Implementing Teleradiology in a Private Radiology Practice: Lessons Learned

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MARKET PRESSURES in the national health care delivery system have resulted in the consolidation of private radiology practices into "mega-groups." In order to achieve optimum efficiency and cost effectiveness, these new entities turn to the use of electronic image transmission to improve the productivity of individual radiologists, decrease the time involved in test turnaround, and still maintain high clinical quality. Two of the larger group practices, which merged to become a "mega-group" in Maryland, implemented "teleradiology" systems independently, linking digital modalities from several outpatient imaging centers and hospitals to two main reading centers. When the practices merged in 1997, these two different systems worked side-by-side, providing the opportunity to compare performance. Several key lessons were learned from this experience, which will provide guidance in the next phase of upgrading and expanding the teleradiology capabilities of this organization.

BACKGROUND

The private practice of radiology has different economic hydraulics than those found in an academic medical center or even a community hospital. Capital is more scarce for private radiology practices due to the smaller size of operations and the greater risks. Because radiology is a capital-intensive specialty within medicine, small private practices have begun to merge into "mega-groups" to improve capital access as well as take advantage of the economies of scale associated with such capital investments. Because of the relatively high costs associated with telemedicine, most small private practices have focused on using it to handle on-call situations rather than for primary diagnosis. Two of the four group practices which merged to form American Radiology Services acquired teleradiology systems over the past seven years with different requirements and different outcomes. With the merger of these practices, we have had the opportunity to compare the systems, the processes used to implement them, and identify some strategic lessons to help guide us in future acquisitions of teleradiology technology in the future.

PRACTICE "A"

Practice "A" consisted of twenty radiologists serving four hospitals and two outpatient imaging centers. Both outpatient centers offered full modalities except MR. In 1990, contracts were signed to serve two additional hospitals and radiologist staffing issues were discussed for evening and night call. The volume of studies performed during the evening and night hours when a radiologist was not on-site averaged five-to-six studies per evening per hospital. The decision was made to acquire a teleradiology system that would allow a single radiologist to take call for multiple hospitals or to allow the primary radiologist from an individual hospital to review studies at home using a personal computer with a modem. The objective was to provide "wet-read" capabilities only. Using equipment connected to a personal computer in the hospital, the technologist, using frame-grab techniques, could push images from the digital modalities over a regular telephone line to the individual radiologist's home PC. The teleradiology system vendor provided on-site support during the implementation process and trained the radiologists in Practice A on how to perform system routine maintenance and trouble shooting.

Over the years, the system performed adequately with the greatest problems being hardware failures with personal computers and the occasional modem failure. The general satisfaction level among the physicians using the system was good.

PRACTICE "B"

Practice B consisted of twenty six radiologists who served four hospitals and nine outpatient imaging centers. Three of the outpatient centers offered all modalities including MRI. In 1994, Practice B began to discuss the use of teleradiology to support night-call capabilities for its hospital

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0897-1889/98/1103-1028\$8.00/0*

clients. A system was selected that had excellent on-call capabilities. The vendor was in the process of developing full diagnostic quality workstations to support primary diagnostic readings. The practice began to discuss the use of the system to support primary diagnosis for MRI and CT modalities in the outpatient facilities. At that time, the practice was experiencing a shortage of MRI and CT subspecialists resulting in vacation or sick time scheduling problems for these modalities. The practice purchased the system initially to support night-call but changed the requirements to include primary diagnostic reading during the day for the outpatient imaging centers. Two reading stations were installed, one in a hospital that had twenty-four hour coverage by a radiologist, and the other in one of the outpatient imaging centers. The "beta" version of the software was implemented for diagnostic reading.

Practice B had assumed that the system could run as installed without a lot of user involvement. At that time, the responsibility for implementing the system was delegated to an office manager in the main outpatient reading center. The individual selected was not experienced in information technology, networks, or teleradiology systems.

In the initial implementation of the system, the on-call features of the system for radiologists reading at home were successful. However, the diagnostic workstation capabilities did not perform as promised. There were significant problems with the network configuration between the hospitals and the imaging centers. The software for diagnostic reading for the outpatient centers did not meet expectations. Several radiologists did not like the new system for diagnostic reading and refused to use it because of the performance problems. Due to a turnover in the radiologist staff, the original "champion" of the system was no longer there. Another radiologist reluctantly assumed that role and worked with the vendor to correct the problems. After eighteen months and several revisions of the software, a full production version of the system was finally achieved. The system was accepted for diagnostic reading by the majority of the radiologists assigned to the outpatient reading station.

LESSONS LEARNED

In planning for a corporate-wide implementation of teleradiology, American Radiology analyzed the

experiences of the two groups. One group was successful in its implementation of a system that was very limited in scope while the other experienced difficulty in achieving the desired outcomes. Some key lessons learned include the following:

1. Understanding the fundamental processes and desired outcomes from the implementation of teleradiology prior to vendor selection is critical to success. Practice A was seeking to use teleradiology to address one process—night call. They selected a system which focused specifically on addressing the issue of radiologists on call. The satisfaction level of the radiologists using the system was high from the start. Practice B was seeking a teleradiology system that would address multiple processes—night call and diagnostic reading over a wide-area network. While the system they selected had the promise of diagnostic reading station capabilities as well as on-call capabilities, diagnostic reading over a wide-area network was unproven at the time the system was selected. Practice B had to expend significant effort working with the vendor to achieve its original objectives.
2. The majority of teleradiology/PACS systems were developed for use in community hospitals and academic medical centers and may not lend themselves well to the business processes of a radiology "mega-group." The system selected by Practice A was never marketed as a hospital-based system for diagnostic reading. It focused on a specific process and successfully achieved expectations. The system selected by Practice B, while designed to support on-call processes at home, was being adapted to support diagnostic primary readings. The fact that it did not initially have the capability to meet the expanded functions caused dissatisfaction with the radiologist-users in the initial implementation and slowed its acceptance with this group. It is critical to understand the environment for which the system was designed before committing to a vendor.
3. Integration with a robust Radiology Information System is essential. Because neither system had DICOM capabilities when implemented, both systems required the technologist to perform additional steps to manually key-in critical patient demographic informa-

tion before the study was transmitted. This slows the diagnostic process down as well as creates bottlenecks in throughput of images. While this is less of a problem in a hospital environment at night where the technologist may be dealing with fewer than six-to-eight studies, it is a significant factor in a high-volume outpatient environment where all of the studies are being transmitted electronically for reading at a remote reading station. While Practice B improved the efficiency of the reading radiologist through teleradiology, it added an additional work process for the technologist which introduced the opportunity for errors as well as slowing the throughput of patients.

4. The support requirements and the responsibilities of the vendor and the purchaser must be clearly understood prior to entering into the agreement. Teleradiology is not equivalent to installing a new software package on your PC that was purchased in the store. The complexity of the application requires a thorough understanding of what is required by both parties. If a private practice has no internal support capabilities, then it must recognize this prior to entering into a contract. If the costs of vendor support are too great, then the practice must be able to weigh the costs of providing the support in-house. Making assumptions about vendor support without having them clearly specified in the contract can lead to conflict, delays, and downtime.
5. Teleradiology, to be successful, requires a level of infrastructure support within the radiology "mega-group" in order to be successful. In both Practice A and Practice B, the primary support of the system was the radiologist who had championed the implementation of the system. Over time, these individuals became burned out by the midnight problem calls and the need to replace and upgrade equipment. It is more cost-effective for the practice to employ a technician to handle these problems than to relegate them to a highly-compensated radiologist.
6. The importance of the network cannot be underestimated. Both practices decided to use

point-to-point telecommunications to link the image acquisition to the final radiologist. As volumes increased, upgrades to the communications network depended on the availability of service by the local telephone company. In some cases this worked, in other cases, it was not satisfactory. It is critical to have a network plan in place that estimates volumes of studies, the size of the studies, and the acceptable time for transmission. Without an overview of the network, individual links may be upgraded and unnecessary additional cost may be incurred than would happen if a single upgrade to a more powerful technology was made. Because of the multiple demands upon a network (RIS, teleradiology, electronic mail), relying on the teleradiology vendor to design the network may not be the best solution. Using an outside network integration resource can provide an objective blueprint of the network that will consider all applications that share the network.

7. If you cannot see it in action, touch it, and feel it, don't buy it. In the private practice of radiology, it is essential to deliver a tangible return on investment in a short period of time. Private practices that get involved in the future delivery of software that has not been written run the risk of delays and ultimately being disappointed with the final results. A radiology practice must focus on its core business process which is the delivery of radiology services, not in software development. Unless the practice has substantial capital resources at hand, it is more prudent to invest in proven technology.

SUMMARY

The private practice of radiology deals with the delivery of high quality, timely service to referring physicians. Technology offers the promise of supporting this objective through faster reading of studies through electronic imaging and the delivery of results in a fast, efficient manner. In order to be successful, the practice must clearly define its objectives, understand its fundamental business processes and select a technology solution that is proven to meet those objectives.