# Time, Effort, and Infrastructure Costs to Use Electronic Health Records

Electronic health records (EHRs) – an electronic version of a patient medical record – have promise in improving care for patients. However, adoption is still low in primary care practices due to skepticism about costs, adverse impact on provider productivity, and associated loss of revenue. This study estimated the actual costs of an EHR implementation that are associated with the time and effort of planning, customization, and training and showed that the loss of revenue and productivity are not as burdensome as feared. Clinicians' productivity decreased initially, but after 12 months was only slightly (4 percent) below pre-EHR levels.

Planning for & First-Year EHR Expenditures

Identifying the actual costs of implementing and maintaining an EHR.
Data were collected in 26 primary care practices (family and general internal medicine practices between two and 12 physicians) within the HealthTexas Provider Network. This study found that an average primary care practice with five physicians required an estimated 611 hours for EHR planning and implementation, which includes tasks such as content development and customization, technical support during the implementation, workflow review and redesign, chart loading, and training. EHR end users, those that will ultimately use the EHRs including physicians, clinical, and non-clinical staff, dedicated an additional 134 hours per physician to preload charts, participate in training, and review and redesign workflow.

The total costs of the 4-month planning period through the first year of EHR use is $233,297 for the average five physician practice or $46,659 per physician (approximately $2,900/physician/month over the 16 months). Yet, after 1 year of implementation, monthly cost to support the EHR had dropped to approximately $1,650 per physician. Overall, 38 percent of total practice costs were for planning and personnel costs, 37 percent for operating costs, and 26 percent for capital expenditures.
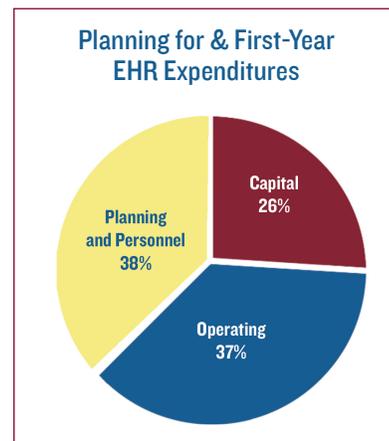
> *"We really had no preconceived ideas about what the level of the costs might be, especially since time and effort must also be considered."*
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> —Physician-Champion for EHR Implementation, Dr. David Bragg

Impact of Study. Thirty-eight percent of total costs are from potentially hidden costs in terms of personnel and planning costs that provider practices and health care organizations must consider when planning an EHR implementation. The three main types of potential hidden costs are:

- Time spent by the organization's implementation team providing guidance, planning, and overall support.
- Time spent at the practice level for planning and training.
- Workflow redesign and time spent by end users in activities such as preloading charts.
- The Department of Health and Human Services is offering financial incentives to hospitals and doctors' practices that can achieve what it calls "meaningful use"

of EHRs by certain dates (see *http://www.cms.gov/ehrincentiveprograms/* for more detail). Practices will be able to collect up to $44,000 through Medicare incentives or $63,000 through Medicaid incentives per eligible provider.

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What are the infrastructure, personnel, and time costs?

Provider practices and health care organizations must consider many hidden resources and staff time costs when planning for an EHR implementation. A group of researchers, led by Dr. Neil Fleming of the Institute of Health Care Research and Improvement and the Baylor Health Care System, looked at a variety of costs related to preparing for and implementing the commercial, Web-based, GE Centricity Physician Office EHR. The team took advantage of an EHR implementation, collecting data at 26 family and general internal medicine practices affiliated with HealthTexas Provider Network, an ambulatory care provider network in the Dallas-Fort Worth area, and estimated costs for an average five physician practice.

Capital and Operating Expenditures: The team documented financial costs: capital expenditures (hardware) and operating expenditures (software licensing, hosting, and support). Capital and operating expenditures per five physician practice were estimated to be approximately $61,300 and $85,500 respectively.

Planning and Personnel Costs: They also captured planning and personnel costs, which Dr. Fleming refers to as hidden costs, associated with the time and expertise of staff to plan, design, and train for use of the EHR. These planning and personnel costs are described below and outlined in detail in Table 1.

Costs were captured over the 120-day planning phase leading up to EHR implementation for each practice. For the HealthTexas Provider Network Implementation team this included estimated time spent on: startup and planning; defining clinic implementation team roles and responsibilities; re-engineering workflow; evaluating existing hardware; and installing new hardware, network capabilities, and interfaces for compatibility.

Who is involved with implementation?

1) The HealthTexas Provider Network Implementation team: This team planned and led the implementation of the system throughout the network including the 26 primary care physician practices. This team consisted of the vice presidents of informatics and for EHRs and information technology, the senior vice president for disease management and quality, a technical deployment manager, a process improvement consultant, and staff who conducted workflow and EHR training for physicians and clinic staff.

2) The Practice Implementation Teams: Each of the 26 practices had an individual practice implementation team which prepared for the practice's implementation and consisted of physician champions, clinical staff superusers, and office managers.

3) Practice End Users: The physicians, nurses, medical assistants, and non-clinical staff at each practice that would use the EHR. End users had to be trained on the use of the EHR and to prepare for its use.

Costs associated with the individual Practice Implementation Teams included time spent on tasks preparing for the EHR implementation in the planning phase, such as planning, workflow reengineering, and training, as well as support 60 days after EHR implementation. Cost of time spent by Practice End Users (physicians, nurses, and medical assistants) included pre-loading charts, training, and simulation of practice cases during the planning period.

The HealthTexas Provider Network Implementation team spent 468 hours in the 4-month planning period and an additional 12 hours during the first 60 days post-implementation, for a total of 480 hours per practice. Based on salary information, the 4-month planning phase and 60 days post-EHR implementation period cost approximately $28,000.

The Practice Implementation Teams spent a total of 130 hours per practice (95 in the planning phase and 35 in the 60 days after EHR implementation) for a cost of almost $7,900 per practice. The Practice End-Users at the individual practices spent an estimated 134 hours per physician (all but 6 of these hours occurred in the planning phase), including 85 hours pre-loading data from paper charts into the EHR. The total cost of this time was approximately $51,626 per practice (or $10,300 per physician). Details are shown below in Table 1.

Table 1 – Average Hours and Cost Per Practice of EHR Implementation, by Team

ACTIVITIES	HealthTexas Provider Network Implementation Team		Practice Implementation Teams		Practice End Users at Individual Primary Care Practices	
	HOURS	COST ($)	HOURS	COST ($)	HOURS	COST ($)
PLANNING						
Content development/customization	63	$5,631	0	$0	0	$0
Interfaces for other systems	29	$1,486	0	$0	0	$0
Workflow mapping/redesign	59	$2,462	37.5	$2,452	13.4	$800
Pre-loading charts	0	$0	0	$0	85	$7,219
Training	73.5	$3,067	52.5	$2,777	23.9	$1,538
Simulation (practice cases)	0	$0	5	$363	5.9	$381
Support during EHR Implementation	104	$4,106	0	$0	0	$0
Project management	10	$765	0	$0	0	$0
Technical deployment including networking	130	$9,856	0	$0	0	$0
Planning Total	468.5	$27,373	95	$5,592	128	$9,938
Post-Implementation (< 60 days)	12	$653	35	$2,265	6	$387
TOTAL	480.5	$28,025	130	$7,857	134.2*	$10,325*

*Per physician. Total practice end user costs for a five physician practice is approximately $51,626.

How do EHRs impact provider productivity and practice expense?

Another barrier to EHR adoption is the fear that it is a risky investment that decreases provider productivity and increases practice expenses.

In order to assess the impact of the EHRs on productivity, the team examined relative value units (RVUs) and visits per physician full-time equivalent (FTE). RVUs are used to compare the amount of resources required to perform various services between or within an organization's departments. Work RVUs per-physician FTE did increase after EHR implementation, representing a drop in productivity. RVUs were 8 percent lower during the first 6 months following implementation but rebounded to 4 percent by 12 months post-implementation. Visits per-physician FTE followed a similar pattern, dropping 8 percent from pre-implementation levels during the first 6 months after EHR implementation, recovering to 4.5 percent lower than pre-implementation after 12 months.

Net income also decreased initially but after 12 months was not different than pre-EHR levels. Physician expense increased to about $1,650 per-physician FTE per month, which is approximately the per-physician monthly cost of EHR maintenance costs. While fears of increased expenses and decreased productivity during the initial period after EHR implementation are justified, they are not as large or persistent as thought.

Conclusion

This study highlights the real costs associated with an EHR implementation. It revealed many hidden costs that provider practices and health care organizations must consider when planning an EHR implementation. The three main types of hidden costs are: time spent by the organization's implementation team providing guidance, planning, and overall support; time spent at the practice level for planning and training; and workflow redesign and time spent by end users in activities such as pre-loading charts. If an EHR implementation is to be successful, organizations need a variety of people for pre-implementation planning, including IT staff, management, clinicians, and leadership, all of whom must be allotted adequate time to participate in the process.

When planning for and implementing EHRs, health care organizations may wish to seek guidance from AHRQ's Health IT Tools and Resources, and/or support for content development, training, project management, and deployment such as that provided by the Regional Extension Centers established by the Health Information Technology for Economic and Clinical Health Act.

> *"While most physicians around the country may not have the existing technical infrastructure to provide for this type of implementation, the Regional Extension Centers and their consulting partners can offer a somewhat similar function."*
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> —Leader at HealthTexas/Baylor Healthcare System