BRIT System’s **Roentgen Works Critical Result Reporting** (RWCRR) is a pure browser based solution. It supports the flagging of urgent findings/critical test results (by reporting clinicians), immediate communications, and complete on-going tracking of results to the ordering clinicians. All updates to the critical result are instantaneously available across the enterprise.

A reporting clinician can easily use RWCRR to effectively communicate their findings in accordance to ACR guidelines and JCAHO initiatives.

**With a few simple automated steps RWCRR can improve patient safety, increase productivity and help to achieve compliance!**

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**System Actions:**
- Auto Documented Conversations Can Be Documented by Users of Browser

**STEP 4**
- Users “Complete” on Phone or via Browser

**STEP 5**
- Critical Results History Added to Report

See Pages 2-5 For a Step by Step Guide.

**Some Benefits of RWCRR Include:**
- Achieves JCAHO National Patient Safety Goal Objective #2
- Seamlessly interfaces with existing workflow (PACS, RIS or EMR)
- Reporting clinician types note in browser and the system utilizes a multifaceted approach to contact the ordering physician
- Ordering clinician is notified proactively via the web, fax, email and/or phone
- Auto-calling of results happens directly and becomes part of the critical results history
- System can connect reporting physician to recipient by phone
- System supports read-backs
- Web interface can be accessed on a computer, laptop or smart phone
- Administrator panel for message monitoring and statistical analysis
- Critical history log for audit trails including messages, users and time stamps archived
- Once “Completed”, history of communication sent as an addendum to the final report

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Test/Study Information Enters Server Via HL-7 or DICOM
UrgentWorks can be readily implemented within any workflow environment: it builds a patient worklist via either an HL-7 interface to a department’s order entry system or via DICOM by regenerating order information from a study’s DICOM header metadata. As an optional step, technologists can change the status of the exam and the contact information for the exam anytime until the study has been reported (or read, if the system receives that information). The order information includes the ordering physician and study location. Profiles in the system dictate if a location or physician is to be called (or both). These profiles also indicate the primary and secondary methods for communicating any urgent results to that patient/location as well as backup person if the first communications aren’t working.

STEP 1

Site Gives Priority of “Stat” and/or Reading Doctor See Urgent Finding
Orders flow through the critical result steps if 1) the study priority is “Stat” or 2) an Urgent Finding is called out.

STEP 2

Reading Doctor Enters Finding Into Server
Critical findings are entered by the radiologist via
1) directly typing them into the browser;
2) typing into their workstation which has been integrated with UrgentWorks via the API; or
3) Roentgen Works parsing it out of the radiologist’s report. This allows the urgent call to start without impeding the radiologist’s workflow. The report can come from any HL-7 report message. System administers enter any number of triggers for the parsing engine; i.e there can be many of them.

STEP 3

System Calls Location/Clinician and Leaves Message and/or Sends Fax & E-mail
UrgentWorks starts to contact the indicated user/patient location, based on the patient location profile. This may include UrgentCall if a user/location has provided phone numbers as a contact method (highly recommended). If calling a patient location, the system asks the person answering the phone to provide a PIN to ID themselves.

The auto call feature converts the reporting clinician’s test to an audio message that can be acknowledged on the fly by the recipient of the phone call. Other contact methods include faxing, emailing and posting it on the web page. The critical findings and history of the communications can be viewed and updated by all involved users on the browser interface or the WebWorks for iPad interface. The system continues to attempt to reach a location or individual, based on the relevant profile, until the study has been acknowledged. All attempts are recorded in the Urgent Finding History File.

STEP 4

Users “Complete” on Phone or via Browser
UrgentWorks starts to contact the indicated user/patient location, based on the patient location profile. This may include UrgentCall if a user/location has provided phone numbers as a contact method (highly recommended). If calling a patient location, the system asks the person answering the phone to provide a PIN to ID themselves.

STEP 5

Critical Results History Added to Report
The recipient acknowledges the Urgent Finding by one of the following methods:
1) pressing the #1 on their phone at the end of the message, as prompted. UrgentCall also supports connecting the referring physician directly to the radiologist or directly to the patient location, as another option during the phone call. This automatically acknowledges the receipt of the information;
2) selecting a radial button indicating they acknowledge the finding via a workstation with the integrated API;
3) by entering the information into the UrgentCalling application’s web page, where it will be listed under an Actions Needed tab;
4) it is entered by another user, documenting the conversation with the recipient.

As an option, the Urgent Finding History can be returned to the RIS/HIS/EMR as an addendum to the report.
Steps That Can Happen Anytime

Viewing of the Urgent Finding History for a given study
At any point in time, the Urgent Finding History can be reviewed from within the application.

Running FireDrills for Contact Number Verification
At any point in time, FireDrills can be run. Obtaining the initial contact information is a relatively large work effort. This can be made simpler if the Medical Records department maintains this information and can provide it in a file format during system setup. Note that the referring physician phone number may be sent as part of the order information, but this is not sufficient. Once the initial numbers have been entered into the system, UrgentWorks runs an automated FireDrill to call all the numbers and have the users verify that these are correct. It is recommended that this drill be run once or twice yearly as part of a disaster recovery drill. Managers can be given reports showing all the failed numbers which can be corrected and rerun separately. Once the numbers have been entered into the system, it is the responsibility of the users to maintain their contact numbers via the web interface. This can be integrated into a site’s portal.

Setting up Users
Non-system manager users, referred to as site coordinators, have the privileges to set-up and maintain IDs that can be called for emergency contact. Typically, there will be a few of these at each patient location that uses the system. That way, a user in the ER, for example, can dynamically enter new contact information for studies that the system can call with results.

Running Management Reports
Also, at anytime, reports can be run to analyze the critical results histories, looking at turn-around times based on a variety of variables, such as for a given facility or patient location. Data can be downloaded into excel for further enhancements and analysis. The diagram below shows the report for a selected time frame for urgent findings.

Working with Teleradiology Groups
Urgent Works is a module in Roentgen Works which was originally developed as a teleradiology solution. Studies can be DICOM stored to Roentgen Works(RW) which can forward them to the teleradiology group. The time the study was received at RW and delivered to the teleradiology group is part of the exam history and can be included as part of the Urgent Works report tool and statistical analysis.

The teleradiology group can also use Roentgen Works as their worklist and utilize a BRIT or OEM workstation with an API (such as Osirix). With customization, the urgent finding can be directly entered from the workstation.

If the RW is not involved in the handling of the DICOM images, then RW will not know when the teleradiology group received the study and the urgent finding history starts at the time Urgent message was received at the server.

The teleradiology group can also read directly from RW via an imbedded, browser-based viewer. Note that even if this is not what they would normally use for reading, it can be very handy if a large study must be read, as the study does not need to be delivered to a workstation (just the screen image is delivered).

Teleradiology groups can use Roentgen Works to verify that a study is ready to be read and also to allow the sending sites to add additional information to the study. For example, technologists / clerks can change the status of the study, alter the order information and attach documents or faxes to the study. The radiologist can always directly enter the urgent findings into the browser.

The teleradiology group can return the report to Roentgen Works via HL-7 and Roentgen Works will parse the urgent finding out of the report.

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Methods of contacting Referring Physicians

UrgentWorks notifies the ordering physician based on a set of rules and contact information defined by each ordering physician. The system can contact the ordering physician via a phone call to an office, mobile or home phone, fax, email or page. It can also deliver the results to an iPad with the WebWorks for iPad product. The user defines the order or priority of contact, the system triggers an automated “Escalation” process until an acknowledgment is received either via phone or over the web. The escalation process attempts to contact the ordering physician’s first priority contact, if the event is not acknowledged, the system waits 2 minutes and tries the same priority contact method again. Next, it tries the user’s second priority number and retries it after 2 minutes. Then, it attempts to contact their backup user, as indicated. If that fails, the system can call a site backup person, including both of their numbers and their back person. If that fails, it can call a system administrator and it can be set to restart at the beginning of the chain again. All events are logged in the history log of the critical result lifecycle.

The phone call recording to a location asks the recipient to ID themselves via a passcode. The recording delivers the patient demographics, critical result message and offers the recipient the option to “acknowledge” and or to speak with the patient location, or radiologist. If the user selects to speak with either the location or the radiologist, the phone call connects the ordering physician immediately.

The process of handling a critical test result for an ordering physician that does not have a profile is part of the escalation process. Some options include contacting the patient location (nurse station, for example) with the critical result. The escalation path will always include other contacts, customizable by site. Typically selections include the radiology manager, the admiral and the system manager. Note: a message can be triggered to the system manager(s) alerting them that the user profile does include contact information.

The recipient acknowledges the Urgent Finding by one of the following methods:

1) pressing the #1 on their phone at the end of the message, as prompted. UrgentCall also supports connecting the referring physician directly to the radiologist or directly to the patient location, as another option during the phone call. This automatically acknowledges the receipt of the information;
2) selecting a radial button indicating they acknowledge the finding via a workstation with the integrated API;
3) by entering the information into the UrgentCalling application’s web page, where it will be listed under an Actions Needed tab. From this interface, the user also has access to medical images and reports, if the system has been integrated with the DICOM server (or if it IS the DICOM server) and RIS, respectively;
4) it is entered by another user, documenting the conversation with the recipient.

**Escalation Process**

The user defines the order or priority of contact, the system triggers an automated “Escalation” process until an acknowledgment is received either via phone or over the web. The escalation process attempts to contact the ordering physician’s first priority contact, if the event is not acknowledged, the system waits 2 minutes and tries the same priority contact method again. Next, it tries the user’s second priority number and retries it after 2 minutes. Then, it attempts to contact their backup user, as indicated. If that fails, the system can call a site backup person, including both of their numbers and their back person. If that fails, it can call a system administrator and it can be set to restart at the beginning of the chain again. All events are logged in the history log of the critical result lifecycle.

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**Patient Access**

The Roentgen Works does include the ability to communicate directly with patients, if desired. They can have a system log-on for direct access and reports can be emailed to them. They can go to a doctor’s office, get on a web browser and access their information. The system supports using and creating a CCR.
Management Tools and other Communication Tools

The system logs all actions and these logs can be viewed directly or used to view reports via a web interface. The administrator panel allows for monitoring of all workflow items and messages. It also supports statistical analysis or the ability to download the data into an excel spreadsheet for further analysis. The system maintains a critical history log for audit trails including messages, users and time stamps archived. Once acknowledged, the history of communication can be sent as an addendum to final report. This also includes the turn around time from when the critical result was called until the result was acknowledged. System managers can produce reports detailing the turn-around time for each urgent finding. The diagram below shows the report for a selected time frame for urgent findings.

Sample of an Urgent Finding

The dictation of a critical result by the interpreting physician is the first entry in the history log. The log includes, name, patient demographics, critical finding message, date and time stamp. Each attempt to contact the ordering physician is logged listing the date, and time stamp for the event as well as the result (unanswered or acknowledged). The log ends when the ordering physician acknowledges the results either over the phone or electronically. The history log can be forwarded to a HIS and/or EMR via an HL-7 report message, if desired.

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