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Computerized Provider Order Entry Implementation: Provider and Hospital Leadership Impacts on Success

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COMPUTERIZED PROVIDER ORDER ENTRY IMPLEMENTATION: PROVIDER AND

HOSPITAL LEADERSHIP IMPACTS ON SUCCESS

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Submitted in partial fulfillment of the
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CERTIFICATE OF APPROVAL

This is to certify that the Master's non-thesis project of

Elizabeth J. Walker

has been approved by the Review Committee for the non-thesis project requirement for the
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ABSTRACT

COMPUTERIZED PROVIDER ORDER ENTRY IMPLEMENTATION: PROVIDER AND

HOSPITAL LEADERSHIP KEY TO SUCCESS

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Healthcare organizations are consistently exhausting efforts to improve their patient safety standards and outcomes, especially those that are regulated by federal and state agencies. Many healthcare organizations have chosen to implement an Electronic Health Record (EHR) to facilitate better decision-making and faster turnaround for providers, thus improving patient safety. The EHR allows providers to manage patient care with the help of decision support functions, and with greater accessibility to the patient's information. One of the components of an EHR is the application of Computerized Provider Order Entry (CPOE). Although the benefits to both providers and patients have shown to be very positive in the use of CPOE, getting there can be a challenge. Implementing CPOE is considered to be enormous change for a healthcare organization. Having provider leadership engaged in the early stages and throughout a CPOE implementation is critical to the success of the overall short and longer term use.

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Introduction

Provider and hospital administrative leadership appear to be critical components needed

for the success of implementing a computerized physician order entry (CPOE) system. Having

the appropriate leadership support in place is essential for the management of major

organizational change, the buy-in for this change, and the acceptance of implementing and using

a CPOE system successfully.

During the past few presidential terms, emphasis has been placed on requiring hospitals

and clinics to implement an Electronic Health Record (EHR). CPOE is a critical part of the

EHR. Recently, as part of his economic stimulus package, President Obama proposed the

funding to push the EHR across the nation to hospitals and clinics. In his proposal, Obama

wants to put $20 billion toward moving to electronic medical records (Lohr, 2009). Obama's

predecessors, Bush and Clinton, also pushed for an EHR during their terms.

Before the presidential office began promoting the EHR, other agencies such as the Joint

Commission of the Accreditation of Healthcare Organizations (JCAHO), Leapfrog, a nationally-

recognized coalition of over 150 healthcare purchasing organizations, and the Agency Resource

for Healthcare and Quality (AHRQ) have completed many studies indicating CPOE and other

components of the EHR would facilitate increased patient safety, reduce health care costs, and

increase efficiencies, which would ultimately result in better patient care with lower medical

costs for all of us (Lohr, 2009).

From a patient safety perspective, one of the primary reasons CPOE is recommended in

study after study is because of the vast number of medication errors which occur within the

healthcare system. Some of these studies reveal that CPOE as a system would be able to reduce

the number of medication errors. According to one study done by Kilbridge, Classen, Bates, and

Denham (2006), some medication errors were due to the legibility of the hand-written paper

orders. This can cause transcription errors, and slow communication both to and from the

pharmacy with the paper orders, along with redundant entry of the medication order into a

pharmacy system (Kilbridge, Classen, Bates & Denham, 2006). Additionally, the study

revealed that medication dosing and interaction errors were found at the time the provider placed

the initial medication order.

With CPOE, the order is no longer illegible, and in many cases, the CPOE system has

direct access to the pharmacy system, so there is no secondary opportunity to misread the order.

The turnaround time back to the patient is faster, as the medication order is received almost

immediately. Additionally, most CPOE systems have the ability to build in alerts that warn

physicians about drug to drug, drug to food, and other important interactions that facilitate a

safer medication order. Lastly, the medication can then be tied to a Medical Administration

Record (MAR) where nurses in hospital settings can document the administration of the

medication ((Kilbridge, Classen, Bates & Denham, 2006).

After implementing CPOE, Children's Hospital and Regional Medical Center in Seattle

realized immediate benefits. In their acute care units they saw a reduction in medication delivery

time by 70 percent, a 70 percent reduction in turnaround time from provider order entry and

pharmacy execution to 14 minutes from 51 minutes, a 30 percent decrease in orders by providers

that were incomplete, and elimination of illegibility and abbreviation problems compared to the

hand-written orders. The Leapfrog group awarded Children's Hospital and Regional Medical

Center the honor of being the first hospital in Seattle to fully meet its standards

(AllBusiness.com, 2005).

Many organizations are looking at other quality and cost improvement opportunities that

a CPOE system can assist with, such as fewer lab or radiology tests, which mean reduced costs

to the patient and the medical insurance payers, as well as the application of best practices

toward patient care. JCAHO publishes an annual National Patient Safety Goals publication and

the associated requirements that the healthcare organization must follow in order to meet the

requirements of JCAHO. Although a CPOE system is not a requirement, it is often a

recommendation to better meet the stringent JCAHO patient safety requirements. Some of the

2009 National Patient Safety Goals include 1) Improve the effectiveness of communication

among caregivers, 2) Improve the safety of using medications, 3) Reduce the risk of healthcare

associated infections, and 4) Accurate and completely reconcile medications across the

continuum of care (JCAHO, 2008).

Kuperman and Gibson (2003) did research on the costs, benefits and issues around

implementing CPOE. When discussing the benefits of CPOE, they said: "Computer physician

order entry affords a health care organization opportunities to standardize practice, incorporate

clinical decision support into daily practice; improve interdepartmental communication; facilitate

patient transfers; and capture data for management, research, and quality monitoring"

(Kuperman & Gibson, 2003).

Kilbridge, Classen, Bates, and Denham (2006) did a study on safety standards around

CPOE. Beyond patient safety standards, it was found that implementing CPOE successfully

improved other areas of quality. For example, greater efficiencies in patient care; preventative

healthcare reminders, such as annual female exams or immunizations; and more proactive medication and food allergy alerts. Additionally, they found medication turnaround times were much faster, and better communication was noticed between various caregivers, especially critical care patients who saw several providers during one stay. They found more reasons to implement CPOE than just medication error reduction initiatives (Kilbridge, et. al, 2006).

There are countless studies and surveys that show the positive impacts of implementing a CPOE system in a healthcare organization. Why are there so few adopters of CPOE? According to a study done in 2008, only about 15 percent of hospitals have adopted EHRs and CPOE completely, and only 17-25 percent of office-based physicians use EHRs or components of an EHR (Zandieh, Yoon-Flannery, Kuperman, Langsam, Hyman & Kaushal, 2008). It is anticipated that the EHR will not get to near maximum adoption until at least 2024.

<center>Background/Literature Review</center>

There are many reasons cited for the delay in implementing CPOE. Two of the primary reasons are costs and the magnitude of organizational change required. Implementing CPOE is a significant undertaking, and something that requires a great deal of pre-planning to ensure organizational readiness. There are many other barriers referenced, such as the organization not understanding or knowing the true cost, or understanding the true work around implementing a CPOE solution (Reed, 2007).   Healthcare organizations are often financially stretched, and each year budgetary cuts are mandated. Adding a costly, time intensive CPOE implementation when an organization is cutting everywhere else may not receive buy in from the executives and other stakeholders. Resistance to change is widespread in healthcare, especially where providers are concerned. Often, a change such as this challenges providers and the way they practice, plus,

there is a strong perception that CPOE will take more time and create more work for providers. Implementing CPOE also impacts the entire organization, so it is managing a great deal of change for a great deal of employees. Another barrier discussed is the low level of maturity of CPOE systems available to healthcare organizations. Although there are hundreds of systems to choose from, many are not mature enough or have not evolved enough to provide an "off the shelf" solution, so the majority of software solutions require a great deal of customizations, especially for use in a very complex and ever-changing environment. Another important barrier revolves around the belief of providers that their hospital administrative leaders are not working in collaboration with them but instead, change is being forced upon them (Reed, 2007).

Can implementing a CPOE system succeed? Most organizations that have implemented CPOE would likely say yes. While many of these organizations did different things to create an environment for success, there are key elements that all of these organizations insisted on including in their recipe for success as they began the daunting task of executing the type of change many organizations would shy away from. One of the key elements was to ensure there was solid leadership in place not only at an executive level, but in varying levels throughout the organization, and within the implementation team (Reed, 2007).

Reed (2007) summed it up well, when he wrote in a recent publication:

Strong leadership and vision are the keys to a successful implementation. The CEO, board of directors, and senior management must believe that technology is the key to the future. Strong leadership is also needed on the department level. Managers and staff alike understand the operations of their departments and they too must take a leadership role in the adoption of electronic solutions and change management (Reed, p. 89, 2007).

Other organizations have followed suit with Reed's recommendations, and have succeeded. In a qualitative study of physician order entry done by Ash and Bates (2002), top

level leadership support was stated as success factors for CPOE implementation. The primary objective of the study was to understand the differences of CPOE use between teaching and non-teaching hospitals, as well as knowing the perceptions of providers with diverse areas of practice. The research team used various methods to gather data, including observations and interviews with individuals with varying roles within the organizations. The research found that organizational issues such as power and control could hinder an opportunity at a successful CPOE implementation. However, the research exposed that having the necessary top-level and mid-level power balanced with the provider champions who favor the technology and do have influence positively impacted the direction of the power and control of the organization's leadership. Furthermore, add to this balance of leadership the opinion leaders, those who likely do not want to support the technology, but hold a certain level of influence, and you have captured a balanced leadership model. In the conclusion of the study, the data found that communication must be open and trusting between the administration leaders and the providers (Ash & Bates, 2002).

To take this a step further, another study by Ahmad, Teeter, Bentley, Kuehn, Kumar, Thomas and Mekhjian (2002) found that adding physician leadership and champions to the CPOE project team were vital to the buy-in and success of the overall implementation. The study looked at multi-hospital environments and the key factors that contributed to the overall success of the CPOE system implementation. Ohio State University Health Systems (OSUHS) have five hospitals and a number of clinics and provider offices. Ahmad, et al., (2002) wanted to understand what helped a complex and large healthcare system see success in implementing a fully operational CPOE system.

What the research found was that the administrative leadership at OSUHS truly understood the impact of putting leadership and ownership back on the provider. They established a formal provider champion team that took a proactive role in developing the system. The ten providers that made up the team were all required to sign a contract showing their commitment to the project. The administrative and medical leadership authorized the provider team to make procedural, policy, and design decisions around the CPOE system. Additionally, each of the providers' departments was paid a stipend to account for the extra time the providers spent outside of their normal clinical duties. Because this approach was used, the hospital received far more buy-in from the other providers because the system was essentially built by their peers. Lastly, the providers felt like they had the executive support required to help them move change forward. Even when some providers tested the implementation by attempting to go back to the manual method, the provider leaders and executive support stood firm, by backing up policy and avoided any potential user revolt, similar to what has been seen at a few hospitals that did not fare so well in their CPOE implementation (Ahmad, Teeter, Bentley, Kuehn, Kumar, Thomas & Mekhjian, 2002).

In an article written by John Halamka, M.D. (2008), he goes into a list of what works and what does not if an organization is going to take on a CPOE implementation. Halamka (2008) referenced Cedars Sinai hospital in Los Angeles, California, and the failure they had in implementing CPOE. Cedars Sinai is considered to be one of the most forward-thinking healthcare organizations when it comes to patient care, so it was a surprise that they failed with CPOE. One of the failure points Halamka (2008) listed was around system selection. The administration of Cedars Sinai developed their system, and then they tried to push it on the

providers. They had no provider input, so they had no buy-in from the providers when it came time to start using CPOE. It was made worse when providers learned that administration was planning on selling the CPOE system, so it seemed that it had also become a potential financial windfall for administration. There is more buy-in, pride, and satisfaction from providers when an organization approaches CPOE with leaders from all areas of the hospital, and engages those individuals together to select a CPOE system.   Providers feel more satisfied knowing they are getting what they want because they were part of the planning, design, and implementation of that system (Halamka, 2008).

Joan Ash and David Bates (2005) have done a great deal of research on the EHR and CPOE. One of Ash's studies incorporated discussion that took place during the American College of Medical Informatics 2004 retreat. One of the sessions that took place was a discussion about the actual implementations of an EHR and what it takes to adopt an EHR in an organization. One of the key points shared during this discussion was around the organizational culture and whether it has evolved enough to be successful in the implementation of CPOE. If providers do not have the experience of having a sense of trust and partnership with their hospital leadership, then the organization is likely not ready for a CPOE implementation. Ash and Bates' study echoed previous studies where if providers felt the hospital leadership was forcing them to use CPOE, they would resist. But, the study also found that if the push came from other providers and clinicians, the remaining providers may be more willing and ready to move to CPOE (Ash & Bates, 2005).

Another similarity Ash and Bates (2005) bring up is around hospitals ensuring provider or clinical leaders are in place from the beginning, before a system is even selected. This

includes having a chief medical information officer available to the project team as soon as possible prior to the implementation. The study also recommends that the project team members have the ability to understand both technical and clinical components of CPOE (Ash & Bates, 2005).

Poon, Blumenthal, Tonushree, Honour, Bates, and Kaushal (2004), wanted to take a closer look at the barriers to implementing CPOE. Many studies reflected a positive increase in patient safety with the use of CPOE, but they also found most healthcare organizations simply had not implemented CPOE. Their study took a look at seventy two hospitals initially, and in the end, interviewed fifty two individuals at twenty six hospitals. Among many questions, some of the key questions were around identifying the top three barriers and facilitators to adopting CPOE, as well as ways that were used to overcome the barriers (Poon, et. al, 2004).

The research found the number one barrier to CPOE adoption was provider and organization resistance. The resistance from providers was focused mostly on the perception that workflow would be negatively impacted with CPOE. During the survey, the research team uncovered several strategies to overcome the primary barriers. The first of these strategies was pure, simple leadership. In fact, strong leadership was a recurring theme in nearly all of the interviews completed. According to the interviews, leadership must be fully committed to CPOE, must be on top of change management, be empowered to ensure compliance with using the system. Leadership must consistently continue to push the organization's vision and criteria for implementing CPOE in the first place, regardless if the path seems extremely difficult at times (Poon, et. al, 2004).

Another recurring theme which surfaced during the research done by Poon, et al (2004) was around identifying provider champions or leaders to spearhead and facilitate the organizational change. The study suggested that the selected champions should be providers respected by their colleagues. The providers have a keen understanding of the provider workflow and how to fit that workflow with an electronic ordering process. Additionally, the providers should be at the table when selecting a CPOE system to ensure early participation and buy-in.

In a recent presentation done by Ann Walsh of Navin, Haffty, and Associates, LLC (2008), one of the key ideas gained from countless CPOE implementations was that a CPOE implementation should not be solely in the hands, or initiated by, the organization's Chief Information Officer. Alternatively, the implementation should not be driven by the Chief Medical Informatics Officer.   A combined organizational approach should be taken, which means many leaders throughout the organization participate and drive the implementation together. Another point Walsh brings up is that the effort should never be driven by the information technology department. Walsh also iterates the importance of recruiting provider champions to act as a liaison between other providers and the information technology team responsible for building and deploying the new CPOE system. Lastly, Walsh discusses the notion of a governance structure, often termed Steering Committee, or some other type of oversight. Individuals included in the oversight should be those that represent the organization through senior leadership roles, medical executive committee participants, board level, and provider level participation.

In the Kilbridge, Classen, Bates, and Denham (2006) CPOE patient safety standards research, they found those who were successful in implementing CPOE ensured senior level leadership commitment to both the implementation and the costs associated with implementing CPOE. These successful organizations also required the involvement of providers as the primary decision-makers and champions of CPOE, plus ensuring that multi-disciplinary levels of leadership, including nursing, ancillary, and technical leadership, were a part of the overall strategy, planning and final implementation of CPOE.

In a recent presentation done by Dr. Sarah Chouinard (2007), she discussed the model used with the Community Health Network of West Virginia, a rural network of clinics. It was decided that they would have a project leader and three other leaders that made up the project leadership team. Those leaders represented the business, technical and clinical areas of the organization. Chouinard's emphasis was placed on the clinical leader, and the high level of commitment required implementing CPOE through each separate clinic within the overall organization. The model required a clinical leader from each clinic, and other providers and supporting staff to facilitate the implementation of CPOE. The overall structure of the leadership team, and the supporting team enabled an environment where implementing CPOE was successful, and viewed positively by the users and recipients of care.

There are other countless examples of successful CPOE implementations due to appropriate leadership being in place, committed, and available. Summa Health Systems, of Akron Ohio recently successfully implemented CPOE with 100% usage (Ross & Banchy, 2007). The CPOE implementation was deployed at two different campuses – Akron City Hospital, and St. Thomas Hospital, with 1,200 physicians, 200 residents, roughly 1,000 beds, 35,000 hospital

admissions, and 100,000 emergency department visits each year. The writers of the publication, Charles Ross, M.D., and Pamela Banchy, R.N. (2007), summarized that the key to their success was the fact they had strong support from their leadership. The steering committee that made most of the most critical decisions was represented by a combination of clinical and administrative leadership, including the Chief Medical Information Officer, Director of Clinical Information Services, VP of Medical Affairs, Chief Nursing Officer, Chief Financial Officer, and directors of finance, pharmacy, radiology and laboratory services. The leadership team often met with the clinical staff and project team members, and stayed intimately involved during the entire implementation, and afterwards as well. The steering committee established a physician focus group, which also proved to be successful. This helped the physicians, ultimately the primary users of the system, to feel involved and accepting of their new world. Now that the hospitals have been using CPOE for some time, they have found that the use of order sets increased to 90 percent compared to the much lower 12 percent usage rate with paper order sets. Also, the sliding scales implemented in the EHR were used 93 percent of the time, compared to the pre-EHR 5 percent. They believe the organization has also dramatically reduced the duplicate laboratory and radiology orders, and allergic reactions and drug interactions have been reduced significantly. From a financial perspective, it is believed they recouped costs associated with the implementation within one year's time frame, in part, due to the shortening of the average length of patient stay once admitted to the hospital (Ross & Banchy, 2007).

It is clear that when implementing CPOE, provider and administrative leadership being involved from the beginning and throughout the entire project is vital to the overall success of the implementation.

What is leadership, and what characteristics or traits are essential to the success of a

CPOE implementation? According to the Center for Leadership Studies at Augsburg College,

their model points out three main areas of focus, including Sense of Vision, Orientation Toward

Action, and Facility for Persuasion. Persons desiring leadership roles should have these three

attributes among many underlying abilities within each of these three main focus areas. Some of

these underlying abilities are critical when participating as a leader in a CPOE implementation,

such as Creativity, Communicative, Decisive, and Risk Assumptive (Augsburg College, 1987).

David Campbell, author of *Take the Road to Creativity and Get off Your Dead End*

(1977), helps readers to understand thinking outside of the box, and tapping into their unique

creativeness. His foreword contains the following excerpt:

> Bringing something new into existence is one of life's most exquisite joys; whether it is a
> new machine, a new idea, a new recipe, a new song, a new person, a new garden, or a
> new political program, our creation has our own stamp on it, and the parental pride is
> almost intoxicating.

One very large aspect of a CPOE implementation is the fact that the organization will

experience enormous change. Change requires a solid leadership base to not only move forward,

but gain acceptance and positive attitudes around the change. If an individual is a really strong

leader, they have the ability to empower others to grasp change and instill that change in their

peers through their own creativity. Within Campbell's book, he has exercises that help readers

to think differently about their own creativity and approach to change and issue resolution. One

exercise that makes quite an impression on participants, according to Campbell, is an exercise

where a wheelbarrow is drawn with only one wheel at the back, and a very long hopper, and the

handle is in an atypical location. In the exercise, the participant is supposed to write five

comments on this new design for a wheelbarrow. The typical response is not mere comments,

but rather negative feedback on why the wheelbarrow won't work, which is precisely where

Campbell wants to take the reader. What is even more interesting is that when this exercise was

given to children under the age of ten, the children all came up with innovative ways the

wheelbarrow could be used in the design as shown. Campbell's message is simple and clear

once the participant completes the exercise. Campbell points out that people often miss

opportunities to come up with a great solution because they focus so much time on the negative

aspects of the issue, rather than the opportunity in front of them (Campbell, 1977).

When it comes to implementing CPOE, not only does creativity help the organization

start to embrace the change they are about to experience, but it also helps within the confines of

the implementation as issues arise that need resolution. Learning to think and behave creatively

and empowering this within others will allow for a more productive change management

process, and an overall successful CPOE implementation.

Campbell (1977) discusses some of the features of a creative process, and upon applying

some of these features; the same can be applied in any project. Campbell's features of the

creative process include: 1) the pressure to continue straight ahead; 2) the ultimate dead end

ahead; 3) taking the torturous route, meaning going down the more dangerous paths, without

roadmaps, without guides, etc., before finding the right solution; 4) the occasional "lucky"

shortcut for finding the best solution; 5) the necessary change of direction needed to find the

solution; and 6) the surprising simplicity of the solution, when you look backwards at how you

actually came to your final resolution.

What kind of characteristics do creative people have? According to Campbell (1977), the

characteristics of creative people fall into three primary categories, essential characteristics,

enabling characteristics, and subsidiary characteristics. Under the essential categories are: mental agility - convergent thinking, mental agility – divergent thinking, conceptual flexibility, originality, a preference for complexity over simplicity, stimulating backgrounds, and multiple skills.

To explain it further, Campbell (1977) describes each of these characteristics in more detail. When he describes mental agility-convergent thinking, he explains that creative people tend to have the ability to amuse themselves with different ideas, concepts, symbols or words, and they are usually able to see atypical relationships between them. With convergent thinking, they partner up the ability to see ideas and concepts and to marry them to the many pertinent facts they are able to dissect and put into use. With mental agility – divergent thinking, creative people have the ability to approach an idea from many different angles, with the outcome creating several different possible solutions to a problem.

Another characteristic Campbell (1977) discusses is conceptual flexibility. By having this ability, an individual has the capacity and flexibility to switch direction or their approach very easily and on impulse. Very closely tied to being able to conceptualize outside of the box easily, creative types are able to come up with unusual and original ideas, thus the originality characteristic Campbell writes about. Creative individuals also have a preference for complexity over simplicity. Campbell quotes Frank Barron, a University of California psychologist, "The preference for complexity allows the greatest possible richness of experience, even though discord and disorder result" (quoted in Campbell, p. 52).

Creative people often have stimulating backgrounds, meaning, they have spent many hours of their lives hanging around people who give them learning opportunities, and the types

of experiences that provide different aspects to life. The last characteristic Campbell discusses under the essential characteristics of creative people is the gift of having multiple skills. Campbell writes that people who have different skill sets rarely get trapped on a single path, and they often have many paths they can take as they make their way through life. Often, because of their multiple skills, each skill is enhanced to a different degree. The analogy Campbell gives is very enlightening. Campbell states, "to have only one skill forces you into a narrow approach to the world. People who are only good with hammers see every problem as a nail" (Campbell, 1977).

The next group of characteristics discussed in Campbell's book are the enabling characteristics: 1) the capacity for hard work, 2) independent judgment, 3) resilience, 4) good communication, 5) interested more in concepts than in details, 6) intellectually curious, 7) playful and spontaneous, 8) avoidance of early self-criticism with their ideas, and lastly, 9) sense of destiny (Campbell, 1977).

Simply put, when one asks an individual considered to be creative how they describe themselves, most creative people will tell you they work harder than most, and often, their work takes up most of their daily lives. In regards to independent judgment, most creative people have a very strong sense of individuality, and they are always able to make their own decisions and trust their own conclusions. The third characteristic Campbell puts under the enabling category is resilience. Most creative individuals do not concern themselves with what others think of them and they rarely get discouraged by failures (Campbell, 1977).

One critical component of a good leader is having the ability to communicate well. This is also true of creative people. To let people know of your ideas and concepts, the ability to

communicate them is critical, otherwise, they are just ideas, and they go away. Most leaders do not get bogged down with the details, which is a trait commonly held by creative individuals. Creative people are simply more interested in the concept rather than the details surrounding the concept. They would rather get to the overall solution and deal with the details of getting there later (Campbell, 1977).

Campbell believes creative individuals are often intellectually curious. Leaders make much better leaders when they have this characteristic. Individuals with this characteristic are always asking questions about their environment, or their situation, or their world. It's the power of inquisition that leads to an enhanced sense of being, and provides enhancement to other skills and outlets of their lives (Campbell, 1977).

Creative people are playful and spontaneous. They do not necessarily always behave like an adult. This can provide them access to a greater variety of life experiences more than the non-creative type. The non-creative type usually plays by the rules, and they will not let themselves take part in their more playful side or be spontaneous with their lives (Campbell, 1977).

The last two characteristics found within Campbell's enabling group are avoidance of early self-criticism, and a sense of destiny. Campbell believes that when creative people have a new concept or idea, they continue to play with it and dig into it, regardless of its inadequacies or issues. Along with this, when the creative individual approaches life, they look at it as if they are the person with the idea and according to Campbell, "creating is their fate and was meant to be" (Campbell, 1977).

Last of the three groups of characteristics, Campbell brings up the subsidiary group. Campbell states that these characteristics have little to do with creation itself; but rather they

impact the innovator's behavior. Often, creative individuals have qualities about them that other people who may have any interaction with them might find difficult to deal with, and somewhat unpredictable. These qualities within the subsidiary group are: 1) unconcern over what others think, and 2) psychological turbulence (Campbell, 1977).

Campbell believes creative people always think for themselves, and really do not care what others think about them, or about their ideas. In turn, they often come across as insensitive and uncaring toward individuals they interact with. Lastly, because creative types live their lives with complexity, they have strong voices and opinions, and come across uncaring and impulsive. Campbell says these individuals are often "in the midst of psychological turbulence" (Campbell, 1977). They live by their own rules and have different ways of taking in information and processing that information than the rest of the world. This causes them issues in their personal and public lives, leading to disruption, and often life-altering changes (Campbell, 1977).

Lastly, Campbell discusses the various blocks that can affect organizations, and organizational change. Campbell writes about seven different blocks that affect organizations, which are: 1) fear of failure; 2) a preoccupation with order and tradition; 3) resource myopia; 4) overcertainty; 5) reluctance to exert influence; and 6) reluctance to play (Campbell, 1977).

Campbell (1977) believes organizations are impacted negatively by fear of failure in three different manners. He says there is difficulty pinpointing who should be rewarded and for what. Secondly, there is pressure created for immediate success. Lastly, an organization ends up with predictable outcomes. Campbell discusses the phenomenon that within most organizations, the reward for failure is much more negative and impacting than the reward for success or simply doing nothing at all. The result is that the organization's employees end up taking the safer path

for fear of losing their job. This does not promote growth and organizational change (Campbell 1977).

Additionally, organizations often want to see the immediate outcome and results. Campbell believes that because it takes a much longer time with many people to achieve success, and only a short amount of time to fail, with usually one person to blame for the failure, organizations often opt for the short-term project, or the "quick win" that will produce something. That "something" is usually a more ordinary accomplishment, with little failure. It is a safer route to go, but the outcome is far less creative and changing. Both of these create an environment of predictability. Most organizations and the people in them do not like surprises or unexpected change. This creates an environment where routine, scheduled structure abounds, and there is little room for innovation, creativity, and opportunity. It allows for a lesser chance of failure, but there is little opportunity for growth and change, which is needed if an organization doesn't want to suffocate (Campbell, 1977).

Probably the number one creative block Campbell discusses that is prevalent in healthcare is the preoccupation with order and tradition, especially with the clinical providers. In this scenario, everything must happen by the book and with order. Healthcare organizations often move forward without really moving anywhere because they have the notion that things should be done the way they have always been done. Order and tradition promote dormancy and the elimination of any emotional attachment. There is no room or opportunity for change or improvements with this philosophy rampant within an organization. And while order and tradition are not always bad and can still be incorporated into overall organizational change, an

organization should never continue a process or methodology only because it's what has always been done (Campbell, 1977).

The last creativity block Campbell writes about which impacts the healthcare industry is around the reluctance to exert influence. In healthcare organizations, there are usually some very strong personalities within the provider arena. Often, they are the most resistant to change, and reluctant to allowing others to share their creative and innovative ideas. With this type of environment, those with great ideas often are not strong or forceful enough to push their idea through to acceptance and inception as they fear they will be shot down, with the ramifications that they may be considered a trouble maker. Campbell states, "organizations are only as innovative as their most dominant people; ideas from others are lost in the 'I'm going to rock the boat' swamp" (Campbell, 1977).

In a healthcare setting, especially one where CPOE is being implemented, it is important for the leaders of the organization to have characteristics that allow for positive change and growth. In his list, Campbell includes: "1) willing to absorb risks taken on by subordinates, 2) comfortable with half-developed ideas and the process to bring them to the next level, 3) willing to 'stretch' company policy, 4) ability to make quick decisions, 5) good listener, 6) doesn't dwell on mistakes, 7) enjoys their own job, and 8) ensures the work setting is best for their team" (Campbell, 1977).

As for the creative organization, a combination of rigid, more structured and traditional employees along with more innovative, chaotic, and less structured employees creates the best environment to create, develop, and implement organizational change. This mix of dynamics is true both for leaders and non-leaders within the organization (Campbell, 1977).

Another key point Campbell discusses which is meaningful for healthcare organizations implementing CPOE focuses on risk taking. Healthcare organizations inherently take on risk both financially and intellectually when implementing CPOE. An organization must be willing to put themselves into a more risky position than they may otherwise if they are to be successful with a CPOE implementation. At first, the financial aspect seems unrealistic and unnecessary, but studies have shown, time after time, if implemented successfully, CPOE will pay for itself within a three to five year timeframe. Many organizations have seen the payoff as soon as within one year's time. Once an organization takes that financial risk, one benefit is the increase of talents and assets that organization brings to the industry, as they are expanding their horizons and implementing change. Of course, with the positive impacts of risk taking, the negative impact could be the loss of revenue if the CPOE implementation fails. The negative impact of the financial failure may also impact change within that organization in the future (Campbell, 1977).

A second type of risk Campbell discusses that is pertinent to healthcare organizations implementing CPOE is that of intellectual risk. By taking on intellectual risk, that organization is submitting themselves to new ideas and major changes to their every-day procedures and work structure. Campbell points out some of the benefits gained by taking intellectual risk, including the excitement around the new way of thinking, the ability to create an environment that is more able to adapt to abrupt change or significant alteration of the environment, and that capability to maintain or increase their competitive edge within the industry. The downside to intellectual risk-taking really points to the fact that providers have a learning curve they must overcome, and

during this time period, they must ensure patient safety is their primary concern, while still attempting to learn their new workflow (Campbell, 1977).

One of the most critical components of a CPOE implementation is accepting the magnitude of change expected. The rollout of CPOE requires a leadership team that is capable of taking themselves out of their normal environment, and they must begin to understand what their new world will look like long before the rest of the organization is in the throes of change.

Organizations implementing CPOE most often experience chaos during and after the implementation. There are a number of leadership experts that agree chaos is needed in order to foster change and create new order.

In Margaret Wheatley's book, _Leadership and the New Science_, Wheatley focuses on change and order, but change being propagated by chaos, which can be understood by looking more closely at nature and how nature organizes through chaos (Wheatley, 2001). Wheatley writes about organizations and their lack of faith and their fear of chaos and change. Organizations are often resistant to change and chaos, and the individuals in these organizations want control. She references nature being a source available for us to learn more about chaos and order. According to Wheatley, "nature is a living system" and "organizations are living systems" (Wheatley, 2001). According to Eric Jantsch, any living system is "a never resting structure that constantly seeks its own self-renewal" (Wheatley, p. 20). A system needs to change in order to sustain itself. Within that system, each participant maintains their own identity as an individual within this larger network of relationships. If something new is introduced to that system, it will cause change and will play a role in creating new order. If new information is introduced but is recognized and engaged within that

organization, the information will grow and change and so will the organization (Wheatley, 2001).

When organizations encounter confusion, or chaos and disruptions, this is often looked at as a negative thing. However, Wheatley argues that it is a positive phenomenon, and can be viewed as an opportunity and is pertinent in the role it plays to foster change. Too many organizations fear disorder, and they fail to recognize that order and disorder can co-exist, and usually do (Wheatley, 2001).

Wheatley also discusses the concept that having an organization that is well centered and understands its value and purpose is more readily able to handle chaos. Organizations need to give up the "old" way of thinking, and get out of their comfort zone. They can realize they may gain more by giving up their view of knowing and tradition, and stay "curious rather than certain". As quoted from Wheatley, "Organizations need to change their thinking at the most basic level....at the global level" (Wheatley, 2001). This way of thinking is a great deal of change for most, and with it comes the fear of change. Our world and our culture are constantly moving through chaos. Having the relationships within our "system" is important and needed for successful change and newfound order from what started as chaos.

Although chaos is often looked at as a negative force, in reality it fosters growth and offers an opportunity for an organization to renew and revitalize itself. Wheatley mentions that chaos usually partners with order, which goes against what we understand chaos to be. If a system or organization hits a point of instability, it usually waivers between two planes, steady and chaos. Once this phase has passed, the system is in a state of chaos. From chaos, the "strange attractor" emerges, and we have somehow found new order. If we focus on the

individual experiences, we fail to see the whole, which equates to order. Focusing on the individual experiences shows us only chaos. Chaos, if recognized as a positive, will help to remove organizations from their old patterns and expose new patterns, which gives organizations the opportunity to recreate themselves or their system (Wheatley, 2001).

One concept Wheatley examines is around iteration, and that iteration is part of the chaos theory, and with it comes chaos and order. Wheatley also talks about fractals, which are both natural and human made. Fractals are patterns within patterns within patterns. There is never any end to the creation of these shapes. Fractals are seen in the way nature organizes such things as plants, clouds, or waterfalls. Fractals have iteration upon iteration of patterns. It is not one single pattern that makes the fractal, but the multitude of the patterns, or iterations, the same iterations that create change and new order. In organizations, we need to recognize the value of iterations, and take the whole of our chaos, and not just the individual parts. The whole is what will help the organization to renew and reinvent (Wheatley, 2001).

What once was believed to be empty, our universe, our space, is now thought to be filled with fields, non-material, invisible factors that play a role as a primary substance of our universe. These fields cannot be seen, but we can see the effects the fields have on our "system." Early on in the art of science, both Einstein and Newton began defining fields, by way of gravity and the relativity theory. In our world today, we experience these fields through magnetization, or sonar radar, or even within our own homes and the electricity we use. Electrons are moving through the air. Our lights work, so we know the effects of these invisible fields we do not see. In an organization, we can never see a field, but we can feel its influence by observing and understanding the underlying behavior. Wheatley states that "organizational behavior is

influenced by the invisible" (Wheatley, p. 56). Vision is another example of an invisible field. Vision can help an organization recreate itself. As an individual in an organization, we need to fill those spaces with positive messages, vision, or any other invisible fields of which we intend to use for the movement toward change and new order (Wheatley, 2001).

As healthcare organizations begin to immerse themselves into the information technology world, awareness of how they use the information is critical to the success of patient care. In organizations, Wheatley says that we treat information as a thing, a material matter, as if you could touch it. Because of this perception and treatment of information, we, within our organizations, fail to recognize the behaviors, content and character of that information, which is risky for providers in the healthcare industry. Information is much more than what is sent in a text message or left on a voice mail. It is a dynamic, changing component in our universe. According to Wheatley, information is a necessity in order to reach new order. Information forms and informs us, just as it is spelled, "in-formation." Information is managing us, in a way that we cannot touch, see, or grab. Once organizations begin to understand how information is managing and controlling each individual, they may be better able to use information as an ally and a way to create new order within their work environment (Wheatley, 2001).

In many organizations, change equates to fear. We try to manage and control change instead of working with change. Because we treat organizations as machines, we continue to see how change can have a positive impact, and organizations continue to fail in their efforts around implementing change. When it comes to implementing change, organizations focus primarily on the physical aspect and size of the change. Why are organizations so resistant to working with change? Our world is constantly changing, and becomes more resilient with change. Wheatley

believes that in order to embrace and work with change, organizations need to change their way of thinking. They need to come out of their silos and stop focusing on the parts of a system, and focus on the whole of the system. They need to begin to understand all of the dynamics that are found within those parts of the system, but ensuring they are integrating those dynamics to the whole of the system. Our brains work in a different capacity, and instead of pulling in the whole, we tend to analyze in a much narrower frame of reference. The challenge is that although organizations must look at the parts as a whole, they must also recognize the differences and the varying contributions each part has to make the whole (Wheatley, 2001).

<center>Research Background and Methodology/Assumptions</center>

Many hospitals have recently either implemented an EHR or are in the process of implementing a system. Research was done around the statement that provider and administrative leadership are critical to the success of a CPOE implementation. The research was done using a Twin Cities hospital which recently implemented an EHR and, subsequently, CPOE. This hospital has roughly 1200 physicians, 150 residents, and 130 mid-level providers either employed or contracted to work at the organization. The facility is licensed for 400+ beds, and has roughly 2500 ER visits per month.

The organization already had a system that allowed for Clinical Order Entry (COE), which was used primarily by nursing and unit clerical staff. Most orders were initiated by the provider either verbally, or via paper to nursing. If the order was initiated via paper, the unit clerk would enter the orders into the COE system. If the order was a verbal order, the nurse would enter the order into the COE system, and a final signature would be required by the provider initiating the order. All ancillary services, such as lab, pharmacy, radiology, physical

therapy, etc. would receive their orders via paper. All orders with results would print out in paper and would be filed to the paper chart. Although the idea of entering orders into an electronic system was not a new concept, having the providers enter them was a significant change from their COE process.

The organization selected Epic, an organization that had a comprehensive EHR, which also had a solid history of CPOE implementations. The organization selected a steering committee that was made up of ancillary directors, the chief executive officer (CEO), chief information officer (CIO), chief nursing officer (CNO), and vice president of medical affairs (VPMA). Additionally, a physician advisory council was put in place that was led by the VPMA and was attended by one representative from each primary care area and specialty area (orthopedics, surgery, pediatrics, etc.). This group was responsible for the development of order sets, decisions around specific orders, and overall workflow for their specialty. Also participating in both of these committees were the program manager and the project manager for the overall project. They were the tie-in to the project team and the day-to-day work. The project team was made up of various individuals with a variety of expertise. There were some clinical team members, who had nursing or other care giving experience, as well as information technology team members whose area of expertise fell on the technical build of the application. Additionally, the team was completed with a core group of trainers who were responsible for training the entire staff of the hospital.

The hospital decided to go with a "big bang" implementation, meaning every unit and every employee would go up at the same time with CPOE. There were roughly 360 super users who were trained extensively and also performed training and comprehension testing to staff.

These super users were assigned to support end users during the implementation and for the duration of four weeks after the first date of production. Lastly, on the first day of production and for four weeks thereafter, a command center was set up with roughly 6-20 support staff to answer phone calls and to manage issues and issue resolution.

A qualitative methodology was used to gather data for the research. Initially, the approach was to perform a web-based questionnaire that would be sent to several hundred participants. However, the organization did not approve this type of research, so an alternative approach was taken. The alternative approach to this research was to interview individuals that were either a key part of the project or leaders during the time of the implementation.

The participants selected came from various roles within the organization, including leaders, clinical super users, and project team members. A recruitment letter requesting participation in the research was sent to these specific groups via email, with only ten individuals accepting. Prior to the interview, each participant signed consent documentation relative to participating in the research.

The interviews were conducted with each participant separately, and notes were taken during each interview. The participants' answers were documented by hand on paper. The questions in the interview were primarily focused around the leadership involvement in the project. Those questions asked were directed at whether the participant felt the leadership was involved and supportive during the implementation and whether or not they felt the leadership involvement and support made a difference in the overall success of the project.

Various assumptions were made about the outcome of the research. First and foremost, that many members of the senior leadership group did not participate as leaders in the project

until very late in the implementation. Secondly, there were certain smaller groups of leaders that made themselves available and supportive throughout the implementation. Third, leadership was not consistent throughout the duration of the implementation. Lastly, provider engagement and leadership was lacking during the implementation.

Results and Findings

All participants were asked whether they felt that provider leadership was engaged throughout the entirety of the project. Unanimously, all participants felt that in concept, the provider leadership group was in place early enough. But in reality, the group would normally meet only once per month, and the meetings were usually around complaints relative to the implementation and the product being deployed. The meetings were rarely productive, and demands were often made by the providers that caused re-building of the product in many cases. Two of the research participants stated they recall an incident where the monthly provider meeting was productive and a discussion between nursing and providers was initiated to discuss the workflow around provider verbal orders and who would be responsible for entering those orders. There was a consistent fear by nursing that providers would merely go around the corner and call in their orders to the nurse and she would get stuck entering orders. By discussing the issue together with the project leadership, both groups felt they gained the position they were seeking and came to an agreement on what the workflow would be.

Another question asked of the research participants was around whether the physician champion leader was the right leader for the job; did the individual have the qualities needed, such as peer respect, vision and innovation, strong communication and the ability to stand firm on decisions made by him/her, or the steering committee? They all felt that the initial provider

selected did not have most of the qualities to be selected as the leader. All respondents felt that s/he was not well respected, and some stated his/her communication skills were lacking. S/he primarily focused on one aspect of the product that was not even to be implemented, or did not rally the troops and stand by decisions made by the steering committee. Furthermore, s/he was rarely able to make a decision on behalf of his/her fellow providers. To take it a step further, when respondents were asked whether the physician champions, whom reported to the physician champion leader chosen for their specialty were the right leaders, most said yes, but felt they may not be the most influential leader to represent their peers.

Research participants were asked whether they felt that the administrative hospital leadership was engaged throughout the project. All research participants stated that administrative leadership was rarely engaged. As a follow up to that question, the research participants were asked if leadership was engaged early enough in the project. All respondents stated that the when the administrative leadership finally did get engaged, it was three months before the production date of CPOE. And, while the leadership steering committee met once per month, the hospital continued to trudge through many initiatives that should have been postponed. This was the largest organizational change the hospital had ever experienced and no focus was put on the project whatsoever by the senior level leaders until they were asked to start committing to the project. Toward the end of the implementation, they did see much more support from leadership, as they attended training sessions and signed up for production support duty, but the respondents of the questions felt that it was too little, too late. A couple of the respondents added that the administrative leaders had a negative impact on the overall implementation as they clearly did not have an understanding of what was really needed, such as

mandating physician order entry with the consequences of not being able to practice at the hospital. Or, the sheer impact the implementation would have on patient care, and the providers and nurses needing to focus on patient care and learning a new system and new workflow.

Another inquiry to the respondents was whether they felt that the nursing leadership had been involved early enough and often enough during the implementation. All felt that nursing leadership was engaged early enough into the project, and when it came to matters that pertained specifically to nursing and the nursing/unit clerk workflow, they were very engaged and supportive. Their impact overall was neutral. There were some nursing leaders that didn't always understand the full picture of the software. At certain points during the implementation, some nursing leaders would escalate issues that did not merit escalation. This caused timeline issues, and anxiety within the project team. This particular incident had a negative impact, but by far, nursing leadership and nursing support was the most involved during the production period according to respondents.

Research participants were asked about the involvement of ancillary leadership, or those leaders that represent the lab, radiology, and other patient care service areas. The respondents felt that while the leaders attended the meetings frequently, they added very little value to those meetings. However, for the detailed aspects of the project, such as the day to day workflow, and the software build, the ancillary leaders did choose the appropriate people to provide the feedback and information needed to build the system accurately. These ancillary leaders had a neutral impact on the overall implementation as most of their departments' workflow changed very little. They were only the recipients of the orders and were still able to print the orders out as they had always done.

When asked what leadership did to help the project succeed, one of the respondents answered "I felt leadership did a good job of supporting the staff throughout the major change". Another respondent felt that leadership best supported the success by sticking to their original mandated statement of allowing no paper for orders unless the CPOE system was down.

The respondents were then asked what didn't work for leadership. One individual felt that although leadership mandated training, they never stood by this and there were a number of providers that never received any training. Another individual felt that the leadership team did not really understand the CPOE system and the advocacy required for the system, not at least until it was too late in the implementation.

Another question asked was if the implementation were to start all over, what could be done differently to have a more positive impact on the overall success of the implementation. The answers varied, with one of them advising that once the project team gets engaged, it must stay engaged. During a two to four year project, frequently, project team members come and go, which compromised stability and engagement. Another respondent suggested that there be fewer provider champions, and only select those champions that truly understand what it takes to build a CPOE system and what it takes to implement and maintain that system based on past experience with clinical informatics systems. It was also suggested that a provider champion be well-respected by their peers, and have the ability to communicate and make decisions they will stand by. Lastly, a respondent suggested that the engagement of workflow discussion with ordering users (providers, nurses, ancillary staff) should have started much earlier in the process.

The final question was geared around what should be done the same as what was done at this facility during CPOE implementation, and all respondents answered that the move of the

hospital leadership to implement 24 x 7 on-site system support helped gain provider buy-in and acceptance toward the end of the implementation.

In summary, all respondents felt that the project went incredibly well, and much better than ever expected, even though the leadership support was lacking and unavailable. There were many things that went well, and there were many leaders that were involved that helped the implementation succeed. Ultimately, the leaders within the trenches of the project were the primary reason for the success of the CPOE implementation.

Summary and Conclusions

The research strongly supports the importance of ensuring solid and consistent provider and administrative leadership is in place prior to, during and after a CPOE implementation.

Although most healthcare organizations have not yet begun down the path of implementing an EHR, let alone the CPOE component of an EHR, there are many lessons of failure and success that clearly point out that the top reason as to whether a CPOE project succeeds or fails points directly to the leadership that was not, or was in place during the implementation.

The research clearly supports that not only does the project leadership need to be in place early on, during the pre-planning stages and throughout the project, but that certain qualities and characteristics should be a part of that leadership team. For instance, as supported in Margaret Wheatley's *Leadership and the New Science* (2001), as a provider leader, one must be able to offer vision and guidance along with helping their peers to look outside of their normal world and normal workflow to understand and embrace the new age of greater patient safety measures, cost reduction for insurers and patients, and improved continuity of care for the patient. The

leader must be able to communicate with his peers and other leaders, and be a risk-taker to achieve what will likely be the greatest change and challenge the organization will ever see, which is echoed in David Campbell's *Take the Road to Creativity and Get Off Your Dead End* (1977). To further support this concept, one research participant stated "our [provider leader] was unsuccessful with communicating to [his/her] peers which then caused a lack of participation and the commitment to use CPOE by the other providers".

As for the administrative leaders of a healthcare organization looking to implement CPOE, they must be supportive, visionary, and risk-takers as well. The message must not come down from them to the providers, as providers will feel this new change is being forced upon them. Similar to what both Campbell (1977) and Wheatley (2001) discuss - leaders must work collaboratively to bring the organization to recognize that change is needed, accept and embrace that the change is coming, and support the change through its implementation and beyond. Cedars Sanai Medical Center experienced this very same problem, and during their first attempt at implementing CPOE, they failed (Halamka, 2008). However, since that time, the organization has understood what is needed from both administrative and provider leadership in order to be successful, and have now experienced greater success with the second CPOE implementation.

Both Campbell (1977) and Wheatley (2001) address change and its many barriers. The authors discuss what leaders can do to facilitate a more positive and enduring path during organizational change. Change is one of the most difficult barriers most organizations will face, and in the healthcare industry, implementing an EHR and CPOE is a daunting, scary, and risky change, but if done with the right leadership it may be the best decision the organization put their energy behind.

While doing this research, there were some limitations to overcome, but the leading limitation was the restriction around accessibility allowed to research participants. The organization prohibited carrying out the type of research originally planned due to security and privacy issues. This was overcome by changing the research approach, and the intended participants.

As the EHR continues to be implemented more widely throughout the country, additional research may be done on long-term use of CPOE, and its long-term patient safety and continuity of care impacts. This type of research may help other healthcare organizations interested in pursuing CPOE to understand how they may implement a system more efficiently and with fewer impacts to staff and patients. Additionally, research may be done to identify areas that need further attention by EHR vendors as they continue to improve and enhance their products.

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