Evidence-Based Medicine as a platform to improve CPOE adoption by physicians
# Table of Contents

- Introduction .................................................................................................................. 3  
- Description of Evidence-Based Medicine (EBM) ......................................................... 4  
- Designing/Adapting Governance Structures to Address Imbedding EBM ..................... 6  
- Third-Party Content Providers for EBM ....................................................................... 7  
- Dell ADOPTS Methodology .......................................................................................... 8  
- Conclusion .................................................................................................................... 9
Introduction

Physician acceptance of an electronic health record (EHR) and Computerized Provider Order Entry (CPOE) is a major barrier to the wide-spread adoption of this technology. Until now, ordering providers have seen implementation of these technologies as an IT-based initiative rather than a clinical transformation. Fears of workflow interruption, decreased production, and what has pejoratively been called “cookbook medicine”, have also prevented more universal acceptance and adoption. Now with a renewed focus on healthcare reform and the drive to realize the financial benefits of “meaningful use” a rigorous method to ensure EHR adoption must be paired with a compelling quality-of-care improvement story to aid institutions in this clinical care transformation.

This story begins with growing evidence that EHR and CPOE result in decreased medication errors, and other improvements in care. The very essence of meaningful use is less about the goal of having EHRs computerized, than improving care of patients and populations. This is an unarguable vision. This paper presents a general approach to building a plan that will result in successful adoption and sustainable use of CPOE and EHRs. Only when physicians can see and believe in a vision of improved patient care will universal acceptance be achieved. Most physicians believe that Evidence-Based Medicine (EBM) improves patient outcomes. But almost universally, hospitals struggle with implementing and maintaining standardized order-sets, which include evidence-based order sets. According to the Agency for Healthcare Research and Quality, it can take up to 14 years for an evidence-based practice to become a routine part of care. In addition, outcome measures, many now publically reported and linked to payment schedules, vary widely within organizations, across communities, and nationally. Paper processes, change control mechanisms, time commitments, and the notion that “I was trained that way” all contribute to the perpetuation of this problem. Physicians often refer to evidence when they actually are relying on consensus or training as their evidence base. In the process of implementing Computer Provider Order Entry (CPOE), a diligent methodology that ensures provider adoption will be necessary to move past these barriers.

Standardization of medical care, decreasing time from research to the bedside, and a universal ease in reporting outcomes will rely on a commitment from physicians and hospitals to build a systematic approach to incorporating and updating EBM in the direct management of patients. Dell Healthcare Consulting provides a methodology that will improve physician adoption rates of CPOE, while imbedding the process of EBM. Through a rigorous process called ADOPTS, which consists of Assess, Design, Optimize, Prepare, Transform, and Sustain, Dell will partner with organizations in the successful EHR/CPOE implementation. This success will not be just at the implementation but will continue well beyond. The Sustain phase, which includes ensuring that physicians continue to use this important new process of providing clinical care, depends on meeting the physicians’ critical judgment as to whether patient care has been improved. The process of imbedding standardized clinical order sets in EHR software products is also crucial to this success.
What is Evidence-Based Medicine?
The definition of Evidence-Based Medicine (EBM), according to David Sackett, who along with Archibald Cochran is credited with establishing EBM, is “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research.”

History of EBM
The first works of evidence-based medicine began with Pierre Charles Alexandre Louis in the early 19th century. Louis was a physician researcher at the Paris Clinical School. He applied “numerical methods to assess the effects of bloodletting.” His numerical method was that new and valid medical knowledge could be derived from aggregated clinical data. Louis cared about the validity of group comparisons and the quality of observations on which they were based, and he checked the logical consistency of his results.

In 1972, British epidemiologist Archibald Cochran published “Effectiveness and efficiency: random reflection on health services.” He was the first to stress the importance of random clinical trials to assess the effectiveness of treatments. The Cochran Center which was later named the Cochran Collaboration was founded on his work and his name. The Cochran Collaboration is a worldwide nonprofit organization that produces a database of systematic reviews of healthcare interventions and promotes the search for evidence.

David Sackett is considered the father of EBM and it was Sackett who first defined the term and presented his first model in 1992. According to Sackett, EBM is the integration of clinical expertise, patient values, and the best evidence into the decision making process for patient care. Clinical expertise refers to the clinician’s cumulated experience, education, and clinical skills. The patient brings to the encounter his or her own personal and unique concerns, expectations, and values. The best evidence is usually found in clinically relevant research that has been conducted using sound methodology.

The evidence is just one of the tools that a clinician uses to help support the patient care process. EBM is a new skill set for most physicians as it is not thoroughly taught in medical school. This includes creating questions about the effects of therapy, the usefulness of diagnostic tests, and the prognosis and etiology of diseases. Literature searches and understanding the validity of the evidence is paramount. The hierarchy of Case Reports, Case Control Studies, Cohort Studies, Randomized Controlled Trial, Systematic Review, and Meta-Analysis is important to understand. The steps in the evidence-based medicine process are outlined below.

The Steps in the EBM Process

| The patient | 1. Before the clinical problem or question that arises out of the care of the patient |
| The question | 2. Construct a well-built clinical question derived from the case |
| The resource | 3. Select the appropriate resource(s) and conduct a search for evidence |
| The evaluation | 4. Appraise that evidence for its validity (closeness to the truth) and applicability (usefulness in clinical practice) |
| The patient | 5. Return to the patient; integrate that evidence with clinical expertise, patient preferences, and apply it to practice |
| Self-evaluation | 6. Evaluate your performance with the patient |

This process is obviously very time and effort dependent. Being an organization embarking on a program to make EBM the mainstay of how it practices medicine can be a daunting. An organization can set up a committee structure and hierarchy to define their EBM strategy. They can select specific areas where they are looking for improvement and mirror the Medicare Quality Indicator System (MQIS) indicators that the organization wishes to address and improve. Alternatively, there are third party content providers, such as Zynx Health and ProVation Medical, that can help an organization by providing evidence-based order sets, alerts, and rules to be used with an EBM imbedded CPOE system as part of the larger EHR. These companies evaluate the evidence and help an organization “keep current” by reevaluating the evidence that they provide.

Physicians offer many differing opinions regarding the value of EBM. For example, some physicians might express that, “I’m all for the evidence, but whose evidence?” Some might say that EBM is not a new concept and that clinicians have been using the literature to guide their practice and clinical decisions for a long time. Others might refer to it as “cookbook medicine” which leaves out the role of clinical judgment. Still others see it as the mindless application of population studies to the treatment of individuals. They might point out that there is no randomized controlled trial or “gold standard” in the literature to address many clinical questions. While many physicians report that they stay current with the literature, Figure 1 illustrates how difficult it is to “just keep up”. As shown, the base of literature that only includes randomized-controlled studies has grown at an exponential rate through the later part of the twentieth century, with the number of published trials growing from under 2000 in 1980, to over 10,000 by 1995 in the U.S. alone, and this number continues to grow.
It is obvious that keeping current with the published randomized controlled trials is a monumental task and not a new problem. The evidence from randomized controlled trials has historically taken a long time to make its way into the medical textbooks. This information overload dilemma fails to include the larger problem of an ever-increasing source of non-peer reviewed sources such as web pages, e-journals, and blogs.

Much of medical education relies on textbooks, which despite being the educational gold-standard, are not the best example of using EBM. Textbooks written and edited even by recognized experts often fail in incorporating EBM, as shown in Figure 2.

**Will Reviews and Medical Books Get it Done?**

<table>
<thead>
<tr>
<th>Year</th>
<th>Evidence</th>
<th>Experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>4 RCTs showed mortality benefit of beta blockers (3,522 patients)</td>
<td>Of 5 textbooks and reviews, 0 mentioned beta blockers</td>
</tr>
<tr>
<td>1990</td>
<td>8 RCTs showed benefits of cholesterol reduction (10,775 patients)</td>
<td>Of 6 textbooks and reviews, 0 mentioned cholesterol reduction</td>
</tr>
</tbody>
</table>

Source: Antman EA, et al. JAMA

If textbooks fail to utilize current evidence, it is reasonable to question the prevalence of using evidence to support clinical decisions. According to Berwick et al, "Only 10-20% of clinician interventions are supported by scientific evidence."

The corollary of this fact is that 80-90% of the clinical interventions are based on something other than scientific evidence. Rather than “evidence-based medicine” we have had “eminence-based” medicine which is defined as a group of physicians, who are considered leaders in the field by their peers, deciding on what is true by consensus. Autologous bone marrow transplants for the treatment of breast cancer and use of drugs such as the COX II inhibitors are recent examples of eminence-based medicine. While eminence-based medicine may not be the optimal approach, it has served medicine well for a long time. As we accumulate evidence through research and studies, we have been augmenting eminence-based medicine with evidence-based medicine. This change will not take place overnight but instead will be the result of measuring our results and applying scientific methods to the work that we do.
Designing/Adapting Governance Structures to Imbed EBM

An overall EHR governance, leadership, and operating structure should be established. It should be based on administrative, medical staff, and other clinical stakeholder involvement. Since this effort must be clinically led, and IT supported, it is a natural fit to use EBM and EBM-related order sets as a basis for CPOE implementation. The hospital and clinical leadership must seize this opportunity for standardization of care where necessary. One key for successful implementation is to identify and empower interested and enthusiastic physician champions. The champions must be sponsored by a chief medical officer (CMO) or a hospital leadership structure that can model a compelling clinically driven vision of the future that embraces EBM and the measurement of outcomes. A governance model must be established for effective management of the magnitude and speed of change, issue resolution, and decision making that can address the most difficult problems.

An overall EHR governance and leadership structure and operating model should be established and be based on administrative, medical staff, and clinical stakeholder collaboration. This model will require a number of levels and functions including: 1) an executive level strategic, visionary, decision making body; 2) cross functional and cross organizational coordination bodies; and 3) multiple domain working or action groups which include subject matter expertise.

This proposed governance structure demonstrates the interdisciplinary nature and level of participation needed to pursue the advanced clinical systems within an EHR that includes the proper EBM tools to ensure physician adoption and continued physician utilization.

Examples of EBM-linked order sets are shown in Figure 3. Generally third-party content providers use their logos to highlight where they have evidence and provide Web hyperlinks to the information. Outlines for evidence-based order sets can be linked to diagnoses, codes, or symptoms as shown below. These order sets, with appropriate medical diagnostics and therapeutics can be built with the appropriate, timely evidence to support current physician practice.

Figure 3

PROVATION
Many academic medical centers have embraced EBM as the basis of their order state process. Below is an excerpt from one major university website:

**Computerized physician order entry.** EBM is the foundation of our CPOE order sets.

**Research to define best practices for care.** Researchers at Duke conduct hundreds of clinical trials and outcome studies each year to prove which medications, procedures, and devices are most effective. The results of these research studies, in combination with medical literature and best practice guidelines, are used to provide the highest quality patient care.

**Standardized order sets** are evidence-based medicine physician orders developed for specific diseases and conditions.

**Third Party Content Providers**

Incorporating evidence into the EHR can be accomplished in different ways. One approach is for an organization to set up a committee with the proper governance and leadership whose stated mission is to bring evidence-based medicine into the practice of an organization by reviewing the literature as well as the published guidelines from various national and international organizations. To build the evidence into the EMR, the committee needs to create order sets, rules, alerts, and reminders for the clinicians based on the evidence. In addition, the organization would need to keep the dynamic evidence current. An alternative method is to utilize vendors who produce this content, as well as update the evidence on a regular basis. This allows the physicians to focus on providing quality care while relieving the burden of keeping evidence current.

These evidence-based practices are made actionable in the EMR in the form of physician order sets, interdisciplinary plans of care, alerts, and reminders. The primary benefits of the pre-built, third party content products are:

- The research and development of evidence-based content is complete and available for immediate use
- Evidence-based content allows for the rapid development of order sets, care plans, and other clinical content
- Content can be rapidly integrated into most vendor systems for orders management
- Order sets and other documents can be used independent of a CPOE system
- Evidence-based content enhances physician acceptance and reduces the review time for standardized order sets
- Authoring tools allow for local customization when and where appropriate
Allowing appropriate customization of order sets built upon a hierarchy is important for physician adoption. There is a recognized pyramid in regards to the quality of evidence in the literature as shown in Figure 4.

In addition, order sets will achieve the meaningful use criterion for submitting Center for Medicare and Medicaid Services (CMS) required quality data, with care based on nationally recognized EBM-supported core-measure order sets. Other reportable outcomes (community based) will be more easily linked to standardized order sets and incorporate the best evidence. There will be appropriate customization of order sets based on local and community standards, but these can be easily measured against the availability of supporting or conflicting evidence. The crucial balance of standardized evidence and appropriate customization will allay fears and characterizations of “cookbook medicine”.

**Dell Services’ ADOPTS Framework**

It has been our experience at Dell that far too many healthcare organizations have not embraced a clear methodology or framework for managing the entire clinical transformation process. While consulting organizations and vendors offer varying approaches, the issue for most healthcare organizations is the lack of understanding of how these methodologies can augment and support the care and operational redesign process.

Because organizations are in very different phases in their journey towards EBM transformation, an inflexible approach that requires rigid adoption of certain methods and tools will frequently be met with significant resistance from those involved in the frontline of healthcare delivery. We have demonstrated that a more flexible but rigorous framework offering a customized approach to healthcare transformation is a better solution for meeting the needs of healthcare organizations. Dell Services’ ADOPTS (Assess, Design, Optimize, Prepare, Transform, Sustain) framework has been developed from our experience with healthcare transformation and other clinical initiatives along with the lessons learned from those experiences. The major lessons include:

- Reframe the culture – for transformation to succeed, it must be woven into the fabric of the organization
- Create improvement capability – the organization must use a flexible framework for solving problems and applying knowledge
- Collaborate across boundaries – cross-disciplinary teams create more effective long term results
- Make decisions based on evidence – data, not anecdotes, must drive process improvements and performance
- Drive results and benefits – ideas are good, execution is better, pace is critical
- Maintain constancy and ongoing focus – the attention of leadership on the importance of healthcare transformation must be present, palpable, and persistent
- Allocate resources – ensuring the adequacy of people, time, and funds in support of the initiative sends critical messages and generates support
The framework for ADOPTS recognizes that a successful approach to healthcare transformation requires an integration of three key elements: people, process, and technology. Balancing and integrating these three crucial pieces is the key that enables the effective use of technology that will allow healthcare providers the ability to manage organizational change and healthcare transformation.

Conclusion

Healthcare leaders and providers need to acknowledge that the tools available through EHRs and links to evidence providers will improve the patient care experience through increased quality, improved cost of care, and improved patient satisfaction. Appropriate use of these tools creates the unique integration of individualized clinical experience, the best external evidence available, and the marriage of these into the patient’s living medical record. The current CPOE/EHR adoption rate is approximately 10 percent, partly due to the unsuccessful methods used by hospitals to accomplish this transformation. Dell Healthcare Consulting provides a methodology that will improve physician adoption rates of CPOE, while imbedding the process of EBM. The application of a rigorous, proven methodology, paired with a commitment to imbed accepted EBM, will move this adoption to a much higher, more appropriate level.

This transformation must begin with appropriate governance and physician leadership at every step along the path. If the content build process is managed through this leadership structure and commitments to standardization begin before the content is inserted, the next steps driving towards outcome improvements will become the norm.

The new future state of a fully capable EHR with CPOE cannot be inserted into a physician’s workflow without adequate assessment and the use of this assessment to overcome the barriers to adoption. The process redesign required, including building around standardized content, will ultimately realize the benefits of meaningful use. It is keeping this focus on the patient and providing the tools to accomplish this every step along the way, that will result in success.

As we move to and beyond meaningful use, and the move towards more transparency and reporting becomes the norm by providers such as CMS, the benefits of this work will become clearer. Consistent evidence-based care, with consistent outcomes, will ultimately improve the health of those we serve. It will also lower cost in the most appropriate way, by leveraging evidence to drive proven medical interventions and prevent unnecessary interventions.

References


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