unlink will stay visible in the Patient Set until you save the full Patient Set.

After making selections from the Actions menu, all changes will appear in a new section called **Unapplied Changes**. Carefully review your selections. Your changes will not take effect until you click Apply. Once you click Apply, the record linkages will be updated and consolidation rules will be executed.

Records are listed in the following sections of the Record Linkages window:

- **Requires CTC Linkage:** The records listed in this section could not be auto-linked. A registrar needs to review and complete the CTC-level linkage.
- **Linked to CTCs:** A list of records is shown for each CTC in the Patient Set. You may move a record that is linked to the wrong CTC. If a record is not fully consolidated, then it will be listed as "Pending manual consolidation".
- **Linked at Patient Level:** This section contains records that are linked at the patient level, listed in sections by the record's reportability. These are listed in this section because, per registry rules, SEER*DMS does not require them to be linked to a CTC. Refer to your registry manager's instructions for your registry's requirements related to these records.

Record Linkages for PAT-0000079 (JONES, LEILANI)

Requires CTC Linkage

ID	Type	Action	Site	Morph	Date	Seq	Cl	Ca	Facility	Path#	Site/Hist Title
REC-1000000036	NA	Move	C502-2	8500/2	01-05-2020	02			FAC-1000 Townville Regional Hos...		

Linked to CTCs Hide Records

ID	Type	Action	Site	Morph	Date	Seq	Cl	Ca	Facility	Path#	Site/Hist Title
			CTC 01	C504-1	8520/3	12-26-2020	01				
REC-1000000099	NA	Move	C504-9	8520/2	09-30-2017	00			FAC-1000 Townville Regional Hos...		
REC-1000000035	NA	Move	C504-9	8523/2	12-26-2015	01			FAC-1000 Townville Regional Hos...		
REC-1000000256	HL7 U	Move	C509-2	3/3	07-05-2017				FAC-1000 Townville Regional Hos...	407981	

Linked at Patient Level

ID	Type	Action	Site	Morph	Date	Seq	Cl	Ca	Facility	Path#	Site/Hist Title
Reportable											
REC-1000007145	HL7	Move	C187	8140/3	12-19-2018				FAC-1000 Townville Regional Hos...	848335	
Pending manual consolidation											
Reportability Unknown											
REC-1000000249	HL7 U	Move	C509-2	3/3	06-12-2017				FAC-1000 Townville Regional Hos...	187607	

Record Information

REC-1000007145 HL7 **Text** Audit Log 10 **CTC Matching** [Open Record](#)

Name: JONES, LEILANI K Site: C187 Morph: 8140/3 Grade:

Path#: 848335

EPath Sites: C187

EPath Morph: M-81403

Clinical Hist
Evaluate for non-Hodgkin's lymphoma. ALL: myelodysplastic syndromes; chronic lymphoproliferative disorders, CLL. Prior therapy: Chemotherapy, Fludarabine more than one month ago. CBC report received.

Nature of Spec
Bone marrow.

Gross Path
Part #1 is labeled "left breast biopsy" and is received fresh after frozen section preparation. It consists of a single firm nodule measuring 3cm in circular diameter and 1.5cm in thickness surrounded by adherent fibrofatty tissue. On section a pale gray, slightly mottled appearance is revealed. Numerous sections are submitted for permanent processing. Part #2 is labeled "apical left axillary tissue" and is received fresh. It consists of two amorphous fibrofatty tissue masses without grossly discernible lymph nodes therein. Both pieces are rendered into numerous sections and submitted in their entirety for history. Part #3 is labeled "contents of left radical mastectomy" and is received fresh. It consists of a large ellipse of skin overlying breast tissue, the ellipse measuring 20cm in length and 14 cm in height. A freshly sutured incision extends 3cm directly lateral from the areola, corresponding to the closure for removal of part #1. Abundant amounts of fibrofatty connective tissue surround the entire breast and the deep aspect includes and 8cm length of pectoralis minor and a generous mass of overlying pectoralis major muscle. Incision from the deepest aspect of the specimen beneath the tumor mass reveals tumor extension gross to within 0.5cm of muscle. Sections are submitted according to the following code: DE- deep surgical resection margins; SU, LA, INF, ME -- full thickness radia samplings from the center of the tumor superiorly, laterally, inferiorly and medially, respectively; NI- nipple and subacnt tissue. Lymph nodes dissected free from axillary fibrofatty tissue from levels I, II, and III will be labeled accordingly.

Final DX
A small population of monoclonal B-cells (Kappa) is present in the bone marrow. The antigenic

Updating Patient Set Data (Source Data Viewer)

Use the Source Data Viewer to compare the values of fields on the source records to the values in the consolidated Patient Set; and use the viewer to update the consolidated values. To change the value of a field, copy a value from a source record or type the value directly into the field. Use the link at the top right of the center panel to toggle between "View Source Data" and "View Consolidated".

The Source Data Viewer is available on pages that contain data consolidated from multiple records. Therefore, it can be used on the Demographics, CTC, and Staging pages. The Summary TX page contains data summarized from other pages within the CTC; it is not consolidated directly from the records. The "Compare TXs" view on the Course Page allows you to compare TX, TXr, and Summary TX values.

The screen shot below shows a section of the Patient Set Demographics page in the Source Data Viewer. When consolidating data, work through each section of the page. The value of a record field will be highlighted if it differs from the Patient Set value. To update the Patient Set field, click the record value, or enter a value directly in the Patient Set field. As you change values, record values that you do not select will be marked as rejected and shown with a strike-through font and the highlight will be removed. Auto-consolidation rules will not generate a failure for a discrepancy with a rejected value.

Race, Ethnicity & Birth Place

	Race	Hispanic	Birth State	Country	Birth Place
Patient Set	01 88 88 88	0	MA	USA	005
Pending					
NA ⓘ C00 (0299)	02 88 88 88 88	0	ZZ	ZZU	003
Previously Consolidated					
NA ⓘ C00 (0247)	01 88 88 88 88	0	MA	USA	005
SU ⓘ P (1000)	99 99 99 99 99				
NA ⓘ C00 (0245)	01 88 88 88 88	0	MA	USA	005

There are four controls at the top of the Source Data Viewer that may help you focus on the data most relevant to your current tasks.

- Use the record drop-down menu to hide rows by record status or type
- Use **Hide Records with No Differences** to exclude rows where a record's values are the same as the Patient Set. This is applied independently for each table.
- Check **Hide Blank Fields** to hide the column of a field if it is blank in the Patient Set and all records.
- Toggle the **Strikethrough Rejected Values** checkbox to turn the strikethrough font on/off. Turn off the strikethrough if it makes it difficult to read a value. This only changes the display; the value will still be considered "rejected" by auto consolidation rules.

There are special actions for certain types of data. For example, you can copy all values for causes of death, site-specific factors, and other fields that are handled in sets. When comparing text, you can append text to the Patient Set field or copy the text to over-write the Patient Set field.

Causes Of Death

	COD	Oth COD	CODs Action	COD Rev#
Patient Set	D489			1 <input type="button" value="v"/>
Pending				
NA <input type="button" value="i"/> <input type="button" value="P"/> (1000)	0000		copy all CODs	0
DC <input type="button" value="i"/> <input type="button" value="P"/> (1000)	D489	A010	copy all CODs	1

Consolidating CTC Data

After a record is linked to a CTC, SEER*DMS executes the auto-consolidation rules for that type of record. These rules will automatically update fields on the Demographics, CTC, and Staging pages. The rules and the fields updated vary by registry.

SEER*DMS also uses the record data to create new treatment, facility, and admission data within the CTC. New TX, TXr, and Facility pages may be created; and new admissions may be added to existing Facility pages. The registry configuration may include algorithms to prevent the creation of duplicate treatment, facility, or admission data entities. For more information on TX pages, see the Treatment Data Section of Chapter 11: Patient Set Editor.

To consolidate data into an existing CTC:

1. Consolidate data on the Main CTC page.
 - a. Review supporting text and visually edit the coded data fields.
 - b. Use the Source Data Viewer to compare values on the pending records to the consolidated Patient Set fields and to update Patient Set fields, if necessary.
 - c. Do not set the Review flag on the CTC page until all treatment and facility pages are reviewed (the CTC review flag also clears warnings on the Facility, Staging, TX, and Summary TX pages).
2. Consolidate data on the Staging page.
 - a. Compare the coded data fields to the text shown in the right panel.
 - b. Use the Source Data Viewer. Compare values on the records to Patient Set fields. Make any necessary modifications.
3. Review newly created Facility pages and new admissions on existing pages.
 - a. Review data and resolve edits for new admissions in the Patient Set data. Links to new pages are shown in bold. If new admissions were added to an existing Facility page, the Facility link would not be shown in bold.
 - b. Check the data for each facility that provided a pending record.

4. Review newly created Treatment data pages (TX and TXr links). SEER*DMS polishers use the data on these pages to update the Summary TX data. Therefore, it is important to review and visually edit these data prior to reviewing the Summary TX data. Links to new TX and TXr pages are shown in bold. Follow the steps below for each page:
 - a. Compare coded data on the TX and TXr pages to supporting text.
 - b. Review associated admission data (if an admission is related to the treatment, a link to the admission will be displayed on the treatment page in the Adm FAC-ID field).
 - c. Resolve all edit errors on each TX and TXr data page. This must be done before proceeding to the review of the Summary TX data. If you do not know how to resolve an edit or do not have the appropriate permissions to do so, you may save the Patient Set with edit errors. The edits will be resolved later in a Resolve Patient Set Errors task.
 - d. If you would like to view the source record during this review, the record type of the source record is displayed as a link next to the "Source" field.
 - e. Use the Course Page to compare one TX or TXr to another. Click "Course 1" in the navigation panel and select "Compare TXs" in the title bar.
5. Review and complete the consolidation of the summary treatment data:
 - a. Click the Course 1 link in the left navigation box. Review the summarized values set by the polishers for each treatment modality. If the polisher identified missing or conflicting data, the review flag associated with the treatment modality will be set to 0 (Needs Reviewed) and an edit error will fail.
 - i. Review the summarized Surgery Treatment data. Compare the summarized data to the contributing data and modify the Summary Treatment fields, as necessary. When you complete the process for Surgery Treatment data, set the Surg Rev flag to 1 (Reviewed).
 - ii. Repeat this process for the Radiation and Systemic sections. There is a separate review flag for each.
6. After reviewing all data pages, resolve any edits that are failing.
7. If required by your registry, check the Visual Edit flag on the main CTC page.
8. Repeat steps 1 through 7 for each CTC that requires consolidation.

Saving and Closing the Consolidate Task

Changes cannot be saved unless all records are linked. If you have made significant changes and would like to save them, verify that all pending records are linked to a CTC or to the Patient Set.

To save changes and close a consolidate task:

1. Check the "Confirm Consolidation is Completed for these Records" box for each record that you consolidated. Do not check the box if you did not complete that record's consolidation.
2. When you exit the task: If there are pending records then the Patient Set will stay in a Consolidate task. If there are no pending records but edits are failing, then a

Resolve Patient Set Errors task will be created. If there are no pending records and no failing edits, then the Patient Set will exit the workflow.

To save changes and continue the consolidate task:

1. Click **Save**.
2. Enter comments to document your changes.
3. If you would like to continue working on the task, click the **Save** button at the bottom of the Review Changes page. This is not an option if you are creating a new Patient Set.