Piedmont Physicians Group
Davies Award Application

The Organization

Piedmont Physicians Group at Collier Road, Suite 775 (PPG 775) is comprised of 8 board certified Internal Medicine physicians, 2 of which are also Board Certified Rheumatologists who provide both primary care and rheumatology consultative services, as well as 2 Physician's Assistants. The clinical functions of the office are supported by 20 clinical staff FTEs, including RNs, LPNS, and MAs, and by four lab and radiology staff FTEs. The administrative and business functions of the office are supported by 10 staff FTEs. PPG 775 has a patient base of more than 40,000 patients.

PPG 775 is affiliated with the Piedmont Physicians Group (PPG). Founded in 1995, the group was formed as a way to broaden Piedmont Hospital's ability to serve patients throughout the competitive Atlanta market. By forming a partnership between the Piedmont Hospital's four hospitals and community physicians, the organization has been able to extend its services into the community, attract physicians, provide management services to primary care physicians, and reach new patients. As the result of this partnership, PPG physicians have access to the many specialists and resources throughout Piedmont Hospital, and its providers have become leaders in the health system and the community as a whole.

Management

Business Objectives

In 1999, PPG 775 decided to 'lead the charge' for the physician community toward electronic medical records. Faced with challenges unique to hospital-aligned physician groups, the PPG 775 executive sponsor collaborated with system executives and physicians to develop a core set of business objectives.

- *To improve the safety and quality of patient care delivered to our patients* through disease management, improved medication management, and improved preventative maintenance.
- *To increase the satisfaction of patients and physicians* by improving productivity, creating efficiencies, reducing redundant work effort, and reducing turnaround times for refills and referrals.
- *To improve the operational and financial condition of the practice* by increasing productivity and optimizing the efficiency of staff workflow.

Overall, we planned to create a patient-centric, integrated medical record that captures data from key points throughout the health system, enabling better patient management.

A series of metrics were developed for each of these objectives. The list of metrics, as well as Pre- and Post- measurement is included in the *Value* section of this report.

Clinical Objectives (a Subset of the Core Business Objectives)

- To improve decision making by making available a comprehensive patient record that integrates patient-encounter information with discrete lab results, radiology, hospital procedures and discharge summaries, specialist consultations, and other important information.
- Improve the safety of the care delivered by focusing on drug allergies, drug administration and prescription writing, accurate patient identification, and the accuracy of clinical documentation available to all providers.
- To improve disease management through patient education and the use of reporting to manage patient compliance.

- To improve preventative maintenance through the use of data reporting
- To provide a means for measuring outcomes and provider performance against practice or national standards.
- Provide for easy remote-access to all clinical information for all appropriate providers from any geographic location.
- Provide a centralized, reliable repository for all laboratory and diagnostic information in a patient-centric environment.

Project Organization

The process of selecting and implementing the EMR was a vast undertaking that involved participation from a variety of groups: PPG physicians and staff, Piedmont Hospital's CIO and technical group, and third-party vendors.

The project was coordinated by an Executive Steering Committee comprised of key decision makers from both PPG and Piedmont Hospital. This governance group included the following executive-level participation:

- The senior physician from PPG 775
- The CIO of Piedmont Hospital
- The Office Manager of PPG 775

In addition to the governance described, the implementation team was multi-disciplinary and came from both PPG and Piedmont Hospital (FTE's in parentheses if greater than one):

PPG	Piedmont Hospital
Physicians	Application Support and Configuration (2)
Medical Records	Technical Support and Development
Lab	Hardware Setup and Support (2)
Nurse	
Office Manager	
Medical Assistants (2)	

These groups maintained consistent communications throughout the project by meeting every Tuesday at 7am for an all-hands meeting, in addition to the daily meetings of various configuration team members as needed.

Implementation

EMR System

PPG 775 selected GE's Centricity EMR (formerly Logician). The product is a fully functional EMR with functionality that includes:

- Data Capture and Documentation: Encounter data can be captured in a variety of ways, including through customizable templates, discrete data capture, and voice recognition-based text
- Prescription Management: Including ordering, interaction checking, autofaxing, formulary management, and e-prescribing.
- Clinical Workflow and Communication: Tasks and communication can be routed to users and sets of users throughout the system based on a customizable rule set.

- Clinical Decision Support: The system provides health maintenance tracking and reminders, support payor formularies, and rule-based disease management functionality.
- Order Entry and Results Management: Providers can order medications, labs, and procedures, with complex order management, closed loop ordering, and referral management.
- Patient Education: Patient-specific information can be provided to patients at the point-of-care.
- Analysis and Reporting: All EMR data can be manipulated to provide analysis of practice patterns, patient populations, etc.

Architecture

Centricity EMR is implemented using a client/server architecture on industry standard platforms, and is delivered to the desktop via Citrix. Users access the EMR through thin client devices located throughout the practice, or via the Internet from remote locations. Printers and scanners are strategically located in optimal locations throughout the practice.

A key decision early on in the process was to look to an external organization to support the technical infrastructure of the system. Given the close ties and proximity to Piedmont Hospital, the hospital's IT department was chosen to support the system. Through this relationship, PPG 775 is able to realize the benefits of a highly available architecture, which include:

- Remote access for physicians who need access from home, hospitals, or other locations.
- Cost savings through the use of inexpensive "thin" client technology.
- Cost savings by leveraging common computing standards (e.g. Microsoft operating systems, Oracle databases, HL7 application language).
- Scalability.
- Security.
- Backup and disaster recovery best practices as provided by Piedmont Hospital IS.

Interfaces

To achieve the objective of sharing data across the continuum of care, PPG 775 has worked closely with Piedmont Hospital IT and a variety of vendors to interface with key systems. The following systems have been directly interfaced to the EMR – see the "Current State" section for a discussion of the success of these integration efforts.

- NextGen Practice Management
- Relay Health
- LabCorp
- Quest Diagnostics
- SoftLab
- HeartLab
- Muse
- HBOC Radiology
- GE PACS
- KBT Transcription
- Brentwood EKG
- DocuTrak

System Implementation

Following the vendor of choice selection, the practice formed three major working groups, each assigned with key implementation tasks:

The ***Technology Workgroup***, under the leadership of the Piedmont Hospital CIO, had the responsibility for overseeing the technical aspects of the implementation, which included:

- Server purchase, installation, and configuration
- The selection and implementation of the application delivery infrastructure (initially thick client, and later thin client via Citrix)
- Office connectivity, including the remote access process
- Availability and security
- Deployment and support of devices
- Software maintenance, updates, and enhancements
- Backups and disaster recovery
- The development, testing and maintenance of interfaces to hospital systems

With the support of the CIO, the EMR project became a priority, freeing technical resources for the project, including:

- Hardware Support (2 FTEs)
- Application/Configuration Support (2 FTEs)
- Technical Interface Support (1 FTE).

The ***In-House Workgroup*** was comprised of seven (7) individuals representing each of the PPG 775 employee groups. These included:

- Physicians
- Medical Records
- Lab
- Nurse
- Office Manager
- Medical Assistants (2)

The group was charged with the configuration of the application and workflow changes recommended to optimize efficiency. This group was co-led by the Office Manager and the lead physician.

The ***Training Workgroup*** worked in coordination with the In-House Team to develop and implement a comprehensive training plan. Training was provided in collaboration with the EMR vendor.

To assist with the implementation, the EMR vendor and a third party consultant were assigned the role of subject matter experts during the implementation. These individuals partnered with each workgroup to ensure that the process and cultural changes the organization wished to accomplish were reflected in the system deployment.

Implementation Approach

PPG approached the implementation as an opportunity for process improvement, and a way to improve the clinical, financial and operational aspects of the practice. The total implementation process took six months from contract execution to go-live, and included the following phases:

Phase I – Planning

Implementation goals and schedules were defined in a series of meetings with the various workgroups, with accountability assigned to workgroup members. The EMR implementation was designed to align with the following principles:

- The EMR implementation was an opportunity for process improvement. The EMR would not be implemented around existing processes. Instead, the practice would identify optimal processes for the flow of information and the delivering of care, and then build the EMR around those processes.
- EMR adoption would be best encouraged through a "Big Bang" approach, with all providers using all functionality from go-live.
- The practice would be completely chartless within 6 months.
- Productivity during implementation would be reduced, but would be back to full production within three weeks.

Phase II – Design and Build

Workflow Design: EMR design began with an intensive workflow improvement effort. The practice hired an industrial engineering consulting group to complete a series of time motion studies related to workflow throughout the office. These studies identified key areas for improvement, and the In-House Workgroup used them to develop future-state workflows. Coincidentally, the practice was undertaking a major physical renovation concurrently with EMR design, so the design and layout of the practice was completed with the EMR-enabled workflows in mind. This process allowed the practice to identify key benefits and expectations for the EMR and to develop appropriate future-state workflows, knowing the physical layout of the practice would support them. The results of this process were also used to identify ideal locations for computers, printers, scanners, and other assets.

Technical Design and Build: Concurrent to the workflow improvement and EMR design, the Technical Workgroup purchased, installed, and configured the application servers and infrastructure, providing the In-House and vendor teams with the access needed to configure and customize the software.

Clinical Content Design and Build: Clinical content was developed and customized by the In-House Team. Early in the process, four Super-users were trained by the vendor. These Super-users were then responsible for translating the future workflows and physician requirements into clinical content. These Super-users were vital to the project, as they became builders, trainers, and energetic ambassadors for the rest of the practice.

Phase III – Training

The EMR training program had three components:

1. EMR Introduction – As part of the overall communication plan, and as a way to expose users to the system, all personnel received an introduction to the EMR early in the project. This enabled future users of the system to get used to the key concepts and accept the impending changes to their work.
2. "Train the Trainer" – Early in the implementation process, an individual responsible for each area or role was trained thoroughly on the system and designated as Super-users. As Super-users, they were then responsible for training others on the team. The key benefit of this model is the sense of accountability on the trainers and their ability to tie key concepts from the EMR to the actual practice workflows. This was the main thrust of the training program and all users were trained by the Super-users.
3. Rollout support – Throughout the rollout, the Super-users were available to assist with troubleshooting for both physicians and nursing staff who were having trouble with the new tools.

Phase IV – "Big-Bang" Rollout

The EMR was rolled out to all physicians and nurses, with all functionality, at one time. The expected benefits of this approach were four-fold:

1. To minimize productivity losses as compared to an extended rollout

2. To encourage adoption – Discussions with other practices using EMRs led PPG 775 to believe that a modular rollout would cause physicians to become frustrated and lose interest in the rollout. The "big bang" approach ensured that all physicians addressed the same issues together. In some ways, it almost became a competition to see who could become proficient the quickest.
3. To maintain the efficient use of non-physician staff. Within 2-3 weeks of rollout, the staff, including Super-users, was able to return their focus to normal business functions.
4. To eliminate paper charts as quickly as possible. Originally, the practice planned to pull charts for six months, in order to ensure that the correct patient information was available to the physician. But within three months, physicians decided that charts were no longer necessary, and they ceased being delivered to the exam rooms.

In order to support the challenging transition to the EMR, several mechanisms were included in the rollout plan:

- An expectation of reduced productivity was set to minimize the strain on patient care. Patient volumes were expected to be lowered to 50% in week 1 and 80% in week 2, with a return to normal patient volumes by week 3. However, based on the success of the first week, patient volumes were returned to 100% by week 2.
- Prior to go-live, temporary workers were hired to enter problem and medication lists for patients scheduled for the following week. In addition, new documents received from non-interfaced systems were scanned into the EMR. The decision was made to NOT scan old patient records into the system.

Lessons Learned

Overall, the initial EMR implementation lasted only one week, after which time patient volumes were raised to normal levels. Many challenges were overcome during the process, and the following key lessons were learned:

1. Using temporary staff to pre-load data in the EMR seemed like a good idea, but ended up as an expensive effort without much value. In the end, it may have been better to add data as patients were seen. We loaded demographic information for hundreds of patients that were ultimately never seen again.
2. The workgroups spent significant time establishing standards for what data and how much should be completed. In reviewing this decision, more time should have been spent on how data is entered, and less on whether all fields are completed. The key is to understand what data is required for insurance, quality measurement, etc. We negatively affected the workflow of the practice in the beginning by requiring all fields to be filled out. This was unnecessary and resulted in less than optimal efficiency.
3. In order to maintain quality, a practice should limit the number of staff members who can enter information. This is particularly important in the case of reference tables such as employer and insurance carrier tables. Our practice allowed numerous individuals to enter data which resulted in issues with data accuracy and consistency, and some of these situations continue to negatively affect the practice today.
4. Scanning old documents is unnecessary. The practice only scanned new documents coming from other organizations. By the end of year 1, about 80% of patient information was current in the system.
5. Voice recognition technology should be considered during the initial implementation, due to the resulting process and efficiency gains. During the practices initial rollout, the technology was not fully available.
6. The "Big Bang" approach is most effective because it alleviates the pressure of forcing physicians to operate in a hybrid environment for any significant length of time. However, it is necessary to have intensive training and a strong support team in place to ensure success.
7. Cleanup routines should be instituted immediately after implementation and performed on a regular basis to keep the data integrity high. Our practice waited for a significant amount of time

before we made a practice of routinely cleaning and compressing data. When we started these routines, the initial data cleanup effort was significant. Suggested files that should be regularly maintained include:

- No Show Lists
- Duplicate Patient Lists
- Inactive Patient Lists

Current State

Adoption

As of 2006, the EMR is an integral part of PPG 775, and is the sole method for capturing patient information. The office no longer maintains paper charts, and all but a few paper charts have been moved to offsite storage.

Functionality

The practice is using the EMR extensively for the following functions:

- Order management for diagnostic studies, medications, and procedures, including physician and other caregiver order entry
- Disease management and preventive services – Reports are generated to identify follow-up requirements and to manage compliance with treatment plans
- Clinical decision support in the form of advisories and alerts
- Patient education – Patients receive specific education and instructions and the end of each visit
- Insurance company chart review
- Contract negotiation – By reporting on improvements in specific conditions, the practice has been able to negotiate improved capitation rates with payors.

A breakdown of the various EMR features and the staff utilizing the feature follows:

Users / Uses	Physicians	Nurses & MAs	Midlevels	Clinical Support (Lab / Rad)	Comments
Radiology and Imaging Results	X	X	X	X – Radiology staff	Reports and images available almost immediately – Images hosted in PACS system
Laboratory Results	X	X	X	X – Laboratory Staff	
Drug Reference Information	X	X	X		Patients are provided handouts with drug information and instructions
Drug Interaction Warnings	X	X	X		Each physician sets flags based on levels of interaction
Reports from Specialists	X	X	X		These are scanned unless received electronically (e.g. dictated hospital reports)
Clinical Guidelines and Protocols	X		X		The practice has built numerous guidelines based on patient conditions, age, gender and medications
Referrals to Specialists	X	X	X		100% of practice referrals are done via the EMR

Users / Uses	Physicians	Nurses & MAs	Midlevels	Clinical Support (Lab / Rad)	Comments
Letters to Patients and Referring Physicians	X	X	X		Most letters and patient reports have a 1-day turnaround from the time all information is available
Current Patient Medications	X	X	X		
Prescriptions / Med Orders	X	X	X		
Procedure / Op Notes	X	X	X		
Past Medical History	X	X	X		100% of medical histories are entered into EMR
Physical Examination / Review of Systems	X	X	X		
Presenting Complaint	X	X	X		
Visit Notes	X	X	X		
Clinical Decision Support					
Integrated displays of patient data	X	X	X		Flowsheets are available for drugs, labs, vitals, risk factors, conditions, immunizations, etc.
Order Sets	X	X	X		

Physician Use

Physician use falls into one of three categories:

- *Fundamental Users* – This is the minimum standard for all users. Basic functions, including use of documentation templates, coding wizards, and basic ordering. PPG estimates that the average annual savings for a Fundamental physician user is $14,500.
- *Average Users* – Most physicians have become proficient in the fundamental uses of the EMR, and have learned to use more advanced functions to increase clinical productivity, decision support, professional and patient satisfaction. PPG estimates that the average annual savings for an Average physician user is $56,000.
- *Power Users* – Several physicians have fully embraced the EMR and are using it extensively for quality improvement, revenue improvement, and management of the entire patient population. Examples of Power use include the use of voice recognition for transcription, the use of flowsheets and protocols and the use of MAs to collect and manage data. PPG estimates that the average annual savings for a Power user is $62,000

Integration

PPG775 has integrated the EMR extensively with other systems in the practice and in the larger Piedmont organization. This impressive level of integration increases the value of the EMR to the practice exponentially and is a hallmark of the success of this implementation. Average weekly volumes of transactions by foreign system are described in the table.

Of particular note is the integration between the EMR and Relay Health, which is a front-end tool that provides a mechanism for patients and physicians to communicate in a secure, private manner. While

traditionally used as a standalone product, the integration of Relay Health with the EMR allows PPG775 to use the powerful functionality of the EMR in a way that is clear and meaningful to the patient. Current uses and benefits include:

- Secure email between patient and physician, resulting in a reduction in phone calls
- Regular newsletters, branded by PPG775, sent to Relay Health users, resulting in increased brand awareness and patient retention
- Clinical reminders, based on EMR-generated data, resulting in improved clinical outcomes

Also of note is the integration between the EMR and NextGen's EPM practice management system. NextGen EPM is a fully functional practice management system for the entire physician practice revenue cycle. All scheduling and demographic data originates (In HL7 compliant format) in NextGen EPM, and is seamlessly sent to the EMR. Once a visit is completed, procedure and billing codes are generated by the EMR and sent back to EPM for bill processing. The interface of these two systems enables the practice to improve its charge capture, coding, and billing functions, and provides extensive documentation.

Interface	Type	System	Content	Avg. Volume per Week
NextGenEPM	Inbound	Practice Management	Patient demographic and scheduling messages (ADT,SIU)	Not measured – all relevant transactions are integrated
NextGenEPM	Outbound	Practice Management	Charge messages (DFT)	Not measured – all relevant transactions are integrated
Relay Health	Inbound	3rd Party Patient Communication System	Prescription refills, medication questions, online consults, requests for: appointments, lab results, referrals	130 contacts/week
LabCorp	Inbound	External Lab System	Lab Results	108 Patients/ 337 Reports
Quest Diagnostics	Inbound	External Lab System	Lab Results	65 Patients/ 269 Reports
SoftLab	Inbound	Piedmont Hospital Lab System	Lab Results	525 Patients/ 1,357 Reports
HeartLab	Inbound	Piedmont's Fuqua Heart Center Lab System	Non-Invasive and EKG results, and image link from Fuqua Heart Center	12 Patients/ 12 Reports
Muse	Inbound	Piedmont's Fuqua Heart Center	Echo results and image link from Fuqua	16 Patients/ 16 Reports
HBOC Radiology	Inbound	Piedmont Hospital's Radiology System	Radiology results	185 Patients/ 307 Reports
GE PACS	Inbound	Piedmont Hospital's PACS system	Radiology images	79 Patients/ 79 Reports
KBT	Inbound	Piedmont Hospital's Transcription System	Transcribed reports	104 Patients/ 104 Reports
Brentwood EKG	Inbound	In-office EKG System	EKG Results and image link from in-office EKG's	Not measured – all relevant transactions are integrated
DocuTrak	Inbound	PG Piedmont Document Imaging System	Scanned & resolved documents	1,059

Ongoing Training

PPG775 has a comprehensive training program in place that is used to train all new employees in the use of the system. This program consists of a series of online lessons provided by the vendor along with a

practice disk for completing practice tasks. This component of the training takes approximately ½ day to complete.

In addition, PPG775 has a peer-based training component that typically takes 5-6 hours to complete. This training is based on role, with physicians training physicians and nurses training nurses.

With this comprehensive program, PPG775 has achieved 100% compliance on staff training since the implementation of the EMR.

Value to the Practice

PPG 775 has met or exceeded all of the business objectives identified at the beginning of the project, as follows.

Core Business Objectives:

1. Improve the safety and quality of care delivered to our patients
2. Increase the satisfaction of our patients and physicians
3. Improve the operational and financial condition of the practice

Improve Patient Safety and Quality of Care

Our improved ability to see patient results over time allows us to make better decisions on the care we deliver to those patients. The flowsheets we have developed for the following variables provide an excellent example of this integrated information display capability:

- Drugs
- Labs
- Vital signs
- Conditions
- Risk factors

These flowsheets will display the variable (subject) over time and in relation to another variable or result. This allows the physician to make decisions based on multiple variables that change over time and in relation to each other. These flowsheets are in use by 100% of our caregivers and are used in approximately 50% of patient visits or encounters.

A significant component of the quality care program is the increasing use of the EMR to measure and improve clinical performance, based upon HEDIS and NCQI standards. PPG currently bases a portion of physician compensation on their ability to meet clinical quality standards, which are annually set. The EMR provides PPG775 with the ability to provide concise measurement of key clinical indicators. Beginning in 2006, the EMR will be used to measure two indicators:

1. Smoking cessation, as measured by the % of smokers who were counseled by the physician to quit; and
2. Measurement of Type 1 Diabetic protocol compliance, as measured by the % of diabetic patients for whom a Hemoglobin A1C was performed twice in the past year.

PPG775 has set a goal of achieving 90% compliance by July 2007, and is planning to use these indicators as a driver for evaluating and revising EMR exam templates to ensure that they capture the right information, and to provide them with alerts for non-compliance.

Another improvement in patient safety and quality of care is that the ED physicians at Piedmont Hospital have access to our outpatient medical record system. Based on this accessibility, the ED physicians can review results of outpatient visits, current medications, problem lists and other vital information on patients of ours who are seen in the Piedmont ED. Due to our proximity to Piedmont Hospital and the high rate of patient sharing between PPG and Piedmont Hospital, this has proved to be a very valuable resource for this busy ED as well as a distinct patient care improvement factor for PPG. All ED physicians have access and use this accessibility regularly.

We have embraced the use of order sets throughout the practice for a variety of circumstances. This has improved patient care by ensuring complete and thorough diagnostic testing based on protocols and clinical guidelines, and together with the integrated data display provides a comprehensive view of the patient's status. We have over 40 order sets in use at PPG by physicians, nurses, lab technicians and at our influenza immunization clinic.

We have also developed an extensive set of clinical guidelines and protocols that are in use by 100% of our medical staff. These 14 protocols cover 4 conditions, age and gender specific concerns and are also based on specific medications the patient is taking. The protocols are available to the physician on the order screen so they can be accessed during the ordering process, and they can be added to the patient note with a single click.

We have implemented drug interaction warnings for 100% of our caregivers based on the Medscape dataset. These warnings improve patient care by checking known current medications with medications being ordered during the visit to identify and flag any potential interactions. This warning system has been in use since go-live and, coupled with the 100% usage rate of the current medications module, has assisted our physicians in making the correct choices when prescribing medications to their patients.

Improve Customer Service

We have two groups of customers – our patients and physicians who refer patients to us. Our stated goal of improving customer service extends to both groups of our customers and will be discussed separately.

Improve Customer Service – Patients

Our patient customer service has improved significantly since the implementation of the Centricity EMR system. Several examples are worth noting:

Patient Report Letters: Letters for consults are now sent to patients within one business day of the results being available. This improvement is due to a number of capabilities in the EMR system, including the template and automated standard letter generating functionality. This functionality, along with the ability to drop template components into letters and automatically generate standard letters, enabled us to distribute **12,683** letters last year, each within one business day of the results being available. This capability is unmatched by other area providers. This total includes patient consult letters, which are discussed below.

Patient Education: We now have the capability, through the use of the EMR system, to provide our patients with educational materials pertaining to their visit and condition. We also provide our patients with educational materials about any pharmaceutical we are prescribing to them. This both improves customer service for the patient by improving their understanding of the situation, and also improves office operations by reducing clarifying telephone calls from patients.

Referrals: Prior to EMR implementation, referrals were processed and made available to the patient within 24 hours. The EMR has streamlined the process, and, depending on patient need, can be available immediately.

Prescription Refills: The refill process is much more efficient with the EMR. Without the need to locate charts, prescriptions can be approved and sent to the patient's pharmacy of choice as quickly as necessary.

We believe these improvements in patient customer service are one of the driving forces behind our above-average ratings in the Press-Ganey satisfaction measurement system on the following measures:

Measurement	National Average	Our Result
Explanations about my condition	91.5	93.6

Information provided about medications	90.5	92.1
Instructions on follow-up care	90.9	92.2
Confidence in this provider	92.4	95.4

Improve Customer Service – Physicians

Our ability to respond to referring physicians with complete information in a timely manner is attributable in large part to the EMR system. We make extensive use of the voice recognition technology in the EMR to produce letters for referring physicians that contain patient status, result of the visit, action taken and follow-up recommendations quickly and easily. These letters are produced within one business day of the results being available, so are often in the referring physician's inbox within 2 or 3 days. This level of service is credited in part for our increase in referral business over the last 7 years (see "Growth of the Practice")

Improve the Performance and Financial Health of the Practice

One of the primary goals for implementing the EMR was to improve the efficiency of operations and the financial health of the practice. In order to measure our progress on attaining these goals, we measured several aspects of operational and financial performance prior to implementation, and again at 6 months, 2 years and 7 years post-implementation. These measures can be grouped into 3 main categories:

- Operational Efficiency
- Cost Avoidance
- Physician Productivity

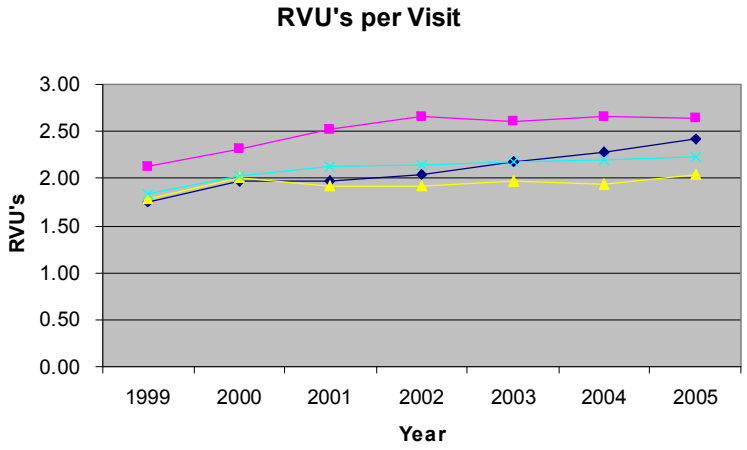
The observed improvements in these measures are included in the table below:

Metric	Baseline Annual Cost	Target Improvement	6 Month Observed Improvement	2 Year Observed Improvement	7 Year Obser Improveme
Operational Efficiency					
Chart pulls	$22,143	50%	14%	99%	100%
Paper filing	22,143	85%	-14%	85%	100%
Rx Refill Effort	206,250	80%	32%	32%	93%
Referral Effort	76,000	35%	10%	10%	75%
Cost Avoidance					
Transcription Lines	127,875	100%	80%	99%	100%
Cost of Forms	936	100%	100%	100%	100%
Cost of Other Supplies	27,833	50%	12%	52%	95.4%
Physician Productivity					
RVU's	213,960	5%	9%	14%	20.6%
Collections per RVU	57.02	None	None	0.3%	5.26%

Efficiency and Cost Avoidance: The financial benefits exclusive of productivity improvements for the physicians are calculated by year in the table below.

	Fixed Size Savings by Year (in '000's)						
Savings Type	1	2	3	4	5	6	7
Efficiency	73.6	114.3	114.3	114.3	114.3	114.3	232.5
Cost Avoidance	106.6	142	142	142	142	142	143.3
Total by Year	180.2	256.3	256.3	256.3	256.3	256.3	375.8
PV at Investment	$1,496						

Physician Productivity: Physician productivity benefits are impossible to calculate with certainty given the information available, but there is a material improvement in RVU's per visit, which is a reasonable proxy for productivity. The RVU's per visit isolates the effect of adding mid-level providers and other confounding variables that make the productivity result hard to calculate. RVU's per visit are identified in the following graph for the 4 physicians who have been with PPG775 since the year of implementation.



Investment in the EMR

The costs to implement the EMR fall into 2 categories: Initial and Recurring. These types of costs are identified and quantified below for the 7 years the EMR has been in use at PPG. The present value calculation is set at the time of investment to provide a point in time to compare costs to benefits using comparable dollars.

Initial Costs:
Initial software licensing
Hardware, including servers and user devices
Implementation costs
Integration costs

Recurring Costs:
Ongoing payments for vendor support
Ongoing payments for internal support

Cost	Initial	Recurring
Software Licenses	$74,000	
Hardware	118,632	
Implementation	93,894	
Integration	40,000	
Vendor Support		$19,288
Internal Support		35,400
Subtotal (PV 6 Years)	326,526	277,579
Total PV at Investment	$604,105	

Comparison of Investment vs. Value

In determining overall financial cost or benefit of the system, we need to compare the investment made with the benefit achieved. Financial benefit was not the primary goal for implementing the EMR, but improving the financial health of the practice was an important part of the strategy. In order to provide comparative numbers, we have calculated the cost and benefit streams as present values *AT THE TIME OF IMPLEMENTATION*. The reason for doing this is to provide the value of the investment and benefit streams in 1999 dollars as if we were looking forward from that time. This is a typical analysis for financial decision-making, and will enable us to answer the question, "was this a positive Net Present Value project?" To state the question more clearly, would PPG775 have taken on this investment (from a financial perspective) if we knew then what we know now. The NPV analysis provides a clear answer to this question.

Costs, PV over 7 years at 5% cost of capital: $604,105
Benefits, PV over 7 years at 5% cost of capital: $1,495,709
Net Present Value as of 1999: 891,604

This was clearly a financially positive value proposition, with the system returning over 147% in profit on the original investment not including physician productivity gains. This fact, along with the improvements we have made and continue to make in quality of patient care delivery, indicates this project has been an unmitigated success.

Critical Success Factors

1. Support from Piedmont Healthcare – The organization provided technical support both during and post-implementation, assisted in decision-making, and remained committed throughout the process.
2. Commitment from physicians and staff.
3. Senior level sponsorship – the three most senior physicians led the charge and were the first to drop the chart – this demonstrated commitment and encouraged others to adopt the EMR.
4. Strong training and support program. Support was available to all users throughout the process. This prevented manual workarounds and improved adoption.
5. The use of thin clients running Citrix provided a high-performance, low maintenance environment.
6. Using the big bang approach to implementation, which provided the incentive to the physicians to be fully committed to the effort and minimized disruption to the practice.

It should be noted that the support provided by the hospital is indicative of the high level of technology integration, both in terms of systems and leadership, found throughout Piedmont Healthcare. As the lead physician at PPG775, and also serving as the Chief Medical Information Officer for Piedmont Healthcare, Dr. McClatchey was responsible for ensuring that the EMR was successful both as a standalone project for his practice, and that it supported the overall vision of Piedmont Healthcare to provide a seamless experience for patients. The results of this level of commitment are apparent in the level of integration between hospital systems and the EMR, and in Piedmont Healthcare IS's time and resources provided to implement and support the EMR implementation.

We believe the implementation of Logician / Centricity at the PPG775 practice is an outstanding example of initial and ongoing success of an ambulatory EMR. The level of integration, process support, and adoption serve as an example for other practices that ambulatory EMR's are not only feasible, but can be a positive operational and financial investment in the physician practice.