

COVID-19 Antigen Rapid Diagnostic Test: Zambia Digital Systems and User Requirements

System User Requirements Specifications for the Zambia
Context

FIND 

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Abbreviations

Ag	antigen
API	application programming interface
COVID-19	coronavirus disease 2019
DSUR	digital adaptation kit
DHIS2	District Health Information Software 2 2
dSTARR	Digital Solutions to Support COVID-19 Antigen RDT Rollout
DTDS	digital tracking and decision support
EMR	electronic medical record
FHIR	Fast Healthcare Interoperable Resources
HCW	health care worker
HMIS	health management information system(s)
ID	identification
ICD	International Classification of Diseases
IND	indicator
IPC	infection prevention and control
ISCO	International Standard Classification of Occupations
MOH	Ministry of Health
NFXNREQ	non-functional requirements
PCR	polymerase chain reaction
PPE	personal protective equipment
RDT	rapid diagnostic test
SOP	standard operating procedure
UHC	universal health coverage
WHO	World Health Organization
ZRDT	Zambia antigen rapid diagnostic test

Objectives

This digital adaptation kit (DSUR) focuses on COVID-19 antigen rapid diagnostic tests (Ag RDTs) within the Zambia context. It aims to provide a common language across various audiences—program managers, software developers, and implementers of digital systems—to ensure a common understanding of the appropriate health information content within the COVID-19 Ag RDT health program area, as a mechanism to catalyze the effective use of these digital systems. The key objectives of this DSUR are to:

- Ensure adherence to Zambia-specific public health and data use guidelines and facilitate consistency of the health content used to inform the development of a person-centered digital tracking and decision-support (DTDS) system.
- Enable health program leads and digital health teams (including software developers) to have a joint understanding of the health content within the digital system through a transparent mechanism to review the validity and accuracy of the health content; and
- Provide a starting point for the core data elements and decision-support logic that should be included within DTDS systems for COVID-19 Ag RDTs.

The information detailed in this DSUR reflects generic workflow processes, data, and decision-support algorithms derived from the Digital Solutions to Support COVID-19 Antigen RDT Rollout (dSTARR) project conducted by PATH and other related World Health Organization (WHO) documents described below. In addition, this DSUR describes linkages to related services for COVID-19 Ag RDTs, such as contact tracing, facility management of an infected patient, and considerations for community management. **Note that the outputs of the DSURs are contextualized to the local Zambian policies and requirements.**

DSUR scope and components

Scope

The scope of the DSUR components defined in this guideline is limited to the below key processes identified by PATH's Living Labs Zambia team during planned facility visits with the primary aim of identifying the health content requirements for a COVID-19 Antigen RDT DTDS system.

- Registration
- Screening
- Testing
- Examination
- Contact tracing
- Referral
- Facility management
- Schedule follow-up
- Community management
- Aggregate data

Components

As shown in Figure 1, this DSUR comprises eight interlinked components: (1) health interventions and associated recommendations; (2) generic personas; (3) user scenarios; (4) generic business processes and workflows; (5) core data elements; (6) decision-support logic; (7) indicators and reporting requirements; and (8) high-level functional and non-functional requirements. All information within the adaptation kit represents a generic starting point, which can then be adapted according to the specific context, in this case, Zambia.

Figure 1. Interlinked components of the COVID-19 antigen rapid diagnostic test digital adaptation kit.



Notation guidance

Throughout this DSUR, there are identification (ID) numbers to simplify tracking and referencing of each of the components. Note that the DSUR represents an overview across the different components, while the comprehensive and complete outputs of each component (e.g., the data dictionary) are included in appended spreadsheets. The notation guide is as follows:

Component 4: Business processes and workflows

- Each workflow should have a “Process name” and a corresponding letter.
- Each workflow should also have a “**Process ID**” that should be structured as an “**Abbreviated health domain**” (e.g., ZRDT). “Corresponding letter for the process” (e.g., A).
- Each activity in the workflow should be numbered with an “**Activity ID**” that should be structured as a “**Process ID**” from the above “**Activity Number**” (e.g., ZRDT.B7).

Component 5: Core data elements (data dictionary)

Each data element should have a running number and a “**Data Element (DE) ID**” that should be structured as an “**Abbreviated health domain**” (e.g., ZRDT). “**DE.**” “*Sequential number of the data element*” (e.g., ZRDT.B7.DE.1, ZRDT.B7.DE.2).

Component 6: Decision-support logic

Each decision-support logic table should have a running number and a “**Decision-support table (DT) ID**” that should be structured as an “**Abbreviated health domain**” (e.g., ZRDT). “**DT.**” “*Sequential number of the decision-support table*” (e.g., ZRDT.DT.1, ZRDT.DT.2).

Component 7: Indicators and performance metrics

Each indicator should have an “**Indicator ID**” that should be structured as an “**Abbreviated health domain**” (e.g., ZRDT). “**IND.**” “*Sequential number of the indicator*” (e.g., ZRDT.IND.1, ZRDT.IND.2).

Component 8: High-level system requirements

- Each functional requirement should have a “**Functional requirement ID**” that should be structured as an “**Abbreviated health domain**” (e.g., ZRDT). “**REQ.**” “*Sequential number of the functional requirement*” (e.g., ZRDT.REQ.1, ZRDT.REQ.1).
- Each non-functional requirement should have a “**Non-functional requirement ID**” that should be structured as an “**Abbreviated health domain**” (e.g., ZRDT). “**NFXNREQ.**” “*Sequential number of non-functional requirements*” (e.g., ZRDT.NFXNREQ.1, ZRDT.NFXNREQ.2).

How to use the digital adaptation kit

Target audience

The primary target audience for this DSUR is health program managers within the Ministry of Health (MOH), who will be working with their digital or health information systems counterparts in determining the health content requirements for a COVID-19 Ag RDT DTDS system. The health program manager is responsible for overseeing and monitoring the implementation of the clinical practices and policies for the health program area, in this case, COVID-19 Ag RDTs.

The DSUR also equips individuals responsible for translating health-system processes and guidance documents for use within digital systems with the necessary components to kick-start the process of developing a DTDS system in a standards-compliant manner. These individuals are also known as business analysts who interface between health content experts and software development teams. Specifically, the adaptation kit contains key outputs, such as the data dictionary and decision-support algorithms, to ensure the validity and consistency of the health content with the DTDS system.

Additionally, using this DSUR requires collaboration between health program managers and counterparts in digital health and health information systems. Although each DSUR focuses on a particular health program area (in this case, COVID-19 Antigen RDTs), the DSURs are envisioned to be used in a modular format and link to other health program areas within primary health care settings, to support integration across services.

Scenarios for using the DSUR

The DSUR may be used across various scenarios, some of which are listed in the table below.

Table 1. DSUR Scenarios for Use

Scenario 1: Incorporating WHO guideline content into existing digital tracking and decision-support systems.	Countries that already have digital systems in place, such as electronic medical records (EMRs) and decision-support tools, may use the information in the DSUR to cross-check whether the underlying content and data for specific health program areas, in this case, Antigen RDTs, are aligned to WHO guidelines. Users of the DSUR can identify and extract specific decision algorithms that need to be incorporated into their existing digital systems. By reviewing this systematic documentation, health program managers and implementers can more readily identify differences in workflows, data inputs, and decision-support logics to examine the rationale for deviations and understand local adaptations of guideline content.
Scenario 2: Transitioning from paper to digital tracking and decision-support systems.	Some countries may currently have paper-based systems that they would like to digitize, e.g., Zambia. The process of optimizing paper-based client-level systems into digital records and decision support may be overwhelming. Users in this scenario may review the DSUR as a starting point for streamlining the necessary data elements and decision support that should be in the optimized client-level digital system. Users may also then refer to the paper-based tools to determine whether there are missing fields or content that should also be included in the digital system.

<p>Scenario 3: Linking aggregate HMIS (e.g., DHIS2) to digital tracking and decision-support systems used at point of care.</p>	<p>In some instances, countries may already have a digital system for aggregate reporting and HMIS but may not yet have implemented digital systems that function at the service-delivery level. The DSUR can guide the development of a digital client record system that operates at point of care, and ensure that there are linkages between the aggregate and service-delivery levels (e.g., community or facility level).</p> <p>As such, a component of the DSUR provides aggregate indicators derived from individual-level data to provide the linkage between these different levels. Complementary guidance dedicated specifically to aggregate-level data should also be consulted for supporting the use of routine data at the facility management and district levels.</p>
<p>Scenario 4: Leveraging data standards to promote interoperability and integrated systems.</p>	<p>This DSUR includes data elements mapped to the RDT data model that are aligned to Fast Healthcare Interoperability Resource (FHIR) standards, to support the design of interoperable systems. The data dictionary in the Web Annex A provides the necessary codes for different data elements, thus reducing the time for implementers to incorporate these global standards into the design of their digital systems.</p>

Zambia antigen rapid diagnostic test digital adaptation kit components

Component 1: Health interventions and recommendations

Key interventions

The key interventions for the Zambia Ag rapid diagnostic test (ZRDT) are based on the [WHO universal health coverage \(UHC\) compendium of interventions](#):

- Implementation of appropriate infection prevention and control (IPC) measures.
- Community testing of symptomatic individuals meeting the case definition of suspected COVID-19.
- To detect and respond to suspected outbreaks of COVID-19.
- To screen asymptomatic individuals at high risk of COVID-19, including health workers, contacts of cases, and other at-risk individuals.
- Clinical management of patients with suspected COVID-19 infection.
- Home care for patients with suspected or confirmed COVID-19 infection.
- Management of contacts of confirmed COVID-19-positive patients.

WHO guidelines, recommendations, and guidance

The DSUR is intended to reflect health recommendations and content that has already been published in WHO guidelines and guidance documents. The health content and interventions are drawn from the [antigen-detection in the diagnosis of SARS-CoV-2 infection recommendations from WHO](#).

Other guidelines represented in the DSUR include:

- [Use of antigen detection rapid diagnostics testing](#)

- [Diagnostic testing for SARS-CoV-2 infection](#)
- [Clinical management of severe acute respiratory infection when novel coronavirus \(nCoV\) infection is suspected](#)
- [WHO COVID Rapid Antigen Testing](#)
- [Technical specifications for selection of essential in vitro diagnostics for SARS-CoV-2](#)
- [Recommendations for national SARS-CoV-2 testing strategies and diagnostic capacities](#)

Component 2: Generic personas

Below is a table of key generic personas and associated descriptions for reference.

Table 2. Descriptions of key generic personas.

Occupational title	Description	Different names	ISCO code
Nurse	A graduate who has been legally authorized (registered) to practice after examination by a state board of nurse examiners or similar regulatory authority. Education includes three, four, or more years in nursing school, leading to a university or postgraduate degree or equivalent. A registered nurse has the full range of nursing skills.	Registered nurse, nurse practitioner, clinical nurse specialist, advance practice nurse, practice nurse, licensed nurse, diploma nurse, nurse clinician	2221 (Nursing professional)
Environmental Healthcare Technologist	Assesses, plans, and implements programs to recognize, monitor, and control environmental factors that can affect human health, ensure safe and healthy working conditions, and prevent disease or injury caused by chemical, physical, radiological, and biological agents or ergonomic factors.	Environmental health officer, Occupational health and safety adviser, Occupational hygienist, Radiation protection adviser	2263 (Environmental and occupational health and hygiene professionals)
Clinical Officer	Provides advisory, diagnostic, curative, and preventive medical services more limited in scope and complexity than those carried out by medical doctors. Works autonomously or with limited supervision of medical doctors and performs clinical, therapeutic, and surgical procedures for treating and preventing diseases, injuries, and other physical or mental impairments common to specific communities.	Clinical officer, Primary care paramedic, Advanced care paramedic, Surgical technician, Feldsher	2240 (Paramedical practitioners)
Laboratory Technician	An individual who has typically completed formal training in biomedical science, medical technology, or a related field. Performs clinical tests on specimens of bodily fluids and tissues to get information about a patient's health, as well as tests and operates equipment for analysis of biological material, including blood and urine. ⁵	Medical laboratory technician, medical laboratory Assistant	3212 (Medical and pathology laboratory technicians)

Occupational title	Description	Different names	ISCO code
Community-Based Volunteer	Provides health education, referral, follow-up, case management, and basic preventive health care and home visiting services to specific communities. Provides support and assistance to individuals and families in navigating the health and social services system.	Community health worker, Community health aide, Community health promoter, Village health worker	3253 (Community health workers)

Abbreviation: ISCO, International Standard Classification of Occupations.


Table 3. Descriptions of related persons. Classifying health workers: Mapping occupations to the international standard classification.


Name	Description	Different names (if relevant)	ISCO code (if relevant)
Client	Within the context of this document, an individual who seeks or has been identified for COVID-19 antigen RDT testing.	N/A	N/A
Patient	Within the context of this document, an individual who has tested positive for COVID-19.	N/A	N/A
Contact	Within the context of this document, an individual who has been identified as having come into contact with a COVID-19-positive person in the previous 48 hours.	N/A	N/A
Data entry clerk	An individual who helps to record, organize, store, compute, and retrieve information, including patient records and registers. The knowledge and skills required are usually obtained in on-the-job training or may include post-secondary education. Clerks may also transcribe data, tally data, fill in routine reports, and review the quality of data with others. ^{5,8}	Data capturer	3252 (Medical records and health information technicians)
District health information officer	A manager who provides supervision of the monitoring system to ensure the quality of care and data. Provides a link between the health center and central level to ensure patient monitoring needs are met (e.g., adequate staff, tools, and other resources) and conveys changes to national standards or norms. ⁸	District health manager, health management information systems focal point, monitoring and evaluation focal point, facility supervision manager	1342 (Health service manager)
Facility in Charge	Plans, directs, coordinates, monitors, and evaluates the provision of clinical and community health services and resources at the health care facility. Provides overall direction, policy standards, and operational criteria for the units managed, including supervising and evaluating personnel recruitment, training, and work activities. Liaises with other health and welfare service providers, boards (including community boards), and funding bodies to coordinate the provision of services.	Health facility administrator	1342 (Health service managers)


Abbreviation: ISCO, International Standard Classification of Occupations.


Source for Tables 2 and 3: World Health Organization (WHO). Classifying health workers: Mapping occupations to the international standard classification [table]. Geneva: WHO; 2019. https://cdn.who.int/media/docs/default-source/health-workforce/dek/classifying-health-workers.pdf?sfvrsn=7b7a472d_3&download=true.


Detailed personas


	Provider persona: Choolwe, Registered Nurse Age: 24 to 37 years old Experience: 10 months to 12 years The nurse has access to a personal smartphone.
Responsibilities	<ul style="list-style-type: none"> • Screens clients for signs and symptoms of COVID-19. • Documents patient and testing data in a laboratory request form and the COVID-19 register and/or available digital tools. • Performs nasopharyngeal swabbing of clients. • Conducts antigen RDT testing. • Conduct clinical assessment of patient vitals, including blood oxygen level checks. • Refers positive patients for clinical or community management based on a clinical assessment. • Treats patient symptoms. • Performs and documents patient interviews for contact tracing. • Collects samples from contacts exhibiting signs and symptoms of COVID-19 for COVID-19 PCR testing. • Submits daily report of COVID-19 RDT testing activities, including COVID-19 consumables usage information, to District Surveillance Officer. • Visits or follows-up with patients in the community management program. • Documents condition of patients in the community management program via a surveillance form and/or available digital tool. • Discharges patients from the COVID-19 community management program.
Context descriptions	Siatezi is a peri-urban facility in a densely populated area in Siavonga district, Zambia. The facility is understaffed, and trained health care workers (HCWs) generally share duties to manage the high workload. The facility is supported by community-based volunteers, but there are generally low literacy levels among the volunteers, limiting their support level. The facility has access to solar power; however, it is unreliable. There is also limited internet connectivity, and most services are still done manually. The facility offers COVID-19 antigen RDT testing but does not conduct PCR testing on-site.
Challenges	<ul style="list-style-type: none"> • Unavailability of standardized COVID-19 registers—all available registers are improvised, making it difficult for health workers to know if they are collecting all the required information. • Limited internet connectivity or data bundles for reporting; reporting is primarily conducted using WhatsApp. • Redundancies in data capture—recording the same data in the line list and register. • Challenges accessing guidelines. • No tools for referral support, and thus dependency on professional judgment to make referral decisions. • Limited space for testing in some facilities.
Opportunities	<ul style="list-style-type: none"> • Develop a digital data capture and management tool to remove redundancies and standardize data collection. • Digitize COVID-19 guidelines for HCWs for easier access. • Make the data management tool an online/offline hybrid to allow health workers to input data offline and upload data for reporting when online. • Integrate a visual mapping component in a digital tool that can help to identify the risk of outbreaks in zones, with contact information of active community-based volunteers in the zone. • Option to print out hard copy records as a backup in the event of connectivity challenges and/or app failure.

	Provider persona: Jacob, Clinical Officer Age: 28 years old Experience: 3 years The clinical officer has access to a personal smartphone.
Responsibilities	<ul style="list-style-type: none"> • Screen clients for signs and symptoms of COVID-19. • Document patient and testing data in a laboratory request form and the COVID-19 register and/or available digital tools. • Perform nasopharyngeal swabbing of clients. • Conduct antigen RDT testing. • Conduct clinical assessment of patient vitals, including blood oxygen level checks. • Refer positive patients for clinical or community management based on clinical assessment. • Treat patient symptoms. • Perform and document patient interviews for contact tracing. • Collect samples from contacts exhibiting signs and symptoms of COVID-19 for COVID-19 PCR testing. • Submit a daily report of COVID-19 RDT testing activities, including COVID-19 consumables usage information, to the District Surveillance Officer. • Visit or follow up with patients in the community management program. • Document the condition of patients in the community management program in a surveillance form and/or available digital tool. • Discharge patients from the community management program.
Context descriptions	<p>Siatezi is a peri-urban facility in a densely populated area in Siavonga district, Zambia. The facility is understaffed, and trained HCWs generally share duties to manage the high workload. The facility is supported by community-based volunteers, but there are generally low literacy levels among the volunteers, limiting their support level. The facility has access to solar power; however, it is unreliable. There is also limited internet connectivity, and most services are still done manually. The facility offers COVID-19 antigen RDT testing but does not conduct PCR testing on-site.</p>
Challenges	<ul style="list-style-type: none"> • No tools for referral support, and thus dependency on professional judgment to make referral decisions. • Booklets and/or guidelines are not easy to refer to in an emergency. • Lack of personal protective equipment (PPE).
Opportunities	<ul style="list-style-type: none"> • Digitize COVID-19 guidelines for HCWs for easier access. • Make the data management tool an online/offline hybrid to allow health workers to input data offline and upload data for reporting when online. • Develop a visualizer/mapping to identify the risk of outbreaks in zones, with contact information of active community-based volunteers in the zone. • Optimize image capture features of apps to reduce image size. • Option to print out hard copy records as a backup in the event of connectivity challenges and/or app failure.

	<p>Provider persona: Moonga, Laboratory Technician</p> <p>Age: 29 to 42 years old Experience: 4 to 5 years The Laboratory Technician has access to a personal smartphone and a facility computer.</p>
<p>Responsibilities</p>	<ul style="list-style-type: none"> • Perform nasopharyngeal swabbing of clients. • Conduct antigen RDT testing. • Document patient and testing data in a laboratory request form, the COVID-19 register and/or available digital tools. • Submit a daily report of COVID-19 RDT testing activities, including COVID-19 consumables usage information, to the District Laboratory Supervisor.
<p>Context descriptions</p>	<p>Siatezi is a peri-urban facility in a densely populated area in Siavonga district, Zambia. The facility is understaffed, and trained HCWs generally share duties to manage the high workload. The facility is supported by community-based volunteers, but there are generally low literacy levels among the volunteers, limiting their support level. The facility has access to solar power; however, it is unreliable. There is also limited internet connectivity, and most services are still done manually. The facility offers COVID-19 antigen RDT testing but does not conduct PCR testing on-site.</p>
<p>Challenges</p>	<ul style="list-style-type: none"> • The lab technicians return the RDT results in-person, which is challenging if their workload is high. • Inconsistent supply of logistics.
<p>Opportunities</p>	<ul style="list-style-type: none"> • Automate patient flow and record management (e.g., ordering an RDT test is currently done through handwritten notes). • Inventory management module with an ordering feature for consumables.

	<p>Provider persona: Ben, Environmental Health Technologist (EHT)</p> <p>Age: 28 to 40 years old Experience: 3 to 11 years The EHT has access to a personal smartphone.</p>
<p>Responsibilities</p>	<ul style="list-style-type: none"> • Screen clients for signs and symptoms of COVID-19. • Document patient and testing data in a laboratory request form and the COVID-19 register and/or available digital tools. • Perform nasopharyngeal swabbing of clients. • Conduct antigen RDT testing. • Conduct clinical assessment of patient vitals, including blood oxygen level checks. • Refer positive patients for clinical or community management based on clinical assessment. • Treat patient symptoms. • Perform and document patient interviews for contact tracing. • Collect samples from contacts exhibiting signs and symptoms of COVID-19 for COVID-19 PCR testing. • Submit a daily report of COVID-19 RDT testing activities, including COVID-19 consumables usage information, to the District Surveillance Officer. • Visit or follow up with patients in the community management program. • Document the condition of patients in the community management program in a surveillance form and/or available digital tool. • Discharge patients from the community management program.
<p>Context Descriptions</p>	<p>Siatezi is a peri-urban facility in a densely populated area in Siavonga district, Zambia. The facility is understaffed, and trained HCWs generally share duties to manage the high workload. The facility is supported by community-based volunteers, but there are generally low literacy levels among the volunteers, limiting their support level. The facility has access to solar power; however, it is unreliable. There is also limited internet connectivity, and most services are still done manually. The facility offers COVID-19 antigen RDT testing but does not conduct PCR testing on-site.</p>
<p>Challenges</p>	<ul style="list-style-type: none"> • Unavailability of standardized COVID-19 registers—all available registers are improvised, making it difficult for HCWs to know if they are collecting all the required information. • Limited internet connectivity or data bundles for reporting—reporting is primarily through WhatsApp. • Challenges accessing guidelines. • No tools for referral support, and thus dependency on professional judgment to make referral decisions. • Challenges in contact tracing and making community follow-ups in rural settings where addressing is poor and access to transport is limited (rely on NHC support). • "Sometimes space on phones is depleted so captured information is lost."
<p>Opportunities</p>	<ul style="list-style-type: none"> • Digitize COVID-19 guidelines for HCWs for easier access. • Make the data management tool an online/offline hybrid to allow health workers to input data offline and upload data for reporting when online. • Develop a visualizer/mapping to identify the risk of outbreaks in zones, with contact information of active community-based volunteers in the zone. • Optimize image capture features of apps to reduce image size. • Option to print out hard copy records as a backup in the event of connectivity challenges and/or app failure.

	<p>Provider persona: Beatrice, Community-Based Volunteer (CBV)</p> <p>Age: 23 to 36 years old Experience: 2 to 9 years of experience as a CBV, and oriented in COVID-19 home-care management. She has access to a personal smartphone and a shared tablet.</p>
<p>Responsibilities</p>	<ul style="list-style-type: none"> • Perform and document patient interviews for contact tracing. • Refer contacts of positive patients who exhibit signs and symptoms of COVID-19 to health facilities. • Visit or follow up with patients in the community management program. • Counsel patients on COVID-19 management. • Document the condition of patients in the community management program in a monitoring form and/or available digital tool. • Refer patients to health facilities if symptoms worsen. • Submit a weekly report of COVID-19 community patient management activities to the District Surveillance Officer and the facility in-charge.
<p>Context Descriptions</p>	<p>Motunya is an urban facility in a densely populated area in Livingstone district, Zambia. The facility is understaffed, and trained health workers often share duties to manage the high workload. The facility is supported by community-based volunteers, but there are generally low literacy levels among the volunteers, limiting their support level. The facility has access to reliable grid power. There is good internet connectivity in the area, and some services are still done manually. The facility offers COVID-19 antigen RDT testing but does not conduct PCR testing on-site.</p>
<p>Challenges</p>	<ul style="list-style-type: none"> • Duplicates of the monitoring forms are submitted to the facility in-charge and the District Surveillance Officer. • A digital tool is used for reporting, but it feels difficult to update the electronic system using a phone. • Wrong patient phone numbers and addresses make follow-ups challenging.
<p>Opportunities</p>	<ul style="list-style-type: none"> • Digitize the contact tracing and patient monitoring forms. • Include a GPS location feature in a digital solution to capture patient locations. • Digitize home-based care guidelines for easier access. • Incorporate data validation features to reduce clerical errors, e.g., in phone numbers and addresses. • Ensure digital tool are adaptable for a wide array of devices.

	<p>Manager persona: Martha, District Health Information Manager</p> <p>Age: 35 to 45 years old Experience: The District Health Information Manager has access to a personal smartphone and a work laptop/computer.</p>
<p>Responsibilities</p>	<ul style="list-style-type: none"> • Oversee district COVID-19 community patient management program. • Consolidate daily testing data from all the facilities in the district. • Consolidate daily COVID-19 inventory management data from all the facilities in the district. • Provide daily district testing and inventory/stock status reports for COVID-19 to the provincial biomedical specialist. • Provide daily district surveillance reports for COVID-19 to the provincial health office.
<p>Context descriptions</p>	<p>Livingstone is an urban district. Health facilities in the district are understaffed, and trained HCWs often share duties to manage the high workload. The facilities are supported by community-based volunteers, but there are generally low literacy levels among the volunteers, limiting their level of support. The district has access to reliable grid power. There is good internet connectivity in the area, and some services are still done manually. Most of the facilities in the district offer COVID-19 antigen RDT testing, but PCR testing is only conducted at the central district hospital.</p>
<p>Challenges</p>	<ul style="list-style-type: none"> • Long, late hours due to reporting requirements—compiles reports for all facilities, which are due at 8 pm daily. • No CBVs are allocated in some settings, leaving the responsibility of community management to the district information manager and trained HCWs. • Missing indicators in surveillance programs, e.g., in schools, due to a break in chain between the school focal points and facilities. • Limited testing kits. • Inadequate staffing. • Internet challenges/inadequate data bundles. • Some facilities do not have laptops and use personal phones to submit images of line lists which the district information manager has to compile. • Compiles report from separate Excel documents and creates EPI curve based on the number of positive cases
<p>Opportunities</p>	<ul style="list-style-type: none"> • Create a digital tool to manage the reporting from facilities and community-based volunteers, with the option for the district information officer to review, edit and approve. • Include a reporting dashboard that autogenerates charts (e.g., EPI curves). • Include an inventory management module/dashboard to monitor the usage of COVID-19 supplies and for ordering new stock. • Develop a digital tool to have a facility/district/Provincial/National level view of the data. • Include a reviewer function at the facility level to sign off on reports. • Filter current and historical data by date and date range. • Incorporate image capture of RDT (“would be a good idea”) for monitoring the quality of results/quality control.

Component 3: User stories

Key personas	Health Facility In-charge Nurse: <i>Inutu</i> Patient: <i>Chimuka</i> Clinical Officer General: <i>Jacob</i> Lab Technician: <i>Moonga</i> District Surveillance Officer: <i>Martha</i> District Lab Technician: <i>Abel</i> Community-Based Volunteer: <i>Beatrice</i>
	<p>Inutu, a facility in-charge at an urban health facility in Livingstone, is at the Outpatients' Department (OPD) assisting HCWs assigned to the OPD due to the number of clients/long queue. Inutu is mainly assisting with screening clients by checking their vitals, including blood pressure and temperature. She also uses the COVID-19 screening form to identify those who may have COVID-19 symptoms. Inutu also records client details in the outpatients' register to capture their name, age, sex, address, and phone number. The client's vitals are indicated on a piece of paper given to them as they go to see the clinic officer for clinical screening. During the screening, Inutu notices that one of the clients, Chimuka, has some symptoms of COVID-19. Without bringing alarm among the other clients, Chimuka is quickly sent to the laboratory with a piece of paper requesting that a test be done.</p> <p>Moonga, a Lab Technician, conducts an Antigen RDT testing upon receiving the request note from Chimuka. Moonga also collects/indicates client details in an improvised register that captures the client's name, age, sex, address, and phone while waiting for the results. After 15 minutes, Chimuka's results are ready and positive; Moonga personally delivers them back to Inutu, who immediately ensures that Chimuka is isolated. Inutu then informs Jacob, the clinic officer, that they have a COVID-19 patient in the isolation room.</p> <p>Jacob conducts a clinical assessment of Chimuka's vitals, including blood oxygen levels and temperature. With these, Jacob decides that Chimuka will be managed in the community. Jacob tells Chimuka that if she feels unwell at any time, she should not hesitate to return to the health facility. Chimuka is treated for the symptoms, and Inutu walks her through the guidelines for community management to avoid infecting others. Inutu collects additional information from Chimuka, including the people she has been in contact with recently.</p> <p>Beatrice, a CBV, comes to Inutu later in the day and requests the improvised COVID-19 register. Beatrice takes note of all those who tested positive on that particular day and notes their details. Beatrice shares patient details with her fellow CBVs, based on overlapping patient and CBV zones.</p> <p>Beatrice calls Chimuka, who is from her zone, to check on how she is doing and make an appointment. Chimuka feels the following day would be okay for her.</p> <p>At the end of the day, Inutu, the in-charge, compiles the daily activities, which she submits to Martha, the District Surveillance Officer. Martha is also informed of the number of patients referred for community management, except those going to the isolation centre. Once Martha has received these reports from health facilities and other testing points, such as schools, she compiles a Consolidated Daily Testing Report. Moonga also submits a report of COVID-19 testing activities, including COVID-19 consumables usage information to Abel, the District Laboratory Supervisor. Abel compiles consolidated daily testing data from all facilities in the district and provides a Daily District Testing and Inventory/Stock Status Report for COVID-19 to the Provincial Biomedical Specialist.</p>
Processes (See Component 4)	<ul style="list-style-type: none"> • Documentation of client details in a register at OPD. • Screening clients for COVID-19 symptoms. • Antigen RDT testing. • Clinical assessment of patient. • Referral for community management. • Identification of community management patients using a register. • Reporting to the district/province.

Key personas	Community-Based Volunteer: <i>Beatrice</i> Patient: <i>Chimuka</i> Contact Person: <i>Mwape</i>
<p>It is a Tuesday afternoon in Maluba Community Zone A, where Beatrice, a CBV, works from.</p> <p>A day before, Chimuka was identified as one of the COVID-19-positive patients referred for community management. Beatrice had called Chimuka to ask her for the preferred time to visit her, so she makes a follow-up call to confirm the appointment, and Chimuka is agreeable that she can be visited. Beatrice meets Chimuka, and their discussion starts with information, education, and communication on COVID-19 and its management.</p> <p>Beatrice then asks Chimuka some questions for contact tracing; Mwape, one of her contacts, exhibits signs and symptoms of COVID-19 and is referred to the health facility for testing. While monitoring the patient's vitals, Beatrice documents the patient's condition in the monitoring form and sometimes uses a digital tool when it is available.</p> <p>Chimuka is visited by Beatrice daily for 14 days. Beatrice checks Chimuka's temperature and oxygen levels daily to monitor for improvements; if the symptoms worsen, Beatrice is ready to refer Chimuka back to the health facility.</p> <p>On the 14th day of the community management, Chimuka's condition is stable. Beatrice refers Chimuka back to the health facility, where Jacob conducts a clinical assessment to ascertain that Chimuka can be discharged from community management.</p>	
Processes (See Component 4)	<ul style="list-style-type: none"> • Community management of patient. • Documentation of patient's progress. • Reporting to the facility in-charge. • Referral to the health facility. • Discharge from community management.

Key personas	Registered Nurse: <i>Choolwe</i> Patient: <i>Mweetwa</i> EHT: <i>Melody</i>
<p>Choolwe is a Registered Nurse at Nabutezi, a rural health facility where she and the EHT are the only trained staff. Choolwe receives Mweetwa, who has come to seek medical services at the health facility, and collects the client's details. These details include the village and zone where Mweetwa comes from, the landmark, age, and sex, which she writes in an improvised register.</p> <p>Using a COVID-19 symptoms checklist, Choolwe screens for signs and symptoms of COVID-19 and asks for Mweetwa's travel details to determine whether she is eligible for antigen RDT testing. Choolwe notes that Mweetwa has some symptoms of COVID-19, and she conducts the antigen RDT test, which indicates that Mweetwa is COVID-19 positive.</p> <p>Mweetwa is moved to another room for isolation and observation. Choolwe monitors Mweetwa by checking her vitals occasionally, including her oxygen levels. After a few hours, Mweetwa's oxygen levels are still normal, and she has no fever, which informs Choolwe's decision to refer her for community management. Mweetwa receives treatment and counseling on how to live to avoid infecting others in the community and is sent back home.</p> <p>At the end of the day, Choolwe sits to compile a daily report, including the number of tests done, positive cases, and consumables used. She sends it to the District Surveillance Officer through WhatsApp.</p> <p>On the other hand, Melody, the EHT, compiles a list of all positive cases in the community and maps out her visits for community management. Some patients come from as far as five kilometers from the facility, and transport is one of the challenges she faces during community management visits. Melody equally has no CBVs who can support her in community management.</p> <p>Melody discharges patients from the community management program depending on their vitals after 14 days of routine monitoring.</p>	
Processes (See Component 4)	<ul style="list-style-type: none"> • Documentation of client details in a register at OPD. • Screening clients for COVID-19 symptoms. • Antigen RDT testing. • Clinical assessment of patient. • Referral for community management. • Identification of community management patients using a register. • Reporting to the district/province.

Component 4: Business process and workflows

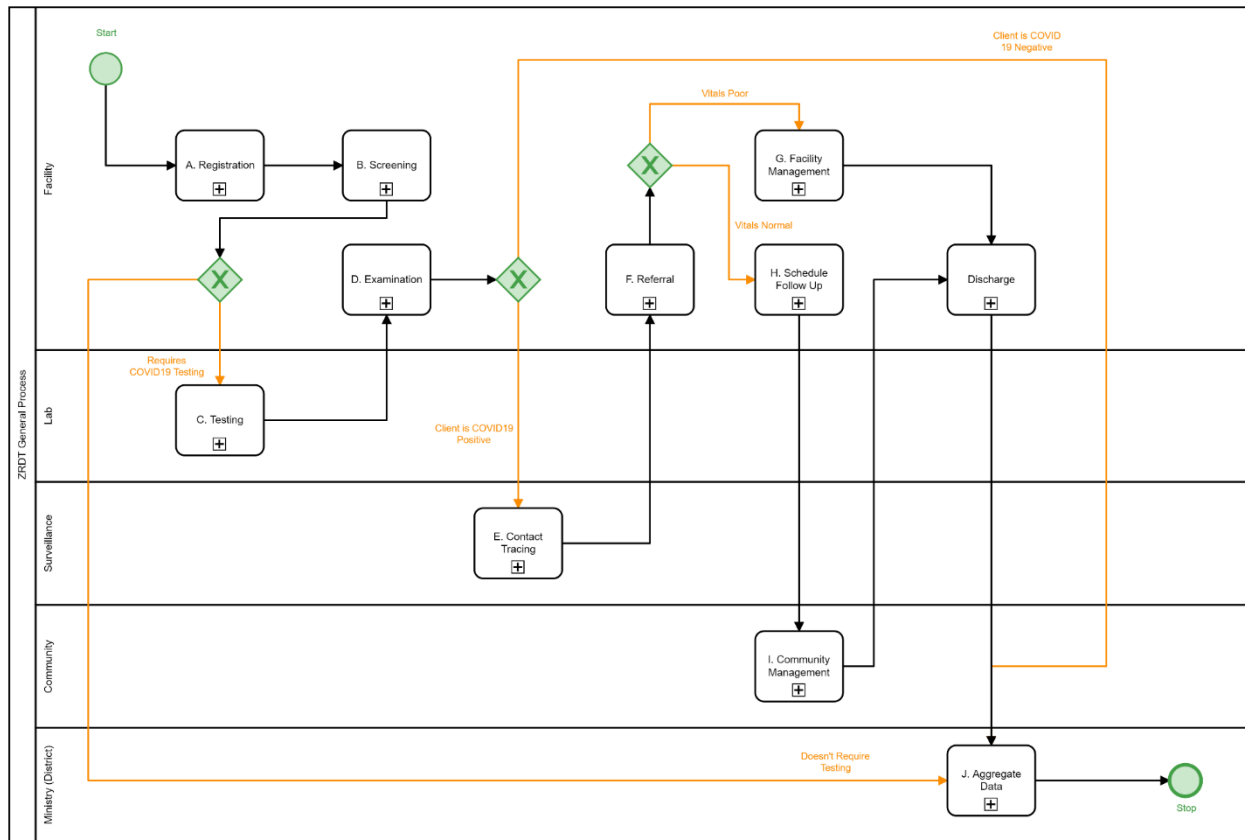
Overview of key Zambia RDT processes

	Process name	Process ID	Personas	Objectives	Task set
	Title	ID used to reference this process throughout the DSUR	Individuals interacting to complete the process	A concrete statement describing what the process seeks to achieve	The general set of activities performed within the process
A	Registration	ZRDT.A	<ul style="list-style-type: none"> Client Facility Staff 	To ensure client is located in the system with updated personal details or, if not located, entered into the system.	<i>Starting point: Client visits facility or asks for COVID-19 testing</i> <ul style="list-style-type: none"> Search for client record. Review and update client record. Create a new client record. Check in client.
B	Screening	ZRDT.B	<ul style="list-style-type: none"> Client Nurse Environmental Healthcare Technologist Clinical Officer 	To capture details on initial screening of a client for signs and symptoms of COVID-19.	<i>Starting point: Check Client for Signs and Symptoms of COVID-19</i> <ul style="list-style-type: none"> Check client for signs and symptoms of COVID-19. Refer client for testing. Fill in lab request form.
C	Testing	ZRDT.C	<ul style="list-style-type: none"> Client Nurse Environmental Healthcare Technologist Clinical Officer Lab Technician 	To capture details on COVID-19 antigen RDT test for a qualifying client.	<i>Starting point: Receive Lab Request Form</i> <ul style="list-style-type: none"> Receive lab request form. Input test reference details. Input RDT details.
D	Examination	ZRDT.D	<ul style="list-style-type: none"> Client Nurse Environmental Healthcare Technologist Clinical Officer Lab Technician 	To capture details on examination of a positive client/patient by a clinician/HCWs to establish a care plan.	<i>Starting point: HCW Receives COVID-19 Test Results</i> <ul style="list-style-type: none"> Receive COVID-19 test results. Forward client details to surveillance for contact tracing. Treat symptoms.

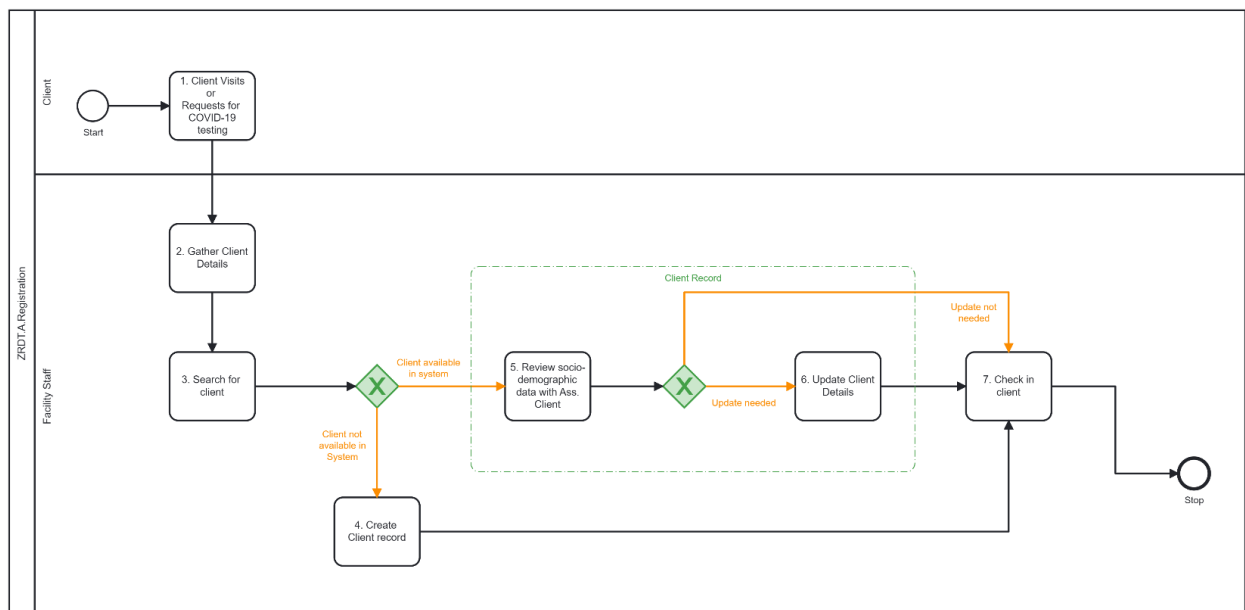
	Process name	Process ID	Personas	Objectives	Task set
					<ul style="list-style-type: none"> Determine medical condition.
E	Contact Tracing	ZRDT.E	<ul style="list-style-type: none"> Patient Nurse Environmental Healthcare Technologist Clinical Officer 	To capture details on identification and follow-up of close contacts of positive clients/patients.	<p><i>Starting point: HCW Receives List of COVID-19 Positive Patients</i></p> <ul style="list-style-type: none"> Receive list of COVID-19 positive patients. Interview patient and identify risk contacts. Reach out to contact for screening.
F	Referral	ZRDT.F	<ul style="list-style-type: none"> Nurse Environmental Healthcare Technologist Clinical Officer 	To capture details on referral of positive clients for clinical care or community management.	<p><i>Starting point: Review Determined Medical Condition of Patient</i></p> <ul style="list-style-type: none"> Review medical condition of patient. Call ambulance for facility-based management. Contact CBV for community-based management.
G	Facility Management	ZRDT.G	<ul style="list-style-type: none"> Nurse Environmental Healthcare Technologist Clinical Officer 	To capture details on facility-based management of positive patients by health workers.	<p><i>Starting point: Patient Admitted to Isolation Center</i></p> <ul style="list-style-type: none"> Patient admitted to isolation centre. Monitoring of patient's condition.
H	Schedule Follow Up	ZRDT.H	<ul style="list-style-type: none"> Nurse Environmental Healthcare Technologist Clinical Officer 	To provide routine health promotion and follow-up with patient on community-based management.	<p><i>Starting point: Patient Referred to Community Management</i></p> <ul style="list-style-type: none"> Schedule patient's next visit Conduct basic assessment during visit Determine if medical intervention is required

	Process name	Process ID	Personas	Objectives	Task set
I	Community Management	ZRDT.I	<ul style="list-style-type: none"> • Nurse • Environmental Healthcare Technologist • Clinical Officer • Community-Based Volunteer 	To capture details on home-based management of positive patients by community-based volunteers and/or health care workers.	<p><i>Starting point: CHW Reviews Register of Positive Cases for Community Management</i></p> <ul style="list-style-type: none"> • Review register of positive cases for community management. • Contact patient and request consent for home visit. • Monitoring of patient's condition.
J	Aggregate Data	ZRDT.J	<ul style="list-style-type: none"> • Facility Staff • District Health Officer/Staff • Facility-in-Charge 	To aggregate client-level data into validated reports, use these data and submit reports at the facility level.	<p><i>Starting point: Time for Periodic (usually monthly) Reporting</i></p> <ul style="list-style-type: none"> • Check data quality. • Correct fixable errors. • Generate and review aggregate reports. • Submit for approval. • Provide feedback and any changes required.

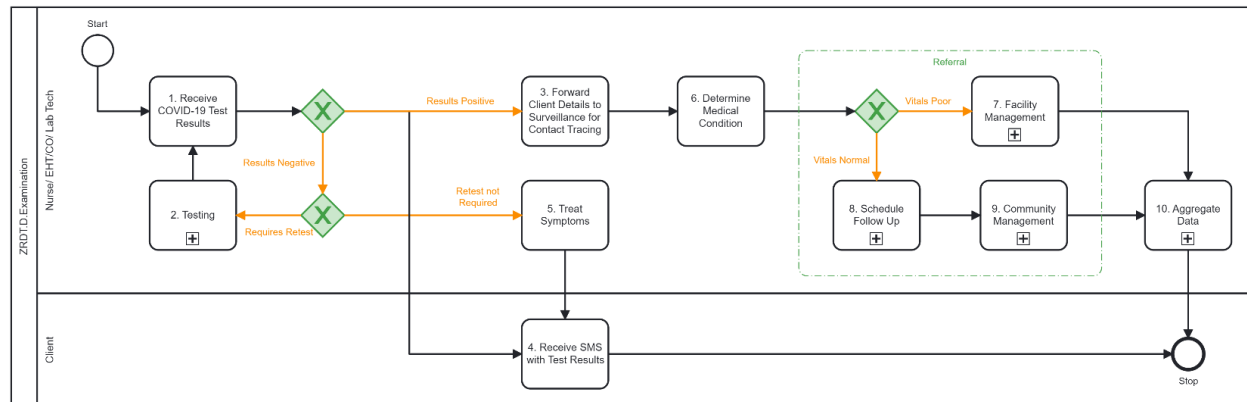
Zambia RDT General Process Flow



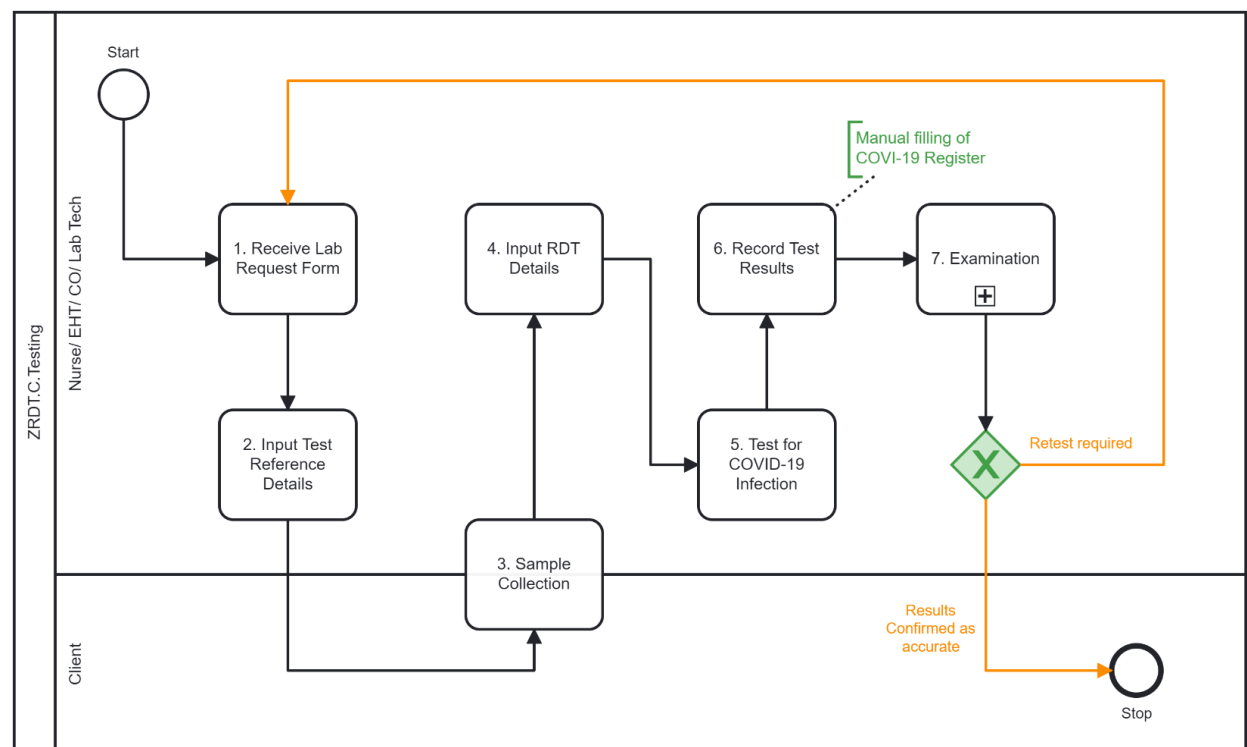
Registration Process Flow



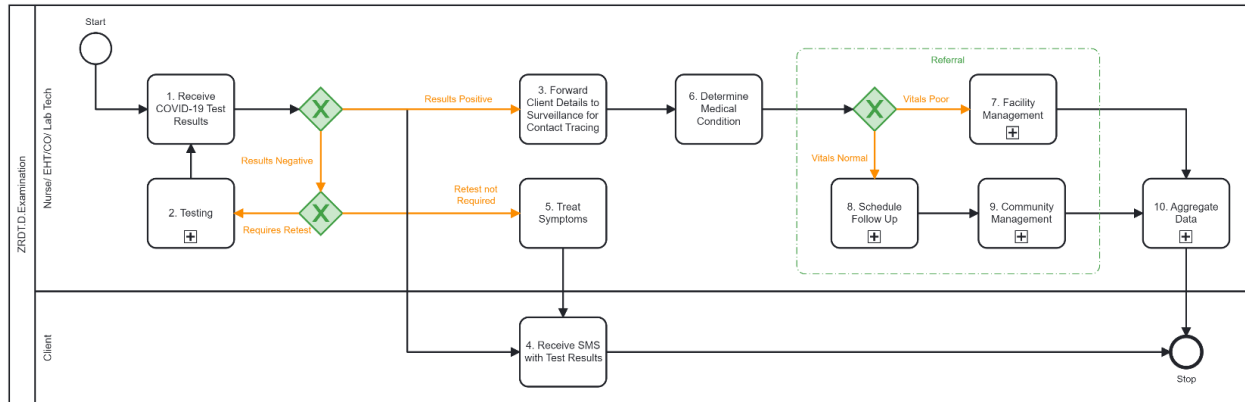
Screening Process Flow



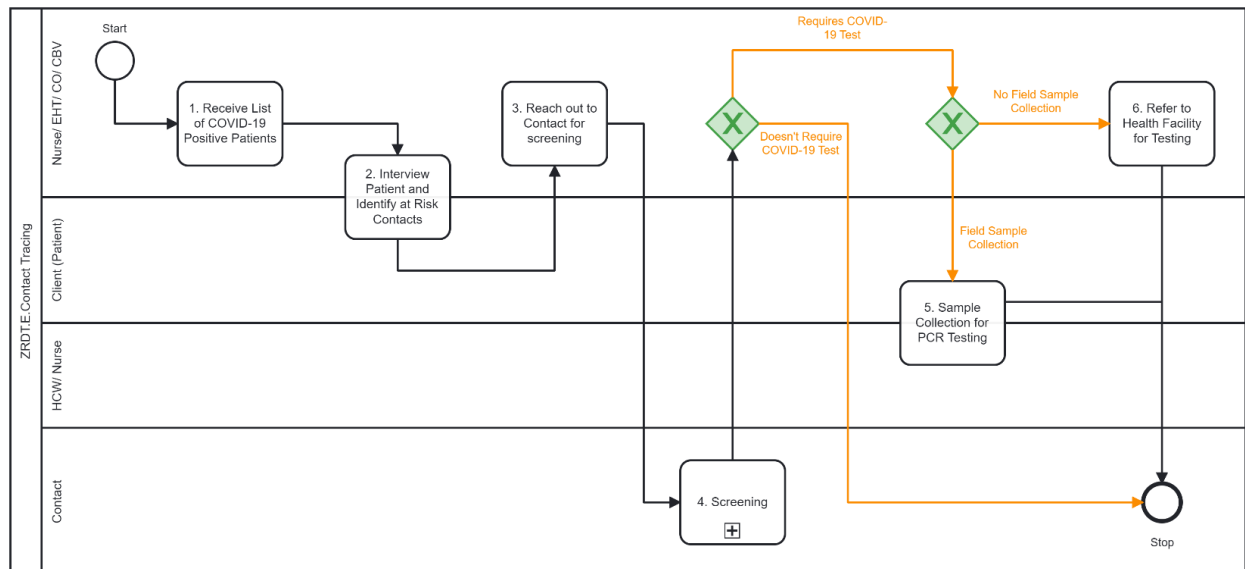
Testing Process Flow



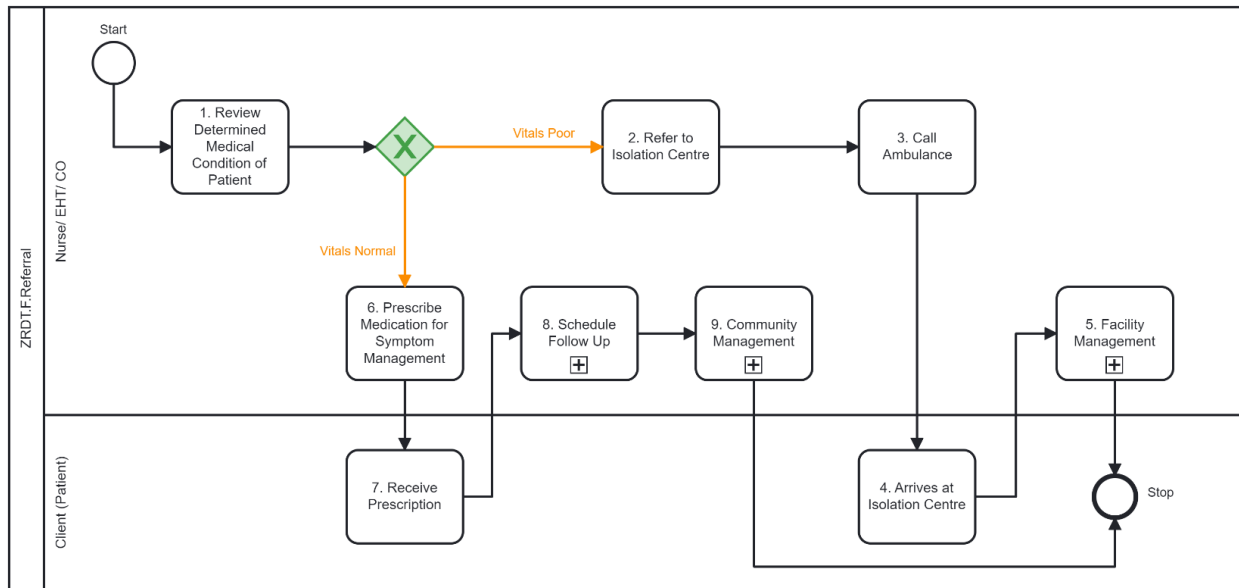
Examination Process Flow



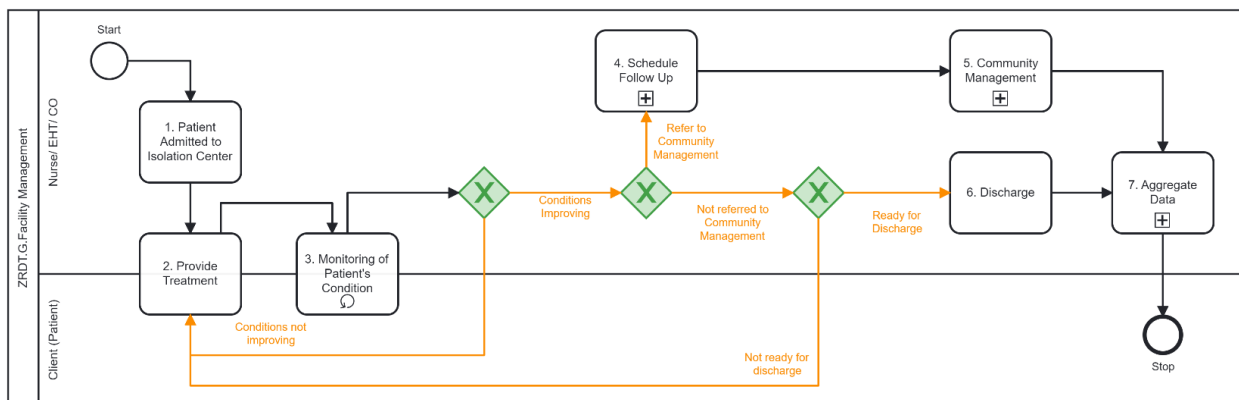
Contract Tracing Process Flow



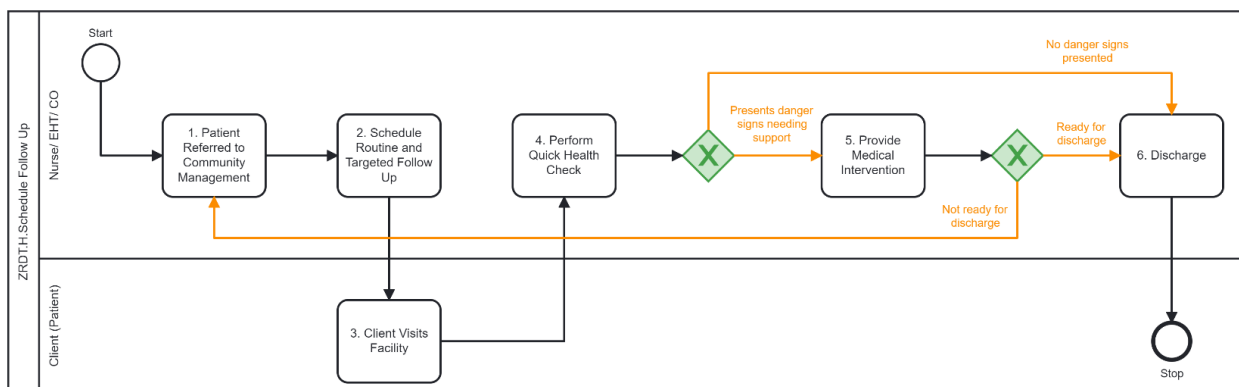
Referral Process Flow



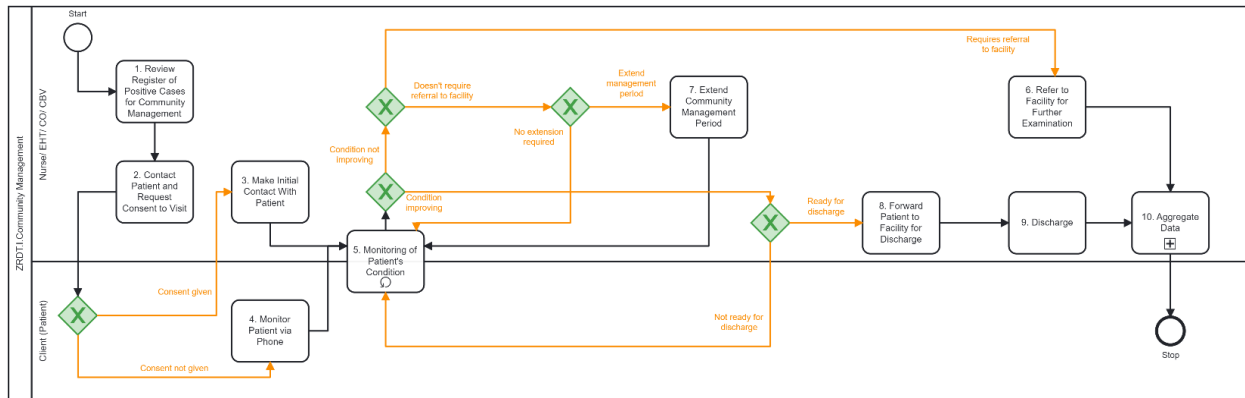
Facility Management Process Flow



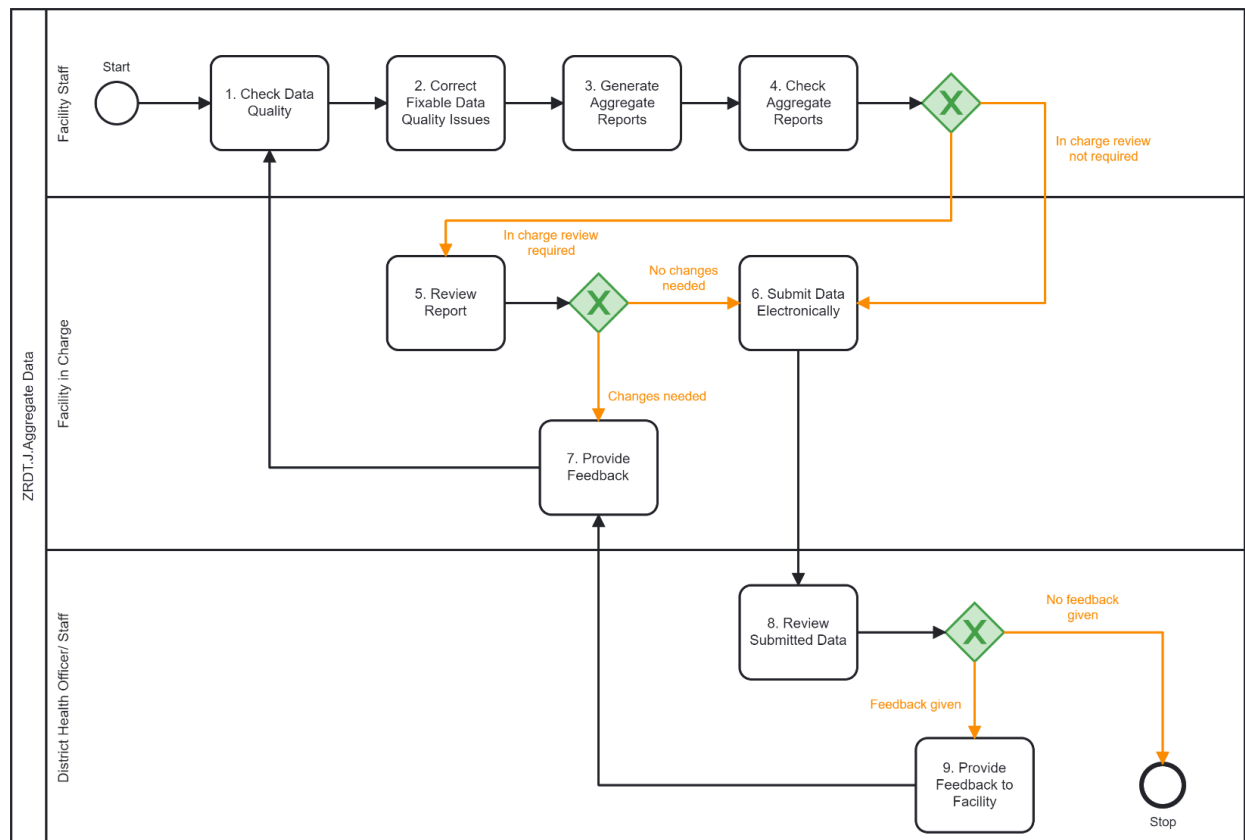
Schedule Follow-Up Process Flow



Community Management Process Flow



Aggregate Data Process Flow



Component 5: Core data elements

Activity ID Activity name	Data element ID	Data element name	Description and definition
Business process ZRDT.A: Registration			
ZRDT.A2. Gather Client Details	ZRDT.A2.DE.1	Client ID	Unique, system generated patient ID
	ZRDT.A2.DE.2	Client First Name	Client's first or given name
	ZRDT.A2.DE.3	Client Family Name	Client's last or family name
	ZRDT.A2.DE.4	Client Birth Date	Client's date of birth capturing day, month and year of birth
	ZRDT.A2.DE.5	Age	Estimated age in years of the client, captured if client birth date is unknown
	ZRDT.A2.DE.6	Sex	Client's biological sex at birth, either male or female
	ZRDT.A2.DE.7	Contact Number	Number where client may be reached
	ZRDT.A2.DE.8	Client Address	Client's address including street name, district/county, city, and region
	ZRDT.A2.DE.9	Next of Kin	Client's next of kin details including name, address, and contact number
ZRDT.A3. Search for Client	ZRDT.A3.DE.1-DE.2	Client in system (Y/N)	Whether or not existing client information is already in system and information is up to date
ZRDT.A7. Check in Client	ZRDT.A7.DE.1	Purpose of Visit	Client's purpose for visiting the facility
Business process ZRDT.B: Screening			
ZRDT.B1. Check Client for Signs and Symptoms of COVID-19	ZRDT.B1.DE.1	Fever or history of fever (>37.5 degrees centigrade) (Y/N)	Existence or patient-reported recent history of fever based on thermometer reading of $\geq 37.5^{\circ}\text{C}$
	ZRDT.B1.DE.2	If yes, please provide temperature	Temperature from thermometer
	ZRDT.B1.DE.3	Sore throat (Y/N)	Patient-reported existence of sore throat
	ZRDT.B1.DE.4	Cough (Y/N)	Patient-reported existence of cough
	ZRDT.B1.DE.5	Runny nose (Y/N)	Patient-reported existence of runny nose
	ZRDT.B1.DE.6	Shortness of breath (Y/N)	Patient-reported existence of shortness of breath
	ZRDT.B1.DE.7	Diarrhea (Y/N)	Patient-reported existence of diarrhea
	ZRDT.B1.DE.8	Have you had these symptoms for more than 14 days? (Y/N)	Patient-reported existence of any symptoms >14 days
	ZRDT.B1.DE.9	Contact with a person with confirmed or under investigation for COVID-19 in the last 14 days? (Y/N)	Patient-reported interaction of contact with suspect case of COVID-19
	ZRDT.B1.DE.10	Have you travelled outside [City of facility]	Patient-reported travel outside of facility location

Activity ID Activity name	Data element ID	Data element name	Description and definition
		in the last 14 days? (Y/N)	
	ZRDT.B1.DE.11	Referred for testing (Y/N)	Existence of testing referral
	ZRDT.B1.DE.12	Referral to	Specification of referral location
	ZRDT.B1.DE.13	Provider name	Specification of referral provider's name
	ZRDT.B1.DE.14	Contact number	Specification of referral provider's phone number
ZRDT.B2. Refer Client for Testing	ZRDT.B2.DE.1	Today's date	Date of screening
	ZRDT.B2.DE.2	Code	Facility ID number
	ZRDT.B2.DE.3	Province	Name of facility province location
	ZRDT.B2.DE.4	District	Name of facility district location
	ZRDT.B2.DE.5- DE.11	Client Details	Client registration details
	ZRDT.B2.DE.12	Hospital/Institution	Name of facility
	ZRDT.B2.DE.13	Physician's name	Specification of screening provider's name
	ZRDT.B2.DE.14	Physician's contact number	Specification of screening provider's email address
	ZRDT.B2.DE.15	Physician's email address	Specification of screening provider's phone number
	ZRDT.B2.DE.16	Reasons for testing	Specification of why patient has presented for testing
	ZRDT.B2.DE.17	Diagnosis (Select all that apply)	Client diagnosis as identified by nurse
	ZRDT.B2.DE.18	Comorbid conditions (Select all that apply)	Client's pre-existing comorbid conditions
Business process ZRDT.C: Testing			
ZRDT.C1. Receive Lab Request Form	ZRDT.C1.DE.1	Received by	Name of provider receiving patient information at testing collected at registration and screening
	ZRDT.C1.DE.2	Date of receipt	Date of receiving patient information at testing collected at registration and screening
	ZRDT.C1.DE.3	Time of receipt	Time of receiving patient information at testing collected at registration and screening
ZRDT.C2. Input Test Reference Details	ZRDT.C2.DE.1	Patient ID	Unique, system generated patient ID, linking patient to test reference details
	ZRDT.C2.DE.2	Test Number	Unique, system generated instance of a test
	ZRDT.C2.DE.3	Test Location	Geocodes of where test is being conducted, collected from device
	ZRDT.C2.DE.4	Sample Type	Indicates how biological sample was collected
	ZRDT.C2.DE.5	Reason Test	Indicates reason for performing test
	ZRDT.C2.DE.6	Repeat Test (Y/N)	Indicates whether the test being conducted immediately follows another, in the event of a failed or inconclusive test

Activity ID Activity name	Data element ID	Data element name	Description and definition
	ZRDT.C2.DE.7	Reason Repeat	Indicates reason for repeating test
	ZRDT.C2.DE.8	Additional Info on Repeat Test	Allows user to capture additional details for test being repeated
	ZRDT.C2.DE.9	Administrator ID	Unique ID of the health worker or practitioner who is conducting the test
	ZRDT.C2.DE.10	Administrator Name	Name of the health worker or practitioner who is conducting the test
ZRDT.C3. Sample Collection	ZRDT.C3.DE.1	Sample collected (Y/N)	Whether or not sample has been collected from patient
	ZRDT.C3.DE.2	Sample type	Specification of type of sample collected from patient
	ZRDT.C3.DE.3	Collected By	Name of HCW conducting sample collection from patient
	ZRDT.C3.DE.4	Date of Collection	Date of sample collection from patient
	ZRDT.C3.DE.5	Time of Collection	Time of sample collection from patient
ZRDT.C4. Input RDT Details	ZRDT.C4.DE.1	RDT Manufacturer	Name of the RDT device manufacturer
	ZRDT.C4.DE.2	RDT Name	Device/RDT test model name as assigned by the manufacturer
	ZRDT.C4.DE.3	RDT Code	Unique identifying code assigned by the manufacturer to each device
	ZRDT.C4.DE.4	RDT Lot Number	Lot or batch number to which the individual device belongs
	ZRDT.C4.DE.5	RDT Expiry Date	Expiry date of the device with respect to the lot number
	ZRDT.C4.DE.6	RDT Start Time	Time at which test was begun
ZRDT.C6. Record Test Results	ZRDT.C6.DE.1	RDT Result	Specification of antigen RDT test result
	ZRDT.C6.DE.2	RDT End Time	Time at which the antigen RDT test result was read by HCW
	ZRDT.C6.DE.3	Image of RDT	Image taken from camera phone or tablet of antigen RDT test result
Business process ZRDT.D: Examination			
ZRDT.D1. Receive COVID-19 Test Results	ZRDT.D1.DE.1	RDT Result	Specification of antigen RDT test result
	ZRDT.D1.DE.2	Received by	Name of provider receiving antigen RDT test result
	ZRDT.D1.DE.3	Date of receipt	Date at which the antigen RDT test result was received by provider
	ZRDT.D1.DE.4	Time of receipt	Time at which the antigen RDT test result was received by provider
	ZRDT.D1.DE.5	Retest required? (Y/N)	Whether or not retest is required based on antigen RDT test result
	ZRDT.D1.DE.6	Retest reason	Specification of why retest is required
	ZRDT.D1.DE.7	Additional notes	Image taken from camera phone or tablet of antigen RDT test result

Activity ID Activity name	Data element ID	Data element name	Description and definition
ZRDT.D3. Forward Client Details to Surveillance for Contact Tracing	ZRDT.D3.DE.1	Contact Tracing Required? (Y/N)	Specification of if contact tracing should be begun
	ZRDT.D3.DE.2- DE.10	Client Details	Client registration details
ZRDT.D5. Treat Symptoms	ZRDT.D5.DE.1	Treatment Received? (Y/N)	Whether or not any kind of treatment was provided to patient
	ZRDT.D5.DE.2	Prescription Given? (Y/N)	Whether or not any kind of medicine or prescription was provided to patient
	ZRDT.D5.DE.3	Type of Prescription	Prescription given (List all)
	ZRDT.D5.DE.4	Additional Notes	Any extra notes by provider regarding treatment or prescription
ZRDT.D6 Determine Medical Condition	ZRDT.D6.DE.1- DE.14	COVID-19 Symptoms	Checklist of COVID-19 symptoms
	ZRDT.D6.DE.15	Danger Signs	Diagnostic signs that patient may be in danger or severe distress
	ZRDT.D6.DE.16	Vitals	Provider-determined vitals classification
	ZRDT.D6.DE.17	Referral	Provider-determined referral suggestion based on signs and symptoms
	ZRDT.D6.DE.18	Completed by	Name of HCW/ provider who conducted the medical examination
	ZRDT.D6.DE.19	Date of Medical Examination	Date of patient examination
Business process ZRDT.E: Contract Tracing			
ZRDT.E1. Receive List of COVID-19 Positive Patients	ZRDT.E1.DE.1-DE.9	Client Details	Client registration details
ZRDT.E2. Interview Patient and Identify at Risk Contacts	ZRDT.E2.DE.1	ZNPHI ID	National ID number
	ZRDT.E2.DE.2- DE.10	Contact's Details	Contact's identification and contact details
	ZRDT.E2.DE.11	Is contact a CHW? (Y/N)	Whether or not contact is a community health worker
	ZRDT.E2.DE.12	HCW's Facility name	Facility name where HCW collecting contact information works
	ZRDT.E2.DE.13- DE.17	Contacts Travel Details	Details on client's recent travels
	ZRDT.E2.DE.18	Date of Symptom Onset	Date on which contact began exhibiting symptoms
ZRDT.E3. Reach out to Contact for Screening	ZRDT.E3.DE.1-DE.8	Screening	Checklist of COVID-19 screening questions
	ZRDT.E3.DE.9	Requires COVID-19 testing? (Y/N)	Provider-determined requirement of COVID-19 testing based on symptoms
	ZRDT.E3.DE.10	Sample Collection	Where sample is to be collected from contact

Activity ID Activity name	Data element ID	Data element name	Description and definition
	ZRDT.E3.DE.11	Referral to	Provider-determined referral suggestion based on signs and symptoms
	ZRDT.E3.DE.12	Provider name	Name of HCW suggesting referral
	ZRDT.E3.DE.13	Contact number	Phone number of HCW suggesting referral
Business process ZRDT.F: Referral			
ZRDT.F1. Review Determined Medical Condition of Patient	ZRDT.F1.DE.1-DE.3	Patient Details	Patient registration details
	ZRDT.F1.DE.4-DE.7	Test Details	Details around the antigen RDT that was conducted
	ZRDT.F1.DE.8-DE.24	Medical Examination Details	Details of medical examination
	ZRDT.F1.DE.25	Vitals	Provider-determined vitals classification
	ZRDT.F1.DE.26	Referral	Provider-determined referral suggestion based on signs and symptoms
	ZRDT.F1.DE.27	Completed by	Name of HCW/provider who conducted the medical examination
ZRDT.F3. Call Ambulance	ZRDT.F3.DE.1	Ambulance Called? (Y/N)	Has an ambulance been called for patient referred to facility management?
	ZRDT.F3.DE.2	Time of ambulance call	Time the ambulance was called
	ZRDT.F3.DE.3	Surveillance Officer/ CBV Informed (Y/N)	Has the surveillance officer/CBV been informed on positive patients referred for community management
	ZRDT.F3.DE.4	Additional Notes	Any additional notes
ZRDT.F6. Prescribe Medication for Symptom Management	ZRDT.F6.DE.1	Prescription Given? (Y/N)	Whether or not any kind of medicine or prescription was provided to patient
	ZRDT.F6.DE.2	Type of Prescription	Prescription given (List all)
	ZRDT.F6.DE.3	Additional Notes	Any extra notes by provider regarding treatment or prescription
	ZRDT.F6.DE.4	Administrator ID	Unique ID of the health worker or practitioner who is conducting the examination
	ZRDT.F6.DE.5	Administrator Name	Name of the health worker or practitioner who is conducting the examination
Business process ZRDT.G: Facility Management			
ZRDT.G1. Patient Admitted to Isolation Center	ZRDT.G1.DE.1	Date of admission	Date patient has been admitted to isolation center for facility management
	ZRDT.G1.DE.2	Patient's In- Patient ID	Unique, system generated in-patient ID
	ZRDT.G1.DE.3-DE.4	Patient Details	Patient registration details
	ZRDT.G1.DE.5-DE.8	Test Details	Details around the antigen RDT that was conducted
	ZRDT.G1.DE.9-DE.27	Medical Examination Details	Details of medical examination
	ZRDT.G2.DE.1	Treatment Received? (Y/N)	Whether or not any kind of treatment was provided to patient

Activity ID Activity name	Data element ID	Data element name	Description and definition
ZRDT.G2. Provide Treatment	ZRDT.G2.DE.2	Prescription Given? (Y/N)	Whether or not any kind of medicine or prescription was provided to patient
	ZRDT.G2.DE.3	Type of Prescription	Prescription given (List all)
	ZRDT.G2.DE.4	Additional Notes	Any extra notes by provider regarding treatment or prescription
	ZRDT.G2.DE.5	Administrator ID	Unique ID of the health worker or practitioner who is conducting the examination
	ZRDT.G2.DE.6	Administrator Name	Name of the health worker or practitioner who is conducting the examination
ZRDT.G3. Monitoring of Patient's Condition	ZRDT.G3.DE.1- DE.15	Medical Examination Details	Details of medical examination
	ZRDT.G3.DE.16	Condition Improving (Y/N)	Has the patients' medical condition improved?
	ZRDT.G3.DE.17	Health Assessment Recommendation	Recommendation based on monitoring and assessment of patient's current medical condition
	ZRDT.G3.DE.18	Completed by	Name of HCW/ provider suggesting referral
	ZRDT.G3.DE.19	Date of Monitoring and Assessment	Date of patient's health monitoring and assessment
Business process ZRDT.H: Schedule Follow Up			
ZRDT.H2. Schedule Routine and Targeted Follow Up	ZRDT.H2.DE.1	Patient First Name	Client's first or given name
	ZRDT.H2.DE.2	Patient Family Name	Client's last or family name
	ZRDT.H2.DE.3	Patient ID	Unique, system generated patient ID
	ZRDT.H2.DE.4	Test Location	Facility name where antigen RDT was conducted
	ZRDT.H2.DE.5	RDT Result	Specification of antigen RDT test result
	ZRDT.H2.DE.6	Date of Medical Examination	Date of patient examination
	ZRDT.H2.DE.7	Additional Notes	Any extra notes by provider regarding antigen RDT test
	ZRDT.H2.DE.8	Residence	Residence of patient where community management will be provided
	ZRDT.H2.DE.9	Community Management Period	The number of days the patient should be under community management
	ZRDT.H2.DE.10	Follow up date	Date of patient community management and treatment follow-up with facility
Business process ZRDT.I: Community Management			
ZRDT.I1. Review Register of Positive Cases for Community Management	ZRDT.I1.DE.1- DE.13	Patient Referral Details	Patient details as pertains the community management referral
ZRDT.I2. Contact	ZRDT.I2.DE.1	Patient Contacted (Y/N)	Has the patient been contacted?

Activity ID Activity name	Data element ID	Data element name	Description and definition
Patient and Request Consent to Visit	ZRDT.I2.DE.2	Consent for home visit given (Y/N)	Has the patient given consent for a home visit?
	ZRDT.I2.DE.3	Mode of health Monitoring	How the patient's health condition is being monitored
ZRDT.I3. Make Initial Contact with Patient	ZRDT.I3.DE.1-DE.8	Patient Details	Patient registration details
	ZRDT.I3.DE.9	Next of Kin	Client's next of kin details including name, address and contact number
	ZRDT.I3.DE.10	Next of Kin Contact Number	Contact number of next of kin
	ZRDT.I3.DE.11-DE.17	Residence Details	Residence details for patient where community management will be provided
	ZRDT.I3.DE.18	RDT End Time	Time at which the antigen RDT test result was read by HCW
ZRDT.I4. Monitor Patient via Phone	ZRDT.I4.DE.1-DE.8	Patient Details	Patient registration details
	ZRDT.I4.DE.9	Next of Kin	Client's next of kin details including name, address and contact number
	ZRDT.I4.DE.10	Next of Kin Contact Number	Contact number of next of kin
	ZRDT.I4.DE.11-DE.17	Residence Details	Residence details for patient where community management will be provided
	ZRDT.I4.DE.18	RDT End Time	Time at which the antigen RDT test result was read by HCW
ZRDT.I5. Monitoring Patient's Condition	ZRDT.I5.DE.1-DE.15	Medical Examination Details	Details of medical examination
	ZRDT.I5.DE.17	Condition Improving (Y/N)	Has the patients' medical condition improved?
	ZRDT.I5.DE.18	Health Assessment Recommendation	Recommendation based on monitoring and assessment of patient's current medical condition
	ZRDT.I5.DE.19	Completed by	Name of HCW who conducted the medical assessment
	ZRDT.I5.DE.20	Role	Role of HCW who conducted the medical assessment
	ZRDT.I5.DE.21	Facility Name	Name of facility HCW is attached to
	ZRDT.I5.DE.22	HCW Contact Details	Phone number of HCW who conducted the medical assessment
	ZRDT.I5.DE.23	HCW email address	Email address of HCW who conducted the medical assessment
	ZRDT.I5.DE.24	Date of Medical Examination	Date of patient examination
ZRDT.I6. Refer to Facility for Further Examination	ZRDT.I6.DE.1	Facility Name	Name of facility patient has been referred to
	ZRDT.I6.DE.2	Facility Contact Number	Contact number of facility patient has been referred to
	ZRDT.I6.DE.3	Referral to	Specification of referral location

Activity ID Activity name	Data element ID	Data element name	Description and definition
	ZRDT.I6.DE.4	Additional Notes	Any extra notes by HCW regarding referral to facility
ZRDT.I7. Extend Community Management Period	ZRDT.I7.DE.1	Community Management Period	The number of days the patient should be under community management
	ZRDT.I7.DE.2	Follow up date	Date of patient community management and treatment follow-up with facility
	ZRDT.I7.DE.3	Additional Notes	Any extra notes by provider regarding treatment or prescription

Component 6: Decision Support Logic

Decision ID	ZRDT.DT.1 Client registration				
Business rule	HCW searches for, creates, and updates client details.				
Trigger	ZRDT.A.Registration				
Client in system (ZRDT.A3.DE.1)	Update needed (ZRDT.A3.DE.2)	Output	Action	Annotation	
Yes	Yes	Client is located in system but some of the client's details need to be updated.	Update Client Details (ZRDT.A.6)	Registration process applies to all clients visiting the facility (or during outreach campaigns), regardless of COVID-19 testing.	
Yes	No	Client is located in system and details are up to date.	Check-in Client (ZRDT.A.7)		
No	N/A	Client is not registered in system.	Create Client Record (ZRDT.A.4)		

Decision ID	ZRDT.DT.2 Client's referred for COVID-19 management and treatment.				
Business rule	After client screening, HCW establishes if a COVID-19 test is required				
Trigger	ZRDT.D.Examination				
RDT Results (ZRDT.D1.DE.1)	Retest (ZRDT.D1.DE.5)	Vitals (RDT.D6.DE.16)	Output	Action	Annotation
Negative	No	N/A	Client's results are negative and doesn't require a retest.	Treat Symptoms (ZRDT.D.5)	Recommendations around retesting of the client and vitals categorization is at the discretion of the HCW.
Negative	Yes	N/A	Client's results are negative, but a retest is required.	Testing (ZRDT.C)	
Positive	N/A	Normal	Client's results are positive, and their vitals are normal.	Schedule Follow-Up (ZRDT.H) Community Management (ZRDT.I)	

Positive	N/A	Poor	Client's results are positive, and their vitals are poor.	Facility Management (ZRDT.G)	
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Decision ID	ZRDT.DT.3 Recommendation from contact tracing				
Business rule	The HCW interviews the contact and recommends the next steps				
Trigger	ZRDT.E.Contact Tracing				
Requires COVID-19 testing (ZRDT.E3.DE.9)	Sample collection (ZRDT.E3.DE.10)	Output	Action	Annotation	
No	N/A	The contact doesn't present any symptoms that lead to COVID-19 testing.	End Process	This application is limited to RDT process. There is no data collected in PCR testing in this version.	
Yes	Field	The contact is recommended for COVID-19 testing. Sample to be collected in the field.	Sample Collection for PCR Testing (ZRDT.E.5)		
Yes	Facility	The contact is recommended for COVID-19 testing. Referred to facility for sample collection.	Refer to Health Facility for Testing (ZRDT.E.6)		

Decision ID	ZRDT.DT.4 Treatment and Management of COVID-19 positive patients.				
Business rule	The HCW reviews the examination results and facilitates patient referral and management.				
Trigger	ZRDT.F.Referral				
Vitals (ZRDT.F1.DE.25)	Ambulance called (ZRDT.F3.DE.1)	SO/CBV informed (ZRDT.F3.DE.3)	Output	Action	Annotation
Poor	Yes	N/A	Patient's vitals are poor, and an ambulance has been called.	Refer to Facility Management (ZRDT.F.2) and Call Ambulance (ZRDT.F.3)	Determination of whether the vitals are poor or normal during examination (ZRDT.D) is at the discretion of the HCW.
Poor	No	N/A	Patient's vitals are poor and isolation center is within the facility.	Refer to Facility Management (ZRDT.F.2)	
Normal	N/A	Yes	Patient's vitals are normal and CBV has been contacted.	Prescribe Medication for Symptom Management (ZRDT.F.6), Schedule Follow Up (ZRDT.H) and Refer to Community Management (ZRDT.I)	
Normal	N/A	No	Patient's vitals are normal and has been	Schedule Follow Up (ZRDT.H)	

			advised to self-isolate.		
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Decision ID	ZRDT.DT.5 Facility Management				
Business rule	HCW determines recommendations following patient's health monitoring and assessment				
Trigger	ZRDT.G Facility Management				
Condition improving (ZRDT.G3.DE.16)	Refer to community management (ZRDT.G3.DE.17)	Ready for discharge (ZRDT.G3.DE.17)	Output	Action	Annotation
Yes	Yes	N/A	Patient's condition is improving and has been recommended for referral to community management.	Schedule Follow Up (ZRDT.H) and Refer to Community Management (ZRDT.I)	Recommendations for patient's recommendations following health monitoring and assessment is at the discretion of the HCW.
Yes	No	No	Patient's condition is improving and is recommended to continue with facility management.	Provide Treatment (ZRDT.G.2) and Continue Facility Management (ZRDT.G.17)	
Yes	No	Yes	Patient's condition is improving and has been recommended for discharge.	Discharge (ZRDT.G.6)	
No	N/A	N/A	Patient's condition is not improving and has been recommended to continue with facility management.	Provide Treatment (ZRDT.G.2) and Continue Facility Management (ZRDT.G.17)	

Decision ID	ZRDT.DT.6 Community Management					
Business rule	HCW determines recommendations following patient's health monitoring and assessment					
Trigger	ZRDT.I Community Management					
Condition improving (ZRDT.I5.DE.7)	Facility referral required (ZRDT.I5.18)	Extend management period (ZRDT.I5.18)	Ready for discharge (ZRDT.I5.18)	Output	Action	Annotation
Yes	N/A	N/A	No	Patient's condition is improving and has been recommended to continue with community management.	Continue Monitoring of Patient's Condition (ZRDT.I.5)	Recommendations for patient's recommendations following health monitoring and assessment during community management is at the discretion of the HCW.
Yes	N/A	N/A	Yes	Patient's condition is improving and has been recommended for discharge.	Forward Patient to Facility for Discharge (ZRDT.I.8)	
No	No	No	N/A	Patient's condition is not improving and has been recommended to continue with community management.	Continue Monitoring of Patient's Condition (ZRDT.I.5)	
No	Yes	N/A	N/A	Patient's condition is not improving and has been recommended for referral to facility management.	Refer to Facility for Further Examination (ZRDT.I.6)	
No	No	Yes	N/A	Patient's condition is not improving and has been recommended to extend management period in community management.	Extend Community Management Period (ZRDT.I.7)	

Component 7: Indicators and performance metrics

Indicators

Indicator code	Indicator name	Numerator		Denominator	
		Definition	Computation	Definition	Computation
ZRDT.IND.1	Percentage of COVID-19 RDT tests conducted per day	Number of COVID-19 RDT tests conducted per day	COUNT of COVID-19 RDT tests conducted per day	Total number of clients who have been screened and recommended for RDT COVID-19 testing	COUNT of all clients who have been screened and recommended for RDT COVID-19 testing
ZRDT.IND.2	Percentage of COVID-19 RDT positive cases reported per day	Number of COVID-19 positive cases reported per day	COUNT of COVID-19 positive cases reported per day from COVID-19 RDT tests	Total number of clients who have been undergone RDT COVID-19 testing	COUNT of all clients who have undergone RDT COVID-19 testing
ZRDT.IND.3	Percentage of COVID-19 RDT negative cases reported per day	Number of COVID-19 negative cases reported per day	COUNT of COVID-19 negative cases reported per day from COVID-19 RDT tests	Total number of clients who have undergone RDT COVID-19 testing	COUNT of all clients who have undergone RDT COVID-19 testing
ZRDT.IND.4	Percentage of COVID-19 RDT positive patients referred to community management per day	Number of COVID-19 positive patients referred to community management per day	COUNT of COVID-19 positive patients referred to community management per day from COVID-19 RDT test results examination	Total number of clients who have undergone RDT COVID-19 testing and are found to be positive	COUNT of all patients who have undergone RDT COVID-19 testing and are found to be positive
ZRDT.IND.5	Percentage of COVID-19 RDT positive patients referred to facility management per day	Number of COVID-19 positive patients referred to facility management per day	COUNT of COVID-19 positive patients referred to facility management per day from COVID-19 RDT test results examination	Total number of clients who have undergone RDT COVID-19 testing and are found to be positive	COUNT of all patients who have undergone RDT COVID-19 testing and are found to be positive
ZRDT.IND.6	Percentage of COVID-19 RDT patients discharged per day	Number of COVID-19 patients discharged per day	COUNT of COVID-19 patients discharged per day	Total number of clients who have undergone RDT COVID-19 testing and are found to be positive	COUNT of all patients who have undergone RDT COVID-19 testing and are found to be positive

Aggregate reports

Report ID	Generic persona	Related persona	Report name	Report description	Frequency	Data elements
ZRDT.AR.01	Nurse/EHT/CO	District Surveillance Officer	COVID-19 testing data client registry	Report daily on client information on COVID-19 testing data to District Surveillance Officer	Daily	<ul style="list-style-type: none"> • Patient name • Age • Sex • Address • Phone number • Result • Zone/catchment • Initials of HCWs who conducted the test
ZRDT.AR.02	Lab tech	District Laboratory Supervisor	COVID-19 testing data and testing supplies/consumables usage	Report daily COVID-19 testing data and testing supplies/consumables usage information to District Laboratory Supervisor	Daily	<ul style="list-style-type: none"> • Number of clients tested • Number of positive tests • Number of negative tests • Number of swabs used • Number of RDTs used • Number of gowns used • Number of gloves used • Number of N95 masks used • Number of surgical masks used • Number of hand sanitizer used
ZRDT.AR.03	CBV	Facility in-charge, District Surveillance Officer	COVID-19 patient monitoring forms	Send weekly COVID-19 patient monitoring forms to District Surveillance Officer and facility in-charge	Weekly	Captures image of the COVID-19 surveillance form for each client and submits through WhatsApp (Corresponding data element can be found in the data dictionary under ZRDT.G and ZRDT.I)
ZRDT.AR.04	District Surveillance Officer (DSO)	Nurse/EHT/CO, CBV	COVID-19 surveillance reports for all facilities in the district	Compile daily COVID-19 surveillance reports for all facilities in the district, and share internally with DLS	Daily	The DSO compiles testing and surveillance information from all the facilities. The DSO also creates an EPI curve based on number of positive cases per day to establish trends (separate Excel documents).
ZRDT.AR.05	District Laboratory Supervisor (DLS)	Lab tech	COVID-19 testing reports for all facilities in the district	Compile daily COVID-19 testing reports for all facilities in the district in Excel, and share internally with DSO	Daily	The DLS compiles testing data and testing supplies/consumables usage information from all the facilities. The DLS is responsible for COVID-19 stock management.

Report ID	Generic persona	Related persona	Report name	Report description	Frequency	Data elements
ZRDT.AR.06	District Surveillance Officer	Provincial Biomedical Scientist	COVID-19 surveillance report	Send daily COVID-19 surveillance report to provincial health office	Daily	<ul style="list-style-type: none"> • Total tests conducted (District) • Total confirmed cases (District) • Positivity rate (District) • Number of clients on community management (District) • Performance of swabs against target (District) • Total RDT tests conducted (District) • Total swabs used (District)
ZRDT.AR.07	District Laboratory Supervisor	Provincial Biomedical Scientist	COVID-19 testing report with testing supplies/consumables usage for the district	Send daily COVID-19 testing report with testing supplies/consumables usage information for the district to Provincial Biomedical Scientist	Daily	<ul style="list-style-type: none"> • Total RDT tests done (District) • Total number of positive tests (District) • Total number of negative tests (District)

Component 8: Functional and non-functional requirements

Functional requirements

Requirement ID	Process step	As a.....	I want...
Business process ZRDT.A: Registration			
ZRDT.FXNREQ.001	Gather Client Details	Facility Staff	The system to generate a unique client ID
ZRDT.FXNREQ.002	Gather Client Details	Facility Staff	The system to have the ability to capture Client's first or given name and Clients family name
ZRDT.FXNREQ.003	Gather Client Details	Facility Staff	The system to have the ability to capture client's date of birth and age.
ZRDT.FXNREQ.004	Gather Client Details	Facility Staff	The system to have the ability capture estimated age in years if client birth date is unknown
ZRDT.FXNREQ.005	Gather Client Details	Facility Staff	The system to have the ability to capture client's biological sex at birth
ZRDT.FXNREQ.006	Gather Client Details	Facility Staff	The system to have the ability to capture client's contact details
ZRDT.FXNREQ.007	Gather Client Details	Facility Staff	The system to have the ability to capture client's address including street name, district/county, city and region
ZRDT.FXNREQ.008	Gather Client Details	Facility Staff	The system to have the ability to capture client's next of kin details including name, address and contact number
ZRDT.FXNREQ.009	Search for Client	Facility Staff	The system to have the ability to check whether or not the client information is already existing in system
ZRDT.FXNREQ.010	Check in Client	Facility Staff	The system to have the ability to capture client's purpose for visiting the facility
Business process ZRDT.B: Screening			
ZRDT.FXNREQ.011	Check Client for Signs and Symptoms of COVID-19	Nurse/ EHT/ CO	The system to have the ability to capture the client's thermometer reading and recent history of fever based on thermometer reading of $\geq 37.5^{\circ}\text{C}$
ZRDT.FXNREQ.012	Check Client for Signs and Symptoms of COVID-19	Nurse/ EHT/ CO	The system to have the ability to capture client's symptoms associated with COVID-19 infection (e.g., reported existence of sore throat, shortness of breath etc.)
ZRDT.FXNREQ.013	Check Client for Signs and Symptoms of COVID-19	Nurse/ EHT/ CO	The system to have the ability to capture all travel details of client if they have traveled outside of facility location
ZRDT.FXNREQ.014	Check Client for Signs and Symptoms of COVID-19	Nurse/ EHT/ CO	The system to have the ability to capture referral details of client in cases where the client has been referred to the facility for COVID-19 testing
ZRDT.FXNREQ.015	Refer Client for Testing	Nurse/ EHT/ CO	The system to have the ability to capture the date of client's COVID-19 screening

Requirement ID	Process step	As a.....	I want...
ZRDT.FXNREQ.016	Refer Client for Testing	Nurse/ EHT/ CO	The system to have the ability to capture the facility details of where screening was done
ZRDT.FXNREQ.017	Refer Client for Testing	Nurse/ EHT/ CO	The system to have the ability to capture the specification of why patient has presented for testing
ZRDT.FXNREQ.018	Refer Client for Testing	Nurse/ EHT/ CO	The system to have the ability to capture client's pre-existing comorbid conditions
ZRDT.FXNREQ.019	Refer Client for Testing	Nurse/ EHT/ CO	The system to have the ability to capture lab request details in case client is referred for COVID-19 testing
Business process ZRDT.C: Testing			
ZRDT.FXNREQ.020	Receive Lab Request Form	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to review the patient's details on the lab request form for COVID-19 testing
ZRDT.FXNREQ.021	Input Test Reference Details	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to generate a unique system generated instance of a test
ZRDT.FXNREQ.022	Input Test Reference Details	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to capture geocodes of where test is being conducted, collected from device
ZRDT.FXNREQ.023	Input Test Reference Details	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to capture how biological sample was collected (e.g., type of sample collection, date of sample collection etc.)
ZRDT.FXNREQ.024	Input Test Reference Details	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to track whether the test being conducted immediately follows another, in the event of a repeat test and reason for repeating test
ZRDT.FXNREQ.025	Input RDT Details	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to capture RDT details (e.g., name of the RDT device manufacturer, lot or batch number to which an individual device belongs)
ZRDT.FXNREQ.026	Input RDT Details	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to capture test details (e.g., time at which test begun and the test results)
Business process ZRDT.D: Examination			
ZRDT.FXNREQ.027	Receive COVID-19 Test Results	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to view antigen RDT test results
ZRDT.FXNREQ.028	Receive COVID-19 Test Results	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to capture the details of provider receiving antigen RDT test result
ZRDT.FXNREQ.029	Forward Client Details to Surveillance for Contact Tracing	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to capture contact tracing details in cases of COVID-19 positive patients
ZRDT.FXNREQ.030	Treat Symptoms	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to capture treatment details for the patient (e.g., prescription given)

Requirement ID	Process step	As a.....	I want...
ZRDT.FXNREQ.031	Treat Symptoms	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to capture the medical details on determined referral suggestion based on signs and symptoms
ZRDT.FXNREQ.032	Determine Medical Condition	Nurse/ EHT/ CO/ Lab Tech	The system to have the ability to capture date of patient examination
Business process ZRDT.E: Contract Tracing			
ZRDT.FXNREQ.033	Receive List of COVID-19 positive patients	Nurse/ EHT/ CO/ CBV	The system to have the ability to view client registration details with attached contacts to be traced
ZRDT.FXNREQ.034	Interview Patient and Identify Risk Contacts	Nurse/ EHT/ CO/ CBV	The system to have the ability to view contact's identification and contact details
ZRDT.FXNREQ.035	Interview Patient and Identify Risk Contacts	Nurse/ EHT/ CO/ CBV	The system to have the ability to capture contact's screening information
ZRDT.FXNREQ.036	Reach out to Contact for Screening	Nurse/ EHT/ CO/ CBV	The system to have the ability to capture sample collection details in cases where contact is recommended for COVID-19 testing
Business process ZRDT.F: Referral			
ZRDT.FXNREQ.037	Review Medical Condition of Patient	Nurse/ EHT/ CO/	The system to have the ability to view patient's file of patient that has been referred for facility or community management
ZRDT.FXNREQ.038	Call Ambulance	Nurse/ EHT/ CO/ CBV	The system to have the ability to capture the surveillance officer/CBV details who have been informed on positive patients referred for community management
Business process ZRDT.G: Facility Management			
ZRDT.FXNREQ.039	Patient Admitted to Isolation Centre	Nurse/ EHT/ CO	The system to have the ability to capture the date patient has been admitted to isolation center for facility management
ZRDT.FXNREQ.040	Patient Admitted to Isolation Centre	Nurse/ EHT/ CO	The system to have the ability to generate a unique, system generated In-patient ID
ZRDT.FXNREQ.041	Patient Admitted to Isolation Centre	Nurse/ EHT/ CO	The system to have the ability to view patient's file
ZRDT.FXNREQ.042	Monitoring of Patient's Condition	Nurse/ EHT/ CO	The system to have the ability to capture details on the monitoring and assessment of the patient, e.g., Has the patients' medical condition improved?
ZRDT.FXNREQ.043	Monitoring of Patient's Condition	Nurse/ EHT/ CO	The system to have the ability to capture recommendations based on monitoring and assessment of patients' current medical condition
Business process ZRDT.H: Schedule Follow Up			
ZRDT.FXNREQ.044	Schedule Routine and Targeted Follow Up	Nurse/ EHT/ CO	The system to have the ability to view the patients file
ZRDT.FXNREQ.045	Schedule Routine and Targeted Follow Up	Nurse/ EHT/ CO	The system to have the ability to capture the recommended number of days the patient should be under community management

Requirement ID	Process step	As a.....	I want...
ZRDT.FXNREQ.046	Schedule Routine and Targeted Follow Up	Nurse/ EHT/ CO	The system to have the ability to auto calculate the date of patient community management and treatment follow-up with facility
Business process ZRDT.I: Community Management			
ZRDT.FXNREQ.047	Review Register of Positive Cases for Community Management	Nurse/ EHT/ CO/ CBV	The system to have the ability to capture patient details as pertains the community management referral e.g., has patient given consent for home visit?
ZRDT.FXNREQ.048	Contact Patient and Request Consent for Home Visit	Nurse/ EHT/ CO/ CBV	The system to have the ability to capture how the patient's health condition is being monitored, i.e., home visit or phone calls
ZRDT.FXNREQ.049	Monitoring of Patient's Condition	Nurse/ EHT/ CO/ CBV	The system to have the ability to capture patients medical condition progress during daily monitoring and assessment
ZRDT.FXNREQ.050	Monitoring of Patient's Condition	Nurse/ EHT/ CO/ CBV	The system to have the ability to capture recommendations based on monitoring and assessment of patients' current medical condition
ZRDT.FXNREQ.051	Monitoring of Patient's Condition	Nurse/ EHT/ CO/ CBV	The system to have the ability to capture the HCW details of the CBV who conducted the medical assessment

Non-functional requirements

Requirement ID	Category	Non-functional requirement
ZRDT.NFXNREQ.001	Security – confidentiality	Provide password-protected access for authorized users
ZRDT.NFXNREQ.002	Security – confidentiality	Provide a means to ensure confidentiality and privacy of personal health information
ZRDT.NFXNREQ.003	Security – confidentiality	Provide ability for allowed users to view confidential data
ZRDT.NFXNREQ.004	Security – confidentiality	Anonymize data that is exported from the system
ZRDT.NFXNREQ.005	Security – confidentiality	Prevent remembering username and password
ZRDT.NFXNREQ.006	Security – confidentiality	Automatically log out the user after specified time of inactivity
ZRDT.NFXNREQ.007	Security – confidentiality	Provide encrypted communication between components
ZRDT.NFXNREQ.008	Security – authentication	Notify the user to change their password the first time they log in
ZRDT.NFXNREQ.009	Security – authentication	Adhere to complex password requirements
ZRDT.NFXNREQ.010	Security – authentication	Provide a mechanism to securely change a user's password
ZRDT.NFXNREQ.011	Security – authentication	Notify the user of password change to their account
ZRDT.NFXNREQ.012	Security – authentication	Reset a user's password in a secure manner
ZRDT.NFXNREQ.013	Security – authentication	Lock a user out after a specified number of wrong password attempts
ZRDT.NFXNREQ.014	Security – authentication	Notify a user if their account is locked due to wrong password attempts
ZRDT.NFXNREQ.015	Security – authentication	Provide role-based access to the system

Requirement ID	Category	Non-functional requirement
ZRDT.NFXNREQ.016	Security – audit trail and logs	Log system logins and logouts
ZRDT.NFXNREQ.017	Security – audit trail and logs	Record all authentication violations
ZRDT.NFXNREQ.018	Security – audit trail and logs	Log all activities performed by the user, including date-and-time stamp
ZRDT.NFXNREQ.019	Security – audit trail and logs	Log access to views of individual client records
ZRDT.NFXNREQ.020	Security – audit trail and logs	Log access to data summaries, reports, analysis, and visualization features
ZRDT.NFXNREQ.021	Security – audit trail and logs	Log exchange of data with other systems
ZRDT.NFXNREQ.022	Security – audit trail and logs	Generate analysis of the usage of different system features and reports
ZRDT.NFXNREQ.023	Security – audit trail and logs	Log all data and system errors
ZRDT.NFXNREQ.024	Security – user management	Allow user with permission to create a new user and temporary password
ZRDT.NFXNREQ.025	Security – user management	Provide role-based access
ZRDT.NFXNREQ.026	Security – user management	Allow roles to be associated with specific geographical areas and/or health-care facilities
ZRDT.NFXNREQ.027	Security – user management	Allow cascading user management and assignment of roles
ZRDT.NFXNREQ.028	Security – user management	Allow user to change their own password
ZRDT.NFXNREQ.029	Security – user management	Allow admin user to request password reset
ZRDT.NFXNREQ.030	Security – user management	Notify the user to regularly change their password
ZRDT.NFXNREQ.031	Security – user management	Allow each user to be assigned to one or more roles
ZRDT.NFXNREQ.032	Security – user management	Support definitions of unlimited roles and assigned levels of access, viewing, entry, editing and auditing
ZRDT.NFXNREQ.033	System requirements – general	Provide a unique version number for each revision
ZRDT.NFXNREQ.034	System requirements – general	Enable earlier versions of a record to be recoverable
ZRDT.NFXNREQ.035	System requirements – general	Enable deployment in an environment subject to power loss
ZRDT.NFXNREQ.036	System requirements – general	Work in an environment that is subject to loss of connectivity
ZRDT.NFXNREQ.037	System requirements – general	Generate IDs that are unique across different installations or sites
ZRDT.NFXNREQ.038	System requirements – general	Report version number when saving data to the database

Requirement ID	Category	Non-functional requirement
ZRDT.NFXNREQ.039	System requirements – general	Be designed to be flexible enough to accommodate necessary changes in the future
ZRDT.NFXNREQ.040	System requirements – general	Allow for offline and online functionality
ZRDT.NFXNREQ.041	System requirements – general	Show the number of records that are not yet synchronized
ZRDT.NFXNREQ.042	System requirements – general	Have ability to easily back up information
ZRDT.NFXNREQ.043	System requirements – general	Warn user if no valid backup for more than a predefined number of days
ZRDT.NFXNREQ.044	System requirements – general	Must have the ability to store images and other unstructured data
ZRDT.NFXNREQ.045	System requirements – scalability	Scalable to accommodate new demands
ZRDT.NFXNREQ.046	System requirements – scalability	Be able to accommodate at least [x number of] health-care facilities
ZRDT.NFXNREQ.047	System requirements – scalability	Be able to accommodate at least [x number of] concurrent users
ZRDT.NFXNREQ.048	System requirements – usability	Be user-friendly for people with low computer literacy
ZRDT.NFXNREQ.049	System requirements – usability	Provide informative error messages and tooltips
ZRDT.NFXNREQ.050	System requirements – usability	Alert the user when navigating away from a form without saving
ZRDT.NFXNREQ.051	System requirements – usability	Support real-time data-entry validation and feedback to prevent data-entry errors from being recorded
ZRDT.NFXNREQ.052	System requirements – usability	Simplify data recording through predefined drop-down menu or searchable lists, radio buttons, check boxes
ZRDT.NFXNREQ.053	System requirements – usability	Support multiple languages
ZRDT.NFXNREQ.054	System requirements – usability	Use industry standard user interface practices and apply them consistently throughout the system
ZRDT.NFXNREQ.055	System requirements – usability	Easy to learn and intuitive to enable user to navigate between pages
ZRDT.NFXNREQ.056	System requirements – usability	Provide guidance to users to better support clinical guidelines and best clinical practices
ZRDT.NFXNREQ.057	System requirements – usability	Be reliable and robust (minimize the number of system crashes)
ZRDT.NFXNREQ.058	System requirements – usability	Adjust display to fit small screens (e.g., mobile phones)
ZRDT.NFXNREQ.059	System requirements – configuration	Configure the system centrally
ZRDT.NFXNREQ.060	System requirements – configuration	Configure business rules in line with guidelines and standard operating procedures (SOPs)
ZRDT.NFXNREQ.061	System requirements – configuration	Configure error messages

Requirement ID	Category	Non-functional requirement
ZRDT.NFXNREQ.062	System requirements – configuration	Configure workflows and business rules to accommodate differences between facilities
ZRDT.NFXNREQ.063	System requirements – interoperability	Communicate with external systems through mediators
ZRDT.NFXNREQ.064	System requirements – interoperability	Provide access to data through application programming interfaces (APIs)
ZRDT.NFXNREQ.065	System requirements – interoperability	Link with insurance systems to verify eligibility and submit claims
ZRDT.NFXNREQ.066	System requirements – interoperability	Exchange data with other approved systems
ZRDT.NFXNREQ.067	System requirements – interoperability	Accept data from multiple input methods including paper, geocoding (GPS)
ZRDT.NFXNREQ.068	System requirements – interoperability	Communicate with external systems through mediators
ZRDT.NFXNREQ.069	System requirements – hardware and connectivity	Allow for data exchange and efficient synchronization across multiple facilities and points of service when Internet is available, even when it is intermittent and slow