

Summary – Technology Recommendations to Improve the Management of Critical Lab Results – Version 2

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- 1 General comments
 - 1.1 Except where noted, comments apply to critical lab results (CLRs, aka emergent, or “red” alerts) as opposed to other kinds of important results
- 2 Overview
 - 2.1 Assume that managing CLRs involves the following steps
 - 2.1.1 Identifying a result as critical (aka event detection, or “generating an alert”)
 - 2.1.2 Identifying the expected responsible provider
 - 2.1.3 Identifying the responsible cross-covering provider, if applicable
 - 2.1.4 Notifying the responsible provider
 - 2.1.5 Assuring that the result has been received by the responsible provider (aka “closing the loop”, or acknowledgement)
 - 2.1.6 Escalation, if the responsible provider cannot be reached
 - 2.1.7 Taking action to address the critical condition
 - 2.2 We will examine each of these areas, as well as identify relevant policy and research areas
- 3 Identifying a result as critical (also known as rule logic, “inferencing”, event detection, or generating an alert)
 - 3.1 Inferencing should be as sophisticated as possible so that the sensitivity and specificity of identified events is as great as possible
 - 3.2 Should incorporate technology that allows increasing amounts of data to be used with increasingly sophisticated knowledge
 - 3.3 Examples of increasing sophistication
 - 3.3.1 High-low flags
 - 3.3.1.1 Examples: $K > 6$, glucose < 40
 - 3.3.2 Trends
 - 3.3.2.1 Examples: Sodium fallen 15 in 24 hours, hematocrit fallen 10 since last result
 - 3.3.3 Drug-lab interactions
 - 3.3.3.1 Examples: Platelets < 40 and patient on NSAIDs, $K < 3.1$ and patient on digoxin
 - 3.3.4 Other EMR data
 - 3.3.4.1 Problem lists, scheduled visits, radiology reports with coded findings, cytology/path reports with coded findings, etc.
 - 3.3.4.2 Examples: More to do with “urgent” and “important” results. For example, if diabetic has elevated HbA1c, could communicate results at time of visit; if $LDL > 100$ and patient has coronary artery disease could alert whereas might not if did not have CAD

- 3.4 Most institutions will rely on their lab and clinical systems vendor to provide inferencing functionality
 - 3.4.1 Vendor capability in this arena is increasing; labs should be sure to make as much use as possible of the offered features
 - 3.4.2 Clinical information systems which interface or integrate laboratory with pharmacy or documentation systems are required to provide functionality outlined in 3.3.3. and 3.3.4

- 4 Identifying expected responsible provider
 - 4.1 Primarily an operational issue, however technology can facilitate some of the processes
 - 4.2 The lab test ordering process should have as a goal that the lab will know (when it receives the specimen) who is the ordering provider and what is the provider's contact info should a critical result be generated from the specimen
 - 4.2.1 Where paper requisition forms are used, allow adequate space for such information and highlight that this is important data
 - 4.2.2 Institutions should implement electronic ordering systems that are used directly by providers (identification of who is ordering is but one benefit of such systems)
 - 4.2.3 Labs should develop policies that reduce acceptance of tests that do not have a responsible provider specified

- 5 Identifying the cross-covering provider
 - 5.1 Preamble – many circumstances might influence the process by which a cross-covering provider is identified
 - 5.1.1 Will vary among environments (e.g., AMCs will be different than outpatient private practice)
 - 5.1.1.1 Any solution of identifying cross-coverage must take into account subtleties of the institution.
 - 5.1.2 Therefore, there will not be one solution
 - 5.2 Practice answering services often are responsible for knowing cross-coverage relationships
 - 5.2.1 Such answering services should have clear, legible, complete, type written list of who is cross-covering for who
 - 5.3 Often, more than one party will need access to the cross-coverage information
 - 5.3.1 For example, if one cardiologist is on-call for the group, the practice answering service needs to know that information as well as the hospital operator who may need to know who is covering for cardiology
 - 5.4 At large institutions (AMCs, community hospitals, multi-specialty practices) phone operators at a minimum must have access to cross-coverage lists of the various groups and departments
 - 5.4.1 The institution must develop a process whereby cross-coverage information is communicated to the phone operators
 - 5.4.2 Ideally, such data would be available broadly within the institution via an intranet application

- 5.4.2.1 Either each department or a central service (e.g., the Telecommunications Dept.) could enter the data into an intranet-accessible database.
 - 5.4.3 There must be a process whereby the lists are maintained and kept accurate
 - 5.4.3.1 Technology can be used to allow MDs to update this data themselves via an intranet, however robust processes must be put into place if this is to happen in an accurate and timely manner
 - 5.5 Hospital and AMCs should have automated paging systems that allow in-hospital status to be recorded and pagers forwarded to other pagers at sign-out time.
 - 5.5.1 Ideally, the paging system could be accessed from a clinical workstation via the Intranet
 - 5.6 Stretch goal
 - 5.6.1 Introduce regulations requiring physicians (if not covering themselves) to post on the Internet “who is covering for them”. State could coordinate and provide a call-in center for those MDs who wish to post data but do not have Internet access. Cross-coverage information could be retrieved or viewed via Internet (assume all labs have access to Internet).
 - 5.6.1.1 Providers who do poorly in this regard should be considered for disciplinary action
- 6 Notification
- 6.1 Background
 - 6.1.1 Labs bear the responsibility for notifying MDs about CLRs
 - 6.1.2 Labs should keep a log of CLRs that occur. Ideally this is a computer database.
 - 6.2 Paging the responsible physician and having them phone the lab to get the lab result information will continue to be most important notification method as pagers remain standard equipment for physicians and telephone communication allows for immediate acknowledgement of the CLR
 - 6.2.1 Requires good expected coverage and cross-coverage information
 - 6.3 Advanced notification methods
 - 6.3.1 Systems that notify physicians automatically of critical and urgent lab results via page and e-mail still are restricted to a few AMCs
 - 6.3.1.1 Other institutions should keep abreast of advances in the market that integrate inferencing, coverage information, notification, acknowledgement, and action features, but widespread availability of such integrated alerting systems still are a few years away
 - 6.3.2 Research into use of novel notification methods should continue, especially use of e-mail for urgent results
 - 6.4 Sidebar: Difference between synchronous and asynchronous notification
 - 6.4.1 Notification via phone is synchronous (have other party on the line when sending the message)
 - 6.4.2 Email and page are asynchronous, i.e., recipient of message is not present when message is sent.

- 6.4.3 Acknowledgement is a non-issue in synchronous notification, but is important in asynchronous notification (see next section)
- 7 Acknowledgement
 - 7.1 Labs responsible for documenting that responsible party has received the CLR information
 - 7.1.1 Part of responsibilities under CLIA
 - 7.2 Tightly linked to notification process
 - 7.2.1 Implicit in synchronous communication modality
 - 7.2.2 Must be addressed explicitly if advanced asynchronous notification modality is used
 - 7.3 Labs should document who has received message in CLR database
- 8 Escalation
 - 8.1 Escalation procedures are invoked if expected provider (or cross-covering provider when relevant) does not respond to notification
 - 8.1.1 Might try to reach the intended person in a different way – e.g., try them at home, cell phone, etc.
 - 8.1.2 Might try to reach someone else – nurse, department chair etc.
 - 8.1.2.1 Where this strategy is used cross coverage lists should contain this additional information
 - 8.1.3 Automated systems can be used to notify other providers (MDs and RNs) who have a relationship to the patient
 - 8.1.3.1 For example attending physician should be notified if ordering or cross covering resident physician does not respond
 - 8.2 Labs should have a “failsafe” policy, i.e., a plan to manage CLR’s if no responsible provider can be identified or the responsible provider can’t be reached
- 9 Actions
 - 9.1 Acting on CLR is responsibility of covering provider
 - 9.2 Tools that enable easy access to related patient data (e.g., a results view application) and taking action easily (e.g., computerized OE applications) might assist the MD in taking rapid action. Otherwise, the phone will be the way that the MD gets contextual information and conveys his wishes for emergency treatment.
- 10 Areas of research
 - 10.1 Improved inference (more detailed rule logic)
 - 10.2 Overall results tracking system (not just CLR’s)
 - 10.3 Automated notification and acknowledgement (e.g., 2-way pagers, cell phones)
 - 10.4 Role of patient and Internet
 - 10.5 Evaluation
 - 10.5.1 How timely are labs in getting critical results to the responsible provider?
 - 10.5.2 How timely are providers in acting to improve the critical condition?

10.5.3 How rapidly do patients respond to treatment and come out of the critical condition?

11 Policy issues

11.1 Regulations to assure that cross-coverage information is kept routinely and accurately in an accessible format

11.2 Censure providers who repeatedly do not make themselves available to receive critical results in a timely manner (or who do not make cross-coverage information easily available)