# The Reality of EMR Implementation: Lessons from the Field

By Homer L Chin, MD, MS

Kaiser Permanente Northwest (KPNW) has more than a decade of experience working with Epic Systems in the development, implementation, maintenance, and continued improvement of the electronic medical record (EMR). EpicCare was initially implemented in two primary care clinics in 1994 and was completely rolled-out to the rest of the region by year-end 1997. This article will describe the most salient lessons that KPNW has learned in the interest of informing other KP regions as they embark on implementing KP HealthConnect (KPHC).

Some of these lessons were learned the hard way. Some things we "lucked into" naturally. Some of these lessons are backed up by hard data; some were gleaned through our experience and have been reinforced by similar learnings from other organizations. We have learned many more lessons than we are able to encapsulate in this short article. For anyone who has additional questions that are not answered here, please contact me directly and I will share whatever experience and knowledge we might have in a particular area. There are very few aspects of implementing an outpatient EMR with which we have not had some experience.

## Overview

KPNW began the implementation of the EMR by developing and deploying an extensive Results Reporting System in 1992. In 1993, after an extensive evaluation of vendors, KPNW chose Epic Systems as our partner to deploy EpicCare, a comprehensive outpatient EMR. In 1994, we began a pilot deployment of EpicCare in two primary care clinics, involving approximately 50 primary care clinicians. After Epic Systems enhanced their system in response to our requirements, we embarked on a rollout of EpicCare to the rest of primary care, clinic by clinic. In 1996, we started the rollout of EpicCare to our specialty clinicians, department by department. After additional software enhancements, including the implementation of a prenatal record, we completed our rollout to our Ob/Gyn clinicians and to the rest of the specialty departments in 1997. In 1998, we implemented our Emergency Department and installed a document scanning system for any residual paper. At that time, we fully retired the paper chart. For members who have joined us since 1998, no paper record is created. Over the years of implementation, our geographically based chart rooms were gradually downsized and consolidated, and the personnel were retrained for other roles and functions throughout our organization.

EpicCare is not only an electronic version of the outpatient medical record; it also automates all information transmission processes in the outpatient setting. Health care providers use this system to document, order, refer, and message other health care staff. EpicCare has a two-way interface for order and results transmittal to our lab and pharmacy systems, giving our clinicians a complete and accurate picture of the laboratory and medication status of a patient. Guidelines, information, and medication suggestions are provided "in-line" to clinicians as they use the system to provide care for their patients. With the implementation of Epic's MyChart and Epic's Home Health System, we are extending secure access to the medical record and messaging into our members' homes.

## Lessons Learned

I have organized our experience and learnings under the following themes: Organizational decision making and project management, system deployment, application software, benefits realization, content management, and other insights that transcend categorization.

## Organizational Decision Making and Project Management
### Empower Project Leaders Who Are Close to The Ground

Although the high-level budgeting and direction were set by the leaders of the Health Plan and Medical Group, the project team was empowered, within broad bound-

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aries, to make decisions—enabling quick resolution of issues that arose during system deployment. Many of the project team members were end users of the system, providing a close link between decisions made and the impact of those decisions.

### The Three-Legged Stool

The close coordination and cooperation of Operations, Permanente Medical Group, and Information Technology in joint management and decision making was an important factor in our success. For efforts in which we had only one or two legs of the three-legged stool, progress was often slow, the result somewhat off-target, or the effort unsuccessful. The close coordination



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of Operations for project management expertise, the Medical Group for the clinical expertise, and Information Technology (IT) for technical expertise was an important ingredient in our success.

### Beware "Scope Creep"

As an information systems project progresses, it is easy for additional functional requirements to creep into the project. Most additional requirements that are added in this way appear benign at first but have significant hidden downstream impacts. For large, complex projects, scope creep may introduce a lack of clarity that may result in significant delays and rework. Although some increases in scope cannot be avoided, it is important to understand that any change in scope may reduce the probability of success of the overall project.

### Begin With the End in Mind (and Think of Everything in Between)

It is important to think through all the steps in a project from beginning to end. We embarked on a number of efforts only to find that we had not thought through the intermediate steps required to reach our goal. If we had done a more complete analysis of all the steps necessary to achieve an objective, we would have realized that our approach was missing critical steps, dooming it to failure from the start.

### Bridgers

Bridgers are special people who are able to bridge the gap and the cultural divide between the end user, the organization, and IT. These people are able to think systematically and can understand and translate between end users, the project team, and the organization. They are often able to trade-off the benefit of

a specific functionality against the effort and risks in developing and implementing that functionality. By focusing on the end goal and thinking globally, they are often able to find the 80/20 solution—where 80% of the benefit can be achieved at 20% of the effort. These Bridgers are often able to identify easy-to-implement functionality that will have significant benefit and distinguish them from requests for functionality that are difficult to implement and have unclear long-term benefits.

### System Deployment and Roll-out
### You Won't Get It Right (Don't Try For Perfection)

Implementing an EMR is analogous to trying to find your way through a dimly lit forest. You have a general sense of the direction to head in and a general timeframe as to when you will reach the other side, but you would not be successful if you charted a rigid course in advance. Implementing an EMR is still more art than science. Tried and true methods for implementation do not exist. And you will not implement it without significant problems the first time. In the deployment, be prepared to make changes "on the fly" in response to identified issues. Trying to reach perfection prior to go-live will add effort and precision that is not warranted for the situation.

### Pilot and Improve, Rollout and Improve

As a corollary to the "don't try for perfection," the flip side is don't roll it out further until the system is at least "good enough" in the locations that you have already implemented. In other words, if you have identified significant problems or issues, fix them and delay further roll out until those

issues or problems are sufficiently addressed. Another way to put it is to "put out the fire" before rolling the system out to further locations. Keeping to a rigid schedule for rollout before "putting out the fire" in implemented locations may result in an uncontrolled blaze that will eventually engulf the entire project in flames.

### Value the Curmudgeons

End user critics of an implementation are a godsend. Listen to, carefully evaluate, and respond to any complaints about the system. By the time you hear of a complaint, many others will probably have silently suffered through similar problems. Although each of these problems and issues may be small, the cumulation of a large number of these "small problems" can be overwhelming. Some organizations have gone as far as to add a "complaint" button to their system, allowing end users to complain at any time and at any point in their use of the system. Although these complaints are occasionally misdirected, they are often warning signs as to where the road may be in need of repair. Ignore these signs at your peril!

### Get Feedback and Use It

A corollary to "value the curmudgeons" is to solicit feedback about an implementation early and often. The system will not be perfect, and it will need improvement. If you are not hearing from clinicians, actively solicit feedback so that you can implement improvements in advance of significant problems.

### Look for the Opportunity and the Easy Win

In implementing a system, you will occasionally come across an opportunity where a "tweak" to the system or use of the system in a way that

was not previously foreseen may result in significant improvements in efficiency or quality. An example of this was in our development of the SmartRx functionality within EpicCare. EpicCare had an Alternative Medication functionality that would alert clinicians to potentially better alternatives to the medication they were prescribing. Our pharmacists tweaked this functionality slightly by adding disease conditions to our medication file (Acute Sinusitis SmartRx, for instance) that allowed clinicians to enter a disease name in the medication field to get guidance on recommended therapy while improving the efficiency of the prescribing process.

### Training Never Ends

Many people believe that the training task is done when a clinician has undergone initial training and is using the EMR. In our experience, clinicians know enough to "get by," but most quickly forget much of what they learned in the initial system training. In an evaluation of our clinicians, we found that more than 50% of our clinicians remembered less than 50% of what we felt was essential material taught to them in the initial system deployment. In addition, information systems and capabilities are constantly changing. Ongoing and continued evaluation, education, and training are necessary to optimize clinician efficiency and effectiveness.

### Implementation Never Ends

Many system implementers believe that once a system is implemented, their work is done. The truth of the matter is that these systems are constantly changing. Application software, operating systems, hardware, technology, and medical knowledge about diagnosis and treatment are constantly changing. The myriad combinations and interactions of all

these changes will keep a project team "implementing" at all times.

### Your Users Are Beta-Testers

It is impossible to completely replicate the production use of a system in a test environment. This results in a system that is not fully tested prior to deployment. At the time of an initial go-live or significant upgrade, your end users become beta-testers of the system. It is not unusual for hundreds of issues, problems, and bugs to surface soon after go-live.

### Jack Be Nimble, Jack Be Quick

In systems that are used for patient care, problems and "bugs" may have patient safety and medical-legal implications. The project team will need to be nimble and quick to fix identified problems—especially those that affect patient safety. Slow resolution of clearly identified problems may also demoralize end users and result in loss of credibility in the project team. A quick identification and resolution process is critical during the first few weeks of go-live.

### Clinician Efficiency Comes First!

Implement the system in a way that tries to maximize a clinician's efficiency at first. After successful implementation, additional tasks can be gradually added as clinician capacity to absorb these additional tasks increases. If a clinician is saddled with many additional tasks at go-live, the clinician may never learn the system well enough to achieve a good level of comfort and efficiency.

### Application Software Keep It Simple!

With EMR software, transparency, reliability, and simplicity are impor-

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tant characteristics that should be valued over system sophistication. In some cases, EMR software is becoming so complex that it is difficult to tell in advance what the system will do in a given situation. When it comes to an EMR, transparency, reliability, and simplicity allow easier detection of errors that may adversely affect patient safety.

### Efficiency and Response Time

The top three important factors in an EMR are: 1) Clinician Efficiency, 2) Clinician Efficiency, and 3) Clinician Efficiency. Having a quick response time is a prerequisite to supporting clinician efficiency.

### Clinical Content
### Simple and Effective Ways to Embed Decision-Support Content

With an EMR, the opportunity exists to use an order requisition as a way to communicate not only from the clinician to the ancillary department but also as a way for the organization to communicate to the clinician at the time of ordering. By embedding guiding information in an order requisition, guidance can be provided to the clinician seamlessly during the ordering process. Another example of a simple but effective way to embed useful content is to automatically print patient information related to an order on the after-visit summary that is given to the patient at the end of the visit. Decision support can also be embedded through Alternative Orders, Smart Orders, Alternative Meds, and SmartRxs. Medication content and decision support include formulary and cost information for medications, drug-drug and drug-allergy interaction checking, and disease-specific interaction checking. Additional types of decision support include Order Panels, Smart Text, Smart Phrases, and Smart Sets. In general, the goal is to embed decision support in a seamless way that makes doing the right thing the easiest option in most cases. EpicCare allows the easy embedding of content in a myriad number of ways throughout the system.

### Content that Supports Clinician Efficiency

Report formatting, layout, and content can have a significant impact on efficiency and effectiveness. For instance, our Previsit Summary automatically scans the last three lab test results for each lab test type. If any of the last three CBCs, for instance, are abnormal, a spreadsheet of the CBCs is printed. In this way, the system supports a quick and comprehensive review of the laboratory status for the patient. Other content areas that support clinician efficiency include key word synonyms that significantly improve the efficiency of ordering, prescribing, and diagnosis entry and well-thought-out departmental preference lists that improve clinicians' ability to find the terms they are looking for. Careful thought and work in these areas will yield significant benefits in clinician efficiency and system usability.

### Keep a Tight Loop Between Content Management and the End User

End users determine the success or failure of content that is implemented in the system. Because the content in the system directly affects the end user, it is important to have a tight loop between the end user and the content embedded in the system. Content management in EpicCare is easy enough to learn and use that it is possible to teach designated end users how to build content and to make them responsible and accountable for developing useful content for a given constituency of users. One of our areas of success is in developing and maintaining pharmacy content. Decisions made by our Pharmacy and Therapeutics Committee are immediately programmed into EpicCare by a pharmacist that same afternoon. We are attempting to disseminate that model of increased end user accountability for content to our clinician group.

### Content Maintenance Never Ends!

Because medical care is constantly advancing and changing, the content within an EMR will need constant updating. Because content is embedded in many different ways and in varied locations in the EMR, the need to determine all the areas in which a change in content needs to be propagated is not a trivial task. KP is in the process of working with Epic Systems on tools to improve our maintenance of embedded content within KPHC.

### Benefits Realization
### Implementation of Information Technology is Just a Tool

It is important to realize that the implementation of information technology, in and of itself, is not the goal. The goal should be to improve the efficiency and effectiveness of our health care delivery system. One of our goals is to improve the efficiency of our clinicians. We have found that for some tasks, reviewing information on paper is still the most efficient way to impart information quickly and effec-

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tively. Because of this, our costs for paper (for Previsit and Aftervisit summaries) have gone up rather than down.

### Organizational Policies Should Reinforce the Behavior Promoted in KPHC

Programming functionality into the system without supporting organizational policies and efforts yields less than optimum results. EpicCare clearly and effectively informs the clinician of the formulary status of medications. However, because our organizational policies do not enforce restrictions around formulary ordering, our compliance with formulary prescribing is not where we would like it to be.

### Enabling a More Effective Data Warehouse

With the implementation of an EMR, the ability to evaluate organizational performance and to systematize health care is significantly enhanced. New paradigms and models for case identification, tracking, monitoring, alerting, and providing feedback are possible. Regions must look carefully at these new capabilities and leverage those that will improve cost-effective high-quality care.

### Clinicians Are Not Optimized for Population Care

Clinicians are optimized for one-on-one care for members. With the implementation of the EMR, significant capabilities to systematize care through care, case, and disease management are enabled. Because these population care approaches are an effective way to reduce cost and improve quality, it is possible to off-load work from the clinician by systematizing care, leaving the clinician more time to devote to the one-on-one care for which they are essential.

### Other Insights
### Clinicians Won't Necessarily Be Faster, But They Should Be Better

It was often assumed that unless the EMR made the clinician "faster" it would not be accepted. In our experience, clinicians are initially slower after EMR implementation. Over time, some clinicians will become faster than they were before, but many will remain slower. Even the slower clinicians recognize the value of information technology—and given the choice, would not want to return to the pre-EMR days. Our theory is that clinicians are able to trade-off their own increased workload against the improvement in care and professional satisfaction that they see with the use of the EMR. With changes in the paradigm of care delivery that the EMR enables, even the "slower" physicians will be more efficient in their overall care of a given population of members.

### The Great Magnifier

The EMR is the "great magnifier." If an organization already does something very well, then the implementation of information technology will probably further improve its performance in that area. However, if an organization is dysfunctional in an area, then the implementation of an EMR will probably magnify that dysfunction. Identifying and addressing potential areas of organizational dysfunction prior to implementing the EMR may improve the overall results of EMR implementation.

### Conclusion

Implementing an EMR is a complex and difficult multidisciplinary effort that will stretch an organization's skills and capacity for change. It will be a challenging and occasionally stressful continuous learning experience. Seeing the systematic benefits of an EMR in improving the care of a large population of members, however, is a gratifying experience that makes the effort of EMR implementation worthwhile. Even after a decade of EpicCare experience, we continue to learn and find ways to use information technology to more fully realize the potential of our integrated health care delivery system. ❖

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## Inspiring a Shared Vision

A leader who Inspires a Shared Vision is one who describes ideal capabilities; looks ahead and communicates the future; is an upbeat and positive communicator; finds common ground; communicates purpose and meaning and/or is enthusiastic about the possibilities.

— *The Leadership Challenge, J Kouzes and B Posner, Jossey-Bass*