AVAILABILITY ASSESSMENT AND CONTENT ANALYSIS OF

IMPLEMENTATION GUIDELINES FOR ELECTRONIC MEDICAL RECORDS

IN PRIMARY CARE SETTINGS

by

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CERTIFICATE OF APPROVAL

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ABSTRACT

Objective: Implementation of an Electronic Medical Record (EMR) system in a

primary care practice is a complex undertaking. This guideline availability and content

analysis study examines the availability, relevance, consistency and interpretability of

five publicly available implementation guidelines for use by the primary care provider.

Perspective: This study focuses on the challenges facing primary care practices

seeking to implement an EMR system on their own. The study setting is relevant for a

new practice or for an existing paper-based practice. The main participant is the primary

care practice manager or the individual assigned to oversee or guide the implementation

in the practice. If the practice is small, the participant may be the physician leader of the

practice.

Methods: This study has two components. First, the availability of

implementation guidelines is assessed using standard Internet search techniques. Ease or

difficulty of finding guidelines is evaluated. Second, content analysis of key words in the

identified guidelines is performed on the first and second level detail of the guidelines.

Findings of the content analysis are used to evaluate the relevance, consistency and

interpretability.

Major Results: Results of this study indicate marginal guideline availability. The

relevance of the guidelines to a primary care setting is rated high. Consistency of

guidelines when compared to each other is judged to be medium to low. Finally,

interpretability of guidelines is rated as medium.

Conclusions: Locating guidelines is not straight forward. At present, the most reliable source of implementation guidelines is through practice specialty web sites, including those of the American Academy of Family Physicians (AAFP) and the American College of Physicians (ACP).

Available guidelines are designed for the primary care setting and present a structured approach through use of top level phases and detailed activity but when compared to each other, lack consistency. Further, the volume of detailed information presents a challenge for time-constrained practices to ingest, suggesting a voluntary versus directive approach. The voluntary implementation approach may impede attainment of a consistent, reliable and stable end state. Guidelines place greater emphasis on business components and less on technical aspects of implementation. No guideline provides an executive summary or quick reference guide.

Academia, clinical informaticians, EMR vendors and healthcare standards organizations should unite to produce a single, standards based EMR implementation protocol. The resulting EMR Structured Life Cycle Protocol would well serve the primary care community by reducing risk and improving prospects for a successful outcome. This standard implementation protocol may also become candidate evaluation criteria for vendor selection, where EMR vendors demonstrate compliance to the standard. Sharing of the standard implementation protocol through all available communication venues, including practice specialty web sites, major health informatics advocacy sites and international standards sites would prove invaluable.

INTRODUCTION

EMR Implementation Challenges - Statement of Problem

Implementation of EMR software systems in primary care is steadily increasing in the United States.[1-3] However, the process of implementing an EMR has proven to be disruptive to the practice,[4-6] lacking a clear business case[4,7-8] and healthcare providers have experienced significant failures leading to, in some cases, system removal.[9] Despite these known challenges, additional pressure is being placed on primary care providers to consider EMR systems driven in part by the prospect of improved quality of care[10-12] or financial incentives.[10, 13-15] Given the time constraints in managing a practice, providers may depend on the EMR vendor or a health information technology consultant for planning and execution of the implementation. Even if the provider were to choose a more active role, it is not clear whether EMR implementation guidelines are publicly available, relevant, consistent in approach or interpretable. Without available, standardized and validated implementation guidelines, the ability for the primary care segment to increase the success rate for EMR implementations remains in question.

Assessing Availability & Usefulness of Guidelines

This study examines the availability of guideline material related to implementing an EMR in the primary care setting. Additionally, a content analysis study is performed on key words in the guidelines to gauge the relevance, consistency and the interpretability of information. While peer reviewed journal articles provide a retrospective view of EMR implementations, the driving force behind this study is to identify the availability and usefulness of guidelines for use by primary care providers.

Research Question

Are EMR implementation guidelines for the primary care provider setting available, relevant, consistent in approach, and interpretable? To further clarify these research questions, the sub-problems are defined as follows:

- *Availability.* Are there publicly available EMR implementation guidelines?

- *Consistency.* Are the EMR implementation guidelines consistent?

- *Relevancy.* Are the EMR implementation guidelines relevant to the primary care setting?

- *Interpretable.* Are EMR implementation guidelines presented in a manner that a primary care provider can understand and follow?

Guideline availability is evaluated as a stand alone component of this study. After securing available guidelines, a content analysis is performed to assess the consistency, relevancy, and interpretability of the guidelines.

Definitions and Terms

For the purposes of this study, the following definitions of key terms are provided:

- *Guideline.* "Text that provides instructions and advice for performing a task and suggests possible approaches."[16] In information technology, a guideline might be called a methodology, or a more explicit set of steps or actions taken to produce the end product.

- *Electronic Medical Record.* EMR refers to a software application which typically includes a problem list, medication list, allergy list, notes, health maintenance information, and results retrieval[17] and is designed to replace the paper-based patient record in a primary care setting. Some literature uses the phrase

Electronic Health Record (EHR) interchangeably with EMR. In this paper, these two terms are interchangeable.

- *Implementation.* This term represents the complete cycle of actions, decisions and effort related to changing a primary care practice from a paper based patient record system to use of an EMR. *Implementation* can and will have differing and distinct meaning based on an individual's perspective. An EMR vendor may interpret *Implementation* as the act of installing, testing and turning the system over to the purchaser. Non-technical people may understand *Implementation* to mean all events from the initial decision to purchase an EMR through completion of installation, activation, training and cut-over activities which bring an EMR into full use in a primary care practice.

- *Available.* This word is used to describe how easy it is to find information related to EMR implementations using typical Internet search techniques or through accessing specific web sites. Is the person searching able to choose key search words that return web links directly associated with guidelines or must there be preexisting knowledge of specific web sites where guidelines might be published?

- *Relevant.* This term is used to describe how well the guideline is written and designed for use in the primary care setting. Do guidelines address the issues and constraints facing a primary care setting and offer actions that address the issues and constraints? Do guidelines offer insight into business activity, such as contract negotiations, that may not be typically encountered in a practice? Do guidelines identify all technical considerations for successful implementation?

- *Consistent.* This term refers to the similarity in approach across implementation guidelines. Do guidelines present a similar path for implementation or do

substantial differences exist? For example, the traditional waterfall model for software development identifies the following top level phases: Requirements, Design, Implementation, Verification and Maintenance.[18]

- *Interpretable.* This term refers to the ability of a provider organization to comprehend and follow the guideline. Is the material written in a manner that would be understood by non-technical people? Must there be an information technology consultant or EMR vendor in order to translate and act on the information?

Study Assumptions

This study assumes that a primary care provider and staff have limited time and resources. Conducting a comprehensive search of all known sources for implementation guidelines would be impracticable. Additionally, this study assumes that if a practice located an implementation guideline, it would likely not search for another guideline for comparison's sake. Finally, this study assumes that the practice may obviate full implementation responsibility to the EMR vendor or a consultant and as a result not need an implementation guideline.

Literature Review

A major component of this study is to identify whether implementation guidelines are available. Extensive searching of public Internet web sites and journal articles has been performed to determine the availability of EMR implementation guidelines. The results of the search are provided in the body of this study.

METHODS - AVAILABILITY OF GUIDELINES

Locating EMR Implementation Guidelines for Analysis

This portion of the study examines the availability of EMR implementation guidelines on the Internet without subscription, registration, purchase or membership. Given the prevalence of information available on the Internet, robust search capability choices and Internet publishing techniques that promote increasingly relevant results when searching, this author's initial assumption was that locating guidelines would be straight forward. As indicated in the results section, this was an incorrect assumption.

After the decision has been made by the practice to bring an EMR into play, the first question might be, "Well, how do we do this?" Enterprising primary care leaders may choose to start their investigation by using a standard Internet search tool and enter a search string of "EMR Implementation Guidelines." Others may reach out through the Internet to their specialty association,[19-24] federal healthcare information technology (HIT) web sites,[25-32] or HIT advocacy organizations[33-43] in search of guidelines. Web site review includes reading posted information on the home page seeking sources related to this topic. Alternatively, the primary care provider might use the web site's local search feature (if provided) to access relevant information. Yet others may turn to colleagues for advice on availability of guidelines. For this study, a typical Internet search technique and thorough web site review were applied to locate guidelines. The overall ease or difficulty encountered in using Internet search and reviews of practice specialty web sites is detailed in the results section.

Criteria for Including Guidelines in the Study

The criteria for inclusion is whether the material in the guideline presented a semblance of step by step approach (top level phases) for implementation and has general instructions (activities) that the reader follows to accomplish the implementation. Published journal articles or white papers which provided high level critique of implementation success or failure but lacked the methods approach did not meet these criteria and were excluded.

RESULTS - AVAILABILITY OF GUIDELINES

With so much public discussion on the benefits of using electronic medical records in healthcare and dozens of EMR vendors actively promoting products, this author assumed that locating EMR implementation guidelines would be straight forward. The reality, however, proved to be much different. Initial efforts using common Internet search engines and much iteration of key search terms yielded virtually no immediate results containing actual guidelines. Only after extensive navigation through a multitude of links and deep examination of a wide variety of web sites, did this author finally stumble on guidelines meeting the inclusion criteria. Without persistent and deep review of many web sites, or prior knowledge of web sites which contain healthcare information technology topical information, virtually no guidelines would have been located. The following sections describe in more detail the techniques used, the results of the searches, the ranking based on difficulty to locate guidelines and unmet search expectations.

Two Search Techniques – A Long Journey to Guidelines

The first search technique used included entering a phrase into a standard Internet search engine. The phrase "EMR implementation guideline" was the selected search string. The search results using this phrase related to implementation guidelines were very limited. The majority of the information returned related to EMR vendor products, vendor sites and publications (books). Only one distinct implementation methodology was located[32] within the first forty search engine return results list (search performed 03/08/08). Other permutations of the search phrase were used without noticeable benefit.

The second approach used to locate EMR implementation guidelines assumes that the person performing the search is aware of the broad array of healthcare-specific,

information technology (IT) advocacy or federal government healthcare web sites. Without that prior knowledge, the success rate of locating guidelines would be even lower. Appendix A – Listing of Identified Web Sites, presents the Internet web sites that were located and reviewed in this study. This listing results from review of federal government healthcare web sites such as the U.S. Department of Health & Human Services (HHS) and documenting any relevant referenced web sites. Navigation to the reference web sites provided a rich source of healthcare practice or healthcare IT web site links, which are included in Appendix A. After compilation of the listing, each web site was examined for explicit references to EMR implementation guidelines. If lacking, resident search tools were used to confirm presence or lack of guidelines.

The targeted review of practice specialty web sites had a higher success rate than the general search of the Internet. Searching practice specialty sites yielded two suitable guidelines.[44-45] Review of federal government healthcare web sites ultimately provided identification of two additional guidelines, though with extreme difficulty.[29, 46] Interestingly, review of top tier healthcare IT advocacy web sites,[33-34, 38] did not provide an EMR implementation guideline.

While it is acceptable to say that EMR implementation guidelines are available, it did take prolonged effort to find relevant material with enough substance to give this researcher confidence that EMR implementation material can be considered available.

Compilation of Implementation Guideline Search

The end result of the search efforts using the two techniques provided five EMR implementation guidelines which were substantially sound in approach and have sufficient breadth and depth to merit inclusion in this research.

They include:

- *EHR Adoption* from AAFP Center for Health IT[45]

- *EHR Adoption* from the Centers for Medicare and Medicaid Services (CMS),
  Doctors Office Quality –Information Technology (DOQ-IT)[46]

- *EHR Adoption Roadmap & Tools* from ACP[44]

- *EMR Toolkit* from Health Canada[32]

- *EHR Roadmap* from CMS, Medicare Quality Improvement Community
  (MedQIC).[29]

Any one of these guidelines could prove useful to a primary care practice, provided the

practice were able to locate the guideline in a timely manner and recognize it as a toolset

to facilitate the planning and implementation of the EMR into their practice.

The following section provides greater insight into the ease or difficulty of

locating each of the five guidelines. Specific step by step actions are provided that

convey the path leading to each guideline.

Ranking Availability of Selected Guidelines

The journey to locate each of the five selected guidelines is quite different. In the

following section of this study the pathway to each guideline as well as the relative

difficulty to locate the guideline, is explained.

EMR Toolkit (Health Canada)

This is the only EMR implementation guideline that was located based solely on

use of an Internet search engine. While the other guidelines were accessible by

navigation from specific web sites, this particular guideline was located in the first

several pages of search results displayed and provides a single, direct link to the actual

EMR Toolkit.

EMR Toolkit
Step 1: Starting from the Google® home page http://www.google.com, enter the search string EMR implementation guideline
Step 2: Examine the returned results and locate the EMR Toolkit from Health Canada.

Since the initial Internet search results were less than satisfactory, this author

began a broader search for guidelines by examining several high profile healthcare IT

advocacy web sites, namely the American Medical Informatics Association (AMIA)[34]

and the Health Information Management Systems Society (HIMSS).[38] Thorough

examination of these two web sites provided references to the federal healthcare and

eventually to the practice specialty web sites as listed in Appendix A, where the

remaining four guidelines were discovered. Had the author not known these sites existed,

the search may have been less successful.

EHR Adoption (AAFP)

The EHR Adoption guideline found on the AAFP web site was the next easiest to

locate. The following steps identify actions taken to locate this guideline.

EHR Adoption

Step 1: Starting from the AAFP home page (http://www.aafp.org), navigate to

Step 2: Practice Management, select

Step 3: Center for Health IT, and finally to

Step 4: EHR Adoption.

EHR Adoption Roadmap & Tools (ACP)

The EHR implementation guideline found on the ACP web site were next in

sequence rated for ease of availability. The following steps identify actions taken to

locate this guideline.

EHR Adoption Roadmap & Tools

Step 1: Starting from the ACP home page (http://www.acponline.org), navigate to

Step 2: Running A Practice, select

Step 3: Health Information Technology and finally to

Step 4: EHR Adoption Roadmap & Tools.

EHR Roadmap (MedQIC)

MedQIC is a program sponsored by CMS and chartered to assist primary care

practices as they implement and manage quality improvement within their practice. In

addition, the program is chartered to assist practices as they move into use of EMR technology. The EHR Roadmap provided by the MedQIC initiative web site was the next most difficult guideline to locate.

EHR Roadmap

Step 1: Starting on the Health and Human Services home page (http://www.hhs.gov), to

Step 2: Centers for Medicare & Medicaid (CMS), select

Step 3: Outreach & Education, navigate to

Step 4: Quality of Care Center, choose

Step 5: Quality Initiatives, select

Step 6: MedQIC, navigate to

Step 7: Physicians Offices and finally, select

Step 8: Med QIC EHR Roadmap.

EHR Adoption (DOQ-IT)

The DOQ-IT project is another CMS sponsored initiative. Sadly, one of the best organized and detailed guidelines was the most difficult to locate.

EHR Adoption

Step 1: Starting on the HHS home page (http://www.hhs.gov), to

Step 2: Centers for Medicare & Medicaid, select

Step 3: Medicare, navigate to

Step 4: Physician Focused Quality Initiative, select

Step 5: DOQ-IT which was an inactivated link.

Further searching by this author found that organizations under contract to CMS who service the Quality Improvement Community (QIC) contract use the DOQ-IT framework to support primary care practices in each state. Through reference links from the state QIC contractors[47-48] and from the AAFP Center for Health IT,[45] the link to the QualityNet eLearning Center on the DOQ-IT University[46] is located.

EHR Adoption – Secondary Access Path
Step 1: Starting on the QualityNet eLearning Center (http://elearning.qualitynet.org), to
Step 2: Register for an ID and password, enter both to access
Step 3: Select the Course Catalog Tab
Step 4: Select DOQ-IT University
Step 5: Select Take a Course
Step 6: Select EHR Adoption tab to launch the course.

Navigation to the "EHR Adoption" on the DOQ-IT University web site is a multiple step process and time consuming, especially on the first visit which required registration to fully access the university site. It was not clear whether this site provided the ability to download electronic copies of the full EHR Adoption material for use outside of the training framework.

Unmet Search Expectations – Where Are the Guidelines?

Searching and locating relevant documents on the Internet is so commonplace that experiencing anything less than hundreds or perhaps thousands of search results that are potentially associated with the topic of choice, is uncommon. With thousands of results the expectation is that it would be difficult to eliminate all but a handful of guidelines for study. In this case, only one guideline was found by direct search of the Internet. All

other guidelines were much more difficult to find and none through a direct Internet search. While frustrating for this author, this drives home a strong message that there are not EMR implementation guidelines readily available to anyone, much less a primary care practice which is likely very time constrained just delivering healthcare services. Spending more than a few minutes seeking a guideline would be a non-starter for most practices.

DISCUSSION - AVAILABILITY OF GUIDELINES

Every organization representing healthcare information technology, whether federal government healthcare, healthcare IT advocacy or practice specialty, acknowledged in its site the importance of moving toward use of information technology as a key component for improving healthcare delivery. Many sites included substantial reference material including case studies, white papers, lessons learned presentations, books and peer reviewed journal articles that articulate the successes, failures or challenges of EMR implementation. Also present on some sites were sample guides for selecting EMR systems, including outlines that could be used as the basis for a Request for Proposal or Request for Information from the EMR vendor community. Several sites provided background information on EMR vendors. Fewer still had a consolidated collection of specific materials related to all activities necessary for implementing an EMR in a primary care setting. Those that did offer EMR implementation guidelines provided so much material that a first time reader may be overwhelmed or intimidated by the volume of material.

Review of Findings – Guideline Availability

EMR implementation guidelines are available to the persistent searcher who has prior knowledge of prospective locations to search. Either through a direct Internet search or through navigation of practice specialty or federal government healthcare web sites, guidelines are available. However, without prior knowledge of where to start looking, an uninformed searcher may come up empty handed. Only one guideline was directly available through Internet searching while all others required prior knowledge of healthcare information technology web sites and extensive time to search and locate.

Reference articles on medical informatics related web sites speak to the necessity of implementing EMRs in the primary care setting. However, only a few sites contain substantial information arranged in guideline format. For those sites providing guidelines, substantial secondary information exists such as white papers, case study and a variety of templates which serve different purposes related to implementation activity. EMR implementation guidelines are available via the Internet but at present it takes substantial effort to locate sources with guidelines which contain information of substance.

Guideline Availability – Analysis Limitations

This study did not consider implementation guides available through purchase. Nor did it consider whether the identified top level phases were the most reasonable or logical sequence of steps or actions to be taken. As a result of the first limitation, findings related to availability of guidelines may be skewed. For the second limitation, the choice or sequence of top level phases did not influence the interpretation of findings.

METHODS – CONTENT ANALYSIS OF GUIDELINES

Content Analysis – Relevance, Consistency & Interpretability

The second half of this study performs a content analysis on key words in the selected guidelines. The results of analysis are used to answer the remaining three sub-problems. Information on the basic structure of guidelines is provided along with a description of the approach for performing content analysis in this study. Finally, a description is provided of the scoring methodology and approach used in scoring.

Description of Guideline Structure

Guidelines are presented in different styles depending in part on the complexity of the subject to which the guidelines are applied. For a less complex subject, a simple sequential listing of tasks may prove sufficient. As the subject increases in complexity, grouping similar tasks together under a general heading or phase helps convey the path from start to finish. The Institute of Electrical and Electronic Engineers (IEEE) provides a standard for developing a software life cycle methodology.[49] A portion of the standard is shown in Table 2.0 Project Management Phase & Activity Groups. This illustrates the concept of *Top Level Phase & Activity Level* as a method to logically organize work. Though more formal than the guidelines examined in this study, this example of a structured software life-cycle phase provides a good illustration of hierarchal task organization and activity grouping.

Table 2.0 Project Management Phase & Activity Groups

(1) **Project Management Activity Groups**		
(2) Project Initiation Activities	(2) Project Planning Activities	(2) Project Monitoring and Control Activities
(3) Create SLCP	(3) Plan Evaluations	(3) Manage Risks
(3) Perform Estimations	(3) Plan Configuration Management	(3) Manage the Project

(1) *Top Level Phase* – The highest level of grouping of similar work.
(2) *Activity Level* – More specific grouping of activity supporting the top level phase.
(3) *Detailed Tasks* – Specific, discrete tasks that can be performed.

For implementation guidelines located in this study, the highest level of organization or grouping of work is called the *Top Level Phase*. The secondary grouping is called the *Activity Level*. Detailed tasks below the *Activity Level* in the guidelines are not part of the content analysis.

Content Analysis - Materials & Procedures

Content analysis is a qualitative research method where researchers examine artifacts of social communication and apply an objective coding scheme to assist in drawing inferences from data[50]. Use of the content analysis technique assists in drawing conclusions on similarity or dissimilarity between the selected guidelines related to relevance and consistency.

This research follows the content analysis approach as defined by Kaus Krippendorff[51] by posing the following six questions[51] when evaluating the EMR implementation guidelines: Which data are analyzed? How are they defined? What is the population from which they are drawn? What is the context relative to which data are analyzed? What are the boundaries of analysis? And finally, What is the target of the inferences? Each question, where appropriate, is rephrased to better fit the context of this study. Answers are provided for each of the six questions in the following section.

Which guideline key words are analyzed?

Two types of key words, or phrases are analyzed. First, words which represent

the *Top Level Phases* in each guideline which are presented in Table 3.0 – Top Level

Phase Key Words. All five guidelines and the key words which represent the respective

Top Level Phases are included in this table.

Table 3.0 – Top Level Phase Key Words

AAFP *EHR Adoption*	ACP *EHR Adoption Roadmap & Tools*	MedQIC *EHR Roadmap*	Health Canada *EMR Toolkit*	DOQ-IT *EHR Adoption*
		Recruitment		
Preparation			Getting Started	
	EHR Investigation			
Readiness Assessment[1]		Assessment		Assessment
		Planning		Planning
				Culture Change
Selection	Selection & Purchase	Selection	Selecting An EMR	Vendor Selection
	Installation			
				Operational Redesign
			Preparing for Implementation	
Implementation	Basic Implementation ---------------------- Enhanced Implementation	Implementation	Implementation & Maintenance	Implementation
Maintenance				
		Evaluation ------------------- Improvement	Optimizing Your EMR	Evaluate & Improve
				Care Management

1. Readiness Assessment appears at the center of the diagram for the AAFP guidelines. This author chose this position in the matrix to include this phase.

The phrases or grouping of words used to describe the lower level activity

comprise the second category for analysis. These words describe the actions performed at

the *Activity Level* supporting each *Top Level Phase.* Phrases used in each guideline can

be found in Appendix B – Guidelines, Phases and Activities. The following example is a

subset of two guidelines showing both the *Top Level Phase* and associated *Activity Level*

phrases.

AAFP *EHR Adoption:*
- **Preparation** *(Top Level Phase)*
  - Find a Doctor Like Me in a Practice Like Mine *(Activity Level)*
  - EHR 101 Introduction to EHRs *(Activity Level)*
  - EHR 120 Understanding Features & Functions. *(Activity Level)*

ACP *EHR Adoption Roadmap & Tools:*
- **EHR Investigation** *(Top Level Phase)*
  - EMR: A Guide for Clinicians & Administrators *(Activity Level)*
  - EHR 101: A Beginner's Guide to EMRs *(Activity Level)*
  - EHRs Fix Everything & Nine Other Myths. *(Activity Level)*

How are the key words and phrases defined?

Top Level Phases, for each guideline are typically represented by one to three

words. When the key words between guidelines are similar (selection or selecting) this

author grouped them together for definition purposes. The definitions provided are

derived from reading the guideline material and extrapolating a concise statement that

best represents the meaning of the key word or phrase. Definitions for *Top Level Phases*

are provided in Appendix C – Top Level Phase Key Word & Definition and for *Activity*

Level Phrases, Appendix D – Activity Level Phrases & Definition.

What is the population from which key words or phrases are drawn?

The study population in this case is comprised of the five guidelines discovered as

a result of the availability analysis. From each of the guidelines, all of *Top Level Phases*

and a portion of the *Activity Level Phrases* were identified for use in the content analysis

portion of this study.

What is the context relative to which key words and phrases are analyzed?

The context relative to the analysis is how relevant are the selected guidelines as they relate to an actual implementation that would take place in a primary care setting, how consistent are the guidelines when comparing one to another and finally, how interpretable are the guidelines. In general, the context relates to the usefulness of the guidelines for successful implementation of EMR systems in a primary care setting.

What are the boundaries of analysis?

The analyses are limited to the key words in the *Top Level Phases* and selected *Activity Level Phrases* associated with subordinate activities in each of the five study guidelines. Because of the extensive number of *Activity Level Phrases,* a limited subset was included in the analysis.

What is the target of the inferences?

The target of the inferences from this content analysis is the primary care practice leadership team or decision body. Ultimately it is the primary care practice seeking to implement an EMR who would benefit from the results of this analysis, whether it confirms existing guidelines or identifies areas for guideline improvement. The conclusion sought from this analysis is how well any particular guideline serves the practice in successful implementation of an EMR.

Scoring Methodology – Content Analysis

The objective scoring methodology used in the content analysis of the *Top Level Phases* is based on the presence or absence of the predominate key words that appear in the *Top Level Phases* of each guideline. For example, "Implementation" is a key word

that is present in all five of the guideline's *Top Level Phases*. A score of 5/5 is assigned to this key word. "Planning" is present in only two of five guidelines and is assigned a score of 2/5.

The objective scoring methodology used for the *Activity Level Phrases* is similar, using single words or phrases. For example, the phrase "Readiness Assessment" appears in the *Activity Level* details in four of five guidelines, scoring a 4/5.

For synonyms or phrases that were determined to be representing the same activity or action, points were given to each guideline for the synonym or phrase. For example, there were two guidelines using the word "Selection" when referring to the process for choosing an EMR product. The three remaining guidelines represented this same activity by using the phrase "Selection & Purchase", "Selecting and EMR" or "Vendor Selection". The resulting content analysis score was 5/5 as all five guidelines made reference to activity associated with selecting an EMR.

RESULTS - CONTENT ANALYSIS OF GUIDELINES

In the following section, the results of content analysis are presented for the two discrete groups: *Top Level Phase* and *Activity Level Phrases*. For phrases that were similar, scores have been combined into a group score for purposes of data analysis.

Top Level Phase Data – Content Analysis Findings

There are a total of twenty-eight phases across all five guidelines. In one instance (DOQ-IT) there were three phases that appeared to be grouped together but lacked an overarching title. For this study, these were treated as individual phases. Table 4.0 – Top Level Phase Scores presents the scores assigned to each key word in the *Top Level Phases* of the five guidelines. Results are presented in rank order of score.

Table 4.0 – Top Level Phase Scores

Key Word	Score
Selection(2), Selection & Purchase, Selecting an EMR or Vendor Selection	5/5
Implementation(2), Basic Implementation, Enhanced Implementation, Implementation Evaluation Improvement or Implementation & Maintenance	$5/5^1$
Assessment(2), Readiness Assessment	3/5
Planning(2)	2/5
Maintenance or Implementation & Maintenance	$2/5^2$
Optimize Your EHR	1/5
Evaluate & Improve	1/5
Preparation	1/5
Getting Started	1/5
EHR Investigation	1/5
Recruitment	$1/5^3$
Preparing for Implementation	1/5
Operational Redesign	1/5
Care Management	1/5
Culture Change	1/5

1) One guideline included two phases related to implementation. For scoring purposes they were counted as one.
2) Implementation & Maintenance was counted once for implementation and once for maintenance.
3) MedQIC organizational objective is to recruit primary care practices which are candidates for EMR implementation. This phase may be unique to this organization.

Activity Level Data - Content Analysis Findings

Table 5.0 Activity Level Phrase Scores presents selected phrases associated with each guideline and the score assigned based on frequency of appearance across all five guidelines. Due to the large number of activity level phrases, scoring is done only on the following subset. Results are listed in rank order of score.

Table 5.0 – Activity Level Phrase Scores

Key Activity or Phrase	Score	Group Score
Selection Checklist	1/5	
Selection Criteria	3/5	5/5
Selection Tool	1/5	
Return On Investment	1/5	
Cost Benefit	1/5	4/5
Payback Calculator	1/5	
Cost Savings	1/5	
Readiness Assessment	4/5	n/a
Practice Workflow Redesign	1/5	
Workflow Redesign	1/5	3/5
Operational Workflow Redesign	1/5	
Contract Negotiations	2/5	3/5
Contracting	1/5	
Implementation Plan	3/5	n/a
Practice Improvement	3/5	n/a
Request for Proposal	1/5	2/5
Request for Information	1/5	
EMR or EHR Introduction	2/5	n/a
Software	2/5	n/a
Implementation Checklist	2/5	n/a
Quality Improvement	2/5	n/a
Workflow	2/5	n/a
Hardware	1/5	n/a
Project Plan	1/5	n/a
Project Management	1/5	n/a
Acceptance Testing	1/5	n/a
Security Guidelines	1/5	n/a
Data Quality	1/5	n/a
Network	0/5	n/a
Training	0/5	n/a

DISCUSSION - CONTENT ANALYSIS OF GUIDELINES

Content Analysis Results - Consistency, Relevancy & Interpretability

The results of content analysis are compared to the research question sub-problems where consistency, relevancy, and interpretability are the key focal points. Only one sub-problem, consistency, was measurable using the results of content analysis. Relevancy and interpretability did not align with the results.

Consistency – Mixed Results & Misguided Significance

Content analysis of the *Top Level Phases* indicates that the phases related to a) selecting the EMR product and b) implementation, score the highest. Both are present in all five guidelines (score 5/5). The phase related to assessing the practice in terms of its state of readiness for making a change to an EMR is present in three of five guidelines (3/5). The phases related to a) planning and b) maintenance receives the lowest group score (2/5). Finally, ten of twenty-eight *Top Level Phases* are unique. Results indicate a medium to low degree of consistency between *Top Level Phases* when comparing one guideline to the others.

Content analysis of the *Activity Level Phrases* indicates that activities associated with selecting the EMR product has the highest score (5/5). This aligns with the findings from the *Top Level Phases* analysis. The second highest ranking for phrases is attributed to a) financial considerations and b) readiness assessment characteristics, each with a composite score of 4/5. Knowing if the practice is ready to make the complex transition from paper based records to an EMR is a reasonable consideration. As well, the financial impact to the practice is a valid concern. Phrases which scored at the mid point (3/5) are

a) workflow redesign, b) contracting, c) practice improvement and d) implementation plans. At or near the bottom of the scoring are many of the technical components, including software, hardware and security. Fifteen of thirty activity level phrases earned a score of two or less. Overall, the content analysis scoring related to consistency across the *Activity Level Phrases* is on par with the scoring of the *Top Level Phases*.

If using the frequency of occurrence of key words in the *Top Level* is a valid method for assigning importance, then selecting the EMR product and implementation are the two most important actions a primary care provider can take. This conclusion may disregard or give less importance to other equally important aspects of implementation including a broad range of technical considerations such as hardware, network, security, interoperability or continuity of operations.

Often it makes sense to find multiple sources of information and compare, allowing the reader to reach a conclusion on the validity of the material. In this case, the consistency in approach is not apparent between guidelines, presenting conflicting messages to the ill informed and technically challenged practice leader. For example, the AAFP EHR Adoption guideline has "Preparation" as the first *Top Level Phase* whereas DOQ-IT EHR Adoption identifies "Assessment" in the same position. Without extensive background knowledge on what comprises these phases, it is difficult to judge whether one guideline is more appropriate than the other. Content analysis scores of the top level phases support this evaluation with less than half of the top level phases aligning.

Relevancy – Do Guidelines Serve the Primary Care Provider?

This author was not able to draw conclusions related to the relevancy of guidelines using the results of the content analysis scoring. Thus, the author provides the following hypothesis related to relevancy of guidelines after extensive review of the collected information.

Relevancy describes how well a guideline is designed to serve the primary care provider. All five guidelines were expressly written and prepared for the primary care setting. Detailed activities provide education on topics not familiar to a primary care practice, samples, templates and other artifacts specifically designed to support the planning or decision making of the practice. Unfortunately, all evaluated guidelines tended to emphasis business functions or EMR functional components related to implementing an EMR and neglected to provide equal or greater focus on the technical aspects of such an implementation. Not withstanding the potential risks associated with the perceived imbalance in focus, the guidelines are clearly focused on the primary care setting and receive a high relevancy rating.

Interpretability – Are Guidelines Helpful?

Content analysis results did not provide insight into the interpretability of the guidelines. "Interpretable" refers to how well the material comprising the guideline is written and organized. Are the guidelines and supporting documentation written in a manner that a primary care practice leader would be able to understand and make critical decisions related to the implementation? Or, would the guideline suggest that an information technology consultant or vendor is required in order to translate and act on the information.

In assessing the interpretability of a guideline, this author considered the breadth and depth of the guideline. Breadth refers to providing a rational methodology or series of top level phases that describe the grouping of work that must be performed, similar to a software development life cycle. Depth refers to providing supporting information for each of the *Top Level Phases* in sufficient detail that the work represented by the phase can be performed.

Each of the guidelines analyzed in this study had a reasonable number of *Top Level Phases*, ranging from five to eight . It can be hypothesized that, based strictly on the number of phases, all five guidelines are highly interpretable at the top level of organizational structure. However, when examining the total number of subordinate activity underlying each *Top Level Phase,* the ability to properly interpret the main message or primary steps becomes much less clear. At the activity level, the total number of phrases associated with each guideline differs dramatically as represented, below:

- *EHR Adoption* from AAFP Center for Health IT – 16 activities

- *EHR Adoption* from CMS, DOQ-IT – 26 activities

- *EHR Adoption Roadmap & Tools* from ACP – 33 activities

- *EMR Toolkit* from Health Canada – 57 activities

- *EHR Roadmap* from CMS, MedQIC – 126 activities.

With activities ranging in number from 16 to 126 across all five guidelines, this author hypothesises that guidelines at the activity level have very low interpretability, and leave much to the discretion of the reader. Voluntary choice of which activity to perform may have a negative effect on the overall outcome of the EMR implementation.

Another interpretability factor is whether a guideline provides a picture, or a graphical representation of the process flow from the initial steps to the concluding

actions of implementation. Only three of the five (AAFP EHR Adoption, DOQ-IT EHR Adoption, Health Canada EMR Toolkit) presented information graphically, in a logical flow diagram. The two remaining guidelines left it to the reader to visualize the overarching implementation strategy. As a result, the interpretability based on this factor is medium.

Also of importance is whether a guideline provides an executive summary, or some type of document that compactly describes the most important actions that must be completed in order to fully implement an EMR. None of the five guidelines provided a condensed, summary view of the major phases or key subordinate activities which would serve as an executive level guide of the implementation process. Based on this factor, it is reasonable to hypothesie that the guidelines have low interpretability.

Finally, examining the writing style (clinical, technical or general), all five guidelines are written at a general level that could be understood by either a non-technical or a non-clinical person. Considering the writing style, it is reasonable to hypothesie that the guidelines are highly interpretable.

The overall interpretability of the guidelines assessed in this study, considering the five factors discussed above, is medium interpretability. However, while the guidelines may be interpretable, this analysis does not reach conclusions on whether the right actions or the right sequence of events have been identified by any of the guidelines examined.

Description of Patterns that the Data Reflect

Overall, data analysis of key words and phrases in the selected guidelines indicate a pattern where the greatest emphasis appears focused on the business functions related to

EMR implementation. These include selection of the EMR product and the actions related to the physical implementation of the EMR product. Little energy is directed toward a comprehensive technical evaluation including hardware platform engineering, system and data security, interoperability or continuity of operations. There appears to be a tendency to provide as much information as possible, including case studies, templates, examples and other material that implies a voluntary versus a directive approach to implementation, suggesting a structural weakness in the guidelines. Also, there appears to be no clear mandate on the absolute minimum business, functional or technical requirements that must be addressed in order to achieve even a minimum degree of success in an implementation. Finally, inconsistent alignment of lower level activities to top level phases indicates lack of a mature, stable methodology for implementation.

SUMMARY & CONCLUSIONS

Review of Findings

EMR implementation guidelines are available to the persistent searcher, either by direct Internet search or through navigation of practice specialty or federal government healthcare related web sites. However, without prior knowledge of where to start looking, the guidelines are not readily available to the uninformed.

Each guideline presents its own concept of a logical work sequence and provides substantial supporting information in lower level activity documentation. However, there is little similarity between guidelines, indicating a lack of maturity or standardization. In addition, there is imbalance with greater emphasis placed on business functions and actions versus the technology aspects of implementation.

Grouping of subordinate activity is inconsistent and varies widely between guidelines. This inconsistency potentially creates confusion or lack of clear direction. Strong business emphasis is also prevalent in the subordinate activity at the expense of a broader focus on key technological components for implementation.

Guidelines are written in non technical and clinical language but lack an executive summary or quick reference view of key actions. Also, the large volume of information provided in each guideline indicates a voluntary versus directive approach. The result of following a less directive approach may impede the attainment of a consistent, reliable and stable end state. Finally, inconsistent organization and volume of information may present a challenge to time constrained practices.

Development of a uniform, standards based EMR implementation protocol and promoting wide distribution and adoption will benefit the primary care community.

Limitations

This study was performed over a three month period and conclusions drawn are the subjective interpretation of this author only. Further, there was no pilot development created to validate the methods. Given time, a more exhaustive search for and acquisition of (purchased) additional guidelines would have been beneficial. Additionally, the content analysis study validity is based on a time limited evaluation of the five subject guidelines and would benefit from a more robust and deeper analysis of all characteristics of each guideline. Content analysis did not yield solid results for two of four sub-problems. Other analytical or evaluative techniques may provide further insight in this area.

Implications

Lacking a readily available and standard implementation guideline for use as a reference guide or to validate processes executed by an EMR vendor may place primary care practices at a disadvantage when implementing an EMR. Considering the complexity, risk and expense of this type of transition, primary care practices would be well served by a uniform, standard implementation protocol.

Future Research

Determining success or failure of EMR implementations using the selected guidelines may yield valuable insight into structural or organizational aspects of guidelines. Evaluation of post implementation technical performance, including system response time, system availability, security and disaster recovery capabilities may confirm expansion of the technical aspects for implementation. Consideration should be given to establishment of a uniform, standard implementation protocol hosted in an

environment where lessons learned or suggestions to iteratively improve the protocol are integrated. This environment should be made widely available to promote broad use of a standard implementation protocol.

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Appendix A – Listing of Identified Web Sites

Organization	Universal Reference Locator (URL)
American Academy of Family Physicians (AAFP)	http://www.aafp.org
American Academy of Pediatrics (AAP)	http://www.aap.org
Academic Pediatric Association	http://www.ambpeds.org
American Health Information Management	http://www.ahima.org
American Medical Association (AMA)	http://www.ama-assn.org
American College of Physicians (ACP)	http://www.acponline.org
Association of American Medical Colleges	http://www.aamc.org
Agency for Healthcare Research & Quality	http://www.ahrq.gov
Bureau of Primary Healthcare	http://www.bphc.hrsa.gov
Bridges to Excellence	http://www.bridgestoexcellence.org
Center for Health IT	http://www.centerforhit.org
California HealthCare Foundation (CHCF)	http://www.chcf.org
Centers for Medicare & Medicaid Services (CMS)	http://www.cms.hhs.gov
Doctors Office Quality – Information Technology. Medicare Quality Improvement Community	http://www.medqic.org
Health Information & Management Systems	http://www.himss.org
Health Resources Services Administration	http://www.hrsa.gov/healthit
High Performance Physicians Institute	http://www.highperformancephysician.com
Institute for Healthcare Improvement (IHI)	http://www.ihi.org
National Alliance for Health Information	http://www.nahit.org
North American Primary Care Research Group	http://www.napcrg.org
Physician Focused Quality Initiative	http://www.cms.hhs.gov/PhysicianFocusedQualInits/05_PFQIDOQ.asp
Physicians EHR Coalition	http://www.pehrc.org
Primary Care Informatics Working Group, American Medical Informatics Association	http://www.pciwg.amia.org
Society of General Internal Medicine (SGIM)	http://www.sgim.org
Society of Teachers of Family Medicine (STFM)	http://www.stfm.org
Virginia Health Quality Center	http://www.vhqc.org
The Leapfrog Group	http://www.leapfroggroup.org
Health Canada EMR Toolkit	http://www.emrtoolkit.ca

Appendix B – Guidelines, Phases and Activities

AAFP – *EHR Adoption*	
Top Level Phase	**Activity**
Preparation	- Find a Doctor Like Me in a Practice Like Mine - EHR 101 Introduction to EHRs - EHR 120 Understanding Features & Functions - EHR 130 Free & Open Source SW - Implementation 101 Things to Think About Before You Start
Selection	- Physician Product Reviewer – Find a Doctor Like Me in a Practice Like Mine - EHR 110 Understanding EHR Contracting & Pricing - EHR 301 How to Select the Right EHR for Your Practice - Readiness Assessment
Implementation	- EHR 120 Understanding Features & Functions - Hardware 101 The Basics - Implementation Tutorials - It Can Be Done. Seven Successful Implementations
Maintenance	- Peer Community (networking) - Events (discussions)
Readiness Assessment	- What Step Am I In?

ACP - *EHR Adoption Roadmap & Tools*	
Top Level Phase	**Activity**
EHR Investigation	- EMR: A Guide for Clinicians & Administrators - EHR 101: A Beginner's Guide to EMRs - EHRs Fix Everything & Nine Other Myths - Case Study Reports - Practice Assessment Tool - Payback Calculators
Selection & Purchase	- Selecting an EMR System - EHR System Selection Check List - Vendor Questionnaire - Vendor Evaluation Matrix - Certified EHRs - Product Selection & Rating Services - Master Quotation - EMR 201: Financing an EMR
Installation	- Advance Planning & Workflow Analysis - Life After Go-Live Part 1 - Installation Planning - Critical Success Factors for Practice Wide EMR implementations - Pre-Implementation Survey - The Electronic Medical Record - Implementation Check List - Common Implementation Problems, Barriers, & Solutions - Case Study: Greenhouse Internists
Basic Implementation	- Life After Go-Live Part 2 - Life After Go-Live Part 3

ACP - *EHR Adoption Roadmap & Tools*	
Top Level Phase	**Activity**
	- Workflow Mapping & Basic Flowcharting symbols
	- Case Study: Evans Medical Group
Enhanced Implementation	- Using EHR to Improve the Practice
	- Boosting Productivity Using Voice Recognition SW
	- Life After Go-Live Part 4
	- Practice Improvement Value Chain
	- Quality Improvement, Pay-for-Performance & Practice Redesign
	- Case Study: Murray Hill Medical group

MedQIC - *EHR Roadmap*	
Top Level Phase	**Activity**
Recruitment	- Efficiencies & Practice Performance Improvement
	- EHR Adoption: A Barrier Analysis
	- EHR Selection Tools
	- Vendor Request for Information
	(Eleven other tools listed)
Assessment	- Computer Knowledge Evaluation Tool
	- EHR Estimated Cost Savings
	- EHR Readiness Assessment
	- Implementation Timeline Template
	- Know Your Processes
	- Practice Readiness Assessment
	- Transition Readiness Assessment
	(Sixteen other tools listed)
Planning	-DOQ-IT EHR Operational Redesign Workbook
	- EHR Goal Setting
	- EHR Required Characteristics
	- Planning Timeline Template
	- Project Team Role & Responsibility Matrix
	- Request for Proposal
	- Return on Investment
	(Eight other tools listed)
Selection	- Agreement Examples
	- CCHIT Certified Products by Company
	- Contracting Guidelines
	- EHR Selection Tools
	- Sample Request for Proposal
	- Vendor Evaluation Matrix
	- Vendor Selection Tool
	(Thirteen other tools listed)
Implementation	- EHR Implementation Checklist
	- Go Live Planning Checklist
	- Implementation Plan Template
	- System Implementation Problems
	- The Implementation Process
	(Four other tools listed)
Evaluation	- Care Model Change Package
	- EHR Post-Live Evaluation Tool

MedQIC - *EHR Roadmap*	
Top Level Phase	**Activity**
	- Mapping Clinical Decision Support Goals - Post EHR Implementation Assessment - Practice Improvement Digest - Provider & Staff Satisfaction Survey (Twenty-nine other tools listed)
Improvement	- EHR in the Exam Room - Healthcare Decision Support Systems - Huddles

Health Canada - *EMR Toolkit*	
Top Level Phase	**Activity**
Getting Started	- Benefits of Adopting and EMR - Challenges of Adopting and EMR - Building an IT Business Case - IT Business Case Template - Cost/Benefit Worksheet - Practice Needs Analysis Templates - Automation Readiness Assessment - Readiness Assessment for Large Practices - Records Management - IT Budget Template - Toward a Technology-Enabled Practice
Selecting an EMR	- Key EMR Requirements - Vendor Checklist - RFP Template - Vendor Test Script - Question list for Vendors - Buyer's Guide Template - Assessing Products & Vendors - EMR Cost Comparison Template - Scope of Work Document - Contract Negotiations
Preparing for Implementation	- EMR implementation Work Plan - Project Planning & Implementation Guide - Human Aspects of Change - Practice Workflow Redesign - Basic Computer Skills Tutorial - Clinic Privacy & Security Guidelines - Information Management Guidelines - System Management Guidelines (Sixteen other tools listed)
Implementation & Maintenance	- Implementation Acceptance Testing - Records Management Guide - Overview of Data Quality - Overview of Data Entry Guidelines - Deriving Structured Data & Adding Clinical Value
Optimizing Your EMR	- Working With Groups - Post Implementation Review Research Project

Health Canada - *EMR Toolkit*	
Top Level Phase	**Activity**
	- Assessing Your Practice: The Green Book - EHRs in the Exam Room: Tips on Patient Centered Care - The Model for Improvement - Sample Measures for Improvement in Primary Health Care - QI Basics for Chronic Disease Management

DOQ-IT - *EHR Adoption*	
Top Level Phase	**Activity**
Assessment	- Are you ready for an EHR? - Developing a Project Charter - Budgeting for Your EHR - Creating a Project Team
Planning	- Principles of Project Management - Create a Project Plan - Developing an Implementation Model - Criteria for Successful Implementation
Culture Change	- Culture Change Process & Tools
Vendor Selection	- Introduction to Vendor Selection - Contracting & Negotiation - Technology Applications - Return On Investment
Operational Redesign	- Preparing for Operational Redesign - Process Redesign Description & Tools - Patient Flow - Point of Care Documentation - Document Management - Office Communications - Getting Ready for Care Management
Implementation	- Implementation Process - Setting up the EHR to Support Care Management
Evaluate & Improve	- Evaluation Strategies - EHR Optimization
Care Management	- Patient Self Management - Creating a Team & Supportive Physical Environment - CDS – Clinical Decision Support

Appendix C – Top Level Phase Key Word & Definition

Key Word	Definition
Selection or Selecting	Referring to the process of choosing the EMR product.
Implementation	Refers to the steps and actions necessary to put the EMR physically into place and achieve the startup use for this tool. This includes any pre-loading of information into the EMR.
Assessment	In the top level phase assessment refers to the general evaluation of the practice as it relates to its readiness to transition from paper to an EMR system.
Planning	In general refers to the planning steps and activity the practice would need to consider in order to complete the entire process of implementing an EMR.
Evaluation or Evaluate	Referring to the process of determining how the practice is performing after the EMR product is installed and operational.
Maintaining or Maintenance	Represents the actions taken by the practice to both keep the EMR and practice operational or managing changes to the EMR after going live.
Enhance or Optimize	Referring to what steps a practice may take after implementation to improve the overall operations of the practice.
Improve or Improvement	Similar to the previous definition where the practice would identify actions or steps after the EMR is implemented that may lead to practice improvement.

Appendix D – Activity Level Phrases & Definition

Key Activity or Phrase	Definition
EMR or EHR Introduction	Generally referring to introduction to what an EMR does, how it will influence the practice and information on information technology.
Readiness Assessment	Assessment activity including what state of mind the practice is in to make a change from paper records, assessment of the current technology in the practice and/or any assessing the understanding of business impact or preparation and planning activities.
Workflow	Activity focusing on documenting current practice workflow and understanding what changes will be made as a result of the EMR. Preparation for change.
Hardware	Activity determining what the hardware implications of the EMR will be to the practice. Whether to host the application internally or contract for external services. Assessing currency of existing technology.
Software	Understanding what other software systems support the practice and what/how integration will be necessary with the EMR. Specifically links to external services such as lab, pharmacy and payor.
Network	Assessing or understanding the practice existing internal or external network capacity to determine sufficiency to support the additional traffic of the EMR.
Project Plan	Processes for establishing a comprehensive project plan that would drive the implementation activity.
Project Management	Defining the team of participants, especially focusing on roles and responsibilities of all the players. How to execute an implementation according to a plan.
Practice Workflow Redesign Workflow Redesign Operational Workflow Redesign	All activity associated with understanding, planning, designing and implementing changes in the practice workflow as a result of the EMR implementation.
Implementation Plan	Establishment of a comprehensive implementation plan to assist in the coordination of activities and participants during the actual implementation of the EMR product.
Selection Checklist Selection Criteria Selection Tool	Defining the process, steps and actions needed to competently select an EMR product for the practice.

Key Activity or Phrase	Definition
Return On Investment Cost Benefit Payback Calculator Cost Savings	This activity covers the financial analysis that supports the business decision to proceed with implementation of an EMR.
Request for Proposal Request for Information	Activities include presentation of sample RFP/RFI and how to use these solicitation tools in the vendor selection process.
Contract Negotiations Contracting	General strategy for conducting contract negotiations and the formal contracting process with the EMR vendor. Additional advice related to determining what the vendor will provide beyond just product, licensing, maintenance, upgrades etc.
Implementation Checklist	Activity includes providing a template checklist to help guide the practice through all the steps and activity during implementation.
Acceptance Testing	Defining acceptance testing criteria and performance of the testing during the implementation activities.
Training	Defining the training needs of the practice such as front office staff, nursing, clinicians and information technology staff. Timing and sequencing of training as it relates to implementation and go-live activity.
Security Guidelines	Providing information related to system and data security in the context of the practice. What should be considered such that the practice can maintain a strong security profile and compliance with HIPAA regulations.
Quality Improvement	Activities which focus on improving the quality of care through use of the EMR.
Practice Improvement	Activities which examine how the EMR and associated systems can streamline parts of the practice which are less efficient.
Data Quality	Activity related to establishing the use of standards in data such that decision support components might be introduced.

PSC #	Name	Req #	PO #	Status	Dates	Orig Amt	Billed to Date
2008-1431	Assad Awan	5400823	1323490	Open		3000	0
2008-0348	John Armbrust	5353146	1277714	Open		1000	500
	Brittany Burda	5409665	1318439	Open		10000	3010
2007-0226	Thomas Bodenheimer	5325086	1266027	Open		10000	4000
	Berlitz Language Center		1311717	Open		1764	0
2007-0225	Lawrence Casalino		1266020	Open		10000	0
	Ruth Chapin	5353145	1277716	Open		2000	0
2008-122?	Jim Carpenter	5400821	1312231	Open		10000	3000
	Steven Counsell	5401292					
2008-0277	Tracy Dana	5346993 / 5393069	1275608 / 1304762	Open		8870	4335
2007-0167	Janet Dailey	5347069 / 5393787	1238026 / 1308213	Open		2475	315
2008-0081	Gerald Gartlehner	5336873 / 5422309	1270861 / 1328941	Open / Closed	1/1/07-6/30/09	12000	1920
	Richard Hansen	5336880 / 5422310	1271130 / 1328914	Open / Open	1/1/07-6/30/07	12000 / 600	256
	HealthInsight Inc (Steven Donn)		1266570	Open		2282	1674
2007-0188	Marcy Jacobs		1240363	Open		6000	3495
	Daniel Jonas	5336881	1279521	Open	1/1/07-6/30/09	12000	0
2004-0069	Catherine Kelley		975738	Open		1000	400
	Galina Kogan	5358741	1284760				
	Maggie Lynch						
2008-0350	Laura Morgan	5347241 / 5393791	1277717 / 1308211	Open		2370	630
2007-0147	Arkady Mak	5393784	1308219	Open		885	260
	David Meier						
	Susan Parker	5327017					

	Ed Reid		1117378	open		3000	2520
	Research Info. Svc. (Pat Bunyard)		1307927	Open		600	135
	Scholar One		1322725	Open		8177.50	5794.37
2007-0168	Dana Selover	5347068 5378000 5393788 5396334	1237911 1302818	Open		8000	1945
2007-0052	Dean Sittig / Kaiser	5361827	1231402				
	Spry Learning Co.	5387926					
2007-0225 2007-0227	Cheryl Schraeder	5325087	1267698	Open		10000	0
2007-0229	Strategic Communications	5325697	1268856	Open		40000	20764
2008-0221	Patricia Thieda	5403028 5347252	1274237	Open		3000	500
	Univ. of CT	540082					
2005-0514	Charlotte Woodard	5356522	1117839				
2007-0228	Adam Wilcox	5325088	1280567	Open		10000	1885