Checklist for a Radiology Information System Go-Live

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Abstract This article highlights the experience of a single center institution undergoing a change in radiology information system (RIS) software platforms, transitioning to an electronic medical record-RIS driven workflow. Ten planning and execution topics with recommendations are presented in checklist form from the radiology department perspective. The build process of creating a site specific RIS takes many months, beginning with the organization of a steering committee. On Go-Live, several checklist items are offered to help streamline the troubleshooting process and improve communication throughout the radiology department. The groundwork of the group effort in creating the infrastructure of the build process can continue to be useful beyond Go-Live, as RIS features are continually optimized.

Keywords Radiology information system (RIS) · Imaging informatics · Electronic medical record

A radiology department changing radiology information system (RIS) software platforms is a daunting task. Most departments undergo periodic software upgrades, or provide service to patient care facilities with a variety of electronic medical records (EMR) platforms that can change over time, but a RIS is at the core of the infrastructure of radiology workflows. A RIS changeover affects all aspects of the radiology interface with its provider and customer base, from ordering and

scheduling through reporting and billing. It is a massive process that can take many months of preparation.

Our institution underwent a switch of single RIS vendors as part of an upgrade process with EPIC (EPIC Systems, Verona WI). The radiology service component of EPIC (Radiant) was incorporated into the pre-existing EPIC EMR, requiring the radiology department to change from a different vendor's integrated RIS-PACS system. Our new system was designed with a EMR/RIS-driven workflow; the features and benefits of which have been previously described [1]. The RIS-driven worklist integrated with our existing PACS (GE Universal Viewer, GE Healthcare, Chicago IL), as well as modalities spanning a broad range of vendors.

A blueprint for the software build was utilized in a combined effort mostly involving the vendor, radiology personnel, and IT (information technology), ahead of a scheduled “Go-Live” day set months in advance. This article details the lessons learned from a new RIS Go-Live experience by creating a to-do checklist of items during both the build process and the Go-Live period (Table 1). Figure 1 shows a general timeline for these major activities.

Pre Go-Live Software Build Steps

Once the institutional agreement is in place for a new RIS vendor, a joint effort is required to identify key personnel that will be involved in the build process.

Create a RIS Steering Committee

Creating a committee of radiology physician and technologist champions from the start of the build process is vital to a RIS creation process [1]. An imaging physician informaticist can

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Table 1 Checklist of major activities during a RIS build and go-live**Pre go-live**

- Create a RIS steering committee
- Identify key personnel contacts outside radiology
- Create an educational plan
- Prepare modality and PACS vendors

At Go-Live

- Create a command center and help hotline
- Protect and task radiology champions
- Continue having steering committee meetings
- Perform group “huddles” at shift changes
- Have a plan to fix “broken” imaging cases
- Stay organized with spreadsheets

drive decision-making and serve as an effective liaison with IT leadership [2]. Our committee formed 21 months before Go-Live. The radiologist champion can be the lone physician representative; however, we included additional physician champions from mammography and interventional radiology. Technologist leads or other representatives for each modality are also important (XR, CT, MRI, US, NUCS, IR). In addition, a representative from radiology administration, radiology nursing, etc. proved helpful at various points. These radiology personnel will combine with members of radiology IT to form the committee that works with the vendor throughout the build process.

As the build ensues, opportunities arise to not just replicate department protocols in a new RIS, but improve upon them as they are revisited. Having a “brain trust” of such a committee can help quickly identify outdated processes that can be updated on the fly, or perhaps need a complete overhaul. Despite possible pressure from IT or vendors to push ahead with a software build, the steering committee can take advantage of the time spent reviewing departmental workflows to improve its service to patients and healthcare groups.

Our steering committee had standing weekly meetings throughout the majority of the build process. Agendas were

usually created by the vendor, with IT providing updates and requests for information. The committee would delegate necessary work assignments to individual members as needed. The framework of the committee should stay in place through “Go-Live” and beyond, as we found the meeting a terrific forum for identifying problems and creating solutions during stabilization and optimization phases post Go-Live as a radiology informatics group. This group can help solve future workflow problems in radiology [3].

Identify Key Personnel Contacts Outside Radiology

Although the steering committee had the ability to define radiology workflows, our institutional policies set boundaries for how other areas were affected. A new RIS may significantly alter the software environment for ordering providers. For example, having an EMR driven system allows for specific ordering questions to be answered by referring physicians as they place imaging orders, with seamless migration of answers to the RIS to be visible by schedulers, technologists, radiologists, etc. In addition, the vendor may offer electronic workflow solutions that are not currently in place and may require sign off from hospital administration. Our committee had lines of communication to contacts in legal, compliance, medical informatics, and executive committees to answer questions or gain permissions as needed.

Create an Educational Plan

The training process for new RIS processes must be comprehensive enough to reach all radiology employees who are RIS end-users. However, vendor materials may be generic and rather general in nature, and not tailored to specific builds on a per institution basis. The IT department coordinated the training schedule with radiology administration for 195 radiology employees, mostly technologists as well as the 27

Fig. 1 Timeline of tasks prior during new RIS implementation

attending radiologists and 16 radiology residents. Classroom sessions of 3–4 h blocks were required. A “train-the-trainer” method was most successful for our group, whereby steering committee members were shown the educational material, and then became the instructors for employees in their domains. In our experience, radiology employees who were taught the generic educational material by a non-radiology worker were much more likely to have workflow difficulties on Go-Live, requiring retraining via resource intensive 1:1 elbow support. It is also important to deliver educational material in just-in-time fashion, as close as possible to the Go-Live date.

Prepare Modality and PACS Vendors

The build process typically includes a testing of integration of image and data transfer from multiple types of modality machines as well as PACS servers. A comprehensive written test plan with several iterations of testing is recommended to ensure image and data integration between the modalities, RIS and PACS. In our experience, we encountered a large variety of issues with integration that were vendor specific for certain modalities during our Go-Live. For example, patient medical record numbers had to be adjusted by adding several zeroes to the beginning of the number for a particular modality vendor, so that demographic information correctly migrated to the RIS. Such a demographic mismatch typically led to images failing to be visible on the PACS in the first hours and days of our Go-Live. Testing in the true RIS environment being created at the institution, rather than the vendor’s foundation base environment is also important in order to catch problems of image integration.

Having on-site representation from vendors as well as institutional biomedical support is vital to smooth out problems with data transfer in a new system. Depending on the PACS vendor, a RIS-driven system likely also requires specific build requirements to ensure image integration that needs vendors to cooperate with each other, a process that ought to be overseen by radiology and IT.

Our institution comprised 114 individual modalities that had to be converted to the new RIS on a schedule straddling our Go-Live date, spanning one hospital, two outpatient imaging centers, and multiple urgent care centers and satellite office sites. Almost all of our modalities could only communicate data with one RIS server at a time to receive a worklist schedule. This fact coupled with finite IT and biomedical manpower, led to our schedule having about half of the modalities being converted to the new RIS within the 2–3 days prior to Go-Live, and the remaining modalities in the 2–3 days after Go-Live. Therefore, technologists had to manually enter patient information rather than select a study from the worklist for this “gap” period, either in the old RIS if switched beforehand, or in the new RIS if converted afterwards. Our schedule

was geographically prioritized, so that modalities in the hospital were converted closest to the Go-Live date, and satellite offices next closest based on size and location.

In our opinion, the effect of technologists manually registering patient studies on modalities had the greatest negative impact on overall workflow during the Go-Live timeframe, with three major interrelated causes: Firstly, technologists’ education on how to operate modality worklists or manually add cases in the new RIS was not complete or fully effective, or occurred too long prior to Go-Live to be remembered. Secondly, manual registration created opportunity for error in demographic mismatch, or modality specific needs such as adding leading zeroes. Finally, the support needed to retrain technologists how to operate during this temporary workflow pulled resources from the IT department, and delayed the schedule of changing over remaining modalities to the new RIS. The overall result of this process was that many imaging studies were performed in an “exception” or “unspecified” status in our PACS and images did not link to the study in the RIS. These studies needed to be managed by technologist users who corrected the errors from a PACS worklist.

On Go-Live

Create a Command Center and Help Hotline

The RIS vendor will typically have a strong presence during a Go-Live, which may extend beyond radiology. Our institution-wide Go-Live also included a hospital and business unit upgrade that similarly required on-site support staff. It was useful for radiology to have its own “command center” of key IT, vendor, and radiology personnel located in the radiology department. This may be in addition to a larger command center for the rest of the institution that is placed elsewhere. A communication protocol should be in place so that all radiologists and technologists know how to ask for help and give critical feedback to the command center, such as a temporary help hotline phone number or e-mail. Simply logging and acknowledging help requests quickly became challenging in our Go-Live experience, and any ancillary support in this area for the first days of Go-Live is recommended.

Protect and Task Radiology Champions

If at all possible, physician and technologist champions ought to have protected time for up to the first week of Go-Live, to provide needed elbow support for other end-users. This includes educating users on an as-needed basis, as the steering committee members and trainers are the best resources available to help their own colleagues with a new system. These people can also be valuable liaisons that pass information to and from the command center if necessary.

In addition, champions can be tasked with being the first test users once the system goes live, to ensure a correct workflow. It can be challenging to diagnose a problem as a technical software failure versus an end-user performing a process incorrectly. Having champions check through the real production environment first can ensure that the basic functions are running smoothly.

Continue Having Steering Committee Meetings

As mentioned earlier, the original build steering committee should continue with scheduled meetings to share information and troubleshoot. During the first week or two of Go-Live, this may occur daily, and the frequency can be dependent on the severity of outstanding problems. Long-term, the committee can be rebranded as a radiology informatics committee that continually works to improve the efficiency and functionality of the RIS [4].

Perform Group “Huddles” at Shift Changes

The excitement of a Go-Live persists as evening, night and weekend shift workers use the new RIS for the first time over a period of days to weeks. However, troubleshooting problems may require quick fixes that need information to be passed along department wide. Although e-mails or other mass communications are necessary, in real-time a verbal or written handoff of information may be needed among co-workers. We created a system of requesting a 15-min crossover meeting, or huddle, at each shift change so that end-users can share information and pass along any new educational material or changes that have been put into the system. This was especially useful at the technologist level where several production updates and workflow changes occurred in the first week. Without such a communication pathway, problematic workflow errors would repeat themselves unnecessarily over the course of shift changes.

Have a Plan to Fix “Broken” Imaging Cases

We inevitably encountered instances where images of a patient study did not transfer to the radiologist RIS driven reading worklist or PACS, for a variety of reasons related to vendor specific integration issues or user process mishaps. Regardless of root cause, a designated team of technologists and/or IT personnel should be prepared to address such cases on an as-needed basis. A communication system for reporting problematic cases is crucial, be it automatically generated or manually notified. This safety net workflow can come in useful in addition to the hotline communication methods created with the RIS vendor. Over time, the task of such quality control activity of ensuring image association can lessen to that of a single individual or group, but at the onset having extra

resources for this process helped our group once a backlog of cases that could not be dictated began to mount.

Stay Organized with Spreadsheets

Problems arise. Functions fail. New requests are made. The radiology champions must be prepared to handle a potential deluge of to-do items. From the first moments of Go-Live, a method of listing and tracking issues is essential. For us, keeping a spreadsheet of worklist items was optimal. Being able to track next steps, and assign problem owners and expected completion dates was also useful. During the hectic first days of a Go-Live, this process may be individualized, but over time having a common shared spreadsheet posted on an intranet site can help steer future committee meeting agendas. At its peak in the weeks post Go-Live, our master spreadsheet had well over 100 distinct issues logged and prioritized for attention.

Conclusion

The overall impact of the Go-Live can be tracked and summarized by study completion and report completion turnaround times. In our experience, turnaround times suffered greatly in the days after Go-Live, as a backlog of cases mounted that was not fully cleared for 60 days. It was thus the third month after Go-Live that turnaround times approximated pre Go-Live averages.

Prospectively, we did not embrace all of the items on this “checklist” for a new RIS Go-Live. Some items are a reaction to problems we encountered. In hindsight, we believe that following these steps can help minimize failures, streamline communications, and optimize problem solving. Similar checklists can also apply for new PACS systems, or any large software or hardware overhauls a radiology department may encounter. Ultimately, it was a team of dedicated champions and conscientious staff that made a new system transfer successful.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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