

Web portals enable electronic orders and results reporting

By Brian Morgan, PMP, MT(ASCP)

Physician practices have a compelling interest in receiving their patients' laboratory results electronically. After all, health systems consistently report that one of the most frequent — and vocal — requests made by providers is for electronic laboratory results reporting. It is easy to understand why: Moving away from paper-based results reporting not only generates substantial administrative efficiencies within physician practices but also improves physician decision making and patient outcomes by making results available more quickly and more accessible.

Yet, a number of issues arise when it comes to the question of *how* physician practices can realize the benefits of electronic results reporting (and, by extension, how *laboratories* can move their physician clients toward electronic order entry). Physicians often find it difficult to choose between competing order entry and results reporting options, sometimes because they are unsure about the current functions and capabilities of their ambulatory electronic medical record (EMR) systems and about what role EMR systems will play in the future. Therefore, it is essential that labs present their provider partners with options that accommodate each practice's current IT reality.

Consider that more than 300 EMR vendors currently operate within the healthcare space, and even that number does not accurately reflect the variety of EMR systems available.

Five years ago, laboratories were focused on providing physicians with order entry and results reporting by means of proprietary systems. Today's physician practices, however, increasingly expect to be able to easily and cost effectively interface their EMR systems with their lab partners' laboratory information systems (LIS). As a result, labs are faced with making the transition from stand-alone and proprietary offerings to providing integrated connectivity solutions. And, while EMR interfaces clearly are the future of lab order entry and results reporting, significant challenges are associated with integrating ambulatory EMR systems and LIS systems.

LIS-EMR interfaces: still a complex process

Many providers (especially small practices) have yet to deploy an EMR system, which means that focusing exclusively on EMR integration effectively excludes a large portion of physicians from electronic order entry and results reporting. Even when addressing practices with EMR systems already in place, it is essential

to recognize that the technology is far from being at the point of deploying EMR interfaces with plug-and-play simplicity.

Integrating an LIS with an EMR system continues to be a complex undertaking. Consider that more than 300 EMR vendors currently operate within the healthcare space, and even that number does not accurately reflect the variety of EMR systems available. As a result of industry acquisitions and mergers, EMR systems from the same vendor can vary considerably. For example, within a single product grouping, multiple versions of EMR systems may exist, each with different capabilities and functionality. This wide variety of available EMR systems presents unique challenges for the typical LIS vendor, who may have limited expertise connecting to any particular EMR system. In addition, providers and laboratories can have unrealistic expectations for implementing interfaces to their systems — resulting in frustration for both.

Following are a few of the obstacles commonly encountered when interfacing an LIS and EMR system:

- Establishing a secure physical connection between the EMR system and LIS is the first hurdle. A common method is to create a virtual private network (VPN). Since most practices with an EMR system do not have a dedicated IT staff, deploying a VPN is not always a viable option.
- Not all EMR systems can place an electronic order and, of those that can, not every order is output in a format that can be accepted by the specific LIS.
- Some EMR systems are unable to accept discrete laboratory results. In those cases, the interface needs to have the capacity to convert the lab's HL7 results data into an Adobe PDF file or graphic file that the EMR system can accept.
- EMR systems do not normally utilize the same conventions as the LIS or hospital system to identify patients and orderable tests.
- If an EMR system did not generate the test order, it may be unable to receive the associated "unsolicited" result.

Portals: narrowing the interface divide

Although the rate of deployment of EMR systems is growing, the issues surrounding the interfacing of EMR systems and LIS systems will not be solved overnight. Until such time as a critical mass of providers occupies the same point on the technology spectrum, it is essential that labs offer their provider partners a technology bridge that will enable them to benefit from an EMR system interface without having to invest in interface options that may not meet their expectations or budget requirements.

Web-based portals are an effective, efficient means of

augmenting a laboratory's EMR interface initiatives and of increasing the number of providers able to place orders and receive results electronically. Portals offer labs the means of transitioning beyond two common, but not always optimal, connectivity options: 1) offering a stand-alone proprietary solution and 2) developing an EMR system interface to the LIS. Portals enable laboratories to support all physicians in the community, regardless of what kind of system (EMR or not) a practice uses.

Portals can be effective in meeting the needs of both laboratories and their physician clients. From the lab's perspective, portals enable physicians to easily and accurately enter lab orders — helping to ensure that the appropriate tests are performed in a timely manner. Once a test has been completed and results posted, physicians can access the portal and retrieve those results from any Internet-enabled device. This means physicians can review results and get them to patients more quickly and spend less time calling the lab to request a resend of results — saving time for the physician practice and the lab. In addition, in practices using an EMR system, portals can serve as a back up in cases where the EMR system is down, since physicians are able to log into the portal and submit an order or access result information in real time.

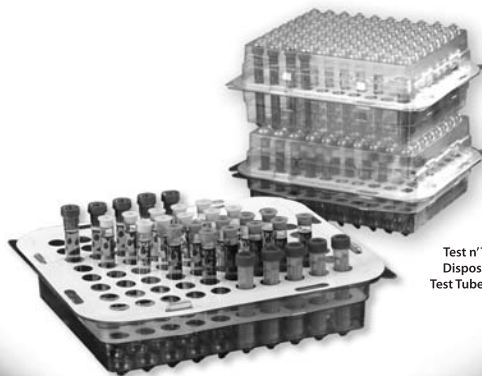
Effective portals are designed to complement existing workflows, promote ease of navigation, and generate useful search results. It is likely that the vast majority of practice staff have used consumer search and shopping sites, such as Google and Amazon, which have distinguished themselves for (among other things) their user-friendliness and appealing organization of information. Similarly, the best lab order entry and results reporting portals mirror these sites in their ease of use and search functions, as well as in limiting the number of page views that the user must navigate in order to accomplish a particular task. In addition to improving user satisfaction, portals featuring these attributes reduce training needs since the basic user interface is already familiar to staff members.

In terms of data flow, portals can be more flexible than many EMR systems when it comes to receiving documents that include digital graphics. An effective portal will support Adobe PDF files, XML, image formats, ASCII, and electronic print captures, which is essential as laboratories move toward generating result reports with graphics and images. Physicians appreciate dynamic reports that include graphs, charts, and images — making it easier for them to analyze results.

Portals also represent an opportunity for laboratories to involve other hospital departments in establishing connectivity with referring physicians. Because portals are uniquely suited for distributing information — for example, radiology reports, discharge summaries, cardiology images, and emergency department records — laboratories can take the lead in establishing electronic connectivity within their organizations while also spreading some of the costs to other participating departments. Compared with the costs and staffing requirements needed to interface with the numerous available EMR systems, portals are a relative bargain that meet both physician and health system needs. □

Brian Morgan, PMP, MT(ASCP), is vice president of operations at Halfpenny Technologies in Blue Bell, PA, where he is responsible for managing the company's project implementation and customer service teams.

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Instrument reliability and QC frequency: a cautionary tale

By John Yundt-Pacheco

Imagine this announcement: “Accuration Instruments Inc. is proud to announce the release of the *Reliabulator 2/500*, a new hallmark in the reliability of clinical diagnostic laboratory automation.”

Your laboratory will be one of the first installations of the new *Reliabulator 2/500*. The manufacturer claims the “2” in the instrument name stands for an expected two years between undetected grave malfunctions, and the “500” means it will process 500 patient specimens per day.

One of the things you need to decide on is a suitable quality-control strategy for the *Reliabulator*. If it only fails every two years, does that mean no quality control (QC) is necessary the first year? That would certainly help the budget. After a bit more consideration, you realize that an expected malfunction rate of once every two years is not the same thing as a malfunction every two years starting after installation. The instrument could have an expected malfunction rate of once every two years and still malfunction the day after it is validated. An expected malfunction rate of once every two years means that the malfunction could occur at any time; but over the long term, there will be an average of one malfunction for every two years of service. Consequently, no QC during the first year is not much of an option.

What about doing QC once a month? What is the worst-case scenario? If QC is done on the first of the month and the system malfunctions on the next sample, that would be the worst case. If the malfunction was not detected until the next QC, that would mean a whole month’s worth of compromised patient samples — call it 30 days of 500 patients per day: 15,000 compromised specimens! But how likely is it that a malfunction will occur on the specimen right after a QC event? The answer is: “Not very likely.”

What about the best-case scenario? The system might malfunction after the last patient specimen of the month but before the QC specimen next month. The malfunction is detected, and no patient specimens are affected. How likely is that to happen? The answer is “not very likely” but about the same probability of the system malfunctioning right after QC. Given that the greatest risk to the laboratory will occur if a malfunction happens on the first of the month just after the QC event, and there is no risk to the laboratory if a malfunction happens at the end of the month after the last patient specimen (but before next month’s QC event), then the middle of the month can be used to estimate the expected number of patient specimens compromised by a malfunction — assuming that a malfunction is equally likely to occur on any day of the month.

It turns out that half the number of patient specimens between QC events is the expected number of specimens that are com-

promised by a malfunction.¹ If the malfunction is grave enough, half the number of patients between QC events will contain an unacceptable amount of error. In the case under consideration, 15 days of 500 patients per day would result in 7,500 compromised patient specimens, every two years, or 3,750 patients per year.

Looking at a strategy of performing QC once a week, results in 3.5 days of 500 patient specimens per day that are compromised in the event of a malfunction — 1,750 every two years, an expected 875 per year.

Evaluating a QC specimen every morning results in 0.5 days of 500 patient specimens per day that are compromised in the event of a malfunction — 250 every two years, an expected 125 per year, or about one every three days. This may be manageable, but it requires doing QC every day, even on an instrument as reliable as the hypothetical *Reliabulator 2/500*.

Unfortunately, there is another consideration: although the expected rate of compromised patient results is one result every three days, they actually occur as 250 consecutive compromised results at one point in time, every two years on average — meaning a major headache when it happens.

The reliability rate can be computed as the number of uncompromised patient specimens times 100/number of specimens. For a test system with periodic malfunctions, it is directly related to the frequency of QC events.

For a QC frequency of once per month over a two-year period, the reliability rate is calculated as $100 * (365,000 - 7,500) / 365,000$ or 97.45% — or sigma value of 3.54.²

**QC once per week over a two-year period,
the reliability rate is 99.52% — or sigma value of 4.09**

**QC once per day over a two-year period,
the reliability rate is 99.93% — or sigma value of 4.70**

By way of comparison, airline baggage-handling sigmas have been reported at a sigma value of 4.15.³ It is evident that even an instrument as reliable as the *Reliabulator 2/500* needs at least daily QC.

John C. Yundt-Pacheco is a technical development manager at Bio-Rad Laboratories in Hercules, CA.

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