

ROGEE MEDICAL  
INFORMATION SYSTEM



LABORATORY MODULE  
Version 6.0



## **Laboratory Information System**

The Laboratory module is an electronic web-based application designed with high flexibility and ease of usage, implemented in single clinics and polyclinics. It is a complete management system that handles all business functions from patient management, results generating, to physician decision making.

RIS makes information immediate, easy to access, easy to update, and always available for those who need to know. It has been made up of integrated set of functions that consolidate the medical center's information base.

Radiology helps managing the administrative and operational functions regarding radiology. Functions provided order processing, specimen collection, setting up the codes for each specimen, lab interface and management system, flagging of abnormal results, as well as results reporting to the Medical Records. It keeps track of all the consumed items during any laboratory procedure.

Radiology system is designed and written specifically for the laboratory provider to take advantage of full integration with the medical center health information system.

### **Objectives**

The laboratory module is a means for E-health care that facilitates management of the workflow of laboratory tests and equipment. The ultimate objective is to store patients' results and provide healthcare professionals with a quick and accurate access to them. Only eligible people with access permittance are consent to access the system, thereby maintaining confidentiality of patients' films. Specific objectives include:

- 1- Establishment of a paperless environment while maintaining a digital recording

- 2- Optimize utilization of medical resources at the medical center
- 3- Increase efficiency of medical care outcome
- 4- Monitoring and control the laboratory workflow process

### **Functionality:**

- Access is permitted to authorized staff from within and outside the health care
- Statistical data generation pertaining to invariable parameters
- Keyboard use for data entry is minimized, compensated by a drop-down list
- All coded selections can be automatically obtained by direct inquiry on the corresponding table or master file, using the browse and select facilities
- Arabic support is included for all user functions
- On-line access and Integration with the Master Patient Index (MPI)
- Integration with the Appointment System
- Integration with the warehousing/inventory system
- Integration with the clinician module
- Integration with the order management

### **Authentication and Authority:**

A- The system ensures high security, business integrity and confidentiality through full information log to the system by the administrator and eligible users. The system is defined by default according to userID for permittance or denial to access information, for the reason of business and medical ethics.

## B- Security:

### 1- On Operating System Level:

- All processes on system are known through the user authentication
- Intranet-based, which disables accessibility to the network
- Multiple checking by clerks, before results archiving by the technologists

### 2- On Application and User Level:

The database administration does not have access to user password because passwords are encrypted on a 64 bit function.

## **Description:**

The Laboratory system has been designed to make efficient use of the common User's capabilities in any health care facility. It is designed in a very flexible and easy to use manner, based on a GUI (Graphic User Interface) application.

The Lab Interface is considered the link between the healthcare professionals and the devices used in making the lab investigations. This communication is done automatically where the clinician system sends all investigation orders and requests related to the lab straight forward to the lab devices, which in turn issues the results of each investigation and sends it again to the sheets specialized for keeping these results and save it in the patient's medical record. In this manner, the laboratory system will be able to keep records of patients' encounters with the lab, and make the results visible to healthcare practitioners.

To access the system, the user must first be defined to both the machine and the application. If already defined, then from the System Login menu the user fills in his ID and password.

### **Laboratory System Modules:**

The laboratory system as a whole is comprised of two types:

I. Medically related sections: for patients encountered at the healthcare centers

- 1- Hematology
- 2- Bacteriology
- 3- Chemistry
- 4- Endocrinology
- 5- Serology
- 6- Virology

II. Occupational Section: for frequent testing of hazardous substances

- 7- Toxicology

For every section, the system maintains a list of all available tests, and is updated whenever a new test is introduced. For every test is assigned a unique LOINC code to facilitate the exchange and pooling of results. As the medically-related sections are integrated into the MPI with continuous updating, the occupational section does not relate to the MPI and their specimens are transferred to the lab from different departments. However, all specimens of both laboratory types are

provided with bar codes for unique identification, and the results of each specimen code can be accessible and viewed irrespective of what section the test was performed in.

### **Specimen Collection**

When a specimen enters the lab and is received by the system, it is automatically assigned a number in chronological order and according to a user defined scheme. The laboratory system as well assigns a specimen code for each lab sample, in addition to the ability to delete this code if required.

When the specimen enters the lab, the system is accustomed to produce labels with bar codes on them. When the specimen is run on the machine, the bar code is scanned and all information pertaining to patient demographics and nature of test will be read by the machine through the bar code. For every request, the system supports the production of a list of tests and specimens received, and the sequence of destination for every specimen by lab section.

### **Order Processing**

Orders processing functions are made through a user friendly interface to handle orders for a specific department or a specific patient. This function is used to keep a timely track of orders after being entered. It can also be used to merge similar orders to decrease the number of samples to collect, and to handle orders in a specific interval of time or a specific order status, e.g: detection of time the test request was issued, time the specimen was collected, and time the specimen was received by the system. It also detects any duplication of orders and procedures if requested.

Procedures that require multiple collections are issued on one request (e.g. stool test for 3 consecutive days) and entered as one order onto the system, where results for every collection is generated and archived.

### **Result Entry**

The last step of an order is to register the results. The result entry windows and forms are completely user defined through a very easy interface. The system allows the results to be processed manually with support to numeric and alphabetical formats. Results are generated on worksheets or directly appear on the instruments and are related to patient's name, age/sex/medications, analyzing machine, workstation, normal ranges in relation to defined parameters, adequate time of collecting the test sample, and information related to a manual of procedures.

In case results fall outside the defined parameters for a test, the system will automatically generate a request for additional testing. A result form is defined at item's level, and is subjected to calculation. The calculations are performed manually or upon their referencing with other sample tests or books and tables.

Result Entry functions are:

- Defined range for every test
- Result entry within the range
- Flag abnormal results

For a given patient, delta check methods compare are incorporated to detect the differences (deltas) between today's test values and corresponding previous test

values with given thresholds. If a delta exceeds its threshold, the value for “today” fails the delta check and is suspected of being erroneous.

### **Laboratory System Integration:**

The Laboratory module is a fully integrated system, as one entry automatically updates all files related to the function on hand. It is a result of an integrating the healthcare enterprise (IHE) into a sole framework. The results are improved accuracy, as well as substantial time saving:

- Upon the archiving of results, the system automatically links them to the patients’ medical files in the Master Patient Index system
- Integrated with the order management module which allows the transfer of requests from different sections and specimen orders to be processed in the laboratory.
- integrated with the clinician module, which allows to view notifications of processed lab tests
- flexibility to interface with new analyzers, as based on directions and manuals provided from vendor, in different directions and modes to enhance exchange of data

### **Field Types:**

- 1- Mandatory fields, i.e. fields which always have to be filled in. If you forget to fill in such a field, a message (e.g filed has to be specified) appears, or a message containing only the name of the field which still has to be complete.
- 2- Optional fields: Fields where an entry is not compulsory

- 3- Display fields: fields where the content may not be changed
- 4- Search fields: free text or by codes, using a wildcard

## **Check Boxes**

In a set of check boxes, any number of items can be selected at one time.

A single check box is displayed in some dialog boxes. Using the mouse, the user can click on the check box next to the required item to select it.

## **The Browse Facility**

To facilitate the data entry process, the laboratory module supports the browse facility. The browse facility is used to list all the currently available values of a displayed field, all medical information of a patient's file, medical orders, and lab results. Search may be achieved by specimen codes or by entering a free text:

- ✓ **By Patient's Name:** The user can enter here a starting character, a full name, or a generic name. The full name will be used to locate the medical number, while the generic search will be used in case you are not sure about the way the patient's name is written. The generic search will show a patients' list that includes all the patients whose data meet the entered search criteria. To select a specific patient, the user has to click on his name/record by using the mouse.
- ✓ **By Family Name:** The user enters the patient's family name.
- ✓ **By Middle Name:** The user enters the patient's middle name.
- ✓ **By Mother's Name:** The user enters the patient's mother name.
- ✓ **By Sex Code:** displaying the choices of sex; M (Male), and F (Female), as previously defined to the system.

- ✓ **By Patient's Tel:** The user enters the telephone number of the patient's current residence.
- ✓ **By ID Number:** The user enters the ID number of the patient numerically.
- ✓ **By Medical No:** The system will list the patient identified by medical record number entered.

### **Statistical reporting:**

The system is accustomed to generate statistical data pertaining to:

- 1- Various results of specific tests
- 2- Measures of quality control indicators: sensitivity, specificity, bias, outliers, precision and accuracy
- 3- The trend of results in relation with a specific test, in junction with a graphical display supported by the system (check 5 result function)

### **Warnings/Alerts:**

The system supports warnings/alerts for several cases the radiologist or medical staff have to be alerted about. E.g.:

- If results entered are not within the allowed parameters
- If an lab test conflicts with another
- Notifications are generated when a lab test is processed

**Print window:**

In the print window, labels are generated as print-outs enlisting the barcode. To carry out this action, the staff member has to be allocated the right to print out results.

Printing is also supported for the results reports after the selection of the patient, irrespective of the kind of laboratory. Each print-out appears as a further letter with date and time of issue. Printing is supported in Arabic and English formats.