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British Columbia
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Electronic Health Information Exchange

Volume 4E: Application Enforced Rules – Provincial Lab Information Solution (PLIS)

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1.0 Introduction

This section describes the transactions and application enforced rules that apply to point-of-service (POS) systems accessing or exchanging electronic health information (EHI) with the Provincial Lab Information Solution (PLIS) and defines the application rules for:

- Summary queries;
- Detail queries; and
- Receiving distributions (i.e., RCD – reportable communicable disease).

These are in addition to the BC HL7 V3 Specifications for PLIS.

Functionality to support POS system requests for PLIS data include:

- Receipt, display, storage and *audit* of the data in the POS application;
- Associated error message handling; and
- Maintaining the clinical integrity of the data.

1.1 Transactions

Transactions to support POS application requests for PLIS data include:

- Query Transactions:
    - Summary Query
    - Detail Query
- Lab Result Notification Transactions:
    - Result Complete Notification
    - Result Revision Notification

Transactions that support these requests are patient-centric. The POS system requests laboratory data for a single patient identified by their Personal Health Number (PHN) and the PLIS selects the patient lab result records that match the PHN.

The following matrix indicates the PLIS transactions permitted for each POS system:

Table 1 PLIS Transaction Permissions by POS

Transaction Permissions	Medical Practice EMR	HA CIS	View-Only Application	Distribution (e.g., Panorama)
Summary Query – L2.6	M	M	M	X
Detail Query – L2.1	M	M	M	X
Result Complete Notification – L1.2	X	O	X	M
Result Revision Notification – L1.3	X	O	X	M

Legend:

- X = Not Permitted
- M = Mandatory
- O = Optional

A Query Transaction may be either a Summary Query or a Detail Query.

The PHN must be the patient identifier included in a request.

- An error message will be returned if the ControlActEvent Wrapper.RecordTarget and SOAP governance header do not contain the same PHN.
- SOAP governance header data includes the patient identification to support client validation governance within the HIAL. The function of this governance is to validate the patient identifier and provide the current valid PHN that corresponds to the identifier provided.
- If a surviving PHN is determined as part of this governance, the response message will identify the patient using the surviving PHN, which may be different than the PHN used in the request, although this is rare. Each report record within the response will contain the PHN that was valid at the time of the report.

1.2 "Summary Query" – L2.6 – Query Laboratory Test Result Summary

The term "Summary Query" used in this document refers to the "Query Laboratory Test Result Summary transaction" and related request and response interactions and messages.

The Summary Query searches for and returns a list of lab tests (batteries) within a date range for a particular patient.

The Summary Query transaction is composed of two interactions:

Transaction ID	Interaction ID	Interaction Name	Description
L2.6	POLB_IN374000CA	Request Query Summary Results	A POS system uses this interaction to request a summary list of lab tests from the PLIS repository for a single patient.
L2.6	POLB_IN384000CA	Response Query Summary Results	The PLIS Lab Repository uses this interaction to return a summary list of lab tests in response to the request for the summary.

1.2.1 "Summary Request" – Request Query Summary Results

The Request Query Summary Results interaction (the "Summary Request") is used to request a list of batteries (patient lab tests) from the PLIS repository. The PLIS application uses the Summary Request's parameters to select battery records to include in the Summary Response message.

1.2.2 "Summary Response" – Response Query Summary Results

The Response Query Summary Results Interaction (the "Summary Response") is sent from the PLIS repository in response to the Summary Request. The PLIS application selects patient lab batteries stored in the PLIS repository that match the specimen collection data/time parameters in the request.

1.3 "Detail Query" – L2.1 – Query Laboratory Test Results Detail

The term "Detail Query" used in this document refers to the "Query Laboratory Test Results Detail transaction" and related request and response interactions and messages.

The Detail Query provides the user with the discrete clinical data result values (the batteries and observations) for each requested report.

The Detail Query transaction is composed of two interactions:

Transaction ID	Interaction ID	Interaction Name	Description
L2.1	POLB_IN354000CA	Query Results	A POS system uses this interaction to request detailed lab results for a single patient from the PLIS repository.
L2.1	POLB_IN364000CA	Query Response	The PLIS repository uses this interaction to return detailed lab result data and lab reports in response to a request.

1.3.1 "Detail Request" – Query Results

The Detail Request uses a single report identifier. PLIS will return the PLIS formatted report in a PDF format (the "PLIS PDF Report") along with the discrete data for that report.

1.3.2 "Detail Response" – Query Response

The Detail Response returns lab observation report discrete data and the PLIS PDF Report. The PLIS PDF Report, which is designed as an approved rendered lab report to reduce risks to patient care. PLIS sends all batteries in the context of the Lab Observation Report and with all available observations. Each report and battery within the report has unique identifiers.

1.4 Distributions – Lab Result Notification Transactions

There are two message transactions to support the distribution of lab results: one for new results and one for revised results. These results are 'pushed' to the POS application, (i.e., there were no queries from the POS system) and the transactions notify the receiving POS applications of new or revised laboratory results.

Recipients of the distributions are designated in a distribution list, associated to the result messages, by the laboratory or the PLIS application.

PLIS receives distribution messages from Laboratory Information Systems (LIS) and distributes the messages to the appropriate receiving systems. Currently, PLIS supports the distribution of test results containing RCD indicators and solicited test results to the public health POS application (Panorama).

1.5 Batteries, Laboratory Reports & Lab Requisitions

Batteries

All batteries are received in the context of the Lab Observation Report (e.g., status of the report, report identifier, accession number, date of report, lab that sent the report). Each report and battery within the report has a unique identifier.

Battery statuses include:

- **Active** which includes:
    - Pending (no observations within a battery are completed); and
    - Partially completed (some, but not all, observations within a battery are completed).
- **Completed** (all observations within a battery are completed):
    - Corrected (observations that are completed may also be corrected); and
    - Aborted (a battery has been cancelled).

Laboratory Reports

A Laboratory Observation Report is the official document that fulfills requests for testing at one laboratory. Each laboratory produces one or more laboratory reports that document the results of tests requested on a requisition. References to the "lab report" within this document refer to the original lab report produced by the laboratory, which is represented by the PLIS PDF Report or the approved POS rendered report.

A Laboratory Report received in a Detail Response message or referenced in a notification may be composed of any combination of the three lab result message payload patterns:

1. Generic lab results;
2. Microbiology sensitivity results; and
3. Pathology results.

The laboratory observation report groups batteries reported by one laboratory by a common report identifier (i.e., accession number). Each report and battery within the report has a unique identifier assigned by the LIS.

Note(s): Lab observation reports or batteries flagged as confidential will not be returned in response messages.

Lab Requisition

A Lab Requisition is a document authored by an Ordering Provider that designates tests to be performed by a laboratory.

2.0 Application Enforced Rules

2.1 General

The following application enforced rule applies to all types of POS applications:

Table 2 General – Application Enforced Rules

#	Rule
LabTx1.1	**Client Registry** The POS application must be integrated with the Client Registry.

2.2 Disclosure Directive Keyword

A patient Disclosure Directive keyword is a password chosen by the patient and used to control access to the patient's electronic health record in the PLIS. Disclosure Directive keyword is assigned by a patient-initiated Disclosure Directive to protect their data in PLIS.

Note(s): The Disclosure Directive keyword to protect the patient's data in PLIS is different from the protective word to protect the patient's data in PharmaNet.

The following rules apply to POS applications that query PLIS:

Table 3 Disclosure Directive Keyword – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx2.1	**Retrieve Data Protected by Disclosure Directive** The POS application must support Disclosure Directive keyword entry and include the Disclosure Directive keyword in the message. The POS application must: • Display the Disclosure Directive keyword screen when a user requests to retrieve a patient record protected by a patient Disclosure Directive keyword; • Prompt for the Disclosure Directive keyword; • Not display the Disclosure Directive keyword in clear text; • Not require verification of the Disclosure Directive keyword in subsequent transactions during the same patient session; and • Maintain the patient Disclosure Directive keyword override until the POS user leaves the context of that patient's session.	✓	✓	✓	

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx2.2	**Protective Disclosure Directive Keyword Storage** The POS application must provide storage specifically for a patient's Disclosure Directive keyword. If the Disclosure Directive keyword is stored, the application must: • Require the user to acknowledge patient consent to store the Disclosure Directive keyword for future use in the POS application; and • Encrypt the Disclosure Directive keyword while stored. Health authorities are not permitted to store the patient's Disclosure Directive keyword.	✓			

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx2.3	**Stored Disclosure Directive Keyword Use** If the stored Disclosure Directive keyword is required to access EHR data, the POS application must: • Automatically populate the Disclosure Directive keyword in the protective word field; • Not display the Disclosure Directive keyword in clear text; • Prompt the user to explicitly verify use of the stored Disclosure Directive keyword (e.g., click the field) in the first transaction during the patient session; and • Not require verification of the Disclosure Directive keyword in subsequent transactions during the same patient session. **Note(s):** 1. In this situation, the patient session means when the POS patient record is open. 2. The patient session ends when the patient record is closed.	✓			

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx2.4	**Delete/Change a Stored Disclosure Directive Keyword** If a Disclosure Directive keyword is stored, a user must have the ability to delete or change the Disclosure Directive keyword in the POS application.	✓			
LabTx2.5	**Printing Patient Protected Information** Printouts containing data that was protected by a patient Disclosure Directive keyword must: • Clearly indicate EHI data was protected by a patient Disclosure Directive keyword; and • Include footer information stating that the report (printout) is intended solely to the person(s) providing or supporting direct care to the patient.	✓	✓	✓	
LabTx2.6	**Logging Access to Patient Protected Information** The application must create a time stamped audit record each time a user access masked data and protected HIE information along with the reason to unmask the data.	✓	✓	✓	

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx2.7	**Access to Patient Protected Information Audit Reports** The application must be capable of generating user defined reports to provide, at a minimum: • Reports by patient: Identifying all users who have accessed patient protected information over a given time; and • Reports by user: Identifying all patient protected information accessed by a given user over a given period.	✓	✓	✓	

2.2.1 Health Authority Emergency Disclosure Directive Keyword Override

In emergency situations authorized users are permitted to override the patient Disclosure Directive keyword without consent (i.e., without providing the Disclosure Directive keyword).

The following rules apply to functionality implemented specifically for POS where user roles permit (e.g., emergency departments):

Table 4 Health Authority Emergency Disclosure Directive Keyword Override – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx3.1	**Override Without Consent** Authorized users must be able to override the patient's disclosure directive without a Disclosure Directive keyword.		✓	✓	
LabTx3.2	**Reason to Override Without Consent** The user must provide a reason for overriding the disclosure directive without the Disclosure Directive keyword.		✓	✓	

The following are examples of user prompt display content:

- Where the user's business role allows the user is authorized to view data held in a province service repository and their permission includes access to information protected by Disclosure Directive

This patient has applied a disclosure directive to control access to this portion of his / her record.

To view this record you must ask the patient if he / she will grant you temporary access to his / her electronic health record by providing you with their Keyword below.

Keyword:_____ *SUBMIT KEYWORD*

- Where the user's business role allows the user is authorized to view data held in a province service repository and their permission includes access to information protected by Disclosure Directive and for access without consent (Override)

This patient has applied a disclosure directive to control access to this portion of his / her record.

To view this person's record you have two options:

Option 1 – Override With Consent: To view this patient's record you must ask the patient if he/she will grant you temporary access to his/her electronic health record by providing you with their Keyword below.

Keyword:_____ *SUBMIT KEYWORD*

Option 2 – Override Without Consent: If the patient is not able to provide consent and delay in accessing masked information could result in meaningful harm, you may access this portion of his / her electronic health record.

Note: All access without consent will be logged and audited.

Reason for Override Without Consent:

- ❑ Patient is unconscious or semi-conscious
- ❑ Patient is apparently impaired by drugs or alcohol
- ❑ Patient is otherwise incapable of giving or refusing consent. Please specify reason below:

_____

Comment (Optional): _____

SUBMIT OVERRIDE WITHOUT CONSENT

2.3 Response & Error Management

The Acknowledgement Detail code indicates if a message contains an error that caused the message to fail. A message that has been processed successfully may contain warnings in Detected Issues.

For details of the usage errors, location errors, and warnings within the response refer to the:

- Volume 4E – Message Specification – PLIS

Table 5 Response & Error Management – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx4.1	**Error Messages** All error messages must be displayed to the user as clear and meaningful messages.	✓	✓	✓	
LabTx4.2	**Query Response Time Out** If a timeout occurs while waiting for a Query Response, a warning message must be displayed, and the following options provided: • Re-try the query; or • View the lab data stored in the POS application and indicate the lab data being viewed might not be the most recent available. **Note(s):** Applicable to applications querying PLIS.	✓	✓	✓	

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx4.3	**No Records in Summary Response** If there are no records in the Summary Response, the user must be notified that no records were found in PLIS for the date range specified and prompted to redefine the query. **Note(s):** 1. Where no records are found the 'QueryResponseCode' is 'NF' in the Query Response (QueryAck). 2. Applicable to applications querying PLIS.	✓	✓	✓	

2.4 Lab Summary Request Criterion

The following rules apply to POS applications that query PLIS:

Table 6 Lab Summary Request Criterion – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx5.1	**Valid Dates and Times** The entry of invalid dates or times in the lab query parameters must not be permitted. The start date must precede or be the same as the end date.	✓	✓	✓	
LabTx5.2	**Date Search Criteria** Users must be able to specify a date range to initiate a Summary Request. 'All' must not be set as the default. **Note(s):** 1. Additional functionality to support date ranges is recommended. For example: • past 2 weeks • past month • past 3 months • past 6 months • past year • user specified (e.g., POS application provides a calendar for selecting dates) • all 2. The Summary Response will return a maximum of 10,000 records.	✓	✓	✓	

2.5 Lab Summary Response

The following rules apply to POS applications that query PLIS:

Table 7 Lab Summary Response – Application Enforced Rules

<table>
<tr><th>#</th><th>Rule</th><th>Medical Practice EMR</th><th>HA CIS</th><th>Viewer</th><th>Distribution</th></tr>
<tr><td>LabTx6.1</td><td>Summary Response Data Presentation
1. The summary list presentation must be limited to what is received in the message and must contain the data elements listed in the table below.
2. If no data for a particular field is received, the field must be displayed and left blank (e.g., a column with a blank cell, box with no data, or a space separated by field delimiters).
3. The user must have the ability to link to the report from the summary list screen.
<table><tr><th>Data Elements</th></tr><tr><td>Specimen Collection Date/Time</td></tr><tr><td>Test Name (BC Display Name)</td></tr><tr><td>Out-of-Range Flag
(Distinctly and prominently presented)</td></tr><tr><td>Laboratory Name</td></tr><tr><td>Ordering Provider Name</td></tr><tr><td>Test (Battery) Status</td></tr><tr><td>Corrected Flag
(Distinctly and prominently presented)</td></tr></table>Note(s):
1. Test Name: The Battery Name is supplied in the response message.
2. Out-of-Range Flag: PLIS rolls up the out-of-</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
</table>

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
	range flag from component observations to determine the flag to send at the battery level. An out-of-range flag on a battery means that at least one component observation value has an out-of-range flag. Out-of-range flags on observations (e.g., High or Low) are sent as "A" (abnormal) on the battery. These flags are not typically available for microbiology and anatomic pathology results. 3. Laboratory Name: The Reporting Laboratory Name is supplied in the response message as the author of the report. 4. Ordering Provider: The names of ordering and copy-to providers are in the response message and may be displayed as provided. There is no implied expectation that integration with the provider registry is needed for the name display. 5. Test Status: Cancelled tests have a status of "completed" prior to PLIS release 7 (March 9, 2013). 6. Corrected Flag: The corrected flag is distinct from the status code. No assumptions about the status of the report, battery or observation can be made from the presence of the corrected flag. PLIS rolls up the corrected flag from component observations to determine the flag to send at the battery level. A corrected flag on a battery means that at least one component observation value has				

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
	been corrected. A corrected flag is rarely used for microbiology. Pathology results are amended (have an amendment) and do not have a 'corrected' flag.				
LabTx6.2	**Issue Detail Request from Summary List** The user must be able to select multiple batteries from the Summary List without performing additional Summary Requests. A Detail Request must be issued for each selected Report ID and the report displayed to the user. **Note(s):** 1. The response to a Detail Request by Report ID will include the PLIS PDF report. 2. The Report ID includes both report identifier extension and object identifier (root OID) as returned in the Summary Response message.	✓	✓	✓	

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx6.3	**One Detail Request per Selected Report** Only one Detail Request must be executed for each report ID selected from the Summary List (i.e., if multiple batteries with the same report ID are selected from the Summary List only one Detail Request for the associated report ID must be sent). **Note(s):** The Summary Response will return all batteries from the same report and display them on separate lines for selection.	✓	✓		
LabTx6.4	**Default Display Sorting** The Summary List must default to one of the following sort displays: • Primary: specimen collection date/time, descending; Secondary: test name, ascending; • Primary: test name, ascending; Secondary: specimen collection date/time, descending.	✓	✓	✓	
LabTx6.5	**Sorting Collection Date/Time** A result that does not include the time in the Collection Date/Time must be sorted as though the time was the earliest of that date (i.e., 00:00:00).	✓	✓	✓	

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx6.6	**Matching PLIS Batteries** Batteries received in the Summary Response that match batteries stored from PLIS in the POS application must not be displayed. To identify matching records, the POS application must compare the following information retrieved in the Summary Response with PLIS data stored in the POS application: • PLIS battery identifier; and • PLIS report identifier. **Notes** 1. The PLIS battery identifier and the PLIS report identifier will not match the identifiers used for non-PLIS records stored within the POS application. 2. The Summary Response provides enough information to allow the POS application to identify matching stored PLIS records. 3. A matching record may be a duplicate or an update to the stored PLIS record. The content of the Summary Response does not provide sufficient information for the POS application to determine if a matching PLIS record is a duplicate or an update.	✓	✓		
LabTx6.7	**Selection of EHR Data to Retrieve** To retrieve detail data, the user must explicitly make selections from the Summary List (i.e., reports must not be automatically retrieved).	✓	✓	✓	

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx6.8	**Display Selection Criteria** Selection criteria used to request, or filter results must be displayed on all associated screens.	✓	✓	✓	

2.6 Lab Data Storage & Updates

The following rules apply to POS applications that store data received from PLIS:

Note(s): These rules are not applicable to view-only applications.

Table 8 Lab Data Storage & Updates – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx7.1	**Automatic Detail Request for Stored PLIS Record** If a stored PLIS record is opened in the patient chart, a Detail Request for that particular report identifier must be issued automatically. If a successful Detail Response is received there must be no further Detail Request for the same report during the same patient session (e.g., if the user requests updates for all stored records, subsequent selection of those records during the same patient session will not initiate an automatic Detail Request). **Note(s):** A patient session means while the patient's chart is open; the patient session ends when the patient's chart is exited or closed.	✓	✓		
LabTx7.2	**User Requested Updates for Stored Reports** The user must be able to request an update to all PLIS reports stored in the patient chart. Based on this request, a Detail Request must be issued for each PLIS report in the patient chart.	✓	✓		

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx7.3	**Viewing and Storing Updated Data** The POS application must: • Support the user in viewing and storing the updated/corrected PLIS data; • Create a new record for the updated data; • Retain clinician entered annotations from the previous record on the new record; and • Provide a visible link to the historical version(s) of the data. If a previous version of a record is viewed it must be evident that the data being viewed is not current.	✓	✓		✓
LabTx7.4	**Record Date and Time Stamps** All records stored in the POS application must be stored with the date and time received. This includes: • Historical records; and • Each discrete battery on the report.	✓	✓		✓
LabTx7.5	**Report Storage** If the POS application uses the PLIS PDF Report, the PDF must automatically be stored with and linked to the corresponding discrete results. If the POS application creates its own report (i.e., does not use the PLIS PDF Report), the POS report must be stored with and linked to the corresponding discrete results.	✓	✓		✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx7.6	**Display Updates to Stored Records** Updates to stored records must be displayed to the user in the context of the report. The updated data must be clearly distinguished from data on the same report that has not been updated. **Note(s):** Typical updates include: • Changes to status (e.g., active to completed; active to cancelled); • Corrected flags on observations; • Updated or new observations; and • Added battery.	✓	✓		✓
LabTx7.7	**Report from a Different Source** If a distributed report from a reporting laboratory or agent matches a report stored from PLIS, the POS application must store the distributed report and allow the user to confirm the reports match. If the user confirms the reports are the same, the POS application must replace the PLIS report with the distributed report as the current report and no longer display or store updates from PLIS for this report. PLIS data must not be used to update stored data received from a reporting laboratory or agent.	✓	✓		✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx7.8	**Check for Duplicate Records** The POS application must determine if data received due to an update request or notification is a duplicate or an update to a PLIS record stored in the patient chart. If a retrieved record or distributed message is determined to be: • a duplicate, it must not be stored or displayed, and the user must be notified that PLIS does not have an update for the stored record. • an update, the retrieved record or distributed message must be stored, and the user must be notified of the update. **Note(s):** 1. To determine a duplicate or an update, each data field of a retrieved record must be compared to the stored record (e.g., result values to result values, units to units). 2. There is no metadata to indicate whether a record has been updated. 3. Some generated messages (e.g., PLIS error recovery) will have the same report identifier and date/time, but the content will be corrected. 4. The user does not have to acknowledge the notification of a duplicate or an update.	✓	✓		✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx7.9	**Withdrawn Report** When a Detail Request is submitted for a stored PLIS report and there is no report returned, the following message must be displayed to the user: "The requested report has been withdrawn from the patient's health record by the reporting organization. For more information contact the reporting laboratory." **Note(s):** The 'QueryResponseCode' is 'NF' in the Query Response (QueryAck) when no records are found.	✓	✓		
LabTx7.10	**References to a Withdrawn Report** A withdrawn report must be retained in the patient chart along with associated links and related clinical annotations. All references to the withdrawn report must clearly indicate "Report withdrawn from the patient's health record by the reporting organization. For more information contact the reporting laboratory."	✓	✓		
LabTx7.11	**Retrieve Updates to Protected Data** When the patient's Disclosure Directive keyword is required to retrieve an update for a stored PLIS record and the user does not provide the Disclosure Directive keyword, the user must be notified the stored record may not be the latest version available.	✓	✓		

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx7.12	**Masked Record Display** When a battery is masked, the associated report must be masked (i.e., all the batteries within the same report must be rolled up and masked) and presented as a single masked report. Presentation of the masked report must be limited to: • Report Specimen Collection Date and Time; and • Sending Laboratory Name.	✓	✓		

2.7 Paging & Screen Controls

The following rules apply to POS applications that display lab data received from PLIS:

Table 9 Paging & Screen Controls – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx8.1	**Display Number of Records** The number of records included in the Query Response and the number of additional records available must be displayed. **Note(s):** The Query Response supplies the number of batteries: • that match the current request parameters; • returned in the response; and • remaining to be retrieved.	✓	✓	✓	
LabTx8.2	**Option to Continue Retrieving Records** If the number of records retrieved exceeds the page size set for the query, the user must be provided the option to continue retrieving records. The first page must be displayed along with the following options: • Continue to retrieve all records; and • Abort the request. **Note(s):** 1. PLIS will return up to 1000 records. 2. The POS application may set a specific page size within the application.	✓	✓	✓	

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx8.3	**Screen Control** Screens of records must be controlled by one of the following options: • Continuous scrolling with an indication of the position of the viewed screen relative to the beginning and end of the display; • Explicit paging - display of the number of screens of records available and provide the ability to move from screen to screen; or • A combination of both.	✓	✓	✓	✓

2.8 Display & Print Standards

The three message types that have distinct display requirements are defined in this section:

- Generic;
- Microbiology culture; and
- Pathology.

Significant efforts have been made to design an approved rendering of the PLIS PDF Report; it may be used across POS systems to reduce risks to patient care.

Note(s): Patient identification and demographics are displayed as part of the banner. Some labs resend the patient demographic information in the content of the pathology lab message (e.g., body of the lab report).

The following rules apply to the print and display of lab results:

Table 10 Display & Print Standards – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx9.1	**Battery Display** A displayed list of stored battery tests must include the following data: • Specimen Collection Date and Time; • Lab Test (Battery) Name (BC Display Name); • Battery Status (as specified in the message); • Report Identifier (accession number); • Out-of-range flags within a battery when any observation value within the battery is flagged as abnormal; • Corrected flags within a battery if any observation value within the battery is flagged; • Specimen Type; • Ordering Provider; and • Sending Laboratory Name. If data is not provided in any of these data fields, the field must be displayed and left blank. **Note(s):** 1. Corrections are only made to observations with a final status; therefore, the final status and corrected flag for observations may be combined. 2. For battery selection displays based on Lab Summary Responses, see table in Lab Summary Response Section.	✓	✓		✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx9.2	**Display Laboratory Report** The POS application must display the laboratory report. **Note(s):** The PLIS PDF report may be used for displaying and printing the report. It contains all report data that must be displayed or printed (except the report date and time, which is included in the message).	✓		✓	✓
LabTx9.3	**Out-of-Range Results Display** In all presentations, including trending and graphing, the out-of-range flag indicator must be distinctly and prominently displayed (e.g., presented in colour, highlighted). Summarized data presented within the application must include out-of-range flag indicators when component results are out-of-range. All non-abnormal result flag values must be displayed in the same way (e.g., as either blank or null). The non-abnormal result flag value must not be displayed as “N” or “Normal”.	✓	✓	✓	✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx9.4	**Date and Time Displays** Displays of date and time must be in the sending laboratory time. The date and time must be displayed without adjusting for the GMT offset. Date and time display must be in the format yyyy/MMM/dd hh:mm (e.g., 2013/Jan/05 13:45). If the time is not included in the record, then the time must not be displayed. **Note(s):** 1. The GMT offset or indication of the sending laboratory time zone may be displayed with dates and times that are part of the business record. This will allow users to interpret the data in the context of their own time zone. 2. Seconds, if supplied, should not be displayed.	✓	✓	✓	✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx9.5	**Test Name Display** The test name displayed for batteries and observations must match the test name provided in the Query Response message. If the POS application receives notification distribution messages, the test name displayed for batteries and observations must be the BC Display Name. If a BC Display Name does not exist, the name received in the message must be used. **Note(s):** 1. The test names in the message conform to the BC standardized nomenclature. 2. Notification messages do not include the test name.	✓	✓	✓	✓
LabTx9.6	**Text Results Displays** Text (e.g., text results and comments) must be formatted in the lab report as received. Any formatting, including embedded line feeds and spaces, must be preserved if text is displayed. If lines of result text are too long for displaying in a single line, the text must be wrapped and break at word boundaries.	✓	✓	✓	✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx9.7	**Display and Print Paging** If a report is continued on subsequent page(s) or screens, the continuation must be indicated through the use of page numbers in the footer of each page and the header of the subsequent pages. For example: • Page 1 footer: “continued on page 2” or “page 1 of ##”) • Page 2: the battery name must be repeated (if it is continued) and have “(continued)” appended to the battery name • Page 2: if the battery was completed on page one and a new battery started, then “(continued)” prints above the battery name. • Page 2 footer: if the report continues to page 3, then the Page 2 footer is “continued on page 3”. The report must indicate the user has reached the end of the report regardless of the number of report pages. If a continuous display is supported (scrolling), then page continuation footers and headings are not required, but the report must indicate the user has reached the end of the report.	✓	✓	✓	✓

<table>
<tr><th>#</th><th>Rule</th><th>Medical Practice EMR</th><th>HA CIS</th><th>Viewer</th><th>Distribution</th></tr>
<tr><td>LabTx9.8</td><td>Page Display of the Report
The user must have the option to view a whole page of the report on the screen (i.e., the user must not be constrained to view a portion of the page on the screen at one time).</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>LabTx9.9</td><td>Report Status Standard Term Display
The following corresponding standard terms must be displayed for Report Status from the message:<table><tr><th>POS Display</th><th>Report Status</th></tr><tr><td>Partial</td><td>Active</td></tr><tr><td>Final</td><td>Completed</td></tr></table></td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>LabTx9.10</td><td>Battery Status Display
If displaying the battery status from the message, the following standard terms must be used:<table><tr><th>POS Display</th><th>Battery Status</th></tr><tr><td>Pending</td><td>Active</td></tr><tr><td>Completed</td><td>Completed</td></tr><tr><td>Cancelled</td><td>Aborted</td></tr></table>The battery status must be displayed on the report if it is anything other than “Completed”.</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx9.11	**Encounter Type Translation** If the Encounter Type is displayed, the Encounter Type codes must be translated for the user (e.g., IMP=in-patient). **Note(s):** The values of the coded entries are included in the Vocabulary Domains for each of the elements.	✓	✓	✓	✓

2.9 Report Heading – Display & Print

The report heading displays information that is common to all batteries and observations on the report.

The report heading is the same for all types of lab reporting (e.g., generic, microbiology, pathology, discrete and non-discrete).

The following rules apply to POS applications that display and print lab data received from PLIS:

Note(s): The PLIS PDF Report satisfies these display and print requirements.

Table 11 Report Heading – Display & Print – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distributions
LabTx10.1	**Report Header Display and Print** The following data must be printed on the top of the first page of the report and displayed on the top of the first page of the lab report screen: • Patient PHN • Patient Names • Date of Birth • Other Patient Identifiers (e.g., MRN or PHN from another jurisdiction) • Gender • Supporting Clinical Observations (e.g., clinical gender) • Report Identifier (accession number) • Report Comments • Report Status[1] • Ordering Provider or Organization	✓	✓	✓	✓

[1] The Report Status and Report Received Date and Time can be displayed in the footer of the report.

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distributions
	• Sending Laboratory Organization • Specimen Collection Date and Time • Specimen Received Date and Time • Report Received Date and Time[2] • Copy-to Doctors and Organizations The following must persist on subsequent pages and screens: • Patient PHN • Patient Names • Date of Birth • Other patient identifiers (e.g., MRN or PHN from another jurisdiction) • Gender • Supporting Clinical Observations (e.g., clinical gender) • Report Identifier (accession number) • Report Status • Specimen Collection Date and Time • Specimen Received Date and Time Each data element must be labelled regardless of data being supplied (i.e., if data was not received, the label will appear, and the data will appear as a blank). If there are no report comments, then a label is not required for that field. A nullflavor (e.g., UNK) must be				

[2] The Report Status and Report Received Date and Time can be displayed in the footer of the report.

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distributions
	displayed/printed (i.e., not shown as blank). **Note(s):** 1. The displayed report does not have to display the report heading that is a duplicate of the information displayed as a banner or heading on the screen. 2. On the PLIS PDF the received date and time is shown as "Printed On: …") The following fields are in the discrete data and may be displayed to support POS application functionality: • Encounter Type (used to distinguish In-patient / Out-patient); • Admitting and attending physician; and • Patient address and phone number.				

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distributions
LabTx10.2	**Printed Version of Report** A printed report must include all clinical data. **Note(s):** 1. The PLIS PDF report meets the requirement for the report heading. 2. The PLIS PDF report includes all the data required for displaying and printing the report except for the report date/time. 3. The POS application may display the report date/time based on data in the message. 4. Each battery on a report will have a collection date with optional time. If the specimen collection date and time is different between the batteries, the earliest specimen collection date and time will be the specimen collected date and time used for the report.	✓	✓	✓	✓

2.10 Discrete Microbiology Culture & Susceptibility Results Report – Display & Print

Microbiology Culture and Susceptibility batteries include 'culture observations' and 'specimen clusters'.

The specimen clusters contain one micro-organism identification, one or more isolate observations and a battery or batteries of susceptibilities that are reported for that particular organism.

A microbiology report may have multiple microbiology culture and susceptibility batteries.

As a general principle, all cluster results that pertain to one battery are to be displayed in a table format that has one column for each organism and one row for each susceptibility.

This table format is referred to as the "microbiology grid".

The PLIS PDF Report satisfies the display and print requirements in the following table:

Table 12 Discrete Microbiology Culture & Susceptibility Results Report – Display & Print – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx11.1	**Culture Observation Events** Culture Observation Events must be displayed and printed first on the report – one per report line. If there are line feeds, spaces or blank lines embedded in text, they must be preserved. **Note(s):** 1. Culture Observation Events may be Gram stain or other Stain results; No growth; Findings and other observations related to specimen and reporting. 2. Very often these are in text or string values and are formatted.	✓	✓	✓	✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx11.2	**Culture Observation Events Comments** Comments associated to the Culture Observation Events must be displayed and printed below the corresponding observation.	✓	✓	✓	✓
LabTx11.3	**Isolate Observation Event Values** Isolate Observation Event values must be displayed and printed below each isolate after any comment that exists on the same isolate. **Note(s):** 1. An Isolate Observation Event conveys additional information about an isolate (e.g., a growth rate). 2. At this time, LIS are not sending isolate observation event values to PLIS, but it is included in the message specification and needs to be retained to support future LIS standards (e.g., use of coding for organisms).	✓	✓	✓	✓
LabTx11.4	**Isolate (Organism) Numbering** The POS application must: • Assign each isolate a consistent, sequential number; • List each numbered isolate sequentially, one per line; and • Start the isolate numbering with the number '1'. **Note(s):** There is no algorithm for determining the number assignment to the isolate and it is not carried explicitly in the message.	✓	✓	✓	✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx11.5	**Isolate (Organism) Comments** If displayed or printed, comments related to the isolate must be on the same screen or page and clearly indicate relationship to the isolate.	✓	✓	✓	✓
LabTx11.6	**Susceptibilities Display** All elements of a susceptibility result must be displayed in a grid cell. **Note(s):** Susceptibilities are reported by: • Value; • Susceptibility observation interpretation; and • Units, if the value is numeric.	✓	✓	✓	✓
LabTx11.7	**Grid Printing** The Grid must be displayed beneath the list of isolates. Grid columns must have headings of the microorganism name or number. If a number is used, it is the number that corresponds to the isolate in the list above. The Grid row headings (names of the antimicrobial agents) must be listed in alphabetical order. **Note(s):** 1. The page or screen design should allow for at least five isolates to be reported across the page. 2. This will minimize splitting the grid horizontally.	✓	✓	✓	✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx11.8	**Susceptibilities Interpretation Comments** If a susceptibility interpretation has a comment, the grid cell must contain an indicator (e.g., asterisk) for the comment. If printing, the susceptibility comments must be printed at the end of the grid (i.e., on the last page of the grid) and the indicator must be unique for each comment. Screen functionality (e.g., hovering) may be used to display susceptibility comments.	✓	✓	✓	✓
LabTx11.9	**Susceptibility Interpretation Codes** An interpretation of the susceptibility interpretation codes (e.g., S, I, R) must be provided as a legend on the report or by hovering over the code on the screen.	✓	✓	✓	✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx11.10	**Continuing Grid Span** If a grid spans more than one screen or page, the following apply: • The continuation must be indicated on the screen or page; • Each subsequent screen must indicate it is continued from the previous screen or page; and • Subsequent screens or pages must repeat the row and column headings. For example: • The bottom of the first screen or page of the grid will indicate “continued on next screen/page”. • The top of second screen or page will indicate “continued from previous screen/page”. For screen displays that support navigation by dragging or scrolling across the display, the grid row and column headings must remain visible on the grid display area. **Note(s):** 1. Displays may be shrunk to fit on a single screen or scrolling may be used to support displays that cannot fit on a single screen. 2. If a grid is displayed on a screen, the display should provide an option to fit on a single screen. 3. Printed views may be shrunk to fit on a single page.	✓	✓	✓	✓

2.11 Discrete Generic Lab Results Report – Display & Print

The PLIS PDF Report satisfies the display and print requirements in the following table:

Table 13 Discrete Generic Lab Results Report – Display & Print – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx12.1	**Battery Name as Heading for Observations** The battery name, as supplied in the message, must display as a heading for all observations reported on the battery.	✓	✓	✓	✓
LabTx12.2	**Battery Comments** Battery comments must appear beneath the name of the battery and before the list of observations that are reported for that battery.	✓	✓	✓	✓
LabTx12.3	**Display Discrete Elements** Each discrete element of the generic lab result observation must be displayed and printed. The following indicates what columns must be displayed and the required headings: • Test Name • Test Result (heading) • Result Flags (heading) • Reference Range (heading) • Result Units (heading) • Time Resulted (heading) – this is an optional field	✓	✓	✓	✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx12.4	**Out-of-Range Flag** If an observation is flagged as out-of-range (i.e., has an interpretation flag that is not null, blank or "N") then both the out-of-range flag and the result value must be uniquely distinguished (e.g., bolded, or colour coded).	✓	✓	✓	✓
LabTx12.5	**Observation Comments** If displayed or printed, comments related to the observation must be on the same screen or page and clearly indicate relationship to the observation.	✓	✓	✓	✓
LabTx12.6	**Display Page Number** If separate pages/screens are used for display, the page number must be displayed on each page/screen.	✓	✓	✓	✓

2.12 Display of Report Body for Non-discrete (Formatted Text) Results

Non-discrete (formatted text) messages may be sent in any of the report types: Pathology, Generic and Micro Culture.

For example, blood bank may be sent as non-discrete generic messages.

Micro Culture may be sent in non-discrete micro messages by some labs.

Pathology results are sent as non-discrete messages.

The PLIS PDF Report satisfies the display and print requirements in the following table:

Table 14 Display of Report Body for Non-discrete (Formatted Text) Results – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx13.1	**Display Name for Observations** The battery name and observation name must be displayed as headings for the observation text. If the names are the same, then only one needs to be displayed. **Note(s):** Text is provided in lieu of an observation result value for non-discrete results.	✓	✓	✓	✓
LabTx13.2	**Use Full Width to Display Text** The text must be displayed using the full width of the screen or page with all formatting preserved.	✓	✓	✓	✓

2.13 Trending & Graphing

The POS application may provide trending and/or graphing functionality of results stored in the POS application.

Trending refers to a tabular display of results; graphing is a pictorial display of results.

The following rules apply to POS applications with trending and graphing functionality:

Table 15 Trending & Graphing – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx14.1	**Display Data Elements When Trending and Graphing** Trending and graphing displays of each test result value must include access to the following data elements: • Specimen Collection Date/Time • Observation test name using the Display Name from the original message • Observation value • Units of measure • Reference range • Out-of-Range indicator • Corrected flag • Comments associated with the observation result • Comments associated with the battery • Sending laboratory organization (source lab) This data must be accessible to the user through the screen display, mouse-over or links.	✓	✓		

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx14.2	**Trending and Graphing Display by Collection Date** The trending and graphing results must be displayed in specimen collection date/time order.	✓	✓		
LabTx14.3	**Multiple Test Graphing and Trending** If multiple test graphing or trending is supported, each test must be labeled and have a different line on the graph or in the table (e.g., multiple columns or multiple rows per collection date/time).	✓	✓		
LabTx14.4	**Trending and Graphing Observations** If graphing is supported, the graph must use a relative to normal scale. Observations from PLIS must not be trended using a numeric scale. **Note(s):** Using a relative to normal scale will allow observations with different units of measure or different reference ranges or from different labs to be graphed on a contiguous line.	✓	✓		
LabTx14.5	**Trending/Graphing with Masked Data** Masked data must not be used in trending or graphing unless it has been unmasked by the user. The user must be warned that some data in the patient chart is masked and will not be included in the analysis unless it is unmasked.	✓	✓		

2.14 Distributions

PLIS receives messages from LIS and distributes the messages to the appropriate receiving systems.

PLIS supports the distribution of batteries containing RCD results and solicited test requests to public health practitioners.

The following rules apply to POS applications that receive PLIS message distributions:

Table 16 Distributions – Application Enforced Rules

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx15.1	**Distributed Message Sequencing** New distributed message data must not be overwritten by stale data. **Note(s):** Distributed messages processed according to the PLIS sequencing logic meet this requirement.				✓
LabTx15.2	**Notify the User** If new or updated data is received: • It must be stored in the patient chart; and • The user must be notified and linked to the content.				✓
LabTx15.3	**Storing in the Patient Chart** If new data is received and there is no associated patient chart, the user must be notified to manage the data, having the option to either: • Create a chart and store the data; or • Manage data received in error.				✓

#	Rule	Medical Practice EMR	HA CIS	Viewer	Distribution
LabTx15.4	**Aggregate for Display and Print** Solicited test batteries (including data for pending, incomplete and complete batteries) received must be aggregated in context of the Lab Report for display and print. **Note(s):** Aggregating the clinical content of all messages on a report ensures that interpretive information that may be contained in an associated battery is not overlooked.				✓
LabTx15.5	**Store All Distributed Messages** All data received in a distributed message must be stored, unless it is a duplicate message (i.e., do not discard a message because the battery status is incomplete). **Note(s):** 1. Messages with solicited battery data are distributed as they are available. 2. Solicited test result distributions will include incomplete, pending and completed batteries. 3. The PLIS PDF Report is not distributed with the solicited test result distributions.				✓

2.14.1 Reportable Communicable Disease (RCD) Distributions

PLIS receives batteries containing RCD result indicators from LIS's and distributes the RCD battery to the appropriate receiving POS applications.

An RCD is not a description of a battery – it is a description of a particular battery with a particular result indicator (i.e., a description of an outcome).

POS applications that receive only the completed RCD battery distributions do not receive all the messages related to the whole Laboratory Report (i.e., they do not receive the non-RCD batteries from the Lab Report).

Note(s):

1. RCD battery results are available as they are completed.
2. RCD distributions do not include incomplete or pending batteries.
3. RCD distributions do not include non-RCD batteries from the same report.
4. The PLIS PDF Report is not distributed with the RCD discrete data.

2.14.2 Solicited Test Result Distributions

Solicited (ordered) lab requisitions are distributed to the ordering provider's system through PLIS from the LIS.

The following rules apply to solicited lab requisitions and test result distributions via PLIS:

Table 17 Solicited Test Result Distributions – Application Enforced Rules

<table>
<tr><th>#</th><th>Rule</th></tr>
<tr><td>LabTx16.1</td><td>Derived Report Status
The report status must be derived from the statuses of the component batteries.
The following corresponding standard terms must be displayed:
<table>
<tr><th>POS Display for Report Status</th><th>Battery Status in Message</th></tr>
<tr><td>Partial</td><td>At least one component battery status = Active</td></tr>
<tr><td>Final</td><td>All component battery status = Completed or Aborted</td></tr>
</table></td></tr>
</table>

3.0 PLIS PDF Report Data

There are differences in the data provided in the PLIS PDF Report and PLIS messages as indicated in the following information:

3.1 Data in the PLIS PDF Report, but not in the PLIS Messages

The following information is included in the PLIS PDF Report, but not in the PLIS message:

- Reporting laboratory logo;
- All hard-coded report elements such as:
    - Labels for fields for patient demographic information (e.g., Patient, PHN, Age);
    - Admission Date and Discharge Date;
    - Ordering Provider;
    - Copy to; and
    - Report Result header information (e.g., Test Name, Result, Reference Range, Units of Measure, Time resulted);
- Footer information which includes a facility name, contact number;
- Report legend information;
- Battery Headers (e.g., Chemistry, Urinalysis, Hematology, Coagulation, Virology) – this data is included in the Lab Summary message;
- Results Sequencing; and
- Confidentiality statement that report was retrieved under a Disclosure Directive.

3.2 Data in the PLIS messages, but not in the PLIS PDF Report

Not all of the information in the Detail Response message is required for the report. Likewise, there are additional field labels on the PLIS PDF Report that are not in the Detail Response message.

The following information is included in the PLIS message, but not in the PLIS PDF Report:

- Admitting and attending physician;
- Event type – inpatient or outpatient;
- Observation dates on micro culture results;
- Report date;
- Specimen type;
- Corrected flags;
- Preliminary flags, if sent;
- Battery status (note battery status is assumed final if there is no indication; pending results display as pending);
- Admin gender;
- The performing lab is not always on the report. However, it is the same as the reporting lab as per lab office business standards. An exception is when a lab copies the contents from an out-of-province test into their LIS. It should be noted in the observation annotation where the test was actually performed (as per accreditation guidelines);
- Data that is in the Summary Response, but not in the Detail Response; and
- Disciplines.