RHEA Project

Use Case Specification: OpenMRS ANC workflow and interaction with the Client Registry, Professional Registry and Shared Health Record through the Interoperability Layer

GID: 0016
UC: 01.016

Version: 0.5

Revision History

Date	Version	Description	Author(s)
29/09/11	0.1	First draft	WN
04/10/11	0.2	Updated following review with Liz	WN
05/10/11	0.3	Separated Clinical and Registration workflow	WN
08/12/11	0.4	Added RHEA Restful Adapter Design Description and Maternal Clinical Summary Design	WN
21/02/12	0.5	Added Draft UI Mock-ups for ANC Registration Workflow	DR, IN, LP, GU, WN

Content

1. Description

This use case describes the workflows at the Point-of-Care system OpenMRS and all interaction scenarios with the Client Registry, the Professional Registry and the Shared Health Record.

2. Actors

- The data clerk (Registration)
- The clinician (Clinical Encounter)

3. Pre-condition

- The user must be logged-in to OpenMRS

4. Post-condition

- None

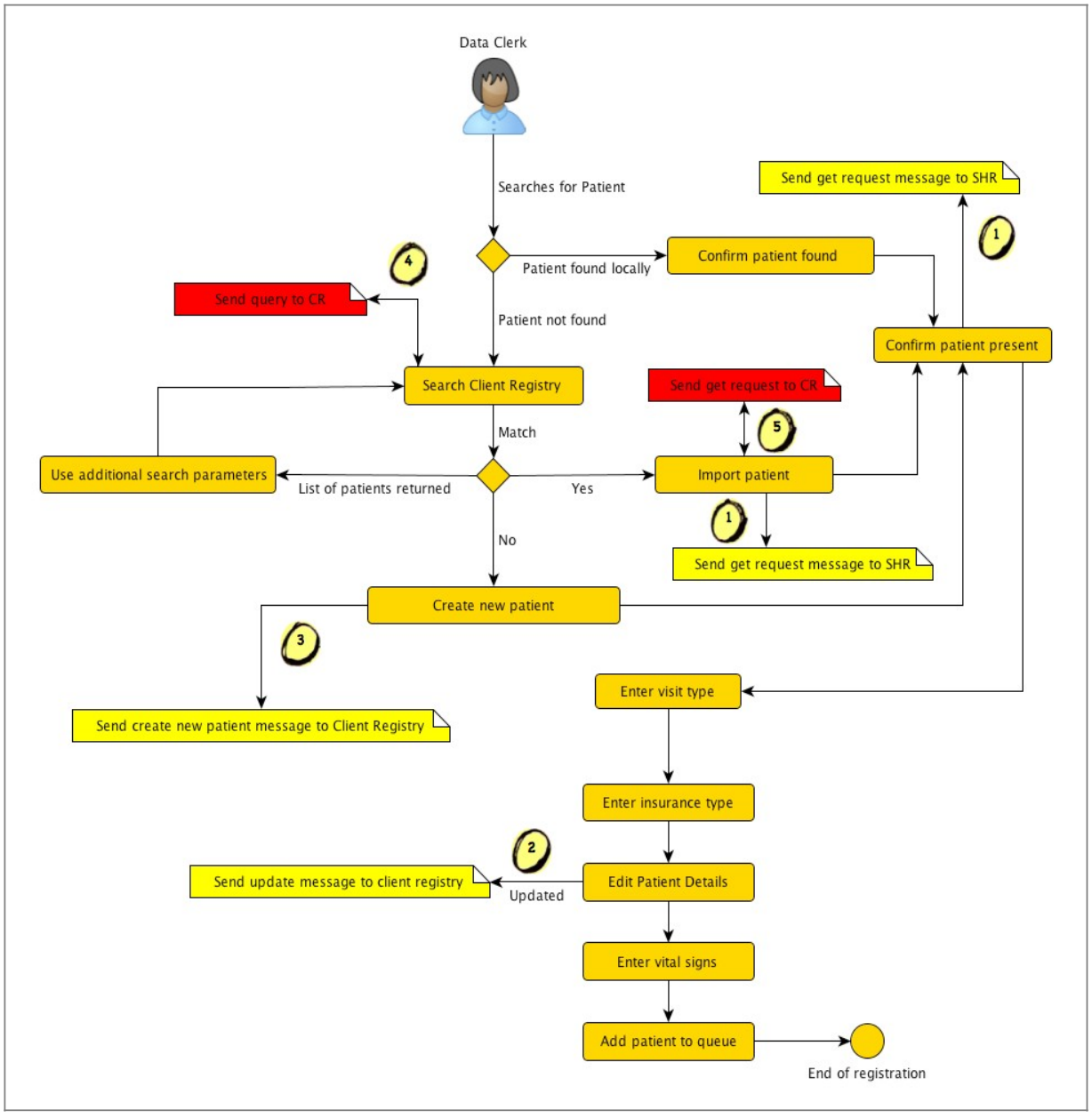
5. Special Requirements

- For each Health Care Facility taking part in the RHEA Phase 1 Pilot, the OpenMRS system will be loaded with patient and health-care provider records from the client registry that belong to the catchment area of that Health Care Facility.
    - These exports are going to be physically stored on some medium (CD or USB stick) and manually uploaded in each HC facility into each Point-of-Care application. The POC will match the records and update them with the MOH unique number and the NID for those who have it.
- All duplicate patient entries will be resolved prior to pilot deployment.
- In general, if the system fails to send any message from OpenMRS either to the registries or to the shared health record, these messages will automatically be stored in a queue and OpenMRS will periodically attempt to send them according to a configurable scheduled service.

6. Primary Scenarios

Note the event types we will be supporting for the RHEA Pilot numbered 1 to 6.

Registration with Internet Connectivity



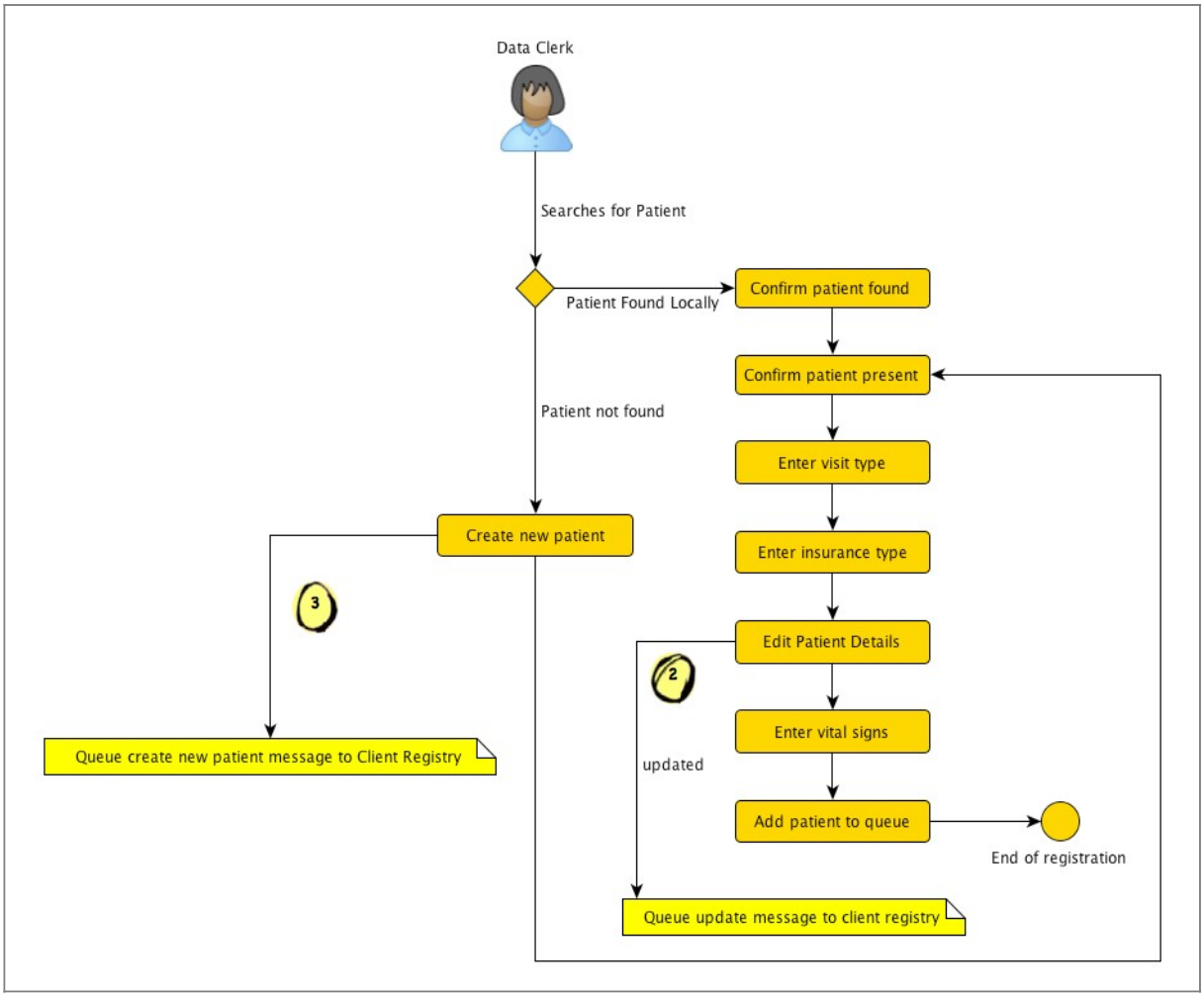
Patient already exists on local system

1. The data clerk will confirm that the patient is physically at the clinic for an ANC visit
2. Immediately following this confirmation, a message is automatically generated and sent to the Shared Health Record to retrieve any new clinical data regarding this patient.
3. The data clerk will then continue with the current registration process of entering the insurance details and vital signs.
4. If the patient's personal or demographic details are updated, then an update message is created and sent to the Client Registry.
5. Finally, the data clerk will add this patient to the ANC Visit Patient Queue.

Patient not in local database

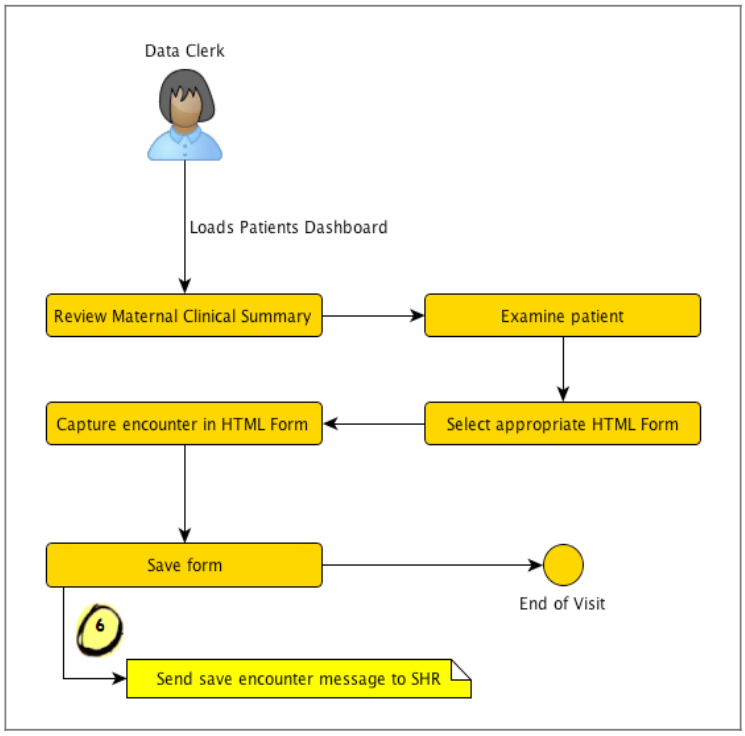
1. If the patient cannot be found on the local system by searching either on the NID or name, then the data clerk will search the Client Registry.
2. A separate page for searching the Client Registry will be inserted into the current touch-screen registration process
3. This page will list a number of fields on which to search for a patient with a few key inputs being mandatory.
4. Once all the mandatory search fields have been entered, the data clerk will initiate the search by clicking on the "Search" button.
5. The results returned by the Client Registry will either be
    a. No match
        i. If the patient is not found in the Client Registry, a new patient will need to be created.
    b. Multiple matches
        i. The client registry will be configured to return a restricted result set, forcing the POC to improve the search criteria and preventing hundreds of patients being returned for multiple searches.
    c. Patient found
        i. If the patient is found, the data clerk will then have the option of importing this patient into the local system. The patient should also at this stage be requested to verify the information and make sure it is correct and current. Once the patient is imported, the system will in addition, automatically send a request to the Shared Health Record for any clinical data related to this patient.
6. Only after the client registry has been searched unsuccessfully, will the data clerk create a new patient on the local system. In the connected use case, this option should appear after an initial search has been made. Data used in the search could also be used to populate the patient creation page.

Registration – No Internet Connectivity



In this scenario, the patient is either found locally on the system or not. If a patient is found and her demographic details are edited, then an update message to the Client Registry is generated and put into a queue to be sent at a later stage. If the patient is not found to exist on the local system, the data clerk would have create a new patient which would result in a create new patient message being generated and put into a queue to be sent to the Client Registry. At the end of the registration process, the Data clerk will add this patient to the ANC Visit Patient Queue.

Clinical Encounter

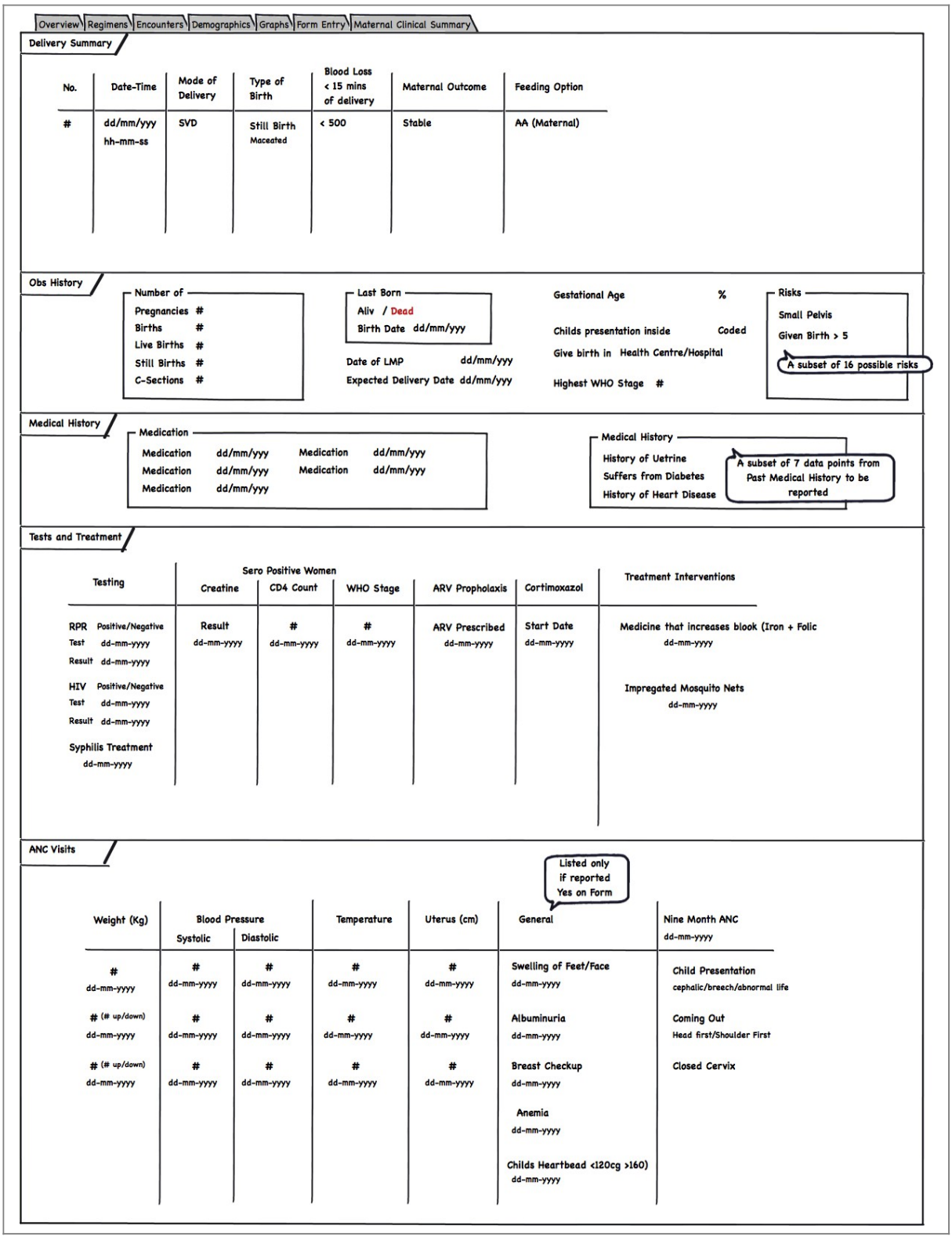


1. The clinician opens the Patient Queue page. In the future, this page may display multiple queues for different services, but for the pilot, we will only develop an ANC visit queue. This page will contain a list of patients added to a first-in-first-out queue during the ANC registration process.
2. The clinician will identify the next patient by calling the name of the patient at the top of the queue and confirming this is the correct patient based on the information displayed in the queue and then clicking on the patient's link, which will bring up the OpenMRS patient dashboard view.
3. The clinician will then review the patient's clinical summary located under the "Maternal Clinical Summary" tab.
4. The clinician would then select the appropriate form to capture data for this encounter located under the "HTML Form Entry" tab. For the Pilot, the following forms will be created (see Maternal data mapping Requirements document):
    a. OB and Past Medical History
    b. Testing
    c. Sero Positive Women
    d. Physical Exam ANC Visit
    e. Treatment and Interventions
    f. Nine Month ANC Visit
    g. Delivery Information
5. When the form is saved, an appropriate message (Save Encounter to SHR) will be automatically generated and sent to the Shared Health Record. If the connectivity prevents the message from being sent, it will be saved in the SHR outbound message queue. The generation and sending of this message to the SHR will run as a background process, allowing the clinician to continue with the next patient.

7. Secondary Scenarios

1. Editing provider demographics
   Currently OpenMRS only stores the following demographic information for a user/provider:
   - Given Name
   - Middle Name
   - Family Name
   - Gender

8. Maternal Clinical Summary Design

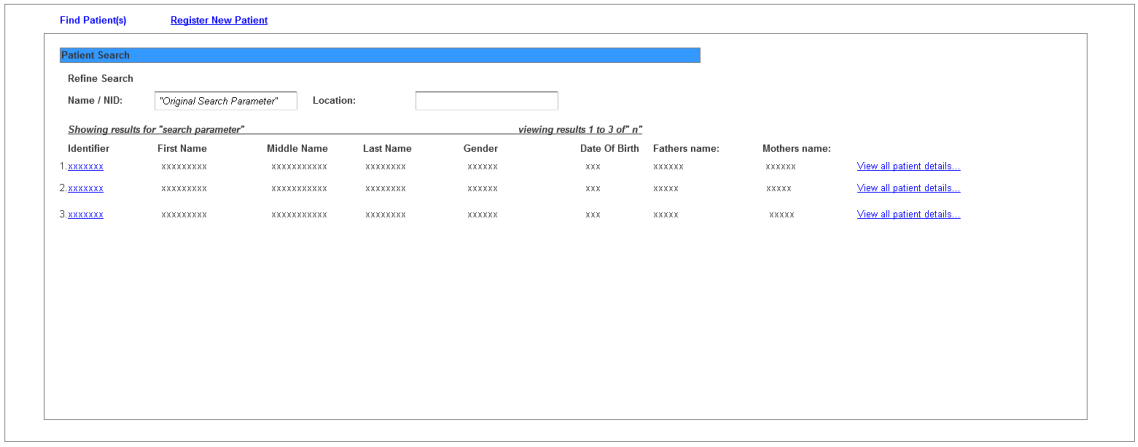


9. Draft UI Mock-ups for ANC Workflow

9.1 Search Page

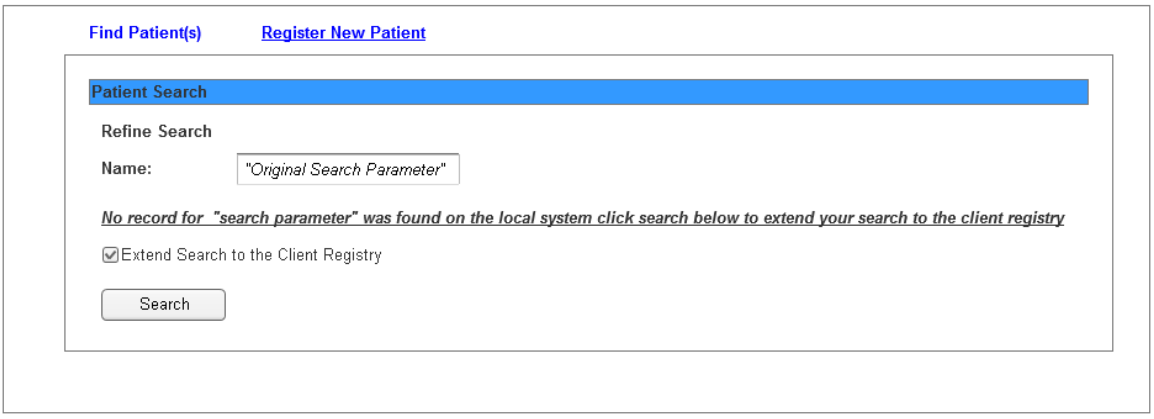
Initial search page, that carries out a search for the patient on the local system using the patient's Rwandan Name or National ID number. The name search can also be extended to search for Anglo/Franco names. An option to search the barcode on the patient's carnet is also provided for by clicking on the scan button.

9.2. Multiple results search from local system



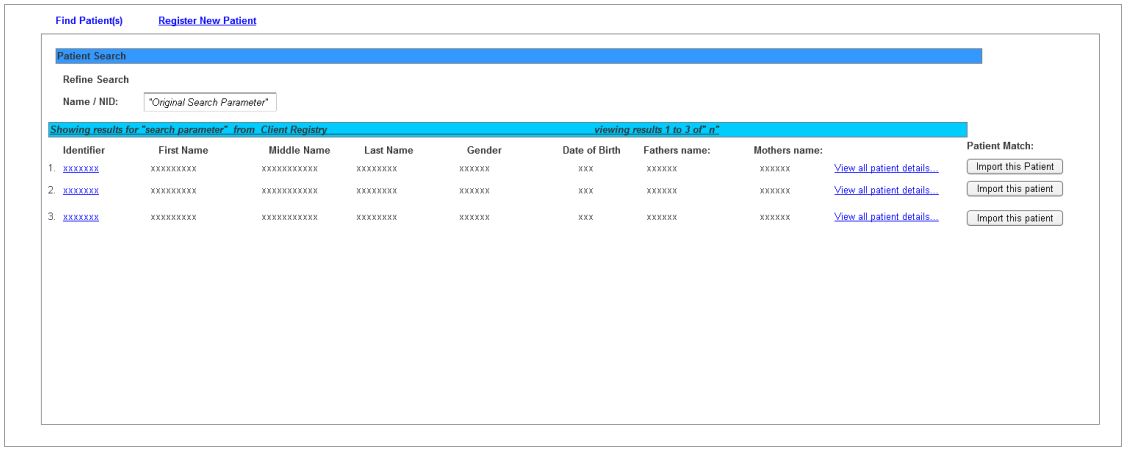
In case of multiple results an additional field is added to refine the search using the location or the view all details link can be clicked to take the user to the screen in section 9.8 which would provide all the details for the particular patient.

9.3 No match on local system



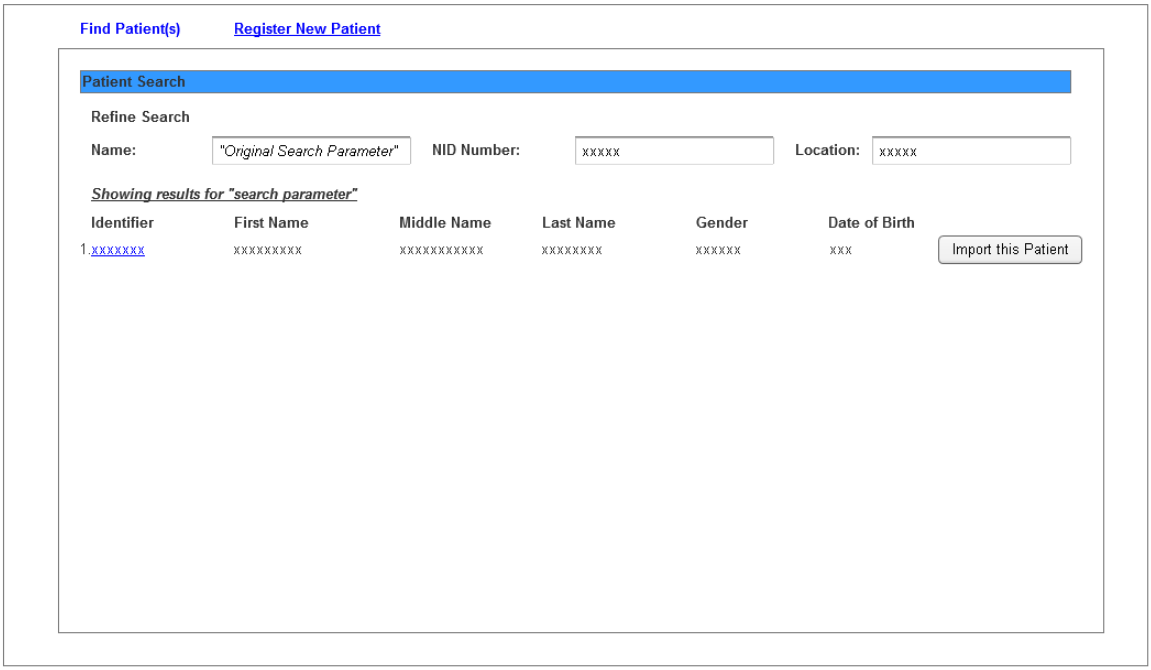
If no match is found on the local system the clerk can select to extend the search to the client registry.

9.4 Client Registry Results



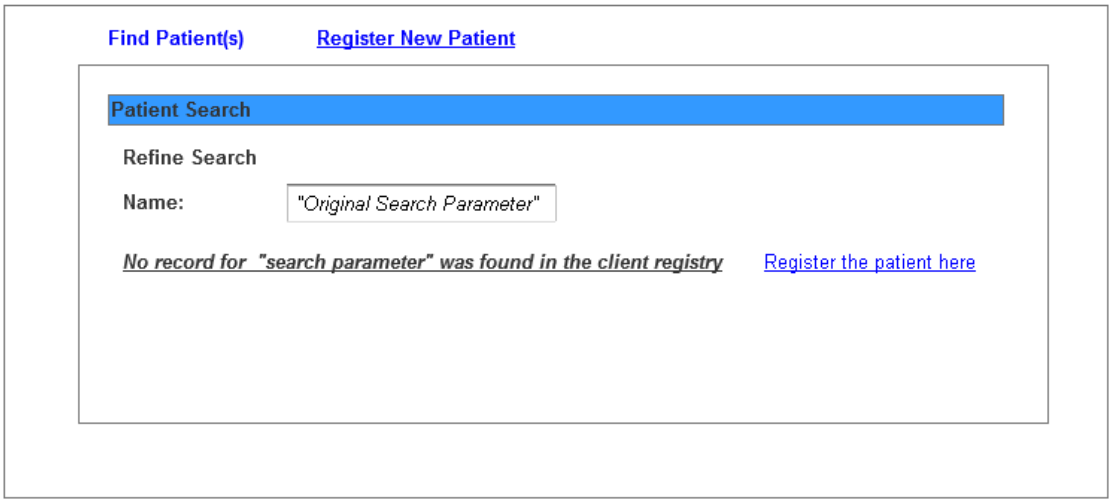
In the event that the search produces multiple results that match the search query and all parameters displayed still don't provide complete difference for the patients, then the view details link is clicked to provide the full patient details as in section 9.8. An import option is also provided for each individual result in the result set.

9.5 Client Registry Unique Result



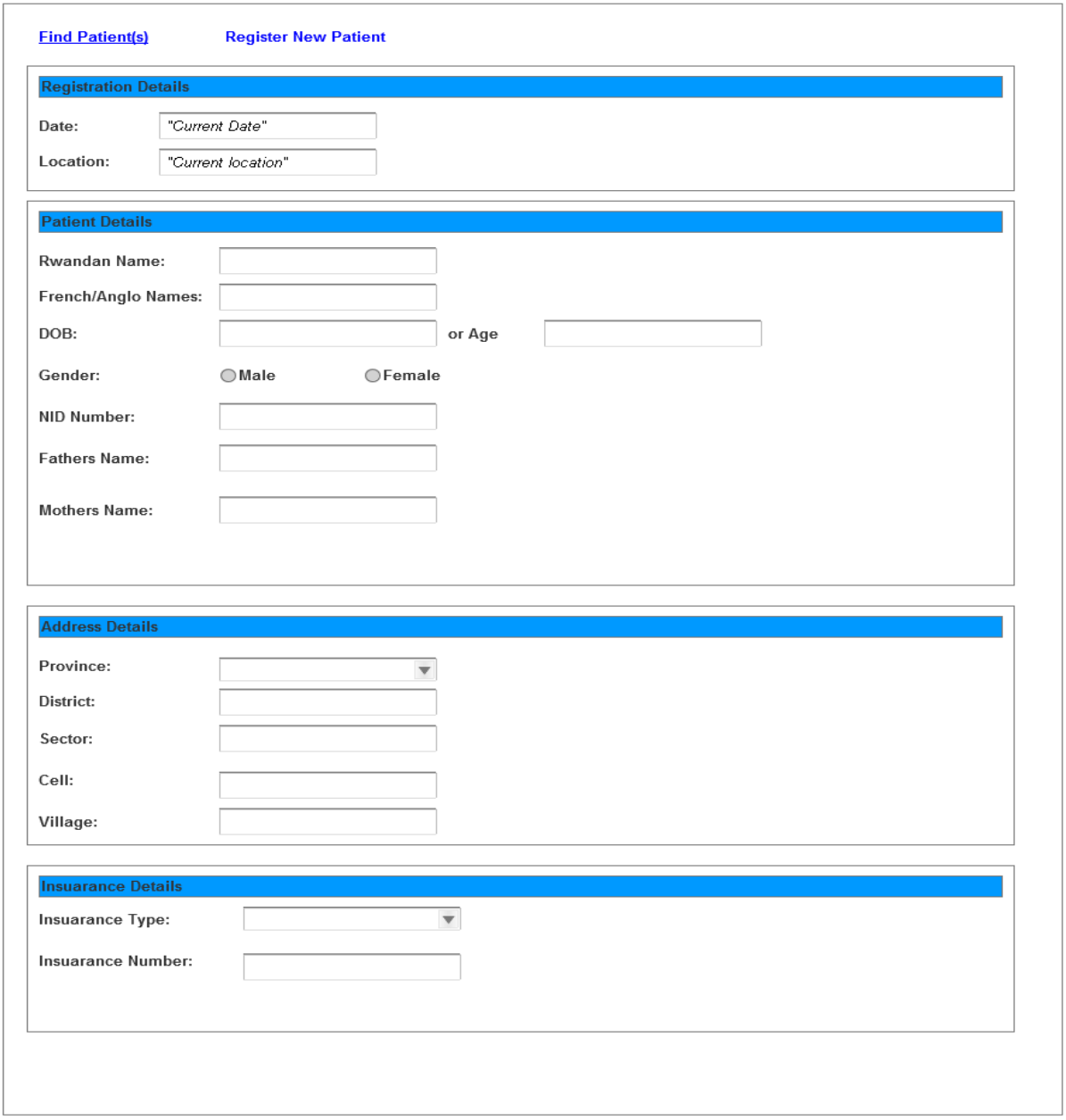
If a unique result is found then the clerk selects the check box to import the patient data into the local system and clicks on the identifier link to bring up the patient information page in section 9.8 of this document.

9.6 Client Registry No Results



If the search yielded no results both on the local system and client registry then the clerk is offered a link to the registration page (section 9.7) to register the patient.

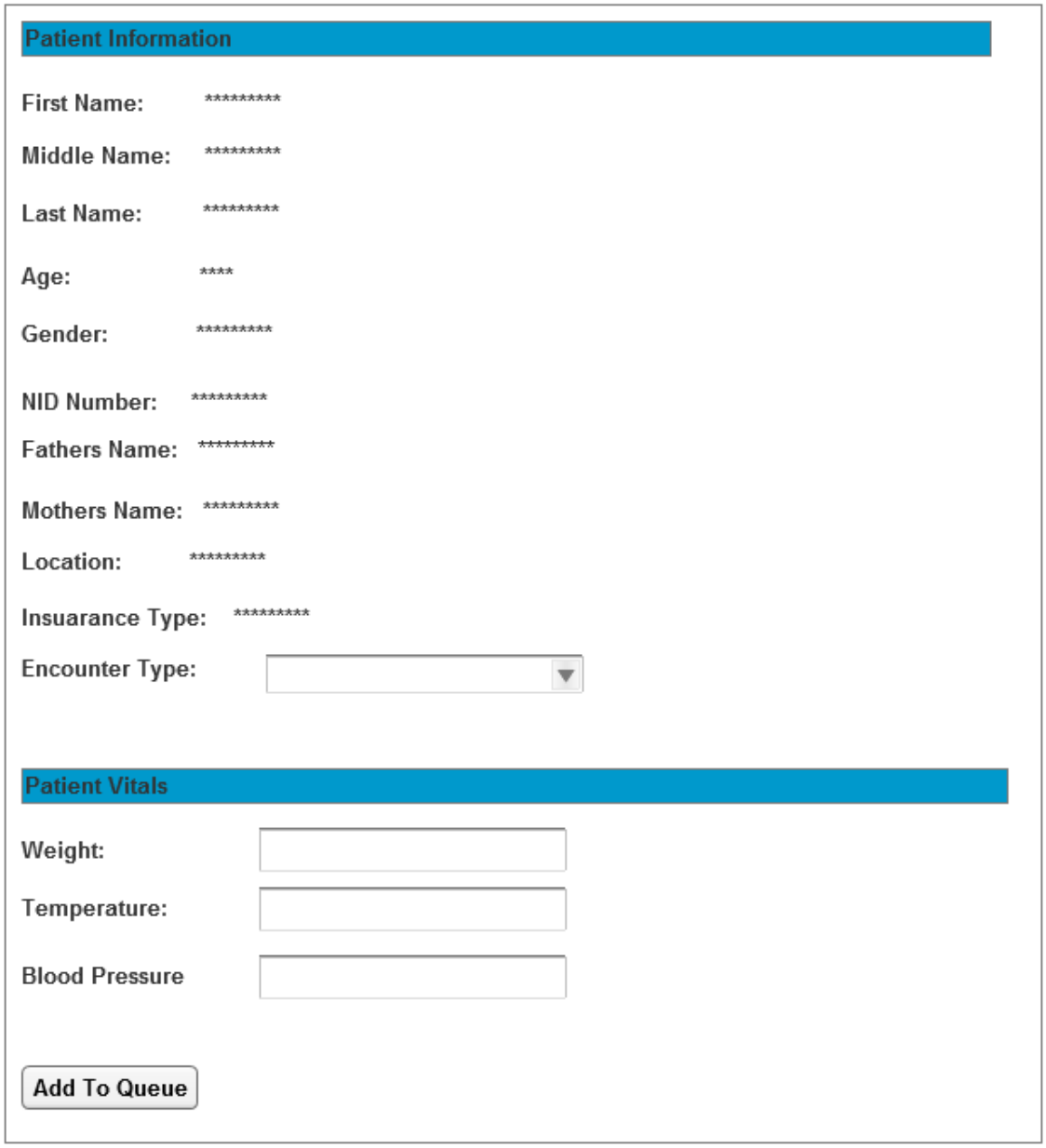
9.7 New Patient



The registration interface is used for a new patient who is neither in the local database and has no record in the client registry that can be imported into the local database, once registration into the local system is complete the information is the exported to the client registry or queued to be done later in the event of a lack of connectivity.

Can we default the date (current) and the location? Is location the health center of the area in the health center- such as ANC clinic?

9.8 Add Patient To Queue



Once a patient is registered or his identifier link clicked on the search result page the patient information is displayed to the clerk allowing them to add vital signs to the taken at the reception area before the patient is added to the patient queue.

Blood pressure needs to be 2 fields separated by a /

9.9 Patient Queue

The patient queue is what the clinician or provider will actually see on their screen, about the patients that are waiting to be attended to. The clinician will mark the patient currently being examined as “attended to” and on hitting the refresh link all patients marked as attended to will be removed from the queue alternatively the system could be scheduled to refresh the screen after a specified duration.

Refresh Queue

ANC Patient Queue

Patients Currently in Queue *Page "x" of " n"*

	Identifier	Time of Arrival:	First Name	Middle Name	Last Name	Date of Birth	Date of Last ANC Visit	Gestation at Last Visit	Attending Provider	Attended To
1.	xxxxxxx	xxxx	xxxxxxxxx	xxxxxxxxxx	xxxxxxxx	xxxxxx	xxxx	xxxxx	xxxx	☑
2.	xxxxxxx	xxxx	xxxxxxxxx	xxxxxxxxxx	xxxxxxxx	xxxxxx	xxxx	xxxxx	xxxx	☐
3.	xxxxxxx	xxxx	xxxxxxxxx	xxxxxxxxxx	xxxxxxxx	xxxxxx	xxxx	xxxxx	xxxx	☐

An OpenMRS Adapter Module will be developed to support all messaging requirements between OpenMRS and the RHEA Health Information Exchange for the Pilot. It will provide support for all communication with the following national services through the interoperability layer:

- Shared Health Record
- Client Registry
- Provider Registry

The RHEA Restful Adapter module will provide all the base functionality required for communicating with the national services through the interoperability layer via a restful web-services implementation. This module will provide

- Event listeners and handlers for each of the following transaction types which we will support for the RHEA Pilot
    - Save Encounter in Shared Health Record
    - Get Encounter from Shared Health Record
    - Create Patient in Client Registry
    - Update Patient in Client Registry
    - Query Patient in Client Registry
    - Get Patient from Client Registry
- A restful API to support the web-service calls for each of these transaction types.
- Message Queues for
    - Processing unsent messages due to Internet connectivity failures
    - Dealing with error responses from the interoperability layer and
    - Message archiving
- A Scheduled Service for periodically attempting to re-send messages in the Processing Queue.

When an event is fired, an appropriate restful event handler will be called based on the event type (see primary scenario for the six event types we will be supporting for the RHEA pilot). For example, when an encounter is saved, the “Save encounter in the shared health record” handler will be called passing in the encounter object (which would have already been persisted to the local OpenMRS database). The restful event handler will then find a registered message handler implementation for the save encounter message type and build the message. For the RHEA Pilot, this will be an HL7 v2.5 Message Building and Processing Implementation. A restful web-service call will then be made with the HL7 message as the payload to the Shared Health Record via the Interoperability layer. The restful event handler will then receive the response and call the registered message handlers process response method.

Messages that are processed successfully will be placed into an archive queue where they will remain for reference purposes. Having access to the original message data can prove invaluable in tracking down data quality issues. If an error is reported in the response, the original message will be sent to the Error Queue and if an exception is thrown such as a resource unavailable exception as a result of Internet connectivity problems, the original message will be saved in the Processing Queue. Messages in this queue will be periodically

checked by an OpenMRS Scheduled Service that will attempt to re-send these messages. Each message will also have a max-retry parameter.

Logging and Auditing

All original messages will be stored in the Archived queue and will be available for reference purposes. For each message in different queues, we will log and display the following information

- Created By (User or System Process (Scheduler))
- DateTime Created
- DateTime Sent
- Response
- DateTime Response Received

In addition to this, we will use apache's common logging interface throughout the code with log4j as the implementation, which will provide information for both technical debugging and audit information.

10. Message Transaction Specifications

See Primary Scenarios for the corresponding events, which will trigger the numbered transactions below. You can find the most up to date message specification here.

11. Data Elements

See the *Requirements Documents* for the complete set of data elements, in particular the "Maternal Data Mapping.xls" spread-sheet which details the forms we will be supporting for the Pilot and the concept mappings to the Rwandan OpenMRS Concept Dictionary which is still work in progress.