OGER MEDICAL
INFORMATION SYSTEM

RADIOLOGY MODULE
Version 6.0
Radiology Information System (RIS)

The Radiology module is an electronic web-based application designed with high flexibility and ease of usage, implemented in single clinics and polyclinics. RIS is a complete management system that handles all the business functions from patient management, diagnosis and reporting, to inventory control.

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 include order request, registration, examination, results reporting, work list preparation, results approval, appointment scheduling, and management system.

It keeps track of all the consumed items during any radiology procedure.

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

Objectives

The radiology module is a means for E-health care that facilitates management of the workflow of radiology services and equipment, in addition to supporting entry of work records and reports. The ultimate objective is to store all Patient images, scans, and ECG graphs on the System or as electronic files due to its integration with PACS, thus eliminating the unnecessary retrieval and dissemination of film. Only eligible people with access permissance are consent to access the system thereby to maintain 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- Optimize radiology resources and streamline workflow
4- Increase efficiency of medical care outcome

**Functionality:**

- Access is permitted to authorized staff of the respective healthcare center
- Provides on-line assistance through extensive help screens, and improves usability with canned text phrase inclusion from user-defined codes
- Statistical data generation pertaining to invariable parameters
- Keyboard use for data entry is minimized, compensated by a drop-down list
- Browse facility to facilitate findings, either by entering a free text or coded data
- Arabic support is included for all user functions
- Integration with the Master Patient Index (MPI)
- Integration with the Appointment System
- Integration with the warehousing/inventory system
- Integration with the clinician module
- Integrated 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
- Provision to authorize observing, changing, approving and generation of reports

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:**

RIS module is designed to collect patient's data, and make it available for personnel providing patient's care. It is designed in a very flexible and easy to use manner, based on a GUI (Graphic User Interface) application. 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.

Built into the RIS module is the ability to tailor the system to meet the changing requirements of the health care institution. HMIS Radiology can be customized using techniques that do not require traditional data processing expertise. The people customizing the system are those who use it, people whose primary concern is health management.

Once a patient is encountered, all his biographic data as well as his critical data will be linked to his medical number. The technician or radiologist examining the patient will note down the starting and ending time of examination. Patient-related information can be provided throughout the healthcare center, whenever it is needed.

As the system is integrated with the MPI and clinician module, the radiologist is capable of issuing his report and adds it to the patient’s profile to be viewed by other physicians upon notification by the system that the report is finalized. The report will include information related to the date, starting and ending time of examination, name of technician or radiologist, name of equipment and film. All scan and films are stored into the PACS system and are given a unique bar code that corresponds for every patient. The bar codes are instilled to facilitate searching for patients’ images and reports, where printouts are generated upon demand.

**Basic data:**

Data which are repeatedly used for the work in Centricity RIS and which are not much changing are so called basic data. These include, for example, the individual procedures, services, referral sources, workplaces, etc.
These data are defined by the system support staff members and are made available in selection windows. If a choice of basic data is available in a field, then generally it is not possible to enter own text into that field. Changes and additions to the basic data can only be done by staff members with the necessary assess authorization (e.g. system support staff members).

Procedure Services:
Procedures correspond to requests (e.g. CT of skull) these are allocated to the patient at appointment allocation or at registration services are more specific requirement for the notified procedure (e.g. CT of skull with contrast medium). The Basic data structure in RIS is: Workplace → modality → Procedure: Selection of the area in registration in junction with the medical equipment and service recording.

Patient data:
If the patient data are transferred from the Master Patient Index (MPI) in general it is not possible to change the patient data (name, first name, date of birth) in RIS. Changes to these should be done directly in MPI and are forwarded to RIS.

Field Types:
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 filed which still has to be complete.
Optional fields: Fields where an entry is not compulsory
Display fields: fields where the content may not be changed
Search fields: free text or by codes, using a wildcard
**Workplace:**

The workplace is the place where the procedure is provided. Every workplace is also automatically available as an appointment book; each resource, radiologist/technician or X-ray apparatus, has a defined daily schedule that is integrated within the appointment system to view the booked appointments.

In the basic data, a medical device can be allocated to a workplace and depending on this allocation the DICOM work lists are created after logon. Via the workplace, in RIS, for example, work lists are created so that patients can be called up by reference to the workplace.

Once the workplace is allocated the daily overview for the day for which the appointment was request, is accessible. If all data required to issue the appointment have been completed, the system allows to schedule the procedure by clicking “schedule appointment”. It is not possible to confirm an appointment or registration for procedures which were not allocated to a workplace in the basic data.

**Registration:**

The values (admission type and referral source) of the selected pre-setting are transferred into the registration field and can be changed if required.

In the procedures block, the appointment values for this day are displayed automatically. If appointment times are displayed here which should not yet be registered, these can be removed from the registration. At the same time, additional procedures can be added for the same request per patient.
Apart from its integration with the appointment system, the RIS module is defined a maximum number of walk-in cases that can be examined. Over-booking is as well provided by the system, based on the patient’s criteria.

**Adding changing procedures:**

In the procedure block, it is possible to enter additional procedures. This means that it is not necessary to switch to the registration for an addition examination of the patient. After the adding of a procedure it is possible to confirm the service directly.

**Preparation Group:**

The RIS module is apt to define the groups of the patients that must receive special kind of treatment or preparation before the radiology test, and can select an already defined one to make any necessary updates.

The system is a graphically based application that is buildup to read all signals from the radiology equipments and portray the produced images, ultimately integrated into the patients’ medical file.

**RIS Integration:**

The RIS module is a fully integrated system, as one entry automatically updates all files related to the function on hand. The results are improved accuracy, as well as substantial time saving:

- Provides the processing of radiology order entry and diagnoses, and results reporting, including creation of dynamic profile orders, which automatically links functionally related orders to maximize resource scheduling requiring only a single result for all of the related procedures.
• Generates appointment schedules automatically, based on user-defined resources and scheduling periods, with rescheduling for both individual and block appointments.
• Tracks both patient and order progress, including patient’s waiting time, procedure’s start and end time, as well as information on the film media, size, and quality.
• Provides an extensive film library management and tracking system, including optional bar code processing, borrower processing, loan requests, over-dues, and on-line access to location of the film, results and loan history.
• Integrated with the warehousing and procurement module, thereby allowing it to keep updates of the radiology-related items in stock or in shortage, and to request orders to compensate for the missing or in-short items.
• Integrated with the order management module which allows radiologists, clinicians and medical staff to add orders from within the radiology department.

**Cancel Appointment:**

A procedure can be canceled from the appointment information screen. If this is an originally request dataset, a reason must be given for the cancellation. The cancellation request is directly sent to the appointment system.

**Referral Source:**

Referral sources are divided into the following sub-groups:
• external physicians (i.e. established physicians, individual as well as well as joint practices)
• Internal and external medical centers.

The referral source allocated to a case at registration is automatically enlisted in the report letter.

**Service Block:**

The system allows for blocking of apparatus and procedures on defined days such as holidays and/or maintenance periods. The scheduling of appointments will be adjusted on the appointment system accordingly.

Nevertheless, the system supports blocking of appointments for patients after a defined number of “no-shows”.

**Reports:**

I. **Radiologist:** After examination, the specialist notes down his report as normal result template, text blocks- as a list of preloaded data or text free. The system provides a default template that could be edited; however RIS allows the user to customize his own format of the report. In case the technician has noted down his findings, the system does not finalize its attachment to the patients’ record, unless approved by the specialist (radiologist/ultrasound). Upon the approval of the specialist and its attachment to MPI, the physician requesting the diagnosis can directly study the radiology outcome.

To monitor and sustain the confidentiality of the films and scan, the system keep records of their movements and destination from within and outside the department and/or medical center.
II. Statistical reporting: The system is accustomed to generate statistical data pertaining to:
1- Type of user (normal, walk-in or emergency)
2- Number of “no-shows” for an appointment
3- Number of canceled appointments with their justifications

PACS Interfacing
The radiology system will be interfacing with PACS to feed it with all patient information required to complete image storing process. The interfacing technique is based on HL7 messaging technology.

The Browse Facility
To facilitate the data entry process, the RIS module supports the browse facility. The browse facility is used to list all the currently available values of a displayed field, all medical information in relation to patient’s file, medical orders, and patients appointments...etc Search may be achieved by codes from the drop down list 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.
✓ 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.

**Warnings/Alerts:**

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

- More than one procedure requested at the same time

- If a report already exists for a procedure that shall be canceled the report has to be deleted first.

- If the same procedure is repeated for the same user within a short period of time interval (e.g. CT scan for two consecutive days)

- At the level of the specialist in case of radiation overdose

- Assigning of females dates, based on their age

- Radiology-related in-stock items that have reached a minimum level
**Print window:**

In the print window, all the necessary layouts which can be printed out on registration are listed, e.g. appointment notices, referral letters, and patient information. Printing is supported in Arabic and English formats. To carry out this action, the staff member has to be allocated the right to print out report in the basic data. Staff members with access to the written reports automatically also have printing rights.

Printing is also supported for the examination reports: after the selection of the patient, it is possible to select the desired procedure, the letter associated with it and the recipient in the lists displayed. Each print-out appears as a further letter with date and time of issue.