

Davies Award of Excellence

AMBULATORY CARE APPLICATION

OKLAHOMA ARTHRITIS CENTER, P.C.

SECTION A

1. **Name and Title of Submitter:** Craig W. Carson, M.D.
2. **Practice Name:** Oklahoma Arthritis Center, P.C.
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4. **City:** Edmond **State:** OK **Zip:** 73013
5. **Telephone:** 405.844.4978 **Fax:** 405.844.0562
6. **E-mail:** cwcarson@okarthritis.com
7. **Web Site Address:** N/A
8. **Number of Providers:** 3 physicians, 2 Physicians Assistants
9. **Number of FTEs:**
 - i. **Clinical Staff:**
 1. RN: 3
 2. LPN: 6
 3. MA: 1
 4. Radiographer: 2
 - ii. **Business Staff:**
 1. Billing: 4
 2. Reception: 4
 3. Medical Records: 2
 4. Administrative: 4
10. **Number of Sites:** 1
11. **Commercial Agreements:** Oklahoma Arthritis Center has an agreement with Allscripts TouchWorks Electronic Health Record solution. OAC serves as a reference site for TouchWorks EHR and PM.
12. **Annual Patient Encounters:** 3900 per provider* **Active Patients:** 4200
13. **EHR Team Members:**
 - Craig W. Carson – M.D.
 - Courtni R. Hamilton – Project manager
 - Wynde L. Hammock – Clinical Nurse Leader
 - Josh Randels – Information Technology

SECTION B

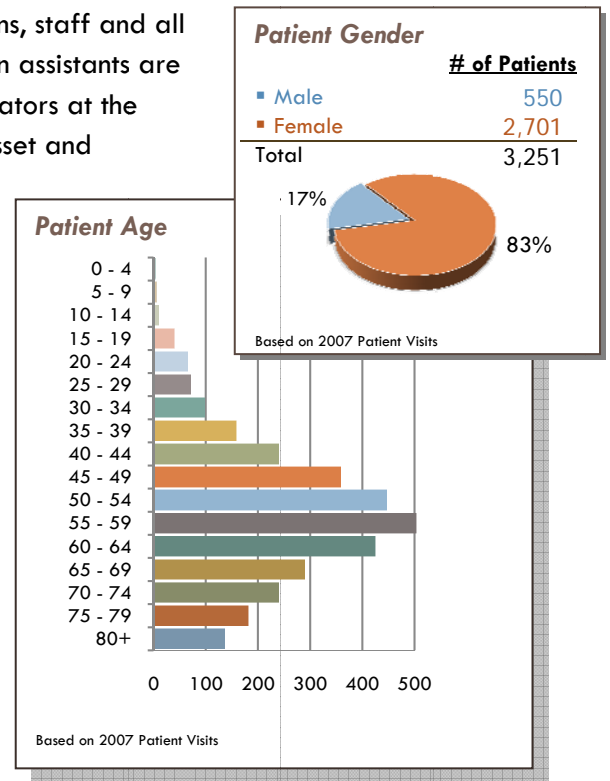
I. The Organization

The Oklahoma Arthritis Center (OAC) is a rheumatology practice located in the Oklahoma City metropolitan area. Founded in 2000 by Craig W. Carson MD, the clinic specializes in patients with Arthritis and related conditions such as lupus, fibromyalgia and osteoporosis. OAC stresses the importance of quality patient care by utilizing technology, innovation and leadership to provide the best service, education, and training possible.

OAC is committed to providing quality education for the physicians, staff and all future health care professionals. Resident physicians and physician assistants are invited to train alongside OAC providers and staff. The administrators at the Oklahoma Arthritis Center believe that the staff is the greatest asset and recognizes that each member of the team makes valuable contributions. OAC offers a wide variety of ancillary services such as an infusion suite, radiology department and clinical laboratory.

Our payer mix includes 42% Medicare and 58% commercial insurances. We see very few HMO patients. The largest portion of our patient population falls in the 40 to 70 age range, and the majority tends to be female. The Charts to the right reflect patients seen in 2007.

In order to ensure continuity of care within the practice, the administrators at OAC chose to implement an EHR system provided by Allscripts. OAC is proud to have been the first client live on both TouchWorks EHR and TouchWorks Practice Management systems. OAC is also an official Allscripts reference site for both systems.



II. Management: Business Objectives

1. Implementation Decision

For over a decade now, politicians and providers alike have been talking about the benefits that Health Information Exchange systems can provide. While there are obvious benefits for patients, such as reduced error rates and lower overall health costs, we believe that the efficiency that technology can provide can also be financially beneficial to providers as well. We believe the first step toward preparing for Information Exchange is an Electronic Health Record system in the clinic. For the Oklahoma Arthritis Center, becoming electronic was the only way to go. In looking at our overall goal, we are here to provide the best patient care possible. If technology can benefit our patients, we usually try and do it. But trying to decide which EHR system to use was very challenging.

Before Dr. Carson first started looking for an Electronic Health Record system, he sat down and started looking at the future of his clinic. He asked the question “where should the clinic be 10 years from now”? At the time, the clinic only consisted of himself, one PA, and a small group of support staff. However, his vision for the future was to have 7 providers and additional onsite ancillary services such as a laboratory and a full diagnostic imaging center.

Throughout the process of choosing an EHR system, the vision of the future became one of the main focuses in deciding what was needed. We wanted a system that could support growth, and would be able to handle integration with all of our ancillary services. By choosing the right system, we hoped that it would provide a conduit that would allow for easier growth in the future. While this meant that we would have to spend a little more upfront, especially when considering interface costs, it also meant a cheaper and streamlined path for growth and daily operations in the future.

a. Daily Operations

We anticipated the EHR program would increase efficiency and provide better time management in our daily operations. Rather than spending hours a day searching for charts, they would be easily accessible via the computer. We would be able to get the patients back to see their provider faster by “plugging” all their problems and medications into the system as opposed to hand writing everything in a paper chart. Interfaces would allow other systems to send information directly to the provider without additional manual entry.

b. Fiscal Vitality

Using technology to streamline our practice, we were able to create a path for growth that was far cheaper than a paper charting system. In addition, we also reduced our daily cost for a given unit of service, which makes us more profitable even though some insurance companies have reduced their allowable benefits.

c. Clinical Outcome

Our staff and providers spend less time waiting, and searching, for charts. Providers spend more time focusing on their patients, and can instantly pull up any patients chart to make notes. The organization of the chart itself is much better as new information can be auto arranged in different views that allow the providers to see a better, more complete, picture of their patients medical information. Overall, we believe our patients receive even better care due to the organization that the EHR provides.

d. Satisfaction

Having had the EHR for a while, we asked our providers what they thought of the EHR now. They all said basically the same thing, “we have more time with patients, less time with paperwork.” From the patient’s perspective, more time with the provider, less time waiting for them to find and fill out paperwork. Either way, the general point seems to be that the EHR (with scheduling, patient statuses and tracking, electronic prescribing, point and click templates, and all of the other features that an EHR can provide) makes everything run more efficiently.

Three of our five providers are part time. They really like the fact that you can work from home. With a paper chart it was impossible for them to work from home, but with an electronic system, they can take their tablet with them and securely login from anywhere. Besides being able to see a patient’s chart in an emergency call, this also gives them the ability to sign off on notes and review lab results from home.

2. Project Organization

a. Leadership/Governance

- i. OAC held regular EHR team meetings to determine which implementation plan would work best for the practice. After thoroughly reviewing the different options, Dr. Carson and the EHR team ascertained that a phased implementation would work best. We wanted as

minimal of down time and impact on the clinic as possible during the process. We also didn't want to overwhelm any of our staff and create a situation that could negatively affect patient care. By only implementing small parts of the application at a time, we were able to convert our users over a two month period without having to significantly alter their patient load.

- ii. OAC believes that the success of the EHR implementation was dependant on three main factors:
 - **Attitude** – The attitude of the EHR team, lead by Dr. Carson, influenced the overall environment of the practice. OAC believes that success is a matter of having a positive attitude and applying motivational principles on a daily basis.
 - **Responsiveness** – The motivational strategies the EHR team applied were essential to the success of the staff's responsiveness to the new system. The EHR team posted motivational posters throughout the office. The posters were used to keep the staff focused on the end goal and help them remember that the frustrations of transition were only temporary. In the scanning room, the EHR team made a "thermometer" count-down based on the number of charts that were scanned. The scanning team then colored in the thermometer as charts were scanned.
 - **Flexibility** – A key element in helping to manage change is flexibility. OAC has learned that installing an electronic health records system is a process. EHR implementation is a commitment to improvement, not necessarily perfection. Having a flexible implementation plan and expectations is absolutely essential for a successful transition.
- iii. When Dr. Carson began researching the benefits of electronic health records, he realized that this goal was only achievable at the right time, with the right team, and with the right system behind him. By 2005, he realized that the time and resources he needed to achieve this goal were available, and he began to organize a team to help him find the right EHR system. In deciding on team members, there were three key functions that he felt were necessary to cover all the aspects of the EHR project: a Project Manager, an experienced Nurse, and a technical consultant.
 - **Project Manager** – The project manager's main responsibility is to provide overall organization for the implementation project. This should be someone with a wide array of knowledge about all aspects of the clinic.
 - **Clinical Nurse Leader** – The CNL provides clinical support for the team and acts as the spokesperson. The CNL builds the clinical content of the EHR, documents workflow and provides training for clinical staff.
 - **Technology Consultant** – The Technology Consultant is responsible for knowing the network layout of the entire clinic and the technical operations of all the systems that are beyond the EHR but may still integrate in some fashion. They provide a single source reference for all of the systems in the clinic.

The implementation process was very time consuming for our EHR team. During the implementation, the Project Manager and CNL spent the majority of their time working on the EHR. Between learning the system, customization, overall project management and training, it

became their full time function. The rest of the clinic only experienced very minor time commitments for training.

Since we decided to handle scanning our own charts, we had to hire temporary employees to do the scanning. In order to accomplish this, we ended up hiring 6 college students that rotated in during regular business hours. To be able to get rid of the paper charts all together, we decided to scan in all the charts for any patient we had seen in the last 10 years. This meant that there were roughly 10,000 charts that needed to be scanned. Each chart contained roughly 7 sections and 120 pages. We started scanning in May of 2006 and finished in August of 2007. When they finished, there was much rejoicing.

A lot of practices don't take the time and expense to scan all of their old charts. However, we think it is well worth it. The other day, a hospital called to ask Dr. Carson if a patient he had seen 8 years ago had lupus. In the past, we would have sent someone to storage for the chart, and we would have called the hospital back within 2 or 3 days. Since we had scanned in the chart, Dr. Carson was able to look up the patient in seconds and give the hospital an answer on the spot without having to waste time calling them back.

- iv. Allscripts also provided their own implementation team to help insure that everything went well and to perform the initial install. Their team included many of the same functions that we also had locally, but specialized for TouchWorks. All throughout the process, Allscripts scheduled weekly phone meetings with our local EHR team. During these meetings, our Allscripts Account Manager would go over our game plan to make sure everyone was still on track. We would also create lists of follow up items that needed to be addressed before the next meeting.
- v. While Allscripts provided an onsite technician to handle their software, it was still necessary to have a local IT consultant to handle the main backend network. We already had an independent consultant that had been working for the clinic on an as-needed hourly rate. Before the project started, we sat down with him and made sure he could block out the time we needed from him. Since he had already installed our other servers and networking equipment, he was very familiar with the clinic.

For OAC, the EHR was part of a much bigger picture that included an onsite laboratory, a radiology department, and a much larger infusion suite. The clinic has continued to add more and more technology even after the initial EHR installation. A few months after the EHR had been setup, we were able to hire the technical consultant part time. In order to keep costs down, we split his contract with another company so that he worked for us 20 hours a week. Another year after that, with the clinic still growing, we were able to hire him full time as the Director of IT.

b. Preparation: Readiness

- i. In order to prepare for the implementation, OAC began a rigorous review of the clinic's workflows. The EHR team attended a week-long training course in Chicago in February of 2006. The knowledge that each team member gained during this training was beneficial in converting the paper workflows to electronic workflows. OAC realized the importance of a smooth transition from paper to electronic workflows in order to insure uninterrupted patient care. Therefore, the main emphasis in the preparation period was the workflow.

- ii. It was very important to us that we maintain quality patient care while learning the new system. We decided it would be best to take things slow and have both paper and electronic options available in the beginning. For the go-live, we used a two month modular approach. This gave our staff time to learn each module without having to worry about the entire process. We started using the electronic prescribing and notes modules, and then graduated into the more complex modules that required interfacing such as lab ordering.
- iii. We routinely scheduled meetings with our staff and went over the exact steps and phases we would be going through. At our first rollout in phase one, we made sure that each of our providers had someone from the EHR team waiting outside of their exam room in case they had any questions. We also shadowed our nurses and encouraged them to ask questions if they had any. We met once every two weeks as an entire clinic to discuss questions, upgrades, problems, and resolutions that we had found throughout that week.

3. Training (a-c)

OAC realized the benefits of training in group settings as well as one-on-one settings, therefore, both of these methods were utilized. Training was provided during normal business hours to make it easier on our employees. When needed, the providers' schedules were lightened to allow for additional time. We ended up providing training to four different user groups: the EHR team, "Super Users," Providers, and everyone else.

In February of 2006, the EHR team attended a training class at Allscripts' facility in Chicago, IL. Along with phone meetings and web based training, they learned every aspect of the ERH from user setup to creating note templates.

Each department had a designated "Super User" that could be the first point of contact for all the other users in their department. The Super Users were trained during a one month period for roughly 5 hours a week. Their training was done by our local EHR team on a one-on-one basis to ensure that they could cover issues specific to each department. To keep them from having to come in on weekends, each user would work their 5 hours a week in during their lunch breaks and after closing on Fridays (since our clinic closes at noon on Fridays).

To train the providers, we started with two group sessions on Friday afternoons. After the initial training, we encouraged them to login to our test system on their own to help them become more familiar with screen layouts.

In order to train the rest of the users, we decided to do one group training session. Knowing that onsite training can be difficult when employees are constantly running in and out, we decided to close the clinic for one day in order to perform the training session. While we don't like to close the clinic, we thought it was worthwhile to ensure our employees could truly focus on training. We wanted to make sure our employees were as prepared as they could be for our go live.

There were three main concepts that the EHR team took into consideration when designing the training strategy for the practice.

- **Workflows** – Workflows were the foundation upon which training sessions were based. This method was most helpful for staff members because they were better able to picture how their job duties would change with the new system.

- **Personalities** – The training strategy OAC used incorporated the use of hands-on and visual approaches to accommodate individual learning styles which were identified prior to training. For those who desired more time, additional one-on-one training was provided.
- **Modules** – Training was based off of the go-live phases. For example, the training strategy first focused on note documentation and prescribing. Once users were comfortable with those modules, training then focused on ordering, resulting, and charge entry.

4. Implementation

- a. **Phase One:** The first step in the implementation process was electronic prescribing and note documentation. Starting in June of 2006, each provider was given the opportunity to utilize the electronic prescribing and note functionalities or to continue documenting on paper. The EHR team encouraged the use of the EHR while realizing that it would take each provider time to adapt to the new workflows.

Prior to each appointment, OAC asked each patient to fill out an “EHR Patient Information Sheet” which asked for the patient’s past and current problems, medications, surgeries and family history. Each provider was responsible for reviewing this sheet with the patient in order to ensure an accurate electronic record. After the patient visit, the paper chart was then taken to the nursing staff to manually enter the data from the EHR patient information sheet into TouchWorks.

The scanning process involved prepping, scanning, and documenting paper charts. Allscripts Impact.MD is the document imaging solution that the scanning team used to scan into TouchWorks EHR. We purchased three high speed scanners which scanned at 30ppm. For practice, we began by scanning all deceased patients’ charts. After a patient’s visit with their provider, their chart would be scanned into Impact.MD. This ensured that they would be in an electronic format at their three month follow up appointment.

Prior to go-live, the EHR team built folders within Impact.MD that correlated with the paper chart. These folders were placed under the heading “Historical Chart” which allowed for straightforward archiving of old records. Once the paper chart was scanned, it was then taken to an off-site storage facility (and later destroyed).

Phase Two: In August of 2006, after the staff had adapted to the new workflows introduced in phase one, OAC began the roll-out of the order entry, result retrieval and charge entry modules of the EHR. In preparation for this phase, the EHR team invested a great amount of time and resources to build the order-result and charge interfaces. At this point, the providers were comfortable with the system and were encouraged to utilize these new modules immediately.

Paper order forms were available for the providers to use as a reference guide when ordering items (specifically labs) within TouchWorks. Because the lab system was designed to accept electronic orders from TouchWorks, extra time was devoted to ensuring that the providers were comfortable with ordering electronically. When results were received, an automated task was sent to the providers to verify the results.

The charge entry portion of the implementation was the most challenging to transition from paper to electronic workflow. OAC wanted to ensure that charges submitted electronically by the providers were an accurate representation of actual services provided. Therefore, paper charge forms were

available for the providers to use in addition to charging electronically. The billing team was then able to use the paper charge forms to audit the electronic charges that each provider submitted.

With the old paper forms, our billing specialist hand entered each provider's charges, fixing any mistakes during the entering process. With the electronic version, the charges would already be automatically entered into the PM billing system from the EHR. The billing team met regularly with the providers and gave them "report cards" based on how well they had captured their charges electronically. These report cards consisted of the amount of charges not captured electronically by each provider, therefore reflecting the amount the providers would have lost in revenue. This gave each provider an incentive to bill correctly in order to ensure proper reimbursement. Once the providers and billing team were comfortable with the provider's ability to charge electronically, the paper charge forms were removed from and an electronic audit was implemented to replace the paper forms.

Weekly Report Card			
Provider	Error	Times Missed	Lost Income
Dr. Carson	More than 1 dx attached	2	\$100
	25 modifier not added to OV w/infusion	2	\$166
	Office visit billed under nurse	2	\$166
	25 modifier not added to OV w/90772	1	\$83
	Office visit not entered 99214	1	\$83
	25 modifier not added to OV w/20610	1	\$83
	Total Lost Income:		

- b. Through the implementation process, communication between the different departments of OAC has become more streamlined through in-office messaging. Additionally, the various departments are now able to work simultaneously within a patient's chart without having to wait for the chart to be found. For example, if a patient calls requesting a prior authorization as well as medical records, the billing team no longer has to wait for the medical records team to return the chart before working on the prior authorization. Both teams can begin to process the patient's request at once, thus creating a more efficient work environment and superior customer service. The physical environment has also become more organized as charts, and the necessary storage associated with them, have disappeared. Without the constant distraction of "chart-hunting," we now enjoy a more tranquil environment throughout the clinic and have more time to spend with patients.
- c. When it comes to setting up interfaces, they can be very challenging. In looking back, we did not spend near enough time going over exactly how naming and HL7 coding standards should have been created for orderable items such as lab tests and diagnostic imaging. Everything still worked, but it would have created a cleaner environment and saved us some time on the backend of the project. We are now in the process of going through and changing some of those standards to create greater clarity between the systems.

Another issue we did not really plan well for was electrical. We planned for battery backups on all of our equipment, but we did not do an electrical survey of the server room. A few months after the installation, some of our fuses for the servers started tripping unexpectedly. The battery backups did a good job of keeping everything up, but we ended up having to have an electrician run a dedicated circuit to the server room.

- d. Charge modules have proven to be one of the most difficult. While most of our clinic is using automation between the EHR and the PM, our infusion and lab charges are still being entered into the PM by hand. The problem lies in all of the complexity that insurance companies create. For instance, there are many different variables in what, and how, you can bill for infusion orders and supplies.

We had to change our initial plan for infusion billing, as it was just too complex with our current requirements. Infusion is still using all parts of the EHR except charge. We had also initially been using electronic billing for our labs, but then decided it still needed more work to accurately reflect what the insurance companies wanted. The lab orders and results are still completely automated through the EHR, but the billing is hand keyed by our billing department. We still have plans to use the charge module for lab in the future, and have recently submitted a detailed enhancement request to get us there.

- e. In our meetings with Allscripts, they helped us create a schedule for our go-live. The schedule was based on a mix of our approach and their experience with other installs. Each week, during our regular meets, we would go over the schedule to make sure everyone was still on track. For the most part, we were able to keep on schedule with only minor changes. The scheduled meetings became very important for the interfacing as we were working with multiple companies to accomplish the interface.
- f. The EHR team worked with each department to make sure we knew how their workflows should be setup. When we started looking at tablet PCs and other hardware, we tried to ensure that all of our employees had a chance to try them out and give us feedback on their likes and dislikes.
- g. Dr. Carson's vision of an EHR system was that it would "allow all of us to spend more time with patients doing what we do best." OAC measures the success of the EHR through the improvement of the day-to-day workflow of the practice. The environment of the practice has become more efficient and patient friendly. A quick glance at a patient status field in TouchWorks helps us track the patient's location and status in the clinic. It smoothes out the flow for patients that may be scheduled for multiple appointments such as a provider and an infusion appointment.
- h. In order to provide the fastest support while still maintaining cost effectiveness, we prefer to use a three layer support system. While it is important for all of our users to have adequate training, each hour of training comes at a cost. Our approach was to train one person from each department as a Super User. The Super Users offer a first line of support, since they are usually located very close to others in their department.

The next line of support would be the EHR team. They received the most amount of training, and were directly involved in creating many of the forms and templates. The final support layer comes from Allscripts. As part of our yearly support contract with Allscripts, they provide us with a login to their WebFirst support site. WebFirst allows us to create and track all of our support issues that the EHR team is unable to solve.

5. IT Support

- a. In order to link directly to Orchard, our lab reference software, we required an interface between TouchWorks and Orchard. Setting up the interfaces was largely accomplished by Allscripts. Allscripts worked with Orchard in order to setup the interfaces via Allscripts' ConnectR interfacing utility. Regular meetings were held between Allscripts, Orchard and OAC to ensure that we were all still on track with our interface design.
- b. For the server Hardware, we decided to use Dell PowerEdge servers. Rather than buying the hardware from the software vendors, we prefer to purchase our own hardware directly from Dell. By doing this, we get better pricing on equipment and maintain a consistent hardware platform across our entire network. In choosing hardware, we considered a myriad of options from blade servers and

SAN devices to Virtual Machines that allow running multiple server platforms from one physical server. In the end, we decided that using Dell PE servers would create the best value and performance for a clinic our size.

For all our systems combined (not just EHR), we are currently running 6x PE 2850's, 1x PE 2950, and 1x PE 1950. Each server was purchased with the highest available options offered at the time and cost roughly \$6k each. We purchased Windows Server 2003 and SQL separately under a contract with Microsoft. All of the hardware was installed into a 4-post rack system. This helped maintain a clean and consistent environment across our multiple software solutions.

For nurse and provider access, we knew that we wanted to use tablet PCs. After many hours of reading reviews, it was still very unclear which tablet would be best for our practice. Since we were going to be buying quite a few of them (we currently have 20 tablets) we thought it would be worth testing. We purchased 4 different tablets to test: an IBM X41, an HP TC1100, an HP TC4200, and a Fujitsu T4020. We let the nurses and doctors walk around with them for a few days and decide which model they liked best. In order to keep support costs down, we wanted everyone to use the same model. We took a poll and the overwhelming winner for us was the Fujitsu tablet. Some of the key factors were weight, balance, overall feel, and battery life. The Fujitsu was very light, and was the only one at the time that had an onboard CD-ROM that could be hot swapped with an additional battery. The rest of the demo tablets were then sold on eBay to recoup most of our cost.

- c. After Allscripts performed the initial onsite install, the CNL and Project Manger began creating the rest of the customized forms and templates using the training they had received from Allscripts. During this time, we also had a dedicated team from Allscripts that made themselves available if we needed any help creating the forms.
- d. IT support was initially outsourced to a local technology consultant at an hourly rate of \$85 per hour. The consultant was responsible for setting up the backend network, and fixing any random issues that might arise with the equipment. While it wasn't required, we thought it would be a good opportunity to upgrade the rest of our network as well. We upgraded all of our switches to gigabit, and added 2 new wireless access points. Since all EHRs run over the network, making sure you don't have any existing network conditions is important. Replacing a \$300 switch is very cheap, and we considered it well worthwhile to ensure we didn't have any bottlenecks occurring on the backend.

6. Disaster Recovery

- a. Each night, the TouchWorks database and files are backed up to an LTO tape drive. These tapes are then taken offsite daily to ensure that the clinic always has an offsite backup available. We also routinely take snapshot images of the servers on USB hard drives. The snapshots help create a faster restore path than what you would have using only tape alone. Combined with hardware RAID on system drives, this gives the clinic a very reliable system.
- b. The data on tapes and snapshots are verified to ensure that the information needed to perform a restore of the system was properly backed up. At this time, we have not yet completed a full test restore of an entire server since that would require purchasing an additional server to do the restore on.

III. Technology Purchasing: *Vendor/System Selection*

1. EHR System

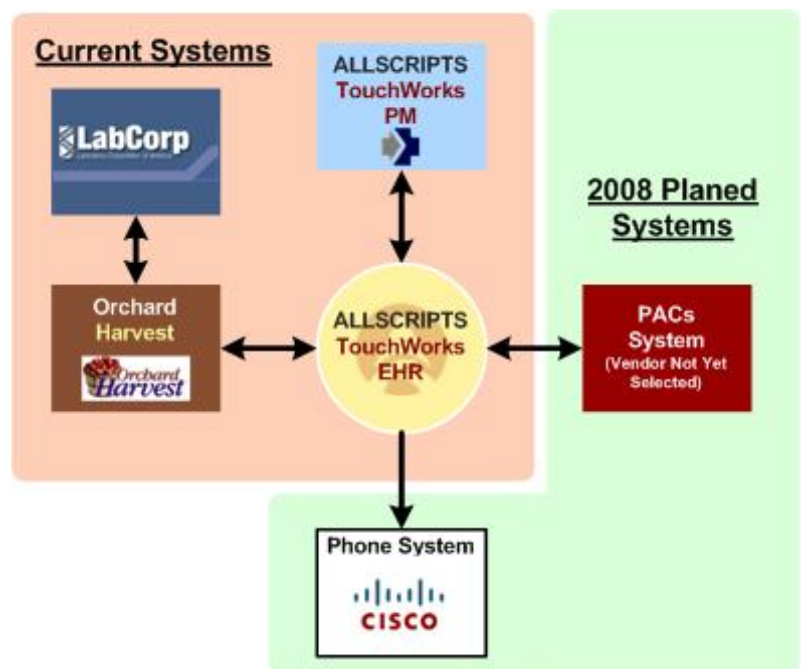
The EHR system was identified and chosen by the EHR team, with ultimate decision-making responsibility resting on Dr. Craig Carson. In selecting an EHR, OAC wanted to choose the system that would provide the greatest feature set and interfacing options. After reviewing many systems, the team selected Allscripts TouchWorks. Although TouchWorks is typically used in clinics that are larger than ours, we liked the functionality that it provided. It was important to our providers to have the same tools at their disposal that other larger clinics might have. The EHR team also felt that it could easily handle the clinics future growth needs.

Since a majority of our patients are seen on a regular basis, being able to easily track a patient's progress is important. The ability to have individual Health Maintenance Plans inside the EHR is important to the providers. The HMPs help the providers ensure that they keep their patients on consistent plans that can monitor their progress. The EHR also creates a very simple "history" view in each lab that shows all the other previous results of that same lab. Along with automated and manual Tasking abilities, these features help improve overall provider efficiency and quality of service.

2. Interfaces

We currently have two interfaces with our EHR system, TouchWorks PM and Orchard Harvest LIS (Laboratory Information System). The interfaces allow information to flow between the different systems. For instance, a lab ordered in the TouchWorks will be automatically sent to the Harvest LIS where our in-house lab can process the order. When the test is completed, the results are automatically returned back to the patients chart in TouchWorks, and an automatic task is sent to the provider to view the results.

These interfaces can be very complex and specific. Each interface was designed for our clinic using HL7 standards and custom scripts written mostly by Allscripts. What we ended up with was all patient data flowing back into TouchWorks. This means that the providers do not have to search multiple systems to find information on their patient. The image to the right shows a graphical view of our current and future planned setup.



The interfaces added considerable cost to our implementation (roughly \$20k each) but in the end the gain in provider speed and overall patient care were considerably strengthened. Let's consider our lab interface with an ROI of 2 years.

The interface cost was about \$25k. We order roughly 43,000 labs (billable codes) a year. If we look at the cost per billable code, that means with a 2 year ROI, our interface has a per lab cost of about .30 cents. For that .30 cents, we save the cost of having an employee manually key in the lab, error associated with manual keying, and the time delay waiting for someone to key in the results.

IV. Functionality

1. We have tried to utilize all of the functionality options available in order to streamline patient care. All notes are created with user created templates (supplemented with typed or dictated information) and

scanned documents. This process of creating notes works much better than handwritten notes as they are always available and always legible. Orders for laboratory and imaging studies are placed electronically from favorite lists or sets of preferred studies for a particular diagnosis. Receiving results via interfaces with Allscripts are quick and easy to retrieve and review. We are also able to capture outside services and place those in the chart as a scanned document. This electronic filing provides immediate access to studies for providers as well as cost and time savings. File clerks are not needed to put this information in paper charts and there is no chart chasing or time lost hunting for misplaced charts. Prescriptions are scripted to pharmacies and only scheduled medications that require a signature are printed. Electronic prescribing is more efficient for both providers and pharmacists. Electronic prescriptions are received and processed by larger pharmacies in a matter of minutes whereas faxed prescriptions often sit in stacks for hours (or days for some of the larger mail order pharmacies). Refills are also handled electronically with the click of a button, saving considerable time, paper, and resources. We are able to capture all aspects of patient care provided in our clinic and elsewhere, helping us provide the best care through a full and complete history, recent diagnostic testing results and up-to-date patient information.

2. We chose not to use electronic billing and charge for Infusion services due to the complications of various ways in which insurance companies require us to bill. We also have some limitations with our lab billing, again due to the variety of requirements by many different insurance companies. After meeting with our billing department and seeing that the system would not allow us to automate billing with the sets of complex rules required by the insurance companies, we chose not to use electronic billing and charge. There are certain processes that do not yet lend themselves to electronic billing.

V. Value

1. Success in Meeting Objectives (a-d)

TouchWorks created the efficiency we were looking for. The more efficient our employees are, the more profitable the clinic becomes. We set out to create a path for future growth, and to do more with less. We are currently at a point where we have excess capacity. By that, we mean we can expand with only very marginal cost. The chart to the right shows where we were at when Dr. Carson first started looking for an EHR vs. where we are now vs. where we plan to be next year.

Our financial value is measured in terms of revenue per unit. So in terms of units, we want to reduce the cost for each additional unit of capacity.

We could consider a “unit” to be either a service offered, or an employee. If we look at units in terms of employees, we can get a measure of productivity. So our per-employee productivity can be measured by dividing the total charges for a given month by the total number of employees on staff that month (including administrative).

Unfortunately, since we only installed the PM systems two months prior to the EHR, we only have limited pre-EHR data

Past, Present, Future Chart	Before EHR 2005	Current March 2008	Future Plan 2009 [†]
# Providers	4	5*	7
# of Patient Encounters [Per Year]	13,500	16,500	25,000
# of Radiology exams preformed In-House per year	1500	3600	4600
# of Lab preformed In-House per year	0	34,000 [‡]	43,000 [‡]
Office Space	5,240 sq ft	7,850 sq ft	11,905 sq ft

[†] Estimated Based on Current Goals

*Full Time: 1 MD and 1 PA -- Part Time: 2 MDs and 1 PA

[‡] Based on CPT billing codes. One Lab order may have multiple units or codes.

that is easily accessible. So starting with April of 2006 (two months prior to implementation) and continuing to March 2008, we have found that our per-employee productivity has increased by an average of about \$13,000 per employee/per month (see Appendix A for figures used). This is based on gross income, and does not show additional profit per employee, but does show additional billed services per employee.

Really, the most important benefits of the EHR are impossible to measure. TouchWorks gives us a central repository for all of the patient's medical information. Having information not only available, but easily viewable allows the patient to receive higher quality care, and reduces potential errors. Refilling prescription is significantly simpler and can usually be done by a nurse over the phone without having to bother any other staff. It allows for easy comparison of changes in lab results over time. It reduces chart hunting and sharing issues. It helps our providers create a closer relationship with the patients.

With any computer system, there are always those moments when you have to reboot a tablet or reset a wireless device in order to fix some random error. But in spite of any of those random annoyances, we all agree that our clinic is much better off with our EHR. It was a lot of work for the EHR team, and the entire clinic, but I think we were very successful in our objective to create a better clinical environment.

2. Improvements

Nothing is ever set in stone. As we continue our journey forward, we strive to constantly improve what we have. We've identified improvements in three ways: external uncontrolled, external controlled, and internal.

External Uncontrolled: In late 2007, we completed an upgrade from version 10.23 to version 11.0 of TouchWorks. Among other things, this added an improved user interface, and lets us take advantage of newer 64-bit processing.

External Controlled: Along with the upgrades that Allscripts provides, we also actively participate by creating enhancement requests with Allscripts to make the system better. One example would be an enhancement request that we created outlining how we would like the charge module to work in order to better accommodate electronic billing of labs.

Internal: As we use the system, we figure out better methods for doing things. We are constantly looking at our workflows to figure out how we can enhance them. An example is our new standards that we created for lab names and coding.

3. External Networking

We are currently connected with an interface directly to Labcorp which allows all of our lab information to be sent back and forth with an automated interface. We also use electronic prescribing that allows us to send prescriptions directly to thousands of pharmacies over the internet. We also now receive all of our faxes electronically, where they can be filed directly to the patients chart, or tasked to a user for additional action.

4. Costs and Benefits (a-c)

Our EHR system was entirely self-funded. Looking at our ROI table in Appendix B, we have outlined our costs to implement the EHR for the first three years (including tech support, installation, interfacing, and other equipment related directly to the EHR). We have also included the savings that we received during those same three years that are directly related to the EHR installation. Under the "Net Value" section at the bottom of the ROI, we have defined a yearly running "EMR Investment" total that shows the amount of

the investment that has not yet been offset by newly created savings. When you then add in our yearly savings, you see that we were able to realize a return on the investment somewhere during the third year of operation.

As our clinic adds more providers, we will continue to increase yearly income without significantly increasing our technology expense. The initial install and interface costs (the majority of the cost) have been completely paid for, so moving forward, we are on a good path for growth.

VI. Lessons Learned / Critical Success Factors

1. Much of our success is owed to the staff and to Dr. Carson. We learned that each staff member has unique needs and adapts to change differently. Motivation was a key factor in maintaining staff morale and keeping the momentum going. OAC used a variety of motivational techniques including the provider “report cards,” posters, games and regular meetings to keep staff informed.
2. Looking back, we wish we had spent more time training the providers and other users on basic computer operation. We currently have plans to go through and do some basic PC and email training with all of our users to try and make sure they all have a “core” PC efficiency. We also wish we had been able to send our IT Consultant to interface training in order to create the external interfaces ourselves. Having someone locally that can walk through the interfaces from all aspects of the clinic would be a major advantage. We currently have plans to attend the interface training so that we can build our own interface for our upcoming PACs implementation.

3. Keys to Success

- **Pick a strong team** – An EHR is centered around two things: clinical and technology. Make sure you have people on your team that truly understands both.
- **Train** – Make sure you get all the training you can. It makes a big difference.
- **Have someone available for providers during go-live** – Having someone right outside the door gave our providers a security blanket. If they had any problems, there was someone to help them. Today’s EHR system can be daunting at first. It takes a few weeks to master.
- **View demos at other clinics** - Unlike some industries, most providers are very willing to share their workflow. Seeing what others are doing in a real environment is probably the most valuable tool available.
- **Distinguish between marketing and reality** – Sales reps and advertising are trying to sell you something. Make sure the system really does what they say it does in a working environment.
- **Know the weaknesses** – Every EHR system is going to have different strengths and weaknesses. It is important to know that there may be some things your EHR won’t do as well as others. Strengths will be well advertised, weaknesses will not. Knowing what those weaknesses are can help you pick and manage them from the onset.

VII. Future Plans

1. Future Plans

Right now, OAC is in the process of selecting a PACs system. OAC currently offers X-Ray, MRI and Bone Density scanning to its patients. We have been using Merge eFilm as a standalone workstation to store all of our images, but as the clinic's radiology scan volume grows, the need for a full scale PAC system has become more important.

The biggest feature we are looking for with our PACs system is integration. It is our goal to have a link directly inside the patient's chart that can be used to view all of their radiology images. It is also very important that the PACs system has the ability to send the reports back to the EHR so that all of the reports can be easily referenced by the provider in a single system.

2. Single Patient, Single Record

One of the main reasons OAC started looking for an EHR system was to prepare for the future integration with a National Health Information Network. From a patient's perspective, we believe having a single chart across multiple medical practices is the best option for their health. We also believe it creates one of the best options for keeping medical costs down by reducing redundant tests at multiple facilities. While we do not yet have any plans to connect to any specific RHIO systems, we believe our EHR is the first major step in that direction.

Appendix A

	Services Preformed	Charges	# of Employees	Charge Per Unit of Service		Productivity Per Employee Per Month	Gain / Loss Compared to same time period 1 year earlier		Gain / Loss Compared to same time period 1 year earlier
Measure	#Services	\$	#	\$/Unit		\$/Employee	Δ (\$/Employee)		Δ #Services
Mar 2008	29,167	2,519,287	27	86		93,307	(3,148)		6,402
Feb 2008	28,583	2,536,153	27	89		93,932	21,361		10,332
Jan 2008	31,994	3,013,616	27	94		111,615	14,159		9,634
Dec 2007	26,563	3,254,447	27	123		120,535	48,685		10,984
Nov 2007	23,012	2,736,411	27	119		101,349	17,199		4,659
Oct 2007	28,873	3,016,852	27	104		111,735	26,165		9,177
Sep 2007	21,382	2,350,171	26	110		90,391	7,049		4,184
Aug 2007	25,253	2,737,356	26	108		105,283	22,390		7,569
Jul 2007	22,219	2,402,993	26	108		92,423	6,079		2,734
Jun 2007	21,351	2,240,031	25	105		89,601	(6,763)		-610
May 2007	26,788	2,661,001	25	99		106,440	(28,125)		-7,709
Apr 2007	19,967	2,039,547	25	102		81,582	33,969		8,416
Mar 2007	22,765	2,411,362	25	106		96,454			
Feb 2007	18,251	1,814,273	25	99		72,571			
Jan 2007	22,360	2,436,420	25	109		97,457			
Dec 2006	15,579	1,796,253	25	115		71,850			
Nov 2006	18,353	2,103,729	25	115		84,149			
Oct 2006	19,696	2,139,266	25	109		85,571			
Sep 2006	17,198	2,000,217	24	116		83,342			
Aug 2006	17,684	1,989,424	24	112		82,893			
Jul 2006	19,485	2,072,254	24	106		86,344			
Jun 2006	21,961	2,312,748	24	105		96,364			
May 2006	34,497	3,229,570	24	94		134,565			
Apr 2006	11,551	1,142,717	24	99		47,613			
		AVERAGES		106		93,224	13,252		5,481
Measure	#Services	\$	#	\$/Unit		\$/Employee	Δ (\$/Employee)		Δ #Services

Short Analysis – Productivity shown here is only a measure of gross income and not meant to reflect profit. In looking at the chart, you notice that the per-unit charge has very little variance. This is important, because it suggests that the increase in employee productivity did not come from simply offering higher cost services or inflation (as the per-unit charge remained basically the same). Mixed in with the per-employee figure, this gives us some form of measurement on per-employee productivity (where per-employee is also measuring all support staff).

You can always simply hire more support staff to increase clinical income, but the per-employee figure adjusts that amount by splitting income across all the employees to hopefully show that the extra staff was worth hiring. If we hired an additional employee, and hiring them did not increase income, then our per-employee productivity would fall even though our total clinical income did not change.

One other thing to note, some of the variations from month to month are caused by new hiring, and pregnancy. Employees that took time off to have a baby were still considered on staff even though they may have been out for a few months. Also, because we are fairly small, the addition of even a single employee may show an initial negative impact as it takes time for them to become valuable (either trained or established). For this reason, I prefer to look at the averages over the larger period such as a few quarters rather than a month to get a clearer picture of what we are looking at.

Appendix B

ROI Analysis of EMR

	Year 1 <small>(half year*)</small> 2006	Year 2 2007	Year 3 <small>(projected)</small> 2008
INVESTMENT			
EHR Software			
EHR Software	(20,000)	0	0
Installation	(70,000)	0	0
2 Interfaces	(40,000)	0	0
Yearly Maintenance Contract	(13,000)	(13,000)	(13,000)
Total Software	(143,000)	(13,000)	(13,000)
Hardware			
3 x Servers	(16,000)	0	0
20 x Tablet PCs	(29,500)	0	0
Networking Equipment [racks, switches and wireless]	(3,500)	0	0
Total Hardware	(49,000)	0	0
Additional Costs			
Training Costs	(50,000)	0	0
Outside Tech Support	(10,000)	(15,000)	(15,000)
Server Software [SQL and Windows]	(5,500)	0	0
Total Additional	(65,500)	(15,000)	(15,000)
Total Yearly Investment	(257,500)	(28,000)	(28,000)
BENEFITS			
Productivity			
Increased Provider Productivity**	41,000	83,000	108,000
Lab Technician***	15,000	15,000	15,000
Total Productivity	56,000	98,000	123,000
Personnel Savings			
File Clerk (Chart Chaser)	30,000	30,000	30,000
Total Personnel	30,000	30,000	30,000
Misc Savings			
Paper & Charting Supplies	6,500	6,500	6,500
Offsite File Cabinets (Storage)	3,000	3,000	3,000
Onsite File Cabinets [75 ² ft floor space @ \$18 ft ²]	1,350	1,350	1,350
Total Misc	10,850	10,850	10,850
Yearly Savings	96,850	138,850	163,850
NET VALUE			
EMR Investment	(\$257,500)	(\$188,650)	(\$77,800)
Savings due to EMR	\$96,850	\$138,850	\$163,850
Calculated ROI	(\$160,650)	(\$49,800)	\$86,050
<i>Return On Investment (ROI)</i>	<i>Just over 2 years</i>		

* Went live with EMR in June of 2006.

** Based only on increased billing revenue of the four providers that were here before the EMR implementation. Does not include revenue from additional Providers that have joined the clinic. Calculated based on change from base year (2005), rounded down.

*** Since Labs results come across automatically, we don't have to have a Lab Tech manually enter and file results in a patients chart. The Providers also receives the results automatically and are prompted to sign off on them electronically.