SYSTEMS LIFE CYCLE: STRATEGY FOR MANAGING THE IMPACT OF INFORMATION SYSTEMS ON NURSING

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Abstract

The impact of information systems on nursing is profound given that a major component of patient care is information handling. The use of the systems life cycle framework for managing change is a strategy that should employ the nursing administrator's commitment from feasibility study to evaluation of any system implementation. Generally, problems will be encountered during various phases of the systems life cycle that must be anticipated by utilizing planned, flexible interventions to cope with the impact of organizational change. Issues which require a commitment from the nursing profession in assisting administration with supporting patient care in new technological environments will also be explored.

Introduction

The introduction of automated information systems in the health care environment creates a challenging management situation for nursing administrators. Health care providers frequently have "crisis managed" change in systems rather than developing proactive tactical approaches. This paper proposes the use of the systems life cycle concept as a framework to help manage issues and problems that result from change created by automating information systems.

The systems life cycle concept has been utilized in data processing to manage the system development process, and contains six distinct phases: I. Feasibility Study; II. System Design; III. Programming and Procedures; IV. System Acceptance; V. Implementation and Support; VI. Maintenance.

The systems life cycle provides a standardized framework whereby management can approach the analysis, design, implementation, and evaluation of systems. The inevitability of technological change and the current economic environment have precipitated a revolution in health care systems. Within such an environment, nursing administrators cannot afford the luxury of a passive approach of merely cooperating with change. Rather, an aggressive stance of actively committing to change is essential to the survival of the nursing process. Systems, often poorly designed, can dictate the course of patient care by the way patient information is gathered and processed.

Change in information systems is a long-term process and management of these innovations is often very difficult. Much attention has been drawn to implementation problems of systems which were "...technical successes but organizational failures."¹

Implementation strategies developed should address change issues within the system life cycle framework. The nurse administrator can use these strategies to create a climate for changing, building, and institutionalizing systems which support nursing practice within their health care organizations.

Discussion

I. During the Feasibility Phase of the life cycle, managers plan and identify needs that are the foundation for the building of systems. The feasibility phase involves six main activities: Strategic long range planning, Needs Identification, Steering/Workgroup Structure, Site Visit, Vendor Assessment, and Benefit Analysis.

The purpose of strategic long-range planning is to plan for and direct operations, producing an outcome that will increase the potential for a favorable influence on future actions. These strategies seek to maneuver environmental forces into the most advantageous position prior to active involvement. Bridging the gap between the strategy and actual operations becomes the goal of a shorter, proactive, tactical plan.² Nurse administrators must ensure, through active involvement, that these plans reflect future needs and directions of nursing practice.

User needs must be clearly identified if information systems are to function effectively at an operational management or strategic level. The purpose of needs identification is to identify the user's informational needs in relation to potential computer applications. An analysis of current manual systems, including what information must be processed and the frequency of occurrence, will be described. The reporting requirements are also defined in an effort to identify informational needs both internally and externally to the nursing department, and appropriate interfaces with other areas. Pertinent forms and definition of terms should be provided for clarification.

Pertinent group structures are established
to assist in dealing with social inertia: steering and work groups are two such methods. Steering groups represent a formal top management system for accomplishing long-range planning and project management; however, alone they are insufficient for producing and imbending change. Work groups become necessary to provide opportunities for representative groups of staff to have face-to-face involvement to actively participate in the management of change. Utilizing this decentralized approach, work groups are useful in supporting change in feasible, incremental ways. Nursing participation at both levels is seen as essential.

Once plans, needs and group structures are established, assessment of vendors and their products becomes important. Site visits to institutions having the vendor's products installed are an essential component of this phase. Prior to the visit, key factors or criteria to be used to select a vendor should be identified and prioritized. A key activity of the site visit is to determine which of the vendor's applications are "really" available versus those under development, as what one may (or may not) see is not necessarily what one receives. The status of applications can often be assessed by talking to a variety of users within the host organization, especially in the vendor's absence. Additionally, similarities and differences between institutions needs to be noted to assess applicability of the system within one's environment.

The major outcome of the feasibility phase is a Request for Proposal (RFP). The RFP provides management with a systematic and comprehensive method of assessing vendor information needed to make sound selection decisions. It communicates to the vendor the organization's long-range plans and should clearly identify current and future organizational requirements. The RFP process also illustrates the potential benefits as well as the organizational and cost constraints of the system. Nursing involvement in the RFP process will assure that their needs are included, and will help to identify potential problematic areas during system design and implementation.

Cost-benefit analysis is utilized in determining the desirability of each alternative identified. To analyze whether the benefits justify the time and resources necessary to implement the system. Benefits are evaluated in quantitative and qualitative terms; most benefits to nursing care are related to improved patient care information management rather than cost reductions. Generally, there are multiple strategies in achieving organizational goals, only one of which may be automation.

Following a system decision, a workplan will need to be established to identify the scope, major activities, time and personnel assignments for the project. The plan should focus on analysis, design, implementation and evaluation of the system, while identifying milestones throughout the phases for managing and projecting actual implementation times.

II. The System Design phase consists of documenting current systems, workplans and information. In documenting current systems, the systems analyst can identify potential improvements through computerization. Flowcharts and narrative descriptions will assist in identifying specific departmental inputs and outputs as well as a hospital-wide flow of information. The plan and design of effective systems evolves from good manual systems; automating problematic manual systems will only allow problems to occur faster!

Information is a corporate commodity that needs to be managed; it is also a political resource that symbolizes power and ownership. Computerized systems redistribute information, causing movement from decentralized ownership of information to recentralized control. Hence, the system designer must ask questions and be prepared to deal with resistance. Who owns the data? Who will or must share it? How will this recentralized and redistributed information be perceived and influence communications, relationships and status?

In the system design phase, workflow must also be assessed. The study of workflow on a patient care unit is important to both the information processed as well as the human interface with the computer. The success or failure of systems is frequently related to how well the human reaction to change is anticipated and handled. Physical location of equipment is also important; finding a suitable spot that maximizes use and minimizes factors such as noise will enhance acceptance. Unit personnel need to be involved in locating the CRT's and printers to better ensure the location will best assist them with their workload. Thought should also be given to possibly pulling cable to multiple areas on a given patient care unit, because as user experience grows, their hardware location needs can change. The greatest expense in cabling hardware is the labor involved and not the cable itself.

III. Once the design is completed, the cycle moves to the Programming and Procedural phase. Nurses will need to rewrite procedures as impacted by the systems implementation. Additionally, backup procedures will need to be identified for use when the systems are "down." A good approach is the utilization of current manual procedures "cleaned up" during system design. These procedures give staff an opportunity to adapt to minor variations before system implementation and to easily adapt should the system become unavailable after implementation.

Nursing staff need to rethink their current activities and documentation. Applications, when well-designed and proactively planned, should be integrated with remaining manual systems. Staff may tend to hold on to manual systems and social contacts by phone and bypass or duplicate the system. The goal is to eliminate redundancy of data and information kept as well as minimize transcription errors. This reaction to change must be anticipated and integrated into revised procedures.

During this phase, training plans must be established. Issues such as training large numbers of staff around the clock in a relatively short time period, overtime pay, teacher/student ratios, and user manuals need to be addressed and corresponding activities incorporated into implementation.
V. This phase deals with the live implementation of the system and the essential support needed during a tumultuous time. Two major implementation strategies are generally utilized, although variations are commonly seen; a modular approach where one function is introduced across the organization at one time, or a total approach, where all functions are introduced to a nursing unit one by one. Regardless of the approach chosen, management must recognize that the introduction of change introduces a turmoil, then recoil action before implementation is fully achieved. The complexity of organizations tends to support change in an incremental and evolutionary manner. Large steps by management and staff alike are resisted and avoided. Keeping the turmoil of change and organizational complexity in mind, the modular or total approach must be tempered with good planning and common sense.

Informal networking of staff during this phase can become a powerful influence. The importance of having key staff members included in the analysis and design phases will become clear during this phase. Often, user resistance to systems is related to false expectations about system benefits. Managers must seek out resistance early and respond to problems and potential issues in an understanding and timely manner. High visibility and commitment of management and implementation staff provides the needed support during the conversion time from manual to computerized systems. An implementation goal will be to encourage staff to use a problem solving process in dealing with initial system impact. Staff often complain of nursing the computer; extra staffing will need to be provided in order to compensate for the time being drawn away from patient care during implementation. Ongoing support of staff during this transitional period underscores management's commitment toward utilization of the system and will decrease staff frustration during this difficult time.

No system will be perfect when it is "turned on," despite the most thorough planning. More efficient ways of organizing information and utilizing systems will be apparent to users as their sophistication increases. The system should be evaluated and necessary changes documented as this will assist in accommodating the changing needs of the institution.

VI. A most costly factor of automated systems can be maintenance; therefore, software changes must be carefully planned and controlled. As system changes evolve, nursing management needs to evaluate such evolutionary changes since many systems currently require nurses to enter and maintain data. With good proactive planning, systems will evolve to provide more sophisticated clinical management information for nurses. Since approximately 40% of patient care deals with information handling, nursing staff need to develop more efficient ways of capitalizing on this investment of dollars and hours spent as information scientists.

Summary

The utilization of the system life cycle framework provides a standardized "care plan" for the analysis, design, implementation and evaluation of systems. It is essential for systems to be well planned and that users needs be clearly defined. Nursing administration must take an active commitment from the beginning to ensure that patient care and nursing needs for information processing are met. Change must be proactively planned and the reaction to change anticipated and well managed. Participation by staff must ensure from the beginning; this should be evident throughout system design, workflow analysis, procedural cleanup, training, implementation, and evaluation. After the system is tested and found acceptable, implementation strategies are chosen to support staff during the impact of change. Once implemented, ongoing evaluation and maintenance of the system will occur as user sophistication increases.

References