Implementing a Document Imaging System

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The benefits of a document imaging system are myriad once it's installed—it's the implementation that you need to prepare for. In this article, get a bird's eye view of one facility's implementation and the many lessons learned along the way.

Healthcare has been inching toward an electronic health record (EHR) environment for several reasons: immediate access to the patient record, less time charting and more time caring for patients, better documentation compliance, simultaneous use of the record, decreased costs for back-end operations, faster billing cycles and increased revenue, and decreased expenses for labor, space, and supplies. With the widespread adoption of Web technologies in the last several years, we are experiencing a renewed vigor to automate healthcare and realize these long-promised benefits.

One automation strategy is document imaging. While this technology does not provide all of the benefits of an EHR, it represents a stepping stone between paper records and complete automation. Stanford Hospital and Clinics (SHC) was an early adopter of document imaging and is now embarking on expanding this technology to Lucile Packard Children's Hospital (LPCH). As one of the first facilities to implement a complete document imaging system in January 1997, the management teams at SHC learned all their lessons the hard way. This article offers an insider's look at the benefits and challenges ofimplementing a document imaging solution.

No Shortage of Benefits

Document imaging can be a key component in moving from a paper chart to an electronic archival record. It is important to remember that document imaging does not replace a clinical database repository, order entry, or a clinical documentation system. Rather, we believe that document imaging fulfills two main functions: it creates an electronic, legal archival record and serves as a bridging technology.

There are many advantages to document imaging of medical records:

- it allows for computerized, long-term archiving of the legal medical record
- it enables online access to the legal medical record, including immediate access for emergent and walk-in cases
- multiple users can access the same record at the same time
- the time required for the HIM department to assemble the record is significantly decreased
- use of document sets can streamline the retrieval, either by viewing or printing of the chart by clinical group
- clinicians no longer need to view administrative portions of the record
- it eliminates time spent retrieving and delivering charts
- special retrieval requests (such as research, quality reviews, utilization review, case management, etc.) can be done from the desktop
- it facilitates faster coding, chart completion, and accounts receivable management
- long-term off-site storage costs can be reduced over time
- the need for a file room is eventually eliminated

By taking advantage of document imaging technology, SHC has realized improvements in the following areas:

Retrieval: Having the documents electronically available and accessible made it possible to achieve a 99 percent retrieval rate. Unlike the paper system, the medical records are immediately available for multiple providers when needed for patient

care by viewing online or by printing hard copies through the HIM department. Medical record information is available online to authorized users.

Coding: Strong discharge control and efficient scanning of documents makes it possible to have the medical records available for coding within 12 hours of discharge, without the risk of misplacing the record after it has been received in the HIM department. As a result, the average turnaround time in coding has been consistently below two days for the last three years.

Chart completion: Scanning facilitates the analysis of the record even if the patient has returned to clinic or if the chart is needed in coding. Because the record cannot be misplaced, it is always available for the physician to complete. In addition, only the deficient parts of the records need to be presented to the physicians for completion. As a result, SHC has been able to push its delinquency rate to between 20 and 30 percent, after languishing in the triple digits. However, achieving this number has required complete re-engineering of our chart completion process.

Billing and accounts receivable management: Because the scanned records are available online and can be printed from any workstation, HIM can support patient financial services locally and provide needed records to support billing. Coupled with the efficiency in the coding process, this technology provides very strong accounts receivable management. The total accounts receivable over the four-day cut-off point has consistently stayed well below $1 million and often below $250,000, when before document imaging it was more than $15 million.

Plenty of Trial and Error, Too

As an early adapter of document imaging, SHC learned several lessons worth sharing as other facilities undertake the same project. They include:

Defining the Legal Medical Record

Before undertaking the implementation of a document imaging solution, it is easy to say that scanning will eliminate the need for file rooms and allow the destruction of original documentation, greatly decreasing operating costs. The challenge, however, is accomplishing agreement among the attorneys, researchers, medical school department heads, and state regulators before a single piece of paper is placed in a shredding bin. After five years, SHC has not destroyed the original medical record documentation. If you are in an academic environment where there is significant FDA monitored research, the challenge may be even greater.

To successfully leave paper records behind, three procedures must be in place:

- a **policy statement** that the scanned record is the legal archival record (as opposed to the original documentation)
- a **scanning quality management program**, which ensures that documents are scanned and indexed appropriately
- a demonstrable **back-up and disaster recovery program**, which ensures that a copy of the data is stored off site and that all of the data can in fact be recovered.

At SHC, we pursued a strategy of scanning and storing the documents in boxes by scan date and batch. We have just recently gone back and tied up the legal, policy, and process foundations that will allow us to define the scanned record as the legal archival record. In this regard, the HIPAA regulation is an ally, with its focus on writing policy and thinking through the security and integrity of the data.

Developing Electronic Interfaces

Directly related to the question of the legal archival record was the decision not to develop electronic interfaces from ancillary systems such as radiology, pathology, laboratory, and transcription to the document imaging system. At the time, we thought that the clinical database would contain that information so redundancy was not necessary or desired. As an interim step, the HIM department decided to print and manually process for scanning all these documents from the electronic ancillary systems. This increased the staffing needs of the department, though we were able to automate part of the process by printing bar codes and affixing them to the printed reports, allowing us to move from manual indexing to automatic indexing.

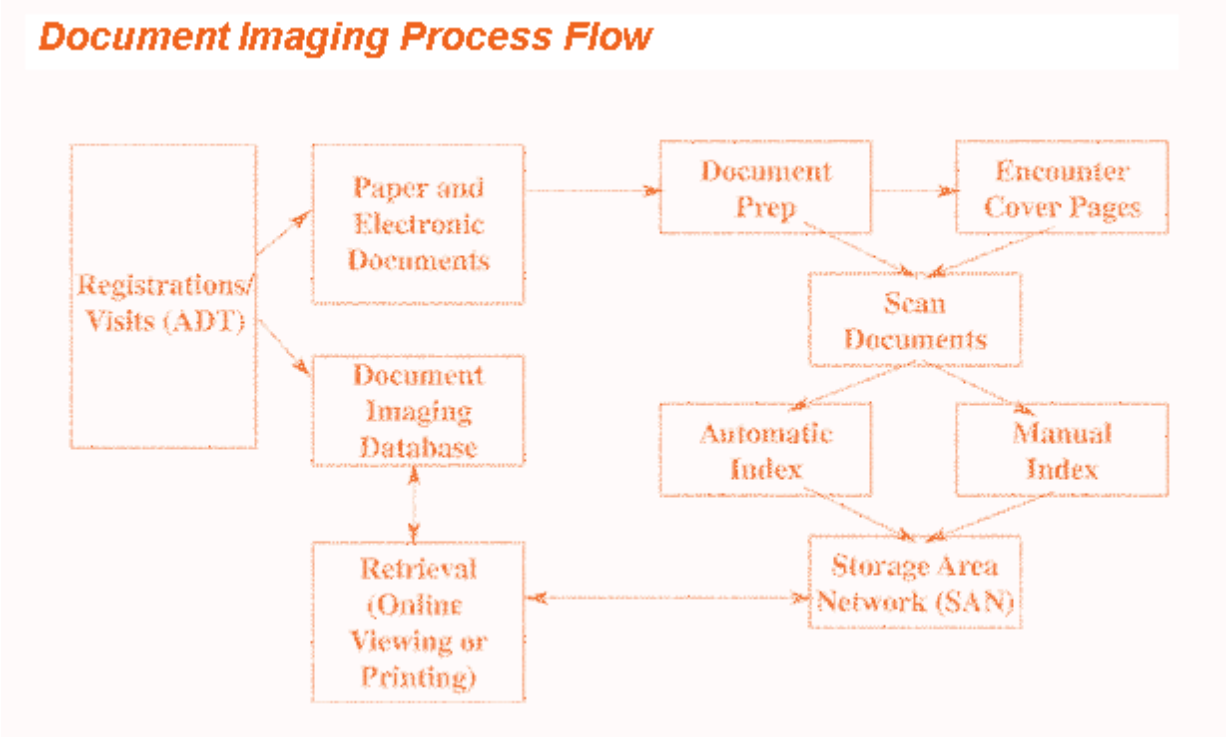
Within a year, SHC began the process of phasing out the clinical database and decided not to convert all data from the old system to the new system. This solidified the HIM decision to continue to scan and index all patient care information and to request capital dollars to build electronic interfaces from the ancillaries to the imaging system. Unfortunately, by this time, the project was in conflict with capital dollar requests for Y2K and shoring up the weakest elements of the UCSF-Stanford Healthcare information systems. Four years later, SHC is in the process of building several interfaces allowing electronic transfer of clinical data from the ancillary systems to the document imaging system. These projects will yield a reduction of approximately seven FTEs by eliminating the need to manually process these documents.

Another learning experience for us is that other hospital projects that affect scanning of documents, such as physician order entry, have neglected to consider electronic interfaces as part of the capital request and project plan. As a consequence, even as we phase out scanning and replace it with interfaces, we are receiving new types of documents that require manual processing.

Opting for a "Big Bang" Implementation

One of the perennial questions when considering document imaging is whether to phase it in or go live in a "big bang." SHC chose a big bang approach in implementing the document imaging process, and the same approach was chosen several years later when rolling out the Web-based viewer throughout the hospital.

This approach has worked well especially in delineating an exact date between the paper and electronic chart, eliminating the need to run a dual medical record system. It has also made marketing and communication clearer, and in our moments of despair, provided no easy way to return to the old paper chart. In the end, the big bang implementation committed us to our chosen course and we have been able to find creative solutions to each problem in succession.



Account Number Structure and Date of Service Issues

The biggest underlying information management structural problem has been SHC's account number structure, which hinders both scanning and retrieval. Currently, the type of hospital admission is built into the account number structure. For inpatients, outpatient surgery, and emergency room visits, there is direct correspondence between the billing number and the date of service. However, for clinic visits, the outpatient account number is reused each time a patient has a clinic visit and the latest encounter date overrides any previous encounters. This structure makes it very difficult to index documents to the correct service dates and view documents by dates.

Five years ago, we assumed that the scanning date would be within 24 hours of the service date and would provide a reasonable sequencing of the scanned documents. In reality, the scanning date may be several days after the service date. To partially address this problem, we developed a form naming convention to help segregate the document types by clinic so that clinicians would have a smaller list of relevant documents to review. On a larger scale, SHC and LPCH are now engaging in an integrated registration project, which will provide unique account numbers for each visit, and as a byproduct, allow indexing of documents to specific service dates. We are working closely with our vendor to enhance the application to allow indexing by service date.

Optimizing Scanning and Retrieval

Initially when building an online medical record, we worked toward optimizing scanning. We needed to organize ourselves, the system, and the work to get records scanned as quickly as possible. With our initial 3,500-inch backlog of loose paper, the question of how to efficiently scan and index intensified.

As more users began to retrieve documents from the system, we learned that the process we chose to optimize scanning hindered our ability to retrieve documents. Specifically, we realized that users of paper charts often think about forms in terms of the color, texture, and design of the form. Most of these characteristics disappear when the forms have been converted to white paper and placed online. Further, we indexed documents to account number (billing number) and form number. The retrieval system worked the same way: within a billing number, forms were presented in form number order. However, at SHC, the form number is simply the sequential number assigned when a new form is approved. Physicians were soon complaining that the printouts and online images made no sense. They were right.

About a year into the project, we decided to reorganize the retrieval system by form name. This seemed like a good idea until we realized that forms were not named by any underlying system. Rather, a form was named by whatever phrase the initiator chose and individuals searching for the form didn't always use the same description as the designer. For example, consider the nutritional assessment form. It could be grouped under assessment, nutrition, dietetics, or food service. To solve this problem, we:

- grouped all forms into categories, using as a starting point the chart tabs in the old paper charts
- assigned each form to a department service so that a user could find the clinical area of interest
- named each form using a short phrase

This modification required changing all the document descriptions in the document imaging database. In addition, for standard forms (such as clinic visit), we created unique forms for each clinic that differed only in form name and number. This enables easier retrieval of information for users even though it adds to the overall number of forms in the system. As a caution, you should also make sure your organization comes up with an optional process for scanning continuancy documents (i.e., immunization records, growth charts, etc.).

Tackling Forms Management

In line with the effort to optimize scanning, considerable effort was directed at ensuring that SHC forms were formatted and bar coded to comply with the scanning requirements. Bar coding a form allows the form to be automatically indexed, which minimizes the amount of manual intervention and the number of FTEs required to support the scanning project. To this end, about 80 percent of the known forms were bar coded prior to the launch of the imaging system. However, we made several mistakes:

- we assumed that our catalog of forms was reasonably complete and that we had identified the majority of the forms in the medical record
- we assumed that once a form was fixed, the clinics and units would use the new form
- we assumed that the printer would print the bar codes correctly and that the bar codes would be readable
- it did not occur to us that units would make their own bar codes, sometimes borrowing the bar code from another approved form
- we assumed that the rather passive forms management program that worked in the paper chart environment was up to the task of managing forms for the electronic medical record
- we did not do a very good job designing the nursing flow sheets, which resulted in them being difficult to scan and view

As a consequence, our initial success soon eroded and our automatic indexing rate dropped from the 80 percentile into the high 60th and low 70th percentile. This meant that for every 100 records scanned, approximately 30 needed manual indexing. As a result, we had to increase staffing in the document imaging area, which was a step away from our promised medical records return on investment.

SHC now has a success rate of more than 93 percent in automatic indexing of documents. A key step in engineering this turnaround time was to completely rethink the forms management program. The HIM committee chartered a new subcommittee to aggressively manage forms. Chaired by a nurse, the committee meets biweekly and includes representation from clinic administration, the ancillaries, risk management, material management, the forms vendor, and HIM. A database has been developed to manage the entire inventory of forms and includes a blank image of all approved forms. The designer of a new form must present it to the committee in person and all newly printed forms must be tested by the document imaging staff. The medical records staff identifies new, unapproved forms for follow up by the HIM management team and the forms committee.

Exploring Storage Options

We originally planned to scan and store images on a magnetic server for three to five days and then move the images to Optical Storage and Retrieval (OSAR) servers for long-term storage. OSAR was a cheaper storage medium, satisfying the requirements of "write once, read many times." However, as we began to retrieve documents for clinic follow-up visits, it soon became apparent that optical retrieval is slow. As the volume of print demands increased and as the images were spread across multiple platters, retrieval time for the first image moved from seconds to minutes. As the number of hits increased, we began to experience technological architecture problems between the viewer and the optical servers as well as OSAR maintenance issues.

In response, we added magnetic servers to extend the time images remained on the magnetic servers, first to 10 days, then to 30 days, and then to 90 days. In addition, we began to develop a new strategy for how we moved images from magnetic to optical storage, which would have kept high-request documents on a magnetic server for extended periods of time and moved low-request documents to optical servers quickly.

In the last 18 months, we completely changed storage strategies, deciding to move all storage to high-density, clustered magnetic storage servers in the form of a storage area network (SAN), which was not technologically or economically feasible five years ago. We recently completed our project of not only permanently storing all new images on the SAN, but also moving all earlier scanned images back from the optical servers to the magnetic servers. And as our next step, our high availability plan is to cluster the database servers.

Printing as a Temporary Solution

Our original plan was to image-enable our clinical database repository with our document imaging system within three months of the imaging rollout. As an interim step, we decided to print requested charts for inpatient admissions and clinic visits and retrieve and send the old (prior to 1997) paper chart. Four years later, we are still printing charts for more than 1,000 clinic visits a day, although we do not retrieve many old paper charts. The process of printing necessitated the purchase and maintenance of several printers, leasing of PCs to manage the print jobs, and increasing the size of the HIM staff to print and deliver the records. In addition, until recently the only online access to the scanned record was through the HIM department.

The interim step of printing documents became protracted for three reasons:

- the HIM team was reluctant to roll out online access while there was a substantial loose sheet backlog
- with the decision to switch to a new clinical database, there was no point in image-enabling the old product
- following the roll out of the new product, we found that the image-enabled desktop competed for drivers with other products on the SHC desktop, making desktop maintenance a daily challenge

As a result, we decided to roll out online access to the imaged charts using a Web-based viewer in 2000. This viewer had several advantages for us: a light desktop with minimal desktop maintenance, lower hardware requirements for the PCs, an easy push to the desktop, and a viewer which maps easily to other Web activities. SHC decided on a soft launch of the viewer

to 2,000 workstations in spring 2001. Once we complete the conversion of all optical images to the SAN, we will begin an aggressive program to wean the clinics from the printed documents and decrease HIM staffing.

Managing Expectations

When selling a project like document imaging, the concerns of at least three different parties must be addressed: administration, the users, and the HIM staff. For administration, much of the sell revolves around the question of how much and how quickly can operating expenses be reduced by authorizing the expenditure of capital. Unfortunately, positioning the return on investment can be overaggressive. The reduction of operating expenses depends on a smooth IT implementation, the liberal use of interfaces, customer acceptance, and effective HIM department management of the project. In addition, there is a transition phase as the old paper charts are phased out and the document imaging system supplants it, which is best measured by the number of months one continues to receive loose paper for the old paper charts.

For the users, document imaging must be placed in a context of other electronic medical record systems. We found that this is best accomplished by positioning document imaging as a step toward a patient care system and as a way to improve the back-end operations of HIM and patient accounts operations.

For the HIM staff, new technology and new processes mean change. Change can be scary and it can also be a reason to expect a new title and a higher salary. At SHC, we addressed these issues through an intensive training program, a new health information associate (HIA) staffing structure, and a mechanism to earn promotions between the HIA grades.

Addressing Leadership Challenges

One of our biggest surprises with the rollout of the new document imaging technology was the effect on the HIM team. Managing technology is harder than managing paper charts, and it takes more managers. Along the way, we burnt out several managers, found more than a few who were not up to the challenge of the job, and discovered that more than one was overwhelmed by managing both the technology and HIM operations.

To help develop and support the management team, we have worked hard at being a team. We hold weekly meetings, which function like college seminars: the meetings are places to try out ideas, present drafts of presentations, brainstorm budget ideas, toss out policy ideas, and sometimes, just gripe. For those of us who stick with it, the HIM department at Stanford is one of the most exciting, intellectual places in the country.

In this article, we've offered a real-life picture of technology implementation. The return on investment was neither immediate nor effortless—it demanded ongoing inspiration, innovation, and exploration. Use our road map to avoid some of the pitfalls we encountered and make your trip to automation a little smoother.

Document Imaging Implementation Checklist

Below is the checklist SHC used when implementing a document imaging system.

___ Select imaging vendor
___ Determine storage approach (magnetic or optical)
___ Determine implementation approach (incremental, soft launch, or "big bang")
___ Make policy revisions or develop:

- Legal medical record policy
- Record destruction
- QA system and controls

___ Examine ADT feeds:

- multiple hospital
- account number
- patient type
- date of service

___ Determine indexing approach, impacting retrieval and imaging
___ Evaluate forms review process (naming, formatting, and bar coding)
___ Implement new scanning operation, addressing:

- document preparation area
- scanner placement, UPS, air-conditioning, and air circulation
- indexing PCs and configuration
- destruction or storage of scanned images
- staging area for completed documents
- staff training

___ Address retrieval demands (online versus printing), including:

- printing policy
- print to colored paper?
- examine printer technologies/maintenance contracts
- ROI and patient account operations
- paper storage
- shredder bins
- staff training

___ Evaluate desktop, type of client, and operating systems

- field service support
- PC leases and maintenance

___ Evaluate HIPAA and security compliance

- security structure
- record and document lockdown
- access control
- audits
- timeouts

___ Organize paper-to-scanning operational transition

- organizational structure
- staffing analysis (title and salary structure)
- management structure
- manager on call
- new medical records policies and procedures
- dual systems

___ Organize marketing, public relations, and support efforts

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