

CLINICAL SYSTEM IMPLEMENTATION

Are You Ready?

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As you walk out of your weekly clinical nurse managers' meeting, trying to digest the director's announcement that hospital managers will be selecting and implementing a new clinical information system throughout the organization, you may be thinking, "This is going to be a mess for my unit. These computer systems never do what they promise. How am I going to tell my staff members that they have to do extra work to implement a computer system? Where do I start?"

Implementation of clinical information system technology is occurring at a rapid pace in many health care practice settings today. In the perioperative setting, "new generation" surgical systems promise automation of the perioperative process in real time and integrate it to improve patient care, outcomes analysis, and financial outcomes.¹ In today's complex health industry, improving the efficiency of operations and patient care should be the basis for decisions to implement technology.² Although health care organizations are investing significant time, money, and human resources to upgrade or implement clinical systems, many of these projects fail.³

Often, project failures occur because organizations do not communicate the big picture of the project to staff members throughout the department and do not review and revise current operational departmental processes. In addition, an adequate assessment of the information technology proficiency of the staff members who will be system end users

is not performed, consequently reducing the effectiveness of clinical system training. Lastly, these projects fail because they are perceived by health care administrators as relatively simplistic software installations rather than time-consuming and complex projects that require complex planning and project management skills.

A disturbing trend in health care is the staffing

shortage, especially regarding nurses. The shortage is predicted to increase, with some estimates of a shortfall of 500,000 nurses by 2020.⁴ Many clinical managers already face daily challenges in dealing with clinical staffing issues; adding technology implementation to their responsibilities can increase their stress.

How does today's clinical manager cope? Clinical managers and administrators must use effective and efficient strategies to successfully implement clinical systems. These strategies are especially critical in light of existing challenges, such as the shortage of clinical personnel, as well as budgetary constraints and limited expertise and resources in clinical informatics. In particular, relevant content and practical strategies are needed

for health care managers and administrators to prepare staff members for the implementation of clinical systems.

THE READINESS FRAMEWORK

A number of resources describe the complex tasks; planning requirements; and underlying theories of the systems, learning, and change often necessary for implementing clinical systems. One

IN BRIEF

△ Implementation of clinical information system technology is occurring at a rapid pace in many health care practice settings.

△ Clinical managers and administrators must employ effective and efficient strategies to successfully implement clinical systems.

△ These authors review the five components of a "readiness framework" and explain how they can help health care organizations effectively prepare staff members for the complex tasks involved in clinical system implementation.

resource describes a detailed approach to implementing and upgrading clinical information systems, outlining eight phases of this process:

- ▲ planning,
- ▲ system analysis,
- ▲ system design/selection,
- ▲ development,
- ▲ testing,
- ▲ training,
- ▲ implementation, and
- ▲ evaluation.⁵

Another excellent resource outlines the health care information system life cycle and essential principles for project management.⁶ Unfortunately, however, the clinical manager is often at a disadvantage to use these resources. Many daily stresses, such as limited time and staff members, can lead to a “just let me get through this day” mindset.

To give the clinical manager a starting point, we propose a “readiness framework,” which clinical managers and administrators can use and build on when faced with clinical system implementations or upgrades. This framework is intended to help health care organizations effectively and appropriately prepare staff members for the complex tasks involved in clinical systems implementation.

The five components (ie, five Ps) of the readiness framework include

- ▲ picture: look at the “big picture;”
- ▲ process: assess current and future operational processes;
- ▲ proficiency: determine the technology abilities of staff members;
- ▲ perseverance: move forward with technology using various learning methods; and
- ▲ possibilities: consider potential outcomes of effective implementation

PICTURE. Grasping the “big picture” will encourage staff member buy-in as the clinical system implementation progresses. Clinical implementation project stakeholders need to understand the project’s part of the organizational information management plan. Clear understanding by staff members of their role in the organization’s information management

plan and process will facilitate the adoption of the change at the end-user level. One of the mistakes most commonly made by organizations when implementing a new system is not involving the end users at the beginning of the process and at every critical level along the way. Investment in a new information technology system needs to be considered from three aspects: system, business, and cultural dynamics. Few health care organizations spend adequate time planning system implementations.

Many just dive into the task without developing a thorough and workable plan for the project. It is during the early planning stage that organizations should perform a detailed assessment of human resources for the project and consider the feasibility of including additional external consultant services. Communicate the project’s progress on an ongoing basis to staff members throughout the organization.

Before beginning the search for vendors, hold a meeting that includes at least one representative from every department that will be affected by the project. This meeting—

often referred to as the kickoff—must include dissemination of the organization’s overall objectives for the clinical system implementation. After the vision and objectives are developed and shared, participants will have the potential to become visionaries and champions of the project and can communicate the information to their coworkers. Including staff members at all levels in the project planning will have a positive effect on the support of the system implementation and subsequent use. Continue to involve end users throughout the system selection process. The amount of input staff members have in the selection of the clinical system to be implemented is directly proportional to the likelihood that implementation will be successful.

PROCESS. To date, no magic system exists that will fix all of the flaws in a health care organization’s processes. Assessing the various clinical, business, and financial processes in each department involved in the system implementation is critical, because new systems tend to magnify problematic processes. Perform operational analyses of clinical and business processes and potential redesign many times



throughout the implementation. Performing thorough analyses before clinical system implementation will identify processes that presently do not work, and will prevent their automation.

Inefficient or ineffective work flows and processes must be identified. According to one professional organization,

The work flow of physicians, nurses, pharmacists, and others must be accounted for . . . and clinicians must be involved in system design and implementation. Many studies have illustrated how the failure to account for workflow and the failure to gain the enthusiastic support of clinical users have compromised otherwise noble performance improvement initiatives.⁷

After evaluating current processes, develop future process flows with necessary improvements before the clinical system implementation.

To produce meaningful outcome measurements postimplementation and beyond, measure existing business and clinical metrics as part of the initial project-planning phase. For example, if one of the clinical system objectives is a reduction in the number of medication administration errors, then collect pre-system implementation data on medication administration errors.

Assessing the organization's cultural dynamic and readiness for change requires support at the executive level. Executive sponsorship must be demonstrated through active involvement by executives in the development of the vision and objectives. The executives subsequently must be kept informed of how the vision is being manifested as the implementation develops. Seek their input formally at each project milestone and informally at every appropriate moment.

PROFICIENCY. Information technology compe-

tency levels vary widely among health care staff members. Establishing a minimum competence level for all staff members before clinical system implementation will enhance the effectiveness of system training. A recent article reviews current literature on nursing computer competency and concludes that the findings can be used by educators and employers to

structure basic and continuing education programs . . . [so that] nurses can develop and maintain computer competencies to benefit themselves, their patients, and their profession.⁸



Another competency resource is the American Nurses Association's *Scope and Standards of Nursing Informatics Practice*, which outlines minimum computer competency levels for beginning and experienced nurses.⁹ Another comprehensive resource for understanding the background and the role of human factors,

usability, and ergonomics within clinical systems describes a framework in which to evaluate health care information applications.¹⁰

Staff member proficiency in clinical system implementation has two major components: competency and training. Devise a competency self-assessment form that is extremely simple, easy to complete, concise, and nonthreatening. Figure 1 provides a sample of such an assessment, which was developed at Rose Medical Center, Denver. It is recommended that the assessment be developed by the health care facility using vendor guidance, if appropriate, with the organization establishing final criteria for basic computer competence. If the form can be completed on a computer, it can be developed to objectively capture computer competence, in addition to the subjective self-evaluation. For example, require various types of actions (eg, clicking check

FIGURE 1: SAMPLE PC USAGE SURVEY

Rose Medical Center PC Usage Survey

Please be honest with your answers. We are trying to determine the training needed as we implement more personal computers (PCs) and wireless laptops in the facilities.

Name: _____ Unit/Department: _____

Title: _____

- | | |
|---|--|
| <p>▲ Do you have a PC at home?
A. Yes
B. No</p> <p>▲ Not including dumb terminals (ie, terminals running only one program), do you use the PCs at work?
A. Yes
B. No</p> <p>▲ How long have you used a PC?
A. Never
B. Less than six months
C. Six months to one year
D. Two to five years
E. More than 5 years</p> <p>▲ In general, how would you rate your level of expertise in using a PC?
A. Beginner
B. Intermediate
C. Advanced
D. Not applicable, never used a PC</p> <p>▲ Rate your ability to use the mouse (eg, clicking on an icon):
0 = No ability
1 = Very limited ability
2 = Sufficient for basic tasks only
3 = Good, adequate for most tasks
4 = Very proficient
5 = Expert (ie, can teach it to others)</p> <p>▲ Rate your ability to properly shut down or reboot a PC:
0 = No ability
1 = Very limited ability
2 = Sufficient for basic tasks only
3 = Good, adequate for most tasks
4 = Very proficient</p> | <p>5 = Expert (ie, can teach it to others)</p> <p>▲ Rate your ability to use a browser, such as Netscape or Internet Explorer:
0 = No ability
1 = Very limited ability
2 = Sufficient for basic tasks only
3 = Good, adequate for most tasks
4 = Very proficient
5 = Expert (ie, can teach it to others)</p> <p>▲ Rate your ability to open more than one program at a time and move quickly between them:
0 = No ability
1 = Very limited ability
2 = Sufficient for basic tasks only
3 = Good, adequate for most tasks
4 = Very proficient
5 = Expert (ie, can teach it to others)</p> <p>▲ Rate your ability to minimize a program and reopen the program or determine if a program is open and has been minimized:
0 = No ability
1 = Very limited ability
2 = Sufficient for basic tasks only
3 = Good, adequate for most tasks
4 = Very proficient
5 = Expert (ie, can teach it to others)</p> <p>▲ Rate your ability to troubleshoot PC-related issues and help others:
0 = No ability
1 = Very limited ability
2 = Sufficient for basic tasks only
3 = Good, adequate for most tasks
4 = Very proficient
5 = Expert (ie, can teach it to others)</p> |
|---|--|

Courtesy of Janice Kelley, RN, BSN, BC, clinical informatics specialist, Rose Medical Center, Denver.

boxes, typing, double-clicking, tabbing) to answer questions so that basic competency can be assessed through the hands-on demonstration of skills. For staff members who are less computer literate, use an alternate method for completing the self-assessment, such as a monitor to assist those who cannot complete the form electronically. These staff members should attend basic Windows training before receiving clinical system application training.

The simple staff member self-assessment in which the user classifies his or her computer competency is a good starting point for establishing proficiency, especially if this is the first major clinical system implementation at the facility. Some staff members may be familiar with graphical user interface or Windows-based applications, since use of Microsoft Windows and the Internet are so widespread, but many clinical systems still are using character-based or menu-driven presentation formats, or a combination of these two styles. Staff members should establish a common minimum level of computer proficiency before the planning, development, and completion of the clinical systems application training. Clinical systems application training should follow the computer competency portion of training. Practical approaches to point-of-care system training that have been successful in the home health agency environment¹¹ also can be applied in other health care settings.

At the beginning of the application training phase, the organization should customize vendor training materials to staff members' learning styles. Some people prefer to have a quick reference guide (ie, a "cheat sheet") next to the computer when they use the application. Others want the entire manual, with pictures of each screen and step-by-step instructions. Illustrated training manuals can greatly enhance training for visual learners. Other staff members benefit more from hands-on training and would find easily accessible computer-based tutorials helpful. Integrating particulars of the organization's infrastructure (eg, the naming convention of nursing floors and units) into training materials will help to smooth system implementation. If the computer training application looks like the one staff members eventually will use, there will be less confusion in the transition from training to the actual production environment.

Regardless of how the clinical systems application training is accomplished, the goal is to have clinical staff members incorporate the system into

Staff members should establish a common minimum level of computer proficiency before the clinical systems application training begins.

their daily routine. Accessing the appropriate information on the computer is just as important as gathering disposable supplies for a clinical procedure. Self-assessment, computer competency training, and clinical system training should be incorporated into each department's orientation and staff member development programs to ensure correct and consistent clinical system use by staff members.

PERSEVERANCE. As can be seen from the discussion above, successful clinical system implementation is a complex and time-consuming process. With the implementation of any clinical system, significant changes to organizational processes and individual staff member tasks can occur. Staff members' resistance to change can be a daunting obstacle to any project's success. The stages of acceptance have been described as part of diffusion of innovation theory.¹² This theory describes five categories of individuals according to their responses to innovation:

- ▲ innovators,
- ▲ early adopters,
- ▲ early majority,
- ▲ late majority, and
- ▲ laggards.

On one end of the spectrum, innovators initiate new technology, whereas laggards are resistant and grounded in the past. The remaining categories (ie, late majority, early majority, early adopters) respond in progressively positive ways to the introduction of innovation. Supporting self-identified "super users" encourages incorporation of the clinical system into the culture of the organization. Cultivate super users continuously along the way, even after use of the clinical system has begun.

Use alternative teaching methods for staff members with varied learning styles.¹³ Staff members who struggle the most at the beginning often become the

TABLE 1: THE READINESS FRAMEWORK IN THE O.R.

Component of readiness framework	Suggested activities
Picture	<ul style="list-style-type: none"> ▲ Secure executive-level sponsorship of the project. ▲ Determine the organization's business, clinical, and financial objectives in the implementation of an OR information system. ▲ Determine specific outcome metrics for each of the objectives. ▲ Hold a project kickoff announcement/meeting for all staff levels and disciplines. ▲ Involve end users of all disciplines in project planning. ▲ Communicate project progress enterprise-wide.
Process	<ul style="list-style-type: none"> ▲ Assess current OR work flows and processes: <ul style="list-style-type: none"> ▲ scheduling, ▲ perioperative charting, ▲ resource management, and ▲ charging. ▲ Design desired future OR workflows and processes. ▲ Map data flow throughout department. ▲ Map data flow as it affects the organization's information management plan. ▲ Gather baseline outcome and decision support data.
Proficiency	<ul style="list-style-type: none"> ▲ Assess the computer competency levels of staff members. ▲ Design tiered training to accomplish a common competency baseline. ▲ Design system training materials based on vendor-provided templates with consideration of staff member abilities.
Perseverance	<ul style="list-style-type: none"> ▲ Train and support "super users." ▲ Keep project champions involved. ▲ Use nurse and clinical educator roles as a system training asset. ▲ Tailor ongoing training and support to various adult learning styles. ▲ Remember and communicate that system implementation is a complex and evolving process.
Possibilities	<ul style="list-style-type: none"> ▲ Increase in patient safety (ie, reduction in surgical site errors). ▲ Increased staff member job satisfaction. ▲ Improved communication of patient information. ▲ Use of the clinical system as a tool to enhance clinical practice and patient outcomes.

system's biggest advocates after they have been converted by effective training and successful use of the new system. Consistently using positive reinforcement (and avoiding negative reinforcement) can create avid users and even super users. Nurses especially can become passionate about the system after they perceive that it will enhance their ability to provide quality patient care.

Nurses and clinical educators are valuable assets in ongoing clinical system training. Another sugges-

tion for training resources is to convert all or part of the original implementation team into the new "super users."¹⁴ Other potential system resources include nursing or health care informatics personnel currently employed by the organization, even if they are in a department that is not directly affected by the implementation. Keeping the champions of the project involved as the system is used also can be an effective tool to achieve ongoing system success.

POSSIBILITIES. Effective implementation and use

of clinical systems by health care staff members can lead to unlimited possibilities, such as increased staff member satisfaction, a reduction in medical errors, an increase in patient safety, and improvement in clinical outcomes. There are many examples of how health care delivery has been improved by effectively implementing technology in the areas of computerized physician order entry, medication management, and automated nursing documentation.¹⁵ Additional potential outcomes include improved access to patient information and clinical decision support resources, which can be integrated as effective tools in health care providers' everyday clinical practice. Mobile computing, Internet technologies, and telecommunication abilities can add significant value to present clinical information systems. Table 1 outlines suggested activities within the readiness framework for the implementation of a clinical information system in the OR environment.

EFFECTS OF SYSTEM USE

Use of the readiness framework and the concepts presented potentially can yield an increase in end user system understanding, acceptance, and sustained effective use of systems. In addition to the effects on individual organizations, cumulative effects in the overall health care system are possible when clinical systems are implemented as effective tools in delivering quality health care. As one health care professional predicts,

*We can envision that the next decade will include a greater partnering of information technologies with health care to form a firm foundation for the emerging health care infocosm . . . to secure the best health care access for all.*¹⁶ △

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