

“Bridge to CPOE” Using Standardized Electronic Clinical Order Sets

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Abstract

The American Recovery and Reinvestment Act of 2009 includes legislature promoting the use of EHRs under the HITECH Act. As “meaningful use” criteria are refined, many organizations are pressured to achieve CPOE functionality, a feature that most U.S. healthcare institutions do not currently have. Realizing that CPOE may be several years away for their own institutions, St. Vincent Health in Indianapolis, Indiana, has designed and executed a unique approach to engage this problem by using a “Bridge to CPOE” strategy. This strategy depends heavily on using standardized clinical order sets in an electronic format. In this paper we describe the processes and methods used by this organization to engage its constituents in developing these standardized electronic clinical order sets, and an easily accessible online delivery mechanism for providers. The successful execution and lessons learned may have potential usefulness to other organizations trying to meet “meaningful use” criteria by 2011.

Introduction

The debate over “meaningful use” criteria for EHR implementation and adoption challenges continue as organizations scramble to qualify for stimulus reimbursement by 2011.(1) One specific area which has caused some consternation is that of Computerized Physician Order Entry (CPOE) functionality and adoption. The majority of healthcare institutions in the United States still do not have CPOE, with recent studies indicating that overall implementation rates are less than 20%. (2) Implementations involving CPOE can take up to several years (3), potentially making the availability and usage of CPOE for many institutions difficult

to accomplish by 2011 when reimbursements through the HITECH legislature are set to begin. In 2009, St. Vincent Health, an 18 acute care-hospital system in Indianapolis, Indiana, and a ministry of its larger parent organization Ascension Health, recognized these challenges and proceeded to take a unique approach to prepare their organization for widespread CPOE use while work continued on their Electronic Medical Record (EMR) and CPOE implementations. Realizing that full CPOE functionality was several years away at best, they chose to concurrently strategize their efforts in designing a solution to bridge their organization’s providers to CPOE.

This “Bridge to CPOE” strategy ultimately relied on the utilization of standardized clinical order sets in electronic format. Previous studies have justified the use of standardized order sets: They have been shown to decrease mortality, decrease hospital resource use, and improve core measures compliance for community-acquired pneumonia (4), improve treatment rates with appropriate medications and time to treat for acute myocardial infarction (5), and result in significant reduction on morbidity, mortality, and resource consumption for severe sepsis and septic shock (6). Recognizing the value of standardized order sets, St. Vincent Health chose to implement online electronic versions of standardized clinical order sets as their bridging strategy to CPOE, revealing a viable and timely intermediary to 2011 “meaningful use.” This paper will focus on the steps taken to achieve organizational engagement in the development process of standardized electronic clinical order sets at St. Vincent Health, including a discussion of the lessons learned from the experience.

Methods

As a starting point, the Chief Medical Informatics Officer (CMIO) of St. Vincent Health assembled a 24-person order set development team under his direction. Members of the team were chosen for their specialized knowledge, experience, and ability to commit time to the build process. The team was instructed to meet on a weekly basis in person; the possibility of having online meetings was discussed but ultimately rejected to maintain accountability and increase collaboration between members. This order set build team finally consisted of 10 nurses, 10 physicians, 3 pharmacists, and 1 dedicated coordinator.

The order set development team was first tasked to analyze the existing environment of the St. Vincent Health system. Through their analysis they discovered exceedingly numerous paper order sets, protocols, and consent forms, scattered throughout the 18 acute care sites in the St. Vincent Health system. Many of these forms were copies of copies, many were outdated and lacked evidence, and most hadn't been revised in years.

A brief analysis was done to narrow down the top 85 percent of St. Vincent Health Diagnosis-related group (DRG) codes, which are typically used by Medicare to determine hospital reimbursement. Using these top DRG codes as a starting point, an algorithm was established to remove the redundancy of the order sets: similar order sets were merged, and where possible, existing Ascension Health order set content was utilized as a reference point.

Once this collation process was completed, the order set development team was left with a usable collection of paper format clinical order sets to build from. The team was tasked to build the content of these paper order sets electronically using a tool by Zynx Health (7) called "AuthorSpace". Zynx Health specializes in evidence-based order set content and this content was utilized heavily during the development phase.

After building the content of these clinical order sets in AuthorSpace, these initial sets were then distributed online to an extended network of subject matter experts consisting of physicians and pharmacists from the 18 acute care sites in the St. Vincent Health system. These expert reviewers were tasked to give feedback on the content of the order sets. The review process was achieved in a complete virtual environment using a separate collaborative tool by Zynx Health called "ViewSpace". In ViewSpace, clinical expert reviewers were able to scan the content of order sets and make comments in a shared collaborative online environment. During and after the review process, the original order set development team continued to revise the content of the order sets until all refinements were finalized and consensus reached. The end result was the development of standardized electronic clinical order sets that were subsequently deployed to appropriate institutions in the St. Vincent Health system.

Results

The initial analysis by the order set build team revealed over 1000 discoverable paper order sets, 450 paper protocols, and 200 consent forms, collected from the 18 hospitals comprising the

St. Vincent Health system. After collating and applying the merging algorithms and refining initial content, the team was left with approximately 170 clinical order sets, 55 protocols, and 80 consent forms. The team built these 170 order sets in Zynx AuthorSpace and collaborated with an extended network of expert reviewers using Zynx ViewSpace to revise and finalize the content in these sets. The review of these 170 clinical order sets in this fashion was ultimately deemed successful, with over 5500 comments generated by clinical reviewers during a six-month period, the most ever to date by a Zynx Health client.

The success of the standardized electronic clinical order sets development also led to a partnership between St. Vincent Health and Zanett Healthcare (8) to develop a solution that functioned as a delivery mechanism for the electronic order set content. This solution featured a web-based delivery medium for the content, an advantageous characteristic for deploying it to hospitals without existing EMRs.

Further attention was received by St. Vincent Health's national parent organization, Ascension Health. Ascension Health expressed interest in using the processes and strategies developed by St. Vincent Health to create a model by which other ministries within Ascension Health could follow. This instigated the creation of a toolkit, developed by one of the authors in collaboration with core members of the order set development team. The toolkit consisted of two major parts. The first part was a formulaic tool which used evidence from previous studies to illustrate the potential return on investment from using evidence-based standardized

order sets. This part emphasized the cost savings resulting from decreased adverse drug events and improved reimbursement rates from demonstrating higher quality of care as defined by CMS. The second part of the toolkit involved the composition of a detailed document which essentially served as a project manager's guide to developing standardized electronic clinical order sets, including important safeguards to ensure organizational engagement. We next describe the two-part toolkit in more detail.

Toolkit for Standardized Electronic Clinical Order Set Development

To help convince hospital management on the advantage of order sets, research on using evidence-based standardized order sets was incorporated to devise the first part of the Ascension Health toolkit. This part of the toolkit approximated increases in reimbursements based on a hospital's discharge volume for specific diagnoses, from improved quality rankings as a result of using standardized order sets. In a simple example, if a hospital in the 4th decile of performance has 100 cases of heart failure per year with an average reimbursement of \$4,883 per case, they would expect \$488,300 in reimbursements for all 100 heart failure cases annually. If the implementation and use of evidence-based order sets can improve this hospital's performance to the 2nd or 1st decile, it would receive an additional 2% reimbursement by CMS for all cases of heart failure, amounting to \$9766 annually in our example. In reality the numbers would be adjusted for more realistic volumes, and the effect on reimbursement rates could potentially be greater depending on the hospital's baseline performance prior to order

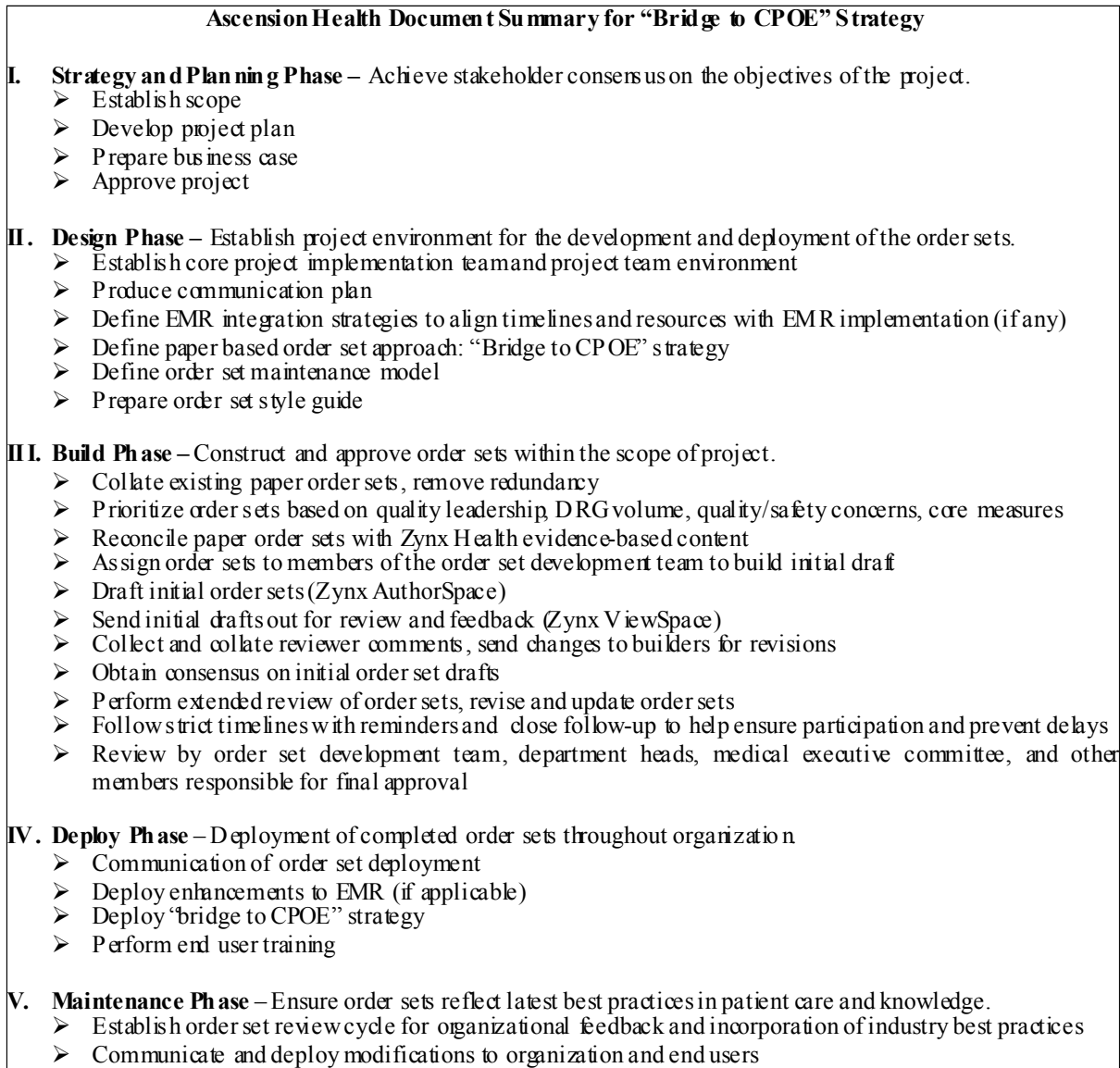


Figure 1: Document Summary for “Bridge to CPOE” Strategy developed as part of Ascension Health toolkit.

set use and the degree of subsequent performance improvement after order set implementation. Hospital quality is a complex issue with a large number of variables, but proposing change with clear financial implications can help convince administrative and clinical leaders of the utility for change.

The second part of the toolkit developed for

Ascension Health consisted of a document containing detailed steps for engaging an organization to tackle the specific challenges in creating standardized electronic order sets; a summary version is presented here (Figure 1). This document incorporated the processes and methods used by St. Vincent Health, enhanced with the lessons learned through their experiences in the build and implementation phases.

Discoveries

Several important discoveries were appreciated during the six-month journey to achieve standardized electronic clinical order sets. Of their 18 hospitals, St. Vincent Health owns 6 that are classified as Critical Access Hospitals (CAH), each with 25 beds or less. Though St. Vincent Health employs a CMIO who leads a Clinical Excellence team that responds to informatics needs, the smaller CAH institutions in the organization do not have the resources to employ their own CMIO or such informatics-related teams. Under this kind of system, informatics solutions are primarily developed centrally, but the development process must be sensitive to the needs of the more remotely located CAH institutions. The strategies utilized by St. Vincent Health described in our methods ultimately served to successfully meet these needs. The CAH sites were the first to integrate these standardized electronic clinical order sets into their workflows.

During the order set content development and review phase, the online virtual environment strategy using Zynx ViewSpace proved particularly useful in enhancing collaboration while also compelling engaged clinicians to take ownership of the overall order set development process. Having users take ownership and allowing some degree of localization in content can help adoption rates, an important contributing factor to the success of informatics implementations.⁽⁹⁾⁽¹⁰⁾ The online strategy helped circumvent the logistical inefficiencies of collecting feedback from multiple providers, and facilitated communication between the core development team and the extended reviewer network despite large geographical

separations. This strategy also allowed for content review without the additional expense of hiring staff or paying for clinician time, a significant feat during times of economic downturn.

Furthermore, in our case the ability for the CAH sites to customize the content to fit their workflow was an important step in promoting user adoption. These hospitals may not have access to certain tests and procedures, and certain medications may not be available on formulary. Allowing physician, nursing, and pharmacy leadership to customize the content in the order sets to reflect these restrictions has been beneficial in getting users to accept the content. We also note that the presence of strong nursing leadership has been particularly important for the development and integration process.

The review process also revealed areas for improvement however. As the order set build team developed content, it became apparent during review that the structure of the clinical content was not consistent across all order sets. More specifically, clinicians may recognize the mnemonic “ADCVAANDIML” (Admit, Diagnosis, Condition, Vital Signs, Allergies, Activity, Nursing, Diet, IV fluids, Medications, Labs/procedures) taught in medical school to include all of the necessary components of an admission order set. During review some order sets were found to have missing components, leading to non-standardized structuring of the content between the sets. This may seem like a small issue but in practice even simple omissions can have great consequences. An admission order set missing an “Allergy” section for example may lead to unfavorable outcomes due to missing information. A style guide was eventually

developed to aid the order set development team to avoid these omissions and has been included in the toolkit built for Ascension Health. This style guide served a secondary purpose to provide a template for order set developers building content for CPOE systems.

Lastly, documentation of the steps taken to accomplish a project of this magnitude was critically important, but equally essential were the lessons learned along the way. The construction of the Ascension Health toolkit served to provide a model to other ministries within Ascension Health to deploy their own standardized electronic clinical order set development, while also providing a means to incorporate lessons learned by St. Vincent Health in their experiences.

Discussion

There are some limitations to note from our work. Clearly there will be organizations with no need to consider a “Bridge to CPOE” strategy as an eminent intermediary for 2011 and beyond, such as those already using standardized electronic clinical order sets or in the process of developing such content. Institutions that already have CPOE capabilities likewise fall into this category. It is worth mentioning however that having a solution developed with our approach can also be used as a downtime strategy for institutions with existing CPOE systems. It is also our hope that those struggling to achieve successful implementations may consider utilizing some of the strategic processes described here.

Another limitation of our work is that due to implementation timing, it is still too early to have

objective evidence of order set usage patterns. The authors have met with clinician champions from the various CAH sites several times and have received early positive subjective feedback. This seems to indicate that at least so far, the strategies applied by St. Vincent Health to engage their users have proven to be initially successful. We expect to collect data moving forward to help us analyze the impact of the standardized electronic clinical order set implementation, including user satisfaction, user adoption rates, clinical outcomes, and the impact to hospital quality-based performance rankings.

Lastly, a further potential limitation pertains to general resource availability for informatics project initiatives. While the roles of physician leadership such as the CMIO are still evolving (11), St. Vincent Health is one institution proving its use case employing a full-time CMIO who, among other responsibilities, also manages a team to work on informatics projects. We recognize that without appropriate leadership, adequate manpower, and adequate funding, a project such as this may not be as successful.

In addition to data collection, future work will also examine various enhancements to the delivery and functionality of the standardized electronic clinical order sets. In its current form the solution developed by Zanett Healthcare for St. Vincent Health, has the ability to automatically retrieve patient demographic information and ordering physician information directly into its web-based delivery mechanism. The solution also embeds quick access reference links for evidence-based clinical content from Zynx Health. We are examining potential future enhancements for

features such as obtainable Continuing Medical Education (CME) credit for physicians who read the evidence-based content, electronic medication reconciliation by leveraging our local health information exchange, and perhaps clinical decision support logic built-in to the order set forms.

Conclusion

By using a “Bridge to CPOE” strategy for their institutions, St. Vincent Health has engaged their organization’s physicians, pharmacists, and other clinicians to take ownership of and successfully develop standardized electronic clinical order sets, while paving the road for later CPOE adoption once available. This timely strategy has gained attention from St. Vincent Health’s national parent organization, Ascension Health, the country’s largest non-profit and third largest healthcare organization, behind Kaiser Permanente and the Veterans Health Administration systems. With many institutions still several years away from CPOE, St. Vincent Health’s model can be utilized as an intermediary step to CPOE. The development of the toolkit for Ascension Health in particular has, at least in part, validated the importance of the efforts by St. Vincent Health. Other organizations looking to pursue their own CPOE implementations that are still several years away may benefit from this “Bridge to CPOE” strategy.

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