



# Clinical Content

## The Essential Currency of Clinical Information Systems

Volume I. Actionable In-Patient Order Sets

A large, high-resolution image of a single water droplet hitting a surface, creating concentric ripples that spread outwards. The water is a deep, vibrant blue, and the ripples are clearly defined, creating a sense of movement and impact. This image serves as a background for the lower half of the page.

*Successful adoption and usage of Clinical Information Systems depend on these systems' ability to deliver high-quality, evidence-based clinical content at the point of care to support clinical decisions.*



The “practice” of medicine based on data and information is familiar to those of us in the healthcare industry. From the very beginning of a patient encounter a variety of data is collected: a patient’s chief complaint and medical history, clinical signs and symptoms, laboratory and imaging results, other physicians’ consultations and current treatments. A working diagnosis is formulated, and the clinician decides on a course of action or treatment plan. If the diagnosis is correct and the appropriate treatment plan is followed, the patient’s medical problem, hopefully, resolves or improves. If the patient’s medical problem deteriorates or doesn’t improve, then the clinician will reassess the evidence in light of any new findings, and the process begins again. This schema is not limited to symptom-driven care, but also applies to assessing health status and guiding personalized prevention and health maintenance.

This generalized process – assess ~ treat ~ reassess – is itself based on the inter-relationship between the collection of evidence, the clinician’s knowledge, and the clinician’s reasoning. Given the exponential explosion of information with which clinicians are continuously inundated, it is no wonder that information scientists have tried for decades to develop computer technologies to assist in the clinical process of delivering patient care. In fact, a recent search of PubMed using the terms “Clinical Information System or Electronic Medical Record” yielded nearly 25,000 publications dating as far back as 1955, with the first mention of “diagnostic aid” and “clinical records” appearing in the title of articles published in 1960.<sup>1,2</sup>

Although the cognitive process of decision making at the point of medical care has not changed considerably, the adoption of Clinical Information Systems (CIS) is a relatively new dynamic fueled by the promise of substantial benefits. While many clinicians and provider organizations might be content to continue using paper-based systems, the collective pressure mounting from payers, the federal government, consumers, and employers over the last eight years has driven the provider marketplace to embrace CIS utilization as a foundation for managing quality of care, improving outcomes, reducing operational inefficiencies, engaging patients and growing market share.

Despite significant progress and investment in CIS, many organizations find it difficult to increase internal adoption and usage among clinicians beyond early adopter organizations. Explanations of these difficulties abound in publications, presentations and informal discussions, although little consensus exists. What is clear, even from the rare long-term studies,<sup>3</sup> is that successful adoption and usage of CIS depend on these systems’ ability to deliver high-quality, evidence-based clinical content at the point of care to support clinical decision making and provide context-specific standardized measures against which to both interpret and benchmark clinical processes and outcomes. When individual clinicians are using a system, the ease with which they access and process information such as standardized order sets and documentation tools significantly affects their productivity and satisfaction. Clinical content is the material of CIS and forms its “currency”.

The vast majority of provider organizations are not adequately prepared for the magnitude of and effort required to acquire and modify clinical content on an ongoing basis. Nor do they realize that it is not necessary to implement CIS or its components in order to benefit from adopting and using structured clinical content. In this white paper, we draw upon the collective experience of the professionals of the subsidiaries of Deloitte & Touche USA LLP (the “Deloitte U.S. Service Providers”) [Deloitte Consulting, LLP] need to clarify— specifically those who are working with provider organizations – to review issues related to acquisition, customization and ongoing management of clinical content, and present critical solutions for near- and long-term success in clinical transformation programs.

## Clinical Content and Content Delivery Systems

Automation of health care processes typically include Admission Discharge Transfer (ADT) systems for patient registration and location, laboratory and radiology processing and reporting systems, pharmacy systems, clinical documentation (nursing, ancillary providers, and physician), and order entry systems. Computerized Physician (or ‘Provider’) Order Entry systems (CPOE) and Clinical Decision Support Systems (CDSS) bring a quantum jump in value to the system.

An Electronic Medical Record (EMR) is a longitudinal, electronic repository of information collected during a patient’s encounters with healthcare providers and services such as medical history, results of physical examinations, progress notes, laboratory data and imaging reports.<sup>4</sup> CPOE functionality facilitates the electronic capture of physician orders for medications, laboratory, imaging and other diagnostics, care instructions, and patient monitoring requirements.<sup>5,6</sup> A third component, the CDSS, is designed to improve clinician decision making by providing relevant clinical information (e.g., practice guidelines, protocols, or other clinical evidence), alerts (e.g., critical lab values, potential drug-drug interactions), reminders (e.g., time-critical orders, need for education or preventive procedures) and other suggestions for clinical care at the point of care through the use of embedded logic and rules.<sup>7</sup>

It is important to distinguish between CPOE and CDSS because, despite the fact that they are well-suited to working together (and are often integrated) in a CIS implementation, either component can exist and operate independently from the other. Furthermore, each comes with its own set of benefits and problems. In fact, the lack of distinction between these two components has been linked to dubious claims of both relative successes and failures of these systems to achieve their stated goals of higher quality, reduced practice variations between clinicians and error reduction.<sup>8</sup>

For the purposes of this paper, the term clinical content refers to the substance of data and information utilized by an advanced CIS. Typically, most CIS implementations focus on clinical content for CPOE, but content supporting other areas such as nursing documentation cannot be neglected. Clinical content for CPOE includes individual orders and order sets. Nursing

documentation including templates, guidelines and plans of care also constitute clinical content for the EMR.

Similarly, clinical content for CDSS refers to standardized or customizable information that is utilized by the embedded rules and logic statements to generate point-of-care decision support, including practice guidelines, reference materials (e.g., drug interactions databases), and other information resources that can be used in the course of clinician reasoning.<sup>9</sup> Clinical workflows and care paths are also associated with CDSS because rules and logic governing the selection of CPOE content are embedded within them. Additionally, the rules and logic statements themselves are considered clinical content because they are meant to represent the clinician's reasoning and are an inherent component of clinical content contextualization (i.e., making it relevant to a specific patient or group of patients at the point of care). Figure 1 summarizes overall components of clinical content.

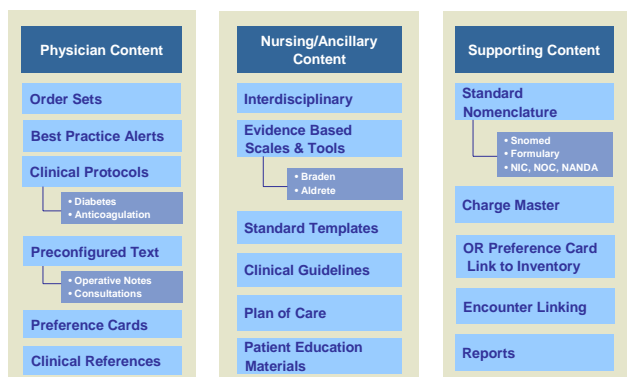


Figure 1. Framework for Clinical Content

It is worth noting that while templates for the presentation of content are not themselves considered clinical content, the design of templates is an important part of the overall content development process because it ultimately impacts user adoption and acceptance. Consistency in the appearance of order sets not only supports the accuracy of use of order sets but also supports the clinician's cognitive approach to planning the care of a specific patient. In addition to templates for documentation, data input and order sets, these design efforts also include document templates for external communications (e.g., for patient referrals, letters to referring physicians, as well as reminders to patients for follow up visits). While the focus here primarily rests with in-patient order set development for use by prescribing providers, the general principles for organization and process apply to other clinicians and related content.

### Content Sources and Vendors

Clinical content can be purchased from a content vendor, initiated with other sources of external content, or can be internally adapted, created or synthesized within the organization. Content vendors typically fall

into one of two categories: CIS Vendors, whose content is developed to work with their own CIS, and third-party knowledge vendors, whose content is CIS-neutral.

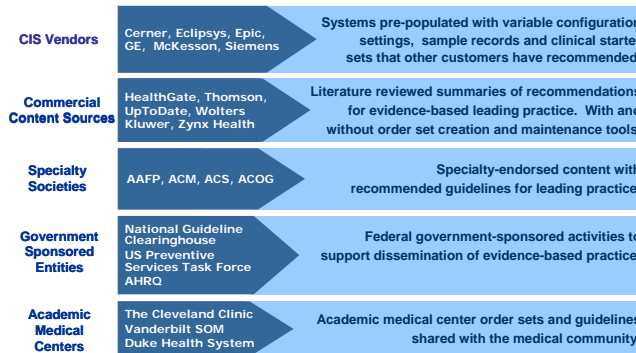


Figure 2. Selected External Sources of Content

Figure 2 describes sources of external clinical content. It is not an exhaustive list of CIS and Knowledge vendors, but it does represent the major vendors and types of external sources that supply content to integrated delivery networks as well as medium and large hospitals. Most CIS vendors develop some content in-house and supply a starter set for their clients. Results from a recent Deloitte Research survey indicate that most CIS vendors have a relationship with one or more knowledge vendors, and leverage licensed content along with content from other clients to help develop order sets for their clients. However, healthcare systems that take advantage of this third-party content through their CIS vendor are likely to purchase an additional subscription through the third party, which may require fees in excess of those assessed by the CIS vendor.

### What It Takes to Succeed with Order Sets: Lessons Learned

Many organizations do not formalize an approach to clinical content development and maintenance at the beginning of CIS implementation, and simply begin with a "starter set" that the vendor supplies. This strategy, by itself, fails far more often than it succeeds. To ensure success, organizations must first establish a formal clinical content governance structure with appropriate representation of constituencies, as well as establish a comprehensive clinical content strategy.

### Governance

Presuming that executive-level leadership for clinical systems implementation/ transformation is already in place, a governance structure is needed to direct the development and ongoing management of clinical content. Given the need for objectivity, it is also advisable to develop methods and metrics to assess and redesign the clinical governance structure itself over time. This will ensure objectives and timelines are met while maximizing the likelihood of stakeholder buy-in.

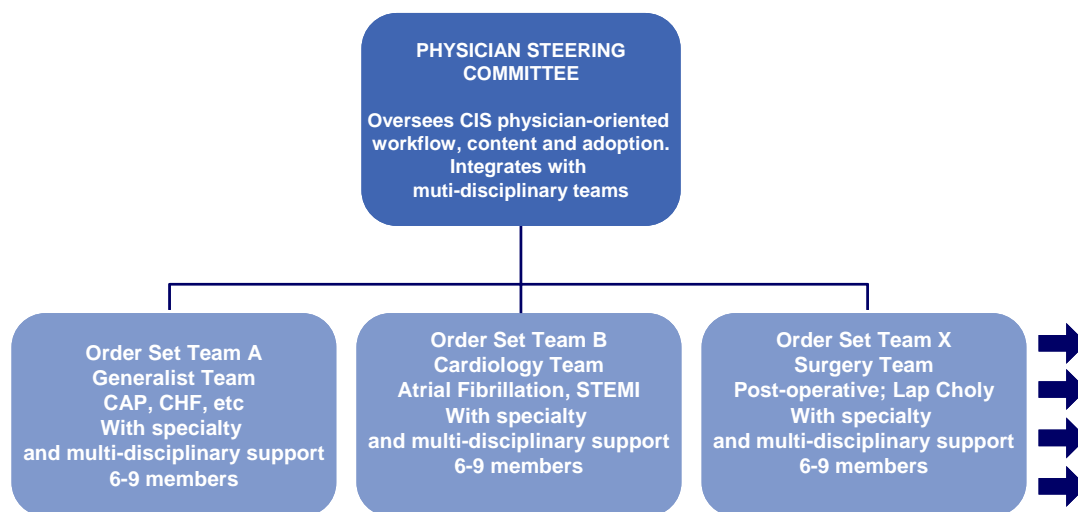


Figure 3. Sample Structure for Physician Order Set Design

Clinicians' membership in the governance process should be carefully assessed, and individual members should be recruited to achieve a mix of skills, experience, medical specialty and practice geography. However, wanting to help may not be enough if physicians or other clinicians do not possess the right skill sets to fully contribute. The members of this group must include physicians, with support from nurses and pharmacists, as well as other clinicians who are respected by their peers. Care should be taken to balance between technophiles and technophobes, and all should have the ability to communicate a shared vision along with broad goals and quantifiable objectives throughout the organization.

The size and structure of the governance body that controls clinical content will vary with the size and complexity of the organization. Typically, there is a Physician Steering Committee (PST), Physician Order Set Design Teams and a similar structure to support nursing and other content design. The PST oversees all physician-related aspects of the design and implementation of advanced clinical information systems including workflow, content and adoption. They define the scope of content (what will or will not be developed), determine the amount of enterprise standardization that will be required in content development, and prioritize the work of the development teams. The issue of content standardization is critical because clinicians are unlikely to use standardized practices (even if they tacitly acknowledge that reductions in practice variations between clinicians ultimately benefit both the patient and the organization as a whole) unless there is an organizational imperative to encourage and support the use of standardized practices and tools to facilitate such use. The PST also charters the Order Set Design Teams and reviews and validates their work.

The PST should include about 10-12 physicians representing primary care, hospitalists, medical subspecialties, surgery (general and/or subspecialty), OB/GYN, pediatrics, emergency medicine, and psychiatry with tailoring for the unique needs of specific health systems. In addition, representatives from nursing, pharmacy, and other key clinical departments should be given advisory positions to the PST. It is also worth considering the inclusion of an administrative/operations executive, since the PST will make recommendations for resource requirements

related to content development and maintenance. If the organization is geographically distributed, consideration should be given to either establishing a single PST for the entire organization where members adequately represent the different geographic areas, or establishing multiple PSTs for each region. If multiple PSTs are established, a formal process should be developed to ensure that leaders from each group freely share information among each other to encourage organizational learning and leverage synergies. Delineating characteristics of endorsable variation (local antibiograms, local formularies, state requirements) will provide guidance to the design process. Based on Deloitte's experience, most organizations that have implemented CIS report that they regret not having pushed for more standardization. They report that, in retrospect, they could have achieved much more.

Typically, the Order Set Design Teams are where the bulk of the content work is done. These teams are responsible for setting the overall content delivery design standards. The Order Set Design Teams also coordinate the design of underlying workflows and content templates which essentially involves creating an interface between the system users and the embedded content. As such, it is the role of the Order Set Teams to ensure that the final system meets the needs of each of the clinical and ancillary services that will come to depend on the systems being developed. To help ensure the efficiency and quality of the content development process, it is good to begin the process with an analysis of the best practices used by other facilities that are similar in practice design and facility structure to the organization. This process engages the clinicians and forces them to begin to identify with the content, recognize how it applies to their practice and think about the process of developing a standardized order set for the organization.

The structure of the Order Set Teams should include six to nine members comprised predominantly of physicians with pharmacy and nursing core participation. The physicians should largely be front-line clinicians who are involved in patient care activities on a near full-time basis. While Order Set members need not be technophiles, they should be generally supportive of the development effort and overall goals of implementation as they must work closely with information systems

personnel on an ongoing basis throughout development, testing, and ongoing content management activities. Additionally, there should be multiple teams based on the scope of work desired. For example, an Order Set Team focused on pulmonary diagnoses would need to develop order sets for pneumonia, COPD and asthma and involve both primarily generalists and specialists in pulmonology, infectious disease and critical care. Also if the organization is implementing both ambulatory and inpatient systems, separate Order Set Teams should be created along with a formalized process to review where content integrates for both sites of care.

Besides the development of physician order content, there should also be a structure to support nursing and other clinical content development. Although content development of physician orders and nursing content takes place in parallel, there must be crossover “checkpoints” and responsible parties to assure smooth integration of all content. One method is to have a higher level Clinical Oversight Committee to ensure compatibility and integration of all content. This Committee may also serve to ensure that content is deployed in compliance with regulatory and quality standards.

In order for an Order Set Team to succeed there needs to be structure, consensus building and complete participation and attendance. A structured facilitation process will make the best use of a clinician’s time and provide value for their effort. Additionally, consensus building is vital to the success of the content development and to the CIS implementation itself because the clinicians involved in the process are going to become the champions and spokespeople for the effort. If they have been involved in and believe in what they produced, their colleagues are much more likely to trust their work and ultimately utilize the content and system at a higher rate. However, consensus building can not be achieved through partial participation. If a clinician agrees to be a member of an Order Set team it needs to be clearly stated what their expectations are in terms of participation, attendance and accountability.

## Clinical Content Strategy

Setting a clinical content strategy is perhaps the most critical first step along the path to successful clinical transformation. In fact, lack of a thoughtful, well-defined content strategy at the outset of CIS implementation is responsible for more failures, setbacks, and wasted resources than any other single factor. This is key, because many organizations assume that their CIS vendor or a third-party content vendor will provide leadership in this endeavor. Unfortunately, they discover too late that the overall cost of clinical content development and its continued maintenance (in terms of time and money) is underestimated and not feasible to continue long-term. Instead, Deloitte Consulting LLP recommends that organizations take a well-planned, informed approach to developing a content strategy within the organization with the proper leadership resources identified prior to, or in parallel with, the CIS purchase. Unfortunately, most organizations find that the requisite experienced clinician resources have very limited availability after the initial planning, development, and implementation phases, so it is key to identify individuals who will oversee, manage, and contribute to these processes on an ongoing basis and provide them dedicated time to perform their duties rather than expecting it to be done as an “add-on” service. The structure and process can be likened to a

system-wide Pharmacy and Therapeutics (P&T) Committee for clinical content.

A thorough, well-defined clinical content strategy must guide the entire content life cycle, including: 1) Understanding content needs ; 2) Identification and selection of content sources; 3) Customization of content, including vetting of evidence; 4) Content update and maintenance process; 5) Ensuring the right tools are available, 6) Creation of an physician adoption strategy; and, 7) Defining metrics of success. In addition, a clinical content development strategy must incorporate the scope of content and degree of content standardization – both of which are defined by the PST and broader health system leadership, as described above.

### 1) Understand content needs

The first step in the development of a clinical content strategy is to understand the clinical content needs. Is the goal to standardize content throughout your organization and decrease variation in practice? If so, what is the definition of standardization? Will providers be required to use order sets and documentation templates? How is content structured to support your standardization goals?

After defining standardization, there should be a detailed inventory of existing clinical content. This involves determining what content is currently available including physicians’ personal order sets, standard documentation forms, patient education materials and any other pertinent content existing within the organization. Often, the formally documented clinical content does not fully represent what is being used on the actual clinical units. Additionally, there should be an assessment of the type of content supplied by the CIS vendor and their expectations of their clients in terms of content generation. Some vendors supply resources to help develop content while others expect that the entire effort will be borne by the organization.

Next content development needs to be prioritized (i.e., which content needs to be rolled out first) and deadlines finalized around system go-live dates. It has been shown consistently that the core number of order sets that need to be completed before system go-live is typically much more than most clients realize. “Which ones need to be done first?” While the answer depends on a number of organization-specific factors, most clients are surprised to find that the answer isn’t driven solely by patient volumes. Many organizations look to their existing quality initiatives to drive initial work (e.g., IHI 5 Million Lives Campaign, JCAHO Core Measures). Other factors include the size of the institution, the scope and staging of the project (e.g., which specialties are going live first), the presence (or absence) of centers of excellence, and the relative complexity of specific diseases and conditions (e.g., those that require multi-disciplinary care pathways) among others.

Many organizations struggle with the long and involved task of choosing, reviewing and modifying clinical practice guidelines in order to incorporate them into practice.<sup>10</sup> It can take years and requires a very qualified team.<sup>11</sup> At last count the National Guideline Clearinghouse at [www.guideline.gov](http://www.guideline.gov) listed more than 1000 clinical guidelines and there are many others that exist locally or within specialty groups. Shiffman, et al, listed several criteria to narrow the search for appropriate guidelines. He suggested finding guidelines

that fit within the organizational priorities, concentrating on areas where there was great local practice variation, where new clinical knowledge would be useful and where resources were not being utilized appropriately.<sup>11</sup> The best guidelines are supported by strong evidence, are straight forward and use data that is normally in the electronic health record.<sup>12</sup>

After an organization chooses guidelines for implementation, they need to be incorporated into actionable order sets. A 2003 study at the VA Puget Sound detailed how 513 order sets were created prior to that organization's system activation, yet only 13% of these order sets were actually used over a six month period. Recommendations from this analysis included gathering more information on pre-CPOE ordering patterns in order to concentrate the build efforts, and working in collaboration with clinicians to ensure their needs were being met.<sup>13</sup>

Clinical content covers broad categories and the total volume of content that is needed initially at system go-live is usually underestimated by organizations and vendors. For example, one specialty hospital (devoted exclusively to the treatment of musculoskeletal disorders) designed 158 order sets for initial go-live, while a regional healthcare system in Canada is planning between 180-240 order sets for their initial pilot. On the other extreme, one major CIS vendor currently recommends that 600 order sets be developed prior to go-live – most likely an inadvisable scenario given the need for, and inevitable complication arising from, initial testing and management processes. Even when the early focus is on specific conditions or diseases, many organizations often include common general order sets, such as medical, pediatric, or pre-operative admissions, and transfer or discharge orders.

Templates for the organization of content within order sets are not commonly found in the literature. Anecdotally, we have learned from organizations that they attempt to use consistent methods and strive for commonality of appearance for their order sets. Traditional characteristics, carried over from paper formatted order sets, include use of the "ADCVANDISMAL" acronym (and variants thereof), section headers to improve organization, and annotations emphasizing preferred options (such as choices of antibiotics, DVT prophylaxis, etc.). The research of Ahmad, et al, at Ohio State University Health System found that after determining the content of order sets, developers needed to work with physicians to ensure the optimal flow of orders and order screen development. If the ordering screen is not consistent and clear visual cues are not present, errors of misidentification may occur<sup>15</sup> They worked through an iterative review process with the lead physicians and departmental representatives while following a generic screen template to ensure organizational consistency.<sup>14</sup> Multiple studies do encourage working with physicians on an ongoing basis during the development and implementation of clinical guidelines and order sets<sup>16</sup> and caution that the exclusion of the physicians can lead to disastrous consequences like the often-cited experience of a West Coast teaching hospital, wherein physicians led an effort to terminate the CPOE project since they had not be fully consulted.<sup>17</sup>

Attention to physician workflow related to order set use is essential. Historically, efforts have focused on creating admitting order sets for specific diagnoses. These

provide much of the core content needed by physicians, however, from the workflow point of view, all order sets (two or more grouped orders) must be made available in appropriately discrete modules to facilitate easy access and use. Therefore, templates for non-specific admissions, transfers, discharges, post-procedure care, etc., are needed. In addition to diagnosis-specific admission order sets, access to subsets for the larger sets are helpful as modules (e.g. "evaluate and treat Congestive Heart Failure"). Furthermore, condition-specific order sets which address patient needs across diagnoses are needed (DVT Prophylaxis, pain management). Some Emergency Department sets are often modified from the "front end" of admission order sets. Physicians engaged in content design must be challenged to envision what types of tools they will need during specific phases of care. Finally, testing order sets in your vendor-specific CIS allows review of the ease of use and the balance of evidence-based ordering options in a set of manageable size. In the design process, physicians will address how much scrolling is required and how many clicks can be tolerated. Achieving a balance between supporting evidence-based leading practice and ease of use becomes an issue.

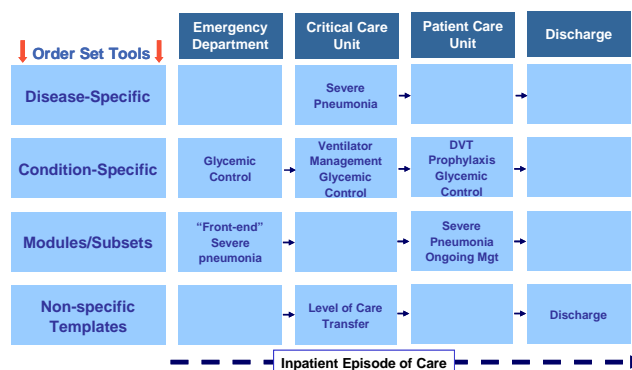


Figure 4. Selected Order Set Tools Across Admission for Patient with Severe Pneumonia with Diabetes Co-Morbidity

## 2) Identify and select content sources

Once the clinical content has been prioritized, the organization will have to determine how to source the target content. Multiple sources of clinical content exist – including those developed internally, those developed by a national or regional specialty society or disease-specific organization, and those developed by a knowledge or CIS vendor, as previously described. Unfortunately there are often discrepancies between all of these sources. Many organizations already have formally structured paper-based clinical content. Since complete internal development of clinical content without the use of external sources is neither a wise use of time nor resources, most organizations will be best served by performing a gap analysis and acquiring content based on defined needs that leverages internal resources and strengths. Most CIS vendors will provide clients with access to a community library that contains clinical content and tools from all of their clients. Typically, access to the content library is contingent upon the commitment to contribute.

The use of clinical practice guidelines to support order sets, protocols, and clinical workflows is, itself, a rapidly evolving area across all medical practices and continues to gain more importance – especially since reimbursement for care is increasingly tied to the use of

best practices. The problem is that what actually constitutes a best practice is neither clear nor agreed upon. However, with all of the guidelines and content available, an organization has ample evidence and material to customize and imbed guidelines into their system. This requires a diligent, structured process and a consensus building approach that will ultimately provide the organization with guidelines that they can validate and support. If the organization chooses to use either CIS or third-party content, there needs to be a clear understanding on how the guidelines and content are developed and whether the content is relevant to their organization and patient population.

A common approach is to use a hybrid process that starts with the purchase of content from a content vendor which is then customized to suit the organization's clinician constituents. The customization process will often vary within a single organization based on numerous factors, including hospital size and type, number and distribution of hospitals, motivation for implementation, vision and leadership, cost, and workgroup constituencies, among others. Some organizations also benefit by first adapting third-party content in a paper model to facilitate early buy-in by clinicians which then eases the transition to electronic systems. Some health systems choose to format these order sets to resemble the screen appearance of their chosen EMR, then store the order sets on their intranet, and then print them locally to the printer closest to the ordering physician. This requires very strong attention to communication and training of physicians, nurses and unit secretaries but has proven to be a successful strategy.

### 3) Customize Content, including vetting of evidence

No matter what clinical content is acquired or created, it will need to be customized to fit the needs of an organization's clinicians. This is an important step and great opportunity to integrate clinicians into the entire clinical information system process and to allow them to make the content their own. Even tightly-knit clinical services can find that reaching consensus on content customization isn't always easy – especially when the success of content implementation is linked at some level to practice standardization. It is vital to document the entire customization process including content iterations, specific member participation and decision rationale. Inevitably clinicians will question why a decision was made, why a piece of content imbedded or deleted. Order Set Teams need to be able to quickly and clearly provide the rationale of their decisions even if it concerns a decision made 12-24 months prior.

The customization effort required varies greatly depending on a number of factors, including the organization's size, geographic distribution, variations in patient demographics, case mix, relative percentage of community-based physicians, and diversity of clinician training and experience. This is further compounded by the complexity of the disease, condition, or protocol being addressed, as well as the quality of the starting source relative to the organization's practices. Some organizations opt to start with commercial order sets that have been derived from specific practice guidelines, while others opt to review existing guidelines first, then select or develop order sets that best match the guidelines of choice. The medical literature includes several discussions about the creation of order sets

based on reviewing, synthesizing and categorizing medical evidence. It is worth noting that the degree of content customization required can impact an organization's decision to purchase third party content – i.e., the more customization required, the less value there is to be gained from the purchase.

### 4) Create a process for content update and maintenance

While most clinicians endeavor to keep up with the continuously changing bodies of evidence behind best practices as a routine part of their ongoing professional education, many find it difficult, if not impossible to keep abreast of all the potentially relevant updates. Therefore, it should not be surprising that among all the steps associated with sustained clinical transformation, none is more underestimated in terms of importance compared to allocated time and resources than the content update and maintenance processes. This is particularly true whenever clinical content is highly customized as it necessarily requires significantly more time and effort to maintain the customized content. Furthermore, there may be legal liabilities for organizations that develop, but do not update clinical content and underlying evidence, so it might be advisable to conduct a risk assessment of existing clinical content and practices to assess their potential for legal liabilities and exposures.

Like the content development process itself, content updating and management strategies are highly dependent on the specific organization. There are, however, some proven strategies that stratify content into different categories in an effort to guide the development of maintenance processes. For example, there should be a process to identify and rapidly replace content that adversely impacts patient safety or quality of care. Another process established to identify and replace outdated content, as well as special processes to review multi-disciplinary content. Knowledge vendors update their content and evidence regularly ranging from weekly to yearly. And when an emergent need arises, such as the 2005 Vioxx recall, these vendors are able to assist their clients to immediately remove the medication from all existing order sets.

### 5) Acquire the right tools for content management

The entire content management life cycle requires the use of proven tools and methodologies to help with creating, customizing, updating, and maintaining clinical content. For multi-entity distributed systems, the advent of web-based authoring tools which can be used for virtual design session and broader review by other clinicians is an innovation that is very helpful to this process. Post-implementation experiences with CIS ultimately reveal important omissions that even the best planned efforts miss. The tools with which to customize, update and maintain clinical content are largely determined by the CIS technologies being used or implemented at an organization, so both the quality and ease of use of these tools should be a factor in the CIS purchase decision. As such, it is critical that organizations understand the strengths, weaknesses and limitations of tools that support CPOE, and third-party content. For example, among the most overlooked of requisite content development and maintenance tools is a robust change tracking tool set. Tracking changes to clinical content over time facilitates clinician buy-in, supports policy development, and provides a record for

legal and regulatory requirements. Another oft overlooked tool set has to do with the development and maintenance of lists of terminologies, synonyms or abbreviations, as any omissions must be quickly added to appease time-strapped clinicians.

Clinical Decision Support Systems (CDSS) may be viewed as a tool supporting the CIS and the utilization of third party content. There are several factors that need to be considered when incorporating rules and alerts into workflows. Quality is the foremost consideration, and the standard of quality has to be carefully managed, as variations will inevitably result in lack of user acceptance. Additionally, for rules and alerts to be effective, they need to be focused and presented in a manner that is contextually appropriate – preferably with consideration given to ease of use. For example, a warning about a patient’s medication allergy that also provides a recommended alternative medication- and a single mouse click to order the drug to replace the initial order – can save time for clinicians while enhancing the quality of patient care. At the same time, too many alerts detract from their own importance and physicians may develop alert fatigue and disregard them altogether.

Detractors of CDSS assert that it is inherently difficult to represent the unpredictable nature of case-based reasoning using current linear, rationalized, sequential workflows and rules engines. However, many of our clients find that existing tools are more than adequate for most common conditions and situations, as well as in those complex cases with well-defined guidelines and parameters. Additionally, there is every reason to believe that these systems and tools will continue to improve over time and will ultimately prove acceptable to clinicians in a wide variety of complex clinical scenarios. Further, the codification of rules as they relate to the development and use of order sets, practice guidelines, standardized protocols, and setting of alerts

will still provide significant value to organizations that have not yet adopted CPOE or CDSS. As such, objections related to the lack of tool or system sophistication, or the lack of current CIS implementation, should be carefully weighed against the time, effort and cost of waiting to acquire, develop, and/or customize clinical content.

### 6) Create a physician adoption strategy

Ultimately, an organization’s clinicians must not only endorse the content development strategies, but must adopt and utilize the clinical content itself. Since clinician behavior – particularly that of physicians – is difficult to change, a number of processes can be put in place to maximize the opportunities for success.

For example, physician representation in content development should start as soon as the CIS vendor selection is made. It is also imperative that physicians are given dedicated time for this purpose, which means that the organization must adequately augment clinician and staff resources to avoid disruptions in, or reductions in quality or volume of, patient care. Similarly, the organization’s executives should lead a change management program focused specifically on the importance of clinical content development, customization, and maintenance as primary determinants of overall success in clinical transformation. In addition to a clearly-stated communication strategy, this change management program must include clearly stated, anticipated benefits, a rationale for process standardization, and the acknowledgement that adoption and use of clinical content is never a substitute for sound clinical judgment. Figure 5 outlines a framework for clinician adoption of advanced CIS including order set use. Physicians involved in the content design process are likely to become early adopters and serve as educators and ambassadors to middle and late adopters.

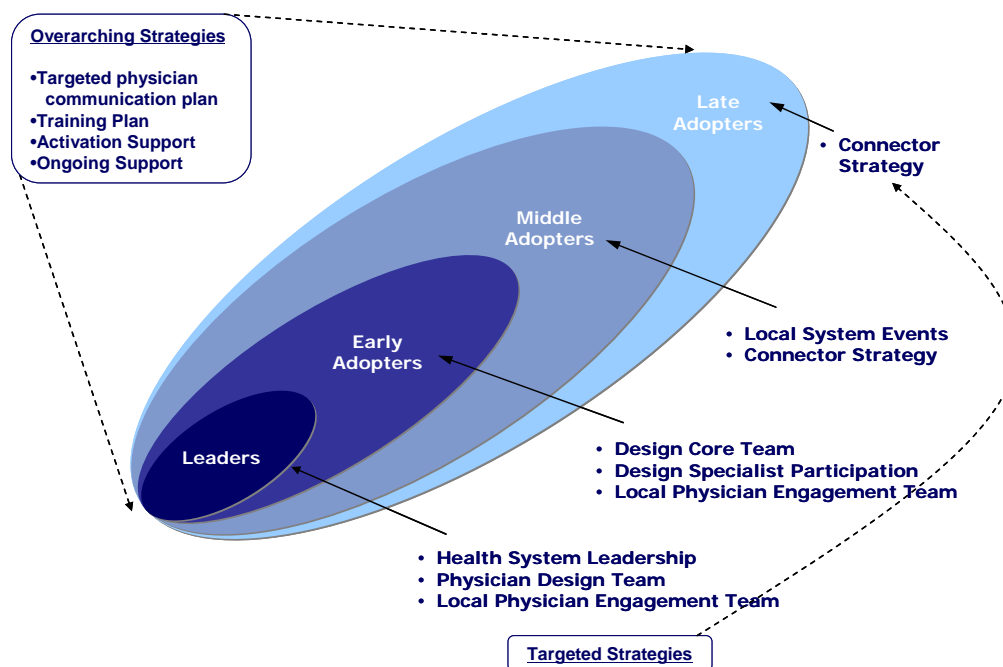


Figure 5. High Level Physician Adoption Framework

## 7) Define metrics of success

As with any key initiatives – and especially those which consume significant resources – it is imperative to define metrics indicative of success. Too often, organizations implementing content development programs don't know what to measure so they typically focus on measures that are either too narrow or too broad. For example, the success of Order Set Teams is often assessed based on the number of conditions for which order sets (with corresponding evidence) are created. Similarly, Boards of Directors are notorious for trying to tie the success of implementation into near-term measures quantifying return on investment (ROI) or increases in market share. Instead, appropriate measures of success should link clinical content to process redesign, as well as appropriate shifts in resource utilization, and improvements in both the quality of care and clinical outcomes. Further, these measures must be identified prior to system implementation so that the appropriate business intelligence tools can be acquired and underlying data models can be developed – thereby enabling the organization to take advantage of automated reporting tools, including dashboards of Key Performance Indicators. Formalizing the definition of these metrics will also clarify expectations during the ongoing content development and management processes.

At a minimum, metrics should address order set use, proficiency of use and related achievement of selected priority health system specific patient care goals and objectives. For example with severe pneumonia, key elements are likely to include physician use of the tools and related outcomes such as complications such as ventilator-associated pneumonia, mortality, length of stay, overall resource utilization and other patient satisfaction and clinical metrics.

## Conclusion

The major hurdle to providing evidence-based care is not generating new knowledge, but effectively applying and utilizing available, current knowledge in patient

care.<sup>18</sup> US Healthcare provider organizations are investing heavily in CIS with the anticipated benefits of improving quality, reducing errors, and growing market share. The call for these systems will continue to be fueled in the future by the growing need to incorporate patient preferences into clinical decision making. This includes awareness of culturally-sensitive practices as well as the advent of personalized medicine, where genomics and molecular diagnostics will ultimately drive treatment choices and reimbursement.

As the users of these systems, clinicians expect their interactions to be more and more content rich so as to better support their increasingly complex decision making at the point of care. Achieving these goals both now and in the future will depend on the use and application of mature content strategies and tools.

The focus of this white paper has been on order sets in the in-patient setting. This discussion can be expanded to address rules and alerts, nursing documentation, physician documentation and other clinical content tools. Deloitte Consulting, LLP, has developed considerable expertise in the area of clinical transformation by working with numerous clients across a variety of organizational structures and at varying stages of CIS deployment, as well as by developing familiarity and experience with most CIS vendors, third-party content vendors, their content, and their tools. As a result, we have identified a highly structured approach to engage providers in the development of a clinical content strategy and in the establishment of an effective governance body – both of which are critical to the overall success of any clinical transformation. Each of the steps outlined in the development of the clinical content strategy, as well as the actual implementation of each step, presents organizational and technical challenges. There is never a one-size-fits-all solution. Provider organizations will need to develop an approach that is built upon the lessons learned from others and one that is sensitive to its own unique organizational culture and traditions.

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