EFFECTS OF A TEACHING STRATEGY

ON ATTITUDES OF REGISTERED NURSES TOWARD A
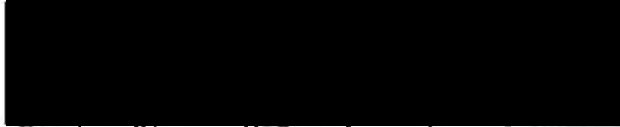
HOSPITAL BASED COMPUTER SYSTEM

By

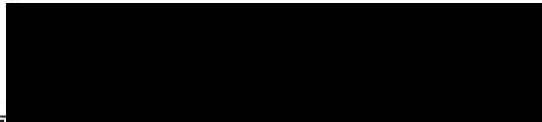Patricia Allen Jacobs

A Clinical Investigation

Presented to
The Oregon Health Sciences University
School of Nursing
in partial fulfillment of
the requirements for the degree of
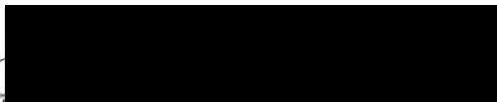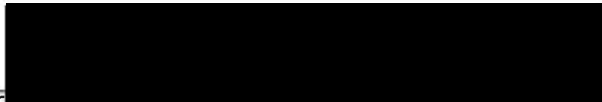Master of Nursing

June 11, 1982

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ACKNOWLEDGEMENTS

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CHAPTER I

INTRODUCTION

The data handling and communication system of a medical facility is as essential to the success of the facility's operations as is the nervous system to a human being. Studies in several hospitals have shown that approximately 25-40 percent of total hospital costs are related to information handling (Jydstrup, 1966; Chapman, 1969; Ball, 1975; Reed, 1980; Anderson, 1981; Dorenfest, 1981). Richart's analysis (1970), of two acute care general hospitals illustrated that 35-39 percent of the hospital's cost per patient day were for patient related communications. The importance of reviewing all components of health service systems in order to better use technology has been stressed by Rutstein (1967). As hospitals enter an era of severe economic pressures and increasingindustry competition, cost effectiveness becomes a major concern (Cook, Fleming, Bauchanan, 1981). Thus there is an increasingly urgent need to use modern technology for a more efficient hospital information system. However, a significant change in data flow and communication within a hospital will have important effects on every hospital subsystem, procedure and person.

In recent years the concept of an automated information system for use in health care has gained increasing attention and acceptance (Singer, 1970; Blum, 1981). The use of such a system in a hospital is especially attractive because of the rapidly increasing hospital costs of modern hospitals. One of the primary factors in increasing hospital costs, is the cost associated with the transfer and handling of information about

patients and their care. Another major concern is the rapid and accurate handling of information to assure a high quality of patient care including completeness of medical orders, reduction of medication errors, continuity of nursing care and minimizing the turn-around-time of orders to ancillary and support service departments.

There has been interest in the development of total hospital information systems since the early 1960's when computers first came into use in United States hospitals. Unfortunately these early efforts were often characterized by overly optimistic claims by vendors, and several hospitals experienced false starts and resultant disappointments. Summarizing the work done during this period, Singer (1969) concluded, "Highly developed computer-based hospital information systems are not currently in general use and will probably not be developed for general use within the next two or three years ... The cost of developing an integrated system is high ... Operational costs of on-line, real-time systems are high" (pg 40).

The situation has improved substantially as a result of work done during the 1970's. New technology has reduced the cost of on-line computing and communications systems, and several firms have developed comprehensive, fully integrated hospital information systems. Marion Ball (1973) described 15 such systems then available on the commercial market. However, because of the earlier inflated claims and severe disappointments experienced at some hospitals, many administrators remain cautious about the installation of these systems in their institutions.

The most recent development in the quest for fully integrated hospital information systems is the development of minicomputers which are lower in cost than some of the larger systems available to hospitals.

Some designers are striving to develop systems with "decentralized processing using multiple minicomputers, with integrations to be achieved through the design of a communications network linking the minicomputers for information sharing" (Austin, 1979, pg 208).

Advances in computer technology have made it increasingly possible to employ computers in the processing of many different kinds of information. Hospitals which previously used computers in limited business office functions have initiated computer applications for information storage, retrieval and communication in areas related to patient care. Large numbers of hospital personnel and physicians not previously directly involved with computers are affected by these new applications, and they generally are sensitive to the impact of computers on patient care and hospital operations. Personnel attitudes toward computer applications in the hospital are potential aids or obstacles to the success of the information system. As the use of information systems in hospitals become more prevalent, hospital administrators, computer vendors and other health care personnel will recognize the importance of understanding both the attitudes of hospital personnel toward computer technology and the ways in which implementation of information systems into the hospital organization might be facilitated.

The implementation of a computerized information communication system for other than administrative areas of hospital care has proven to be a very difficult process (Rikle, 1966; Collen, 1970; Dowling, 1980). "It is a difficult task under the best of circumstances" (Schmitz, 1977, pg 115). The introduction of a medical information system could be expected to alter the ways in which information is processed and may affect role change in professionals involved in the implementation of a

system on the patient care unit.

This study was conducted to determine the attitudes of nursing personnel toward a hospital information system and to determine if changes in attitude occur as a result of a training program utilizing adult educational learning principles.

In order to provide some insight on the impact a computerized medical information system would have on the hospital environment, the author has reviewed the literature in the following areas: 1) Conceptualizing Change, 2) Process of Change, 3) Factors Influencing Attitudes Toward Change, 4) Research to Date on Attitudes Toward Hospital Based Computers, and 5) Impact of a Medical Information System on Nursing. Literature on learning and teaching principles for adult education has also been reviewed.

Review of the Literature

Conceptualizing Change

The target of change is both the individual and the social system, usually a formal organization or some subdivision of it (Rodgers, 1973). Before the change process can be understood it is necessary to be clear about what is meant by change. Perhaps the difficult conceptual issue in studying change is to adequately define change. Lippit (1973) defines change as "any planned or unplanned alteration in the status put in an organism, situation, or process" (pg 37). He further distinguished between planned change and organizational change in which the former is any "intended, designed, or purposive attempt by an individual, group or organization, or larger social system to influence directly the status quo of itself, another organism or a situation" (pg 37). He defines organizational change as "any planned or unplanned alteration of the

status quo which affects the structure, technology, and human resources of the total organization (pg. 37). Zaltman and Duncan (1977) define change at the individual and system level as "an alteration in the way an individual or group of individuals behave as a result of an alteration in their definition of the situation" (pg. 9). A person changes his or her behavior when they define the situation as being different and now requiring different behavior. This approach is closely related to prevailing definitions of innovation (Rogers and Shoemaker, 1971; Zaltman and Stiff, 1973). For purposes of this study change will be defined as follows: "The process is one of relearning on the part of an individual or group that (1) is in response to newly perceived requirements of a given situation requiring action and (2) results in changes in the structure, and/or function of social systems" (Zaltman and Duncan, 1977, p.g. 29).

Having defined change it is now important to distinguish between the different types of change that can occur. Change can be both planned and unplanned. Planned change is viewed by the author and for purposes of this study as "a deliberate effort with a stated goal on the part of a change agent to create a modification in the structure and process of a social system such that it requires members of that system to relearn how they perform their roles" (Zaltman and Duncan, 1977, pg. 101). Unplanned change also occurs as a result of the interaction of social system forces. However, it is change "brought about with no apparent deliberateness and no coordinated goal setting on the part of those involved in it" (Bennis, 1966, pg. 84).

Changes are instituted by the organizational management to improve operational efficiency, as a response to pressures of economic and

political forces in the business environment (Fudson, 1966). Whatever
the primary source of the pressure to change, management decides to
act hoping for certain improvements or benefits, whether immediate or
time-projected. In some cases, only a segment of the company's opera-
tion is affected. In others, the whole organization is involved. Some
people will be affected directly by the changing circumstances and will
have to alter their established patterns of behavior. Others will be
required to contribute their efforts towards realizing the changes, but
will not be affected directly. People tend to consider the effects of
the change on their personal lives, their own status, and their future
more than on the welfare of the organization or company. Most people
find it more comfortable to continue with existing patterns; however,
change forces them into new patterns, which they find uncomfortable.

Process of Change

The actual process of change as described by Lewin (1958) is a
three step procedure: unfreezing, moving and refreezing.

In Lewin's first step of change, "the unfreezing", a motivation to
create some sort of change occurs. Unfreezing involves "breaking the
habit", disturbing the equilibrium. In the unfreezing process the
information which is introduced leaves the person feeling uncomfortable.
It creates a sense of uneasiness, a disequilibrium. This first step of
change is a cognitive one, in which the individual is exposed to the
idea that change needs to occur. The individual then must decide what
is wrong and finally once the problem is identified, a solution is se-
lected that best fits the situation.

In Lewin's second step of change, the actual changing or "moving"
occurs. New responses are developed based on collected information.

This information has been sought by the individual to clarify and identify the problem. The information can be gathered from a single source or a variety of sources. Lewin believes that cognitive redefinition (looking at the problem from a different perspective) occurs through "identification". If a person can identify with another individual it will facilitate his willingness to change. As a person's frame of reference shifts, he will develop new beliefs which will lead to new feelings and responses.

And thus, Lewins third step of change - "refreezing" - takes place. In this step new changes are integrated and stabilized when new feelings and responses become comfortable for the individual, when the change is confirmed or reinforced by others, a kind of consolidation or freezing takes place, and the idea or change becomes a part of the individuals own value system.

Hodge (1977) states the key to a successful Medical Information System (MIS) implementation is "the successful management of change". The steps of change as described by Lewin represent the process of attitude change. Implementation of an MIS in a hospital means "change in the way hundreds or even thousands of people carry out their professional responsibilities or roles". "They must abandon methods and attitudes that have been with them most of their adult lives." "Accordingly, most implementation problems can be expected to be behavioral rather than technical" (Hodge, 1977, pg. 90). Attitudes and behaviors must be altered before benefits of the change can be realized.

Factors Influencing Attitudes Toward Change

Change operates through each employee's attitude to produce the response that is conditioned by his feelings about the change and his

environment (Fulmer, 1974). Change brings about three different effects in people: behavioral, psychological and social.

Behavioral Effects: The most evident effect of any change is the objective alterations that must be made by those doing the work, to the physical routines by which the work is performed. Alterations do not occur automatically at management's request or direction. Alterations require active cooperation of those directly involved, and the extent and nature of their cooperation will depend in part on their attitudes.

Psychological Effects: Any change will tend to alter the way in which an individual relates to and feels about what he is doing. Initially change creates uncertainty. The individual will have many questions, the variety of which and the intensity of one's feelings about which depend primarily on one's personality and experiences.

Social Effects: Social effects are the alterations that take place in the individual's established relationships with others in his work group, with his management, and with others in the organization as a whole. The pattern of interactions among a group working together is important. The physical location of the work environment, the level of skills involved, the means by which the work is progressed from one point to another, and the pay system, all affect the pattern of inteaction.

Anyone who has worked on a particular job for an appreciable length of time will have tried to satisfy some of his personal needs by establishing rapport with others in his working environment. When the procedures and the systems of work are changed, those comfortable and satisfying relationships are disrupted.

Each change situation is interpreted by an individual according to his attitudes about it. The way one feels about a change will determine how he responds to it. In order for change to be successful management must relate and maintain an atmosphere that will serve to minimize resistant behavior and encourage acceptance and support (Koontz, O'Donnel, 1964; Fudson, 1966; Beckhard and Harris, 1977). Management must be able to anticipate questions and problems arising as a consequence of change. Management can create the proper atmosphere and cope with problems only if it understands the dynamics of the relationship between attitudes and behavior, in both individuals and groups.

There are several interrelated factors that have been identified as factors that influence an individual's attitude toward change (Hamilton, 1981). Feelings of insecurity and fear influence a person's attitude. Feelings of insecurity can cause a person to have fears without objective justification and could make him apprehensive about potential changes. A person who depends solely upon his job and salary for his income is more likely to fear changes affecting his job than an individual not as dependent. Will the change decrease the individual's power, authority or status? If so, the change will most likely be resisted.

Trust is another factor influencing an individuals attitude toward change. Trust in supervisors or in management brings about faith in workers that their welfare will be looked after whatever the change may be. Feelings of trust and loyalty are formed by the way in which individuals interact. Trust is given a supervisor or management only after honesty has been proven and demonstration of interest in the employee is interpreted as sincere.

Historical events also impact an individuals attitudes. People often view past events as precedents for what is likely to occur in the future. Significant historical events in an organization might be past policies, practices and customs, the nature of past and present managements, the extent to which management have proven trustworthy, the manner in which past changes have been carried out, and the outcome of past changes.

The manner of change also influences attitudes of those impacted by the change. The effects of how a change is brought about may be quite independent of the effects generated by the change itself. The former depends upon how those involved regard the methods employed to implement the change and how the desired changes in behavior are achieved. Any negative attitudes generated are typically directed against the change itself and not against the manner of its realization.

The timing of change is essential. Most individuals require time to adjust their thinking to the new conditions. Sufficient information about the change and its probable effects and implications should be readily available to prevent apprehension and presumption on the part of the individual.

Thoren, Smith and Gould (1969) in a study conducted at Massachusetts General Hospital indicated that four major factors influence the attitude hospital workers display toward technological innovations and specifically toward the use of computers in the hospital. The four factors identified as important when considering planned technological changes in hospitals are: 1) Method of introducing the change (a formal training program was designed at the Massachusetts General Hospital and included nurses, unit managers, laboratory technicians, ward secretaries,

clerks and supervisors). 2) Effect of the change on the nature of the work performed (if personnel think the change will make their work easier or less tedious, a positive attitude will be more likely). 3) Impact of the change on employee power and prestige (automation alters the nature of work and subsequently redistributes responsibilities, power and prestige. However, it may be impossible to avoid changes that disrupt the hospital's traditionally rigid status structure). 4) Worker satisfaction with the status quo. Thoren et al found that workers who rated highest on the attitude scales which measured satisfaction with the job, satisfaction with the hospital, and satisfaction with the medical care field are the least likely to believe that automation will improve patient care. The people in this particular group at Massachusetts General Hospital were generally over 40 years of age and were long-term employees. To these people, organizational changes necessitated by the computer posed the greatest threat, because they changed the status quo with which they were so satisfied. However, this group of stable employees also displayed the most noticeable change in attitude toward automation as a result of the orientation and training sessions.

At the present stage of computer system utilization it is imperative that the opinions and feelings of those who will one day bear the distinction "users" be made known to the implementors. It is not easy for one who is deeply involved with computers to understand the withdrawal symptoms of the uninitiated. What appears efficient to the computer programmer or systems analyst is to the lay person often impersonal, inflexible, and technical, especially when the new is radically different from the old. Barnett (1969) has described the situation well, "The successful application of technology to clinical medicine often depends

upon the resolution of problems concerned with the interface of technology and the human being". Grams (1977) states "one of the most perplexing and challenging problems with which the data processing field must deal with is the human problem" (pg. 192). One aspect of this is certainly attitudinal.

Attitudes Toward Hospital Based Computers

Literature on the expression of opinions toward computers in the health field is scarce. Discussions of this subject have generally been relegated to off-the-cuff remarks in presentations at meetings. Those statements which are well documented are often in conflict, as indicated by the following declarations: "The climate for accepting computer applications in clinical medicine is favorable among the physicians polled" (Mayne, 1968), or "Computer-based systems are now becoming a standard feature in hospitals" (Pugliese, 1981), versus "Many have resisted even the beginning of automation" (Day, 1970), and "Physicians in particular believe that the use of computers reduce their time for therapy and seldom enhance their professional prominence" (Dlugacz, 1981).

There has been little research to date regarding the attitudes of medical personnel toward computers. One of the early reports represents work done by Reznikoff (1967). Reznikoff and his associates presented a 35-item questionnaire to all employees of a psychiatric hospital and to the nursing personnel of a general hospital. Their results showed significant differences in attitudes toward computers among employee groups, that attitudes increased positively with age and education, that the professional and medical staff and males, in particular, presented more favorable attitudes. In addition, factor analysis indicated that statements dealing with computer usefulness and efficiency, and with the

need for human control in computer activities, accounted for the most variation in questionnaire responses. A later study by Rosenberg (1967), demonstrated that the unfavorable attitude survey scores of student nurses could be raised significantly through interaction with computers.

In 1972 Startsman and Robinson reported their work on "Attitudes of Medical and Paramedical Personnel toward Computers". A short attitude scale and an open-ended questionnaire were administered to 338 individuals representing seven different groups at a 500-bed university medical center in an attempt to provide information concerning the optimal interfacing of a computer based information system with the hospital staff. Factor analysis of the responses to the attitude statements by the physicians (interns, residents and medical faculty), registered nurses, students (both medical and nursing), ancillary personnel (LPN's, ward secretaries, nursing aides, attendants and orderlies) and medical record librarian students resulted in four distinct dimensions of computer attitudes. The seven groups of individuals were compared on the basis of 1) general evaluation of computers, 2) willingness to use or accept the use of computers, 3) the potential threat of computers to employment, and 4) possible benefits of the application of computers to the problems of the hospital. Results showed that all groups were aware of the advanced capabilities of computers; interns, nurses and ancillary personnel expressed the least willingness to use data processing systems; while medical faculty, medical students and medical record librarian students were the most receptive.

Thies (1975) also did an attitude analysis of hospital personnel and computer based systems. Using a Thurstone attitudinal scaling instrument administered three times during the course of the study, Thies

showed that personnel attitudes toward computer systems can be anticipated through analysis of biographical data and that existing attitudes can be modified by new experience. Among the personnel studied "technicians exhibited the most positive attitudes, followed by administrators, physicians, secretarial/clerical and nurses in that order. Statistically, secretarial/clerical personnel were found to be significantly more negative than technicians, and nurses were significantly more negative than technicians and physicians".

The work by Barrett (1975) in the Battelle Report on the evaluation of the Technicon Medical Information System at El Camino Hospital is the most significant and complete data reported thus far on hospital based computer systems.

El Camino Hospital is a 464-bed general acute care hospital located in Mountain View, California. In 1965 a project was initiated with the aim of designing and installing a total hospital information handling system. The project gained national recognition in 1971 when the hospital was awarded a $1.2 million contract from the Department of Health, Education and Welfare for a comprehensive evaluation of the System. The federal support spanned a four-year period from 1971 to 1974. In August of 1974, the El Camino Hospital administration made a permanent commitment to the new system by entering into a contract with the Technicon Corporation for its continuing operation. The final project report of the hospital's evaluation was submitted to HEW and published as public document in December 1975. The government also contracted with the Battelle Memorial Institute for an independent evaluation, and the first Battelle Report was published in 1976. A follow-up cost study by Battelle was published in May 1979.

The El Camino system includes entry of orders for patient services and tests through remote terminals with program controlled message switching and transmission of orders to the appropriate service departments. Previously entered orders and results of diagnostic tests are accessible to hospital employees on terminal displays. The system generates some of the data required for the patient's medical chart. Subsystems related to the order entry and communications subsystem include admissions, accounts receivable, accounts payable, general ledger accounting, budgetary control, inventory control, payroll and labor distribution.

The El Camino System uses a primary and a back-up computer. Video terminals are installed throughout the hospital. Lightpens are used with the terminals for selecting items from information on the video displays. Communication devices link the terminals and other input-output equipment with the computer.

As mentioned previously the system has been extensively evaluated. One measure of success is obtained by examining the attitudes of the hospital staff toward the computer system. Three surveys were taken over a two and one-half year period. The first two surveys were concerned solely with measuring attitudes toward the acceptance of a hospital based Medical Information System (MIS). The third survey collected information for an evaluation of the MIS, as well as information on acceptance and attitudes toward the system.

When responses to individual items on the 1974 nursing staff questionnaire are compared with the responses for similar items on the earlier questionnaires the results indicated increasingly favorable responses over time. Work sampling studies of nursing activities at

El Camino Hospital indicated that 18 percent of the nursing staff time (RN, LVN) was devoted to clerical work. After implementation of the MIS there was a significant increase in nursing staff time spent in direct patient care and a significant decrease in time devoted to communications, reports, conferences and other nursing activities (Barrett and Norwood, 1974).

Response to individual items of a general evaluation questionnaire by other hospital ancillary employees was also done in 1974. The conclusion was that other hospital personnel had a favorable attitude toward the MIS; the major negative evaluation was the amount of time spent waiting in line to input information or to obtain output information from the system.

Physicians attitudes have been mixed. However, physicians polled in a 1974 questionnaire generally had a positive attitude toward the MIS. Physicians demonstrated that the direct interaction with the computerized medical information system was acceptable and many medical staff members indicated the system desirable. Acceptance of the system as measured by actual usage was found to be even greater than acceptance expressed in the questionnaire. Compared to other El Camino surveys the physicians attitudes tended to be increasingly positive over time.

Investigations in this area have generally employed attitude questionnaires. Several research designs have been used to administer the questionnaires and compile results. Thies (1975), Startsman and Robinson (1972) and Reznikoff (1967) each surveyed one institution with a single administration of a questionnaire. These early investigations began to establish some general knowledge of attitudes among hospital employees toward information systems in hospitals. In 1976 Hardy administered a

single questionnaire, but in two different institutions. The first
institution did not have an information system, but was considering in-
stalling one. The second hospital had just recently implemented such
a system. Hardy's research design provides data relevant to the effects
of the actual system in comparison to a control group of personnel that
had no experience with a computer system. Only Thoren et al (1969),
utilized a pre- and post- test design in order to assess the effects of
a brief training program that paralleled implementation of a system.
This design was developed to provide data about changes in attitudes.

Young, Hardy and Armstrong (1978) conducted a two year study on
"Change in Attitudes of Hospital Personnel Towards an Automated Informa-
tion System". A 50 item questionnaire was given pre and post implemen-
tation to 183 hospital staff and 43 medical staff personnel of a 200-bed
acute care general hospital. Most of the attitudinal items for the
questionnaire were drawn from a previous study by Hardy (1976). Four
categories were addressed in the study: 1) computers in general and
use of computers in the hospital; 2) impact of computers on individual
staff members; 3) impact of computers on patient care; and 4) computer
impact on information management. Results indicated a positive shift
in attitudes over the two year period during which the system was imple-
mented. Young et al (1978) found that attitudes displayed in Category I
indicated that computers were deemed necessary in general life situa-
tions and need not be avoided in hospitals. Items addressed in Category
II which focused on the impact of computers on hospital staff reflected
a positive attitude toward the use of computers. Computers "were not
perceived as unmanageable or overly threatening, either before or after
implementation" (Young et al, 1978, pg. 691). In regard to Category III

computers were perceived as contributing to improved patient care and as contributing to the amount of time available for patient care. Finally, "computerized information management was perceived as superior to manual systems" (Young et al, 1978, pg. 691).

In general, research about attitudes has concluded that hospital personnel accept computers as an essential part of technological advancement (Startsman and Robinson, 1972; Hardy, 1976; Young et al, 1978). Studies in which training has paralleled the introduction of an information system (Reznikoff,1967; Rosenberg,1967; Thoren et al, 1969; Thies, 1975) have shown that personnel who held negative attitudes generally become more positive as they understood the system and were able to interface with it.

However, there are two areas where personnel have continued to exhibit negative attitudes toward hospital information systems. Personnel in direct contact with patients appear most skeptical about the influence of this kind of technology on the personalized nature of patient care. Also, fear that jobs may be lost due to the introduction of information systems arose among certain personnel (Startsman and Robinson, 1972).

Thoren et al (1969) also identified a group of personnel that were particularly reluctant to accept the prospects of an information system. These were generally personnel in direct patient care positions who had been employed for a number of years at their particular jobs. Their skepticism about computers arose from a fear that the quality of patient care would deteriorate. However, Thoren et al speculated that this fear was largely based on the individuals reliance on routine methods of functioning and ultimately a reluctance to allow new means of patient

care to enter into their work environments.

> "Professionals are used to being in a position where
> they could be called professionals because they have
> a body of knowledge and an expertise that is not
> commonly available. Although doctors, nurses and
> hospital administrators should welcome computer tech-
> nology because of the nature of their business they
> often become 'computer-phobic' and reject any infringe-
> ment on the medical profession" (Dowling, 1980, pg. 4).

Skepticism among hospital employees about the effects of computer installations on patient care and job security may pose an obstacle to the effective installation and operation of an information system in the hospital. The conclusions of several researchers (Reznikoff, 1967; Rosenberg, 1967; Thoren et al 1969; Startsman et al 1972; Theis, 1975) have been that adequate training of hospital personnel, focused upon preparing them for implementation of the system, will enhance accept- ance of the system. Zelstorff (1976) states "effective orientation is a crucial aspect of successful implementation of automated systems, in terms of both employee satisfaction and realization of the benefits for which the system is designed" (pg. 16).

Impact of an MIS on Nursing

Rapid scientific and technological changes are creating a host of specific yet diverse learning needs in many health care institutions. In fact all of today's nurses are adult learners whose career choices have placed them in the ever changing health care field, whose interests lead them into diverse roles, and whose various responsibilities create numerous learning needs.

The state of the art of hospital automation has already reached a point where substantial changes in existing patterns of operation are feasible. Under current practices, a great deal of the most important and most expensive services performed in the hospital consists of the discovery, collection and processing of information. There is no question that physicians and nurses spend an inordinate amount of time in information processing-filling out forms, transcribing information, and trying to find test results or to locate data in the medical record. These frustrations and time delays can be considerable, and the inability to locate the necessary data may jeopardize patient care (Barnett, Zelstorff, 1977).

The nurse is the hub of the flow of patient data. One estimate by Jydstrup (1966) is that, on the average with a manual system, a head nurse spends 58 percent of her time, a staff nurse 36 percent of her time, and a nursing assistant 7 percent of her time in processing patient data. Cook and McDowell (1975) state that the Technicon MIS at El Camino Hospital now "handles many information processing tasks that nurses formerly handled" (pg. 67). "Freedom from transciption tasks has enabled nurses to move ahead with the development of standard nursing care plans". "Patient records and data are more complete and accurate; medication errors have decreased, and nursing time spent in direct patient care probably has increased as, apparently, has job satisfaction" (pg. 72).

Authors Rosenberg, Glueck and Bennett (1967) describe a computer- ized psychiatric nursing observation reporting system that records "moment to moment patient behavior in a more objective, accurate, condensed and accessible manner than previously possible" (pg. 926). The basic goal of therapy for the patients reported on was to help modify

maladaptive behavior, the system assisted in this goal by facilitating timely treatment by the therapist. It was also reported that such a "computerized system permits a standardization and quantification of behavioral observations, resulting in useful predictor indices that reveal significant patterns of change in patient behavior" (pg. 926).

Tolbert and Pertuz (1977) report on how computerization affects nursing activities in an ICU. An automated Cardiac Post Operative Recovery Unit (CPOR) provided "more precise, concise and legible information; was faster; saved time; and allowed more time for the patient" (pg. 82). Additional data collected indicated another effect on patient care. Analysis of the hospital stay of patients admitted to the computerized CPOR indicated shorter periods spent in each phase of postoperative care than patients admitted to a noncomputerized CPOR. In addition to the shorter length of stay, it was documented that earlier recognition of cardiac arrhythmias and finer hemostatic monitoring occurred in the computerized CPOR.

Nurses are concerned about the quality of care rendered to patients. They are also concerned about the inappropriate utilization of professional skills. Data processing techniques can help to relieve these concerns. By using electronic data processing techniques handling patient information can be vastly speeded up, there can be enormous increases in the volume of information which can be dealt with and there will be advances in the reliability of the information. Furthermore, all information collected on patients in other places and at other times can be made available almost instantaneously. This information would include patient histories and results of various examinations and tests.

Zieserl (1980) wrote about installing and implementing an MIS at

Rush Presbyterian St. Luke's Medical Center in Chicago. "Nursing personnel are able to spend more time with the patient and at the same time keep more accurate and thorough records" (pg. 39). Zieserl also states a "number of nursing staff have indicated they would not work in a hospital without an MIS" (pg. 38).

Cook et al (1981) writes of the El Camino MIS ten years after installation,

> "Traditionally nurses spend from 15 to 25 percent of their time on paperwork. MIS reduces that time by at least 50 percent. By eliminating much of the clerical work, by creating a more professional setting for registered nurses, and by providing the nurses with a tool they can use to advance their profession, El Camino has not experienced the nursing shortage that other area hospitals have" (pg. 25).

The sector of hospital health care delivery that is most profoundly affected by an MIS is nursing. Nurses are inundated with ever increasing amounts of paperwork. JCAH recommendations, professional nursing standards, patient care activities and quality assurance - everything dictates that the nurse document, document, document. An MIS can relieve the nurse of a large portion of her clerical burden, and it can provide substantial assistance in the planning and management of nursing care. For instance, communication of all medical orders to appropriate recipients is carried out by the computer, thus eliminating the need for nurses to make multiple transactions from chart to card files, to ancillary service requisition, to medication cards, and so on. In addition, the transcription errors that would accompany the use of some 60 to 70 hospital forms are eliminated. Medication administration

scheduling is accomplished automatically and results in hourly medications due lists for each nursing station. Charting of scheduled medications is accomplished in seconds on a check off video display that matches patients with medications scheduled for the hour. The computer further monitors the medication process by issuing reminder notices when scheduled medications are not charted within a given period.

The scope of nursing data that may be entered into an MIS includes medication given, fluid intake and output, patient care planning instructions, vital signs, patient activity, nursing procedures and general nursing notes. All nursing data entered into the system are documented on patient data summaries, which are printed out daily at each nursing station. The computer assists nurses in planning and managing patient care by providing them with a patient care plan for each patient for each shift based upon the set of current medical and nursing orders. This care plan incorporates basic patient data, diagnosis and surgical procedures, diet and fluid balance orders, and general care instructions, as well as specific nursing tasks for the shift. The nurse may annotate the care plans for her patients and use these notes for charting and reporting.

Zielstorff (1980) states "computers are a valuable resource for nursing in terms of improving patient care" (pg.X). Hannah (1976) states as

> "Patient advocates nurses are committed to using every
> means at their disposal to ensure high quality care.
> Computers are merely one tool to be used in achieving
> this goal. The question should no longer be: "Should
> we resist automation?" but "How can we best use auto-
> mation to promote improvements in patient care and

nursing practice?" (pg. 555).

The role of the nurse will be affected by the introduction of a medical information system in a hospital. Cook and McDowell (1975), point out that the nurse "will have some of her working tools completely changed". Nurses' receptivity to change will be an important element in the successful implementation of an MIS.

Adult Education

Training involves learning and learning involves change.

"Learning is concerned with the acquisition of habits, knowledge and attitudes. It enables the individual to make both personal and social adjustments. Since the concept of change is inherent to the concept of learning, any change in behavior implies that learning is taking place or has taken place" (Crow and Crow, 1963, pg.1).

Burton (1963) also states"Learning is a change in the individual, due to interaction of that individual, and his environment, which fills a need and makes him more capable of dealing adequately with his environment" (pg. 7). "There is remarkable agreement upon the definition of learning as being reflected in a change in behavior as the result of experience" (Haggard, 1963, p. 20). Kidd (1973) also states learning means change, "A change in behavior, which makes us respond differently" (pg. 15). It is clear that these theorists view learning as a process by which behavior is changed, shaped or controlled.

Skillful educators have known that one cannot teach adults as children have been traditionally taught. Knowles (1973), in his book The Adult Learner: A Neglected Species, speaks about 'andragogical theory',

a theory about Adult Learning. Earlier Knowles (1970) defines Andragogy as "the art and science of helping adults to learn" (pg. 38). He believes Andragogy is premised on four assumptions that differentiate a child learner from an adult learner. These four assumptions are: 1) changes in self concept, 2) the role of experience, 3) readiness to learn and 4) orientation to learning. Knowles (1970) states that as a person matures,

> " 1) his self concept moves from one of being a dependent person toward one of being a self directing human being; 2) he accumulates a growing reservoir of experience that becomes an increasing resource for learning; 3) his readiness to learn becomes oriented increasingly to the developmental tasks of his social roles; and 4) his time perspective changes from one of postponed application of knowledge to immediacy of application and accordingly his orientation toward learning shifts from one of subject centeredness to one of problem centeredness (pg. 39).

Each assumption has some implication in the education of adults.

Self Concept

The assumption here is that as a person grows and matures, his self concept grows from one of total dependency (as in infancy) to one of increasingly self-directedness. "Andragogy assumes that the point at which an individual achieves a self-concept of essential self-direction is the point at which he psychologically becomes an adult" (Knowles, 1973, pg. 45).

This assumption has several implications for the adult educator. Knowles (1970) has identified five implications. One is the learning

climate. It includes not only the physical environment, but the psychological environment as well. Adults must be comfortable, physically, in their environment - that is furnishings should be adult sized, appropriately decorated, and informally arranged. The psychological climate should be one of respect, support and acceptance; one where the learner and the teacher are mutual inquirers.

Another implication identified by Knowles as important for the adult educator is that learners are more motivated to learn the things they see the need to learn. There should be emphasis on involving the adult to diagnose his own needs for learning.

The planning process is still another implication important for adult educators. "Every individual tends to feel committed to a decision (or an activity) to the extent that he has participated in making it (or planning it)" (Knowles, 1970, pg. 42). Learners should plan their own learning with the teacher serving as a guide, a reference or a resource.

Knowles (1970 views the learning experience as the responsibility of the learner and the teacher. He redefines the teachers role as that of a "coinquirer", a "catalyst", a "guide" (pg. 43).

Finally, Knowles (1970) identifies evaluation as an important implication for adult learning. He feels a process of self evaluation that leads to a rediagnosis of learning needs, reinforces the concept that learning is a continuing process.

Experience

Adults define themselves largely by their experience. As a person matures he/she accumulates a vast background of experience not only in the number of experiences but also in the kinds of experiences. An adult

"defines who he is and establishes his self-identity, in terms of his accumulation of a unique set of experiences" (Knowles, 1970, pg. 44).

Since an adult views himself largely by his experience, when his experience is not utilized or its value is minimized, the adult feels rejected. Knowles (1970) identifies methods by which educators can convey their respect to an adult by making use of his experience as a resource for learning. There should be emphasis on action learning techniques - i.e., group discussion, role playing, field experience, skill practice exercise. Emphasis should also be on practical application - i.e., design learning experiences that parallel the learners day to day life.

Finally, emphasis should focus on self-directed learning - i.e., learning collabortively rather than competitively, and learning through analysis of one's own experience. In other words, "learning to learn from experience" (Knowles, 1970, pg. 45).

Readiness to Learn

Knowles (1973) states that as an individual matures, his readiness to learn is "decreasingly the product of his biological development and academic pressure and increasingly the product of the developmental tasks required for the performance of his evolving social roles" (pg.46). A developmental task is a "task which arises at or about a certain period in the life of the individual, successful achievement of which leads to his happiness and to success with later tasks, while failure leads to unhappiness in the individual, disapproval by the society, and difficulty with later tasks" (Havighurst, 1961, pg. 2). Each developmental task produces the need in an individual to learn.

The crucial implication of this assumption is timing of the learning

experience to coincide with the developmental task. Knowles (1970) also feels the grouping of learners will have some impact on their readiness to learn. For some learning situations a homogeneous grouping according to developmental task is ideal. While in other learning situations it might be preferable to have a heterogeneous group.

Orientation to Learning

Adults view learning from a perspective of immediacy of application. They pursue learning experiences because of pressures from their current life situation. To an adult, education is "a process of improving their ability to deal with life problems they face now" (Knowles, 1970, pg.48). The adult learner wants to apply tomorrow what he has learned today, thus adults have a problem - centered orientation to learning.

Knowles identifies several implications this assumption has regarding the organization of the learning experience. Adult educators must be person centered, that is, they must focus on assisting adults to learn rather than teaching a subject matter. Because adults are problem centered learners, content of adult programs is organized around problem areas, not subjects. Finally, because adult learners are problem oriented, the most appropriate starting point for a learning experience is beginning with the problems and concerns the adults have when they enter. That does not imply, Knowles (1970) states, that the learning experiences ends with the problems the learners identify, but rather that is where the learning starts.

Summary

Health care institutions today generate massive volumes of information that must be collected, transmitted, recorded, retrieved and summarized. Managing all of these activities has become a monumental task. As

a result, hospitals are beginning to use computer based medical information systems. The purpose of a medical information system is to provide a computer based framework to facilitate the communication of information within a health care setting.

Essentially, an MIS is a communication network linking terminals and output devices in patient care and/or patient service areas to a central processing unit that coordinates all essential patient care activities. Thus, an MIS provides a communication system among various hospital departments; a central information system for receipt, sorting, transmission, storage and retrieval of information; and a high speed data processing system to provide information in its most useful form.

One advantage of an MIS is that much time is saved through reducing clerical activities and telephone calls between departments. Furthermore, there is greater accuracy and speed of information transfer, and continuity of care can be ensured in all departments through census summaries and status listings. Duplication of effort can be eliminated and personnel used more effectively. This provides financial savings for the patient. Finally, more complete patient records and data are available for research.

Obviously, information must be entered into the computer before any processing can be done. However, few devices in our complex society have the mystique and evoke the misconceptions that computers do. Research suggests attitudes of the nurse, the physician and other health care personnel influence the use of a computer system. Research also indicates that attitudes can be modified through appropriate training or through favorable experience with a computer system.

This study will be conducted to determine attitudes of nursing

personnel toward a hospital based computer system, and to determine if changes in attitude occur as a result of a training program which focuses on preparing the personnel for implementation.

<u>Hypothesis</u>

1) Registered nurses who have had training utilizing adult educational teaching principles will have a more positive attitude toward a hospital based computer system than will registered nurses who have not had an adult teaching strategy.

2) Registered nurses new to the study hospital will have a more positive attitude toward a hospital based computer system than will registered nurses who are not new to the study hospital.

CHAPTER II

METHODOLOGY

It has been stated that implementation of hospital based computer systems is a very difficult process (Rikle, 1966; Collen, 1970; Schmitz, 1977). The introduction of such a system into the hospital environment will affect role change in the individuals involved in the implementation. The sector of the hospital environment that is most profoundly affected by a hospital based computer system is nursing. The system relieves the nurse of a large portion of her clerical burden, and it provides substantial assistance in the planning and management of nursing care. Research to date has shown that in general, hospital personnel accept computers as an essential part of technological advancement (Hardy, 1976). Studies in which training has paralleled the introduction of an information system (Reznikoff, 1967; Rosenberg, 1967; Thoren et al, 1969) have shown that personnel who held negative attitudes generally became more positive as they understood the system and were prepared for implementation.

This study was designed to test the effectiveness of a teaching strategy utilizing adult educational principles on the attitudes of registered nurses toward a hospital based computer system. It was hypothesized that registered nurses who had received training utilizing an adult educational teaching strategy would have a more positive attitude toward a hospital based computer system than registered nurses who received the traditional teaching strategy. It was also hypothesized that registered nurses new to the study hospital would have a more positive attitude

toward the hospital based computer system than registered nurses who have been employed at the hospital for a period of time.

Design Overview

Utilizing an experimental design, the researcher randomly assigned groups of individuals to one of two teaching strategies. Each group received training in the use of the hospital based computer system for Central Supply requests. The experimental group received training in the Central Supply Module utilizing an adult educational teaching strategy. The control group received training in the CS module utilizing a traditional teaching strategy developed by the computer system vendor and modified to meet the specific hospital needs. Both groups were pre-tested for attitudes toward computerization in hospitals. Three weeks after training was completed both groups were tested again for any alteration in attitudes toward computerization in hospitals. The design is sketched as follows:

Group I   (Experimental Group)   R O_1 X_1 O_2

Group II   (Control Group)   R O_1 X_2 O_2

O_1, indicates the pre-test for attitudes

O_2, indicates the post-test for any alteration in attitudes

X_1, indicates the teaching strategy utilizing adult educational principles

X_2, indicates the teaching strategy utilizing the traditional strategy of teaching

Setting

The study took place in a 491 bed acute care medical-surgical hospital located on the outskirts of a large metropolitan area of the Pacific Northwest.

In 1979 the study hospital signed a contract with a computer system vendor to implement a hospital based computerized Medical Information System (MIS). The system was to be implemented in a series of eight phases. In January 1980, Phase I was brought on-line. Phase I focused on the Admission of the patient to the hospital - the entry, storage and retrieval of demographic patient information and the distribution of such information to vital areas within the hospital. From May through June 1980, Phase II was brought on-line on each nursing unit. This phase decentralized the transfer and discharge functions from a central area (Admitting) to each nursing unit, thus facilitating rapid transmission of this data to vital hospital areas and departments. In August 1980, Phase III was brought on-line. This phase provided order entry for all patient dietary orders and diet instructions. The study hospital is currently involved in bringing Phase IV, the Central Supply module of the system on-line. This phase provides rapid transmission of Central Supply requests from the nursing unit to CS and provides automatic capture of charges for the supplies requested.

Phase V will involve medication order-entry, medication charting and automatic capture of charges. Phase VI and VII will involve all ancillary order-entry and charge capture. Finally, Phase VIII will involve outpatient facility registration, medical record indexing and automatic charge capture. The study hospital, like most hospitals which contract for such a hospital based computerized MIS intends to

    1) improve patient care delivery and to assist those who practice medicine and nursing in the hospital,

    2) replace the majority of manual record keeping systems and clerical tasks involved in hospital operations,

and to maximize the operational efficiency of
the hospital,

3) alleviate problems of escalating costs and manpower
   shortages,

4) provide a greatly improved hospital-wide communication
   network,

5) expedite patient services by improved accuracy and
   timeliness of information,

6) provide relevant, timely information for control and
   decision making by physicians, nurses and hospital
   management, and

7) be cost effective.

Sample and Selection

The subjects were professional registered nurses and nursing unit
secretaries who were employed at the study hospital and who were scheduled
to receive training for the Central Supply Module of the hospital based
computer system.

Subjects were selected for the study in the following manner. There
were 18 nursing units at the study hospital which were randomly assigned
to a training week by the researcher. The nursing unit supervisor sched-
uled each registered nurse and unit secretary for a one hour class during
the training week assigned to the unit. The researcher had no involve-
- ment in the scheduling process. When the researcher received approval to
conduct the study, the upcoming training week of May 18 - 22 was selected
as the sample. The researcher randomly assigned the 27 classes of this
week to either an experimental group or a control group. The researcher
made no attempt to match groups in reference to subjects. There were a

total of 14 experimental groups that included 39 individuals and a total of 13 control groups that included 26 individuals. Composition of the groups, class sequence and teaching strategy can be found in Appendix A.

Variables and Measurement

Independent Variable - Teaching Strategy

Two teaching strategies were tested by the researcher. One teaching strategy utilized adult education principles outlined by Malcolm Knowles (1973). The other teaching strategy utilized information developed by the computer system vendor. Both teaching strategies provided training and practice in the use of the Central Supply module of the Medical Information System at the hospital where the study took place.

Adult Educational Teaching Strategy

In his book The Adult Learner: A Neglected Species, Knowles (1973) outlines conditions for learning that stimulate growth and development in the adult learner. Knowles contends that the identified conditions of learning are produced by practices in the learning-teaching activity that adhere to certain principles of teaching. Table 1.0 refers to the principles outlined by Knowles with the principles of teaching that have application to the study. Appendix B provides the content of the Adult Teaching Strategy.

Traditional Teaching Strategy

The computer system vendor provided a manual of instructional content for each system module. These instructions detailed step by step the necessary points of the particular module. Appendix C provides the content of the computer system vendor instructional material as it relates to the study.

It has been the practice of the individuals whose responsibility it

TABLE 1.0

Knowles' Conditions of Learning and Principles of Teaching

CONDITIONS OF LEARNING*	PRINCIPLES OF TEACHING*	PRINCIPLES OF TEACHING WITH APPLICATION TO THE STUDY
The learners feel a need to learn.	1) The teacher exposes students to new possibilities for self-fulfillment. 2) The teacher helps each student clarify his own aspirations for improved behavior. 3) The teacher helps each student diagnose the gap between his aspiration and his present level of performance. 4) The teacher helps the students identify the life problems they experience because of the gaps in their personal equipment.	1) Learning experiences to coincide closely in time to developmental task. 2) Share with students class objectives. 3) Ask students to share their objectives. 4) Inquire with students how they perceive their role to change. 5) Share with students how role will change through review of operational procedures.
The learning environment is characterized by physical comfort, mutual trust and respect, mutual helpfulness, freedom of expression, and acceptance of differences.	1) The teacher provides physical conditions that are comfortable (as to seating, smoking, temperature, ventilation, lighting, decoration) and conducive to interaction (preferably, no person sitting behind another person). 2) The teacher accepts each student as a person of worth and respects his feelings and ideas. 3) The teacher seeks to build relationships of mutual trust and helpfulness among the students by encouraging cooperative activities and refraining from inducing competitiveness and judgmentalness. 4) The teacher exposes his own feelings and contributes his resources as a co-learner in the spirit of mutual inquiry.	1) Training Room environment conducive to learning - i.e., comfortable both physically and psychologically with adequate space to allow interaction of students. 2) The student and teacher are co-inquirers. 3) The teacher accepts each student as they are and assists the student to learn.

CONDITIONS OF LEARNING*	PRINCIPLES OF TEACHING*	PRINCIPLES OF TEACHING WITH APPLICATION TO THE STUDY
The learners perceive the goals of a learning experience to be their goal.	1) The teacher involves the students in a mutual process of formulating learning objectives in which the needs of the students, of the institution, of the teacher, of the subject matter, and of the society are taken into account.	1) Share with the students the goals of the computer system installation at the hospital - both overall and for Central Supply.
The learners accept a share of the responsibility for planning and operating a learning experience, and therefore have a feeling of commitment toward it.	2) The teacher shares his thinking about opinions available in the designing of learning experiences and the selection of materials and methods and involves the students in deciding among these options jointly.	2) Share with the student how the goals will affect nursing. 3) Student objectives relating to CS will be addressed. 4) Give the students decisions whenever possible.
The learners participate actively in the learning process.	1) The teacher helps the students to organize themselves (project groups, learning-teaching teams, independent study, etc.) to share responsibility in the process of mutual inquiry.	1) Students are given choices when possible.
The learning process is related to and makes use of the experiences of the learners.	2) The teacher helps the students exploit their own experiences as resources for learning through the use of such techniques as discussion, role playing, case method, etc. 3) The teacher gears the presentation of his own resources to the levels of experience of his particular students. 4) The teacher helps the students to apply new learnings to their experience, and thus to make the learnings more meaningful and integrated.	2) Situations paralleling the work environment are given to the students. 3) Practical application is self paced by the learner. 4) Experiences of the students are used as teaching tools.
The learners have a sense of progress toward their goals.	1) The teacher involves the students in developing mutually acceptable criteria and methods for measuring progress toward the learning objectives. 2) The teacher helps the students develop and apply procedures for self evaluation according to these criteria.	1) Students share the product of learning situation with the teacher. 2) Students evaluate their own progress.

*(Knowles, 1973, pg. 70-73)

is to teach the hospital personnel using the computer system to modify the vendor instructional material. Modification includes 1) changing items ordered to better represent what would be ordered at the study hospital, 2) including operational procedures as program content, and 3) discussing any customization of the displays that impact job functions of those being trained. Appendix D provides the content of the modified instructional material and the traditional teaching strategy utilized in this study.

A comparison of the adult educational teaching strategy and the traditional teaching strategy highlights the following differences: 1) The adult teaching strategy outlines measurable objectives at the beginning of the teaching session, thus both instructor and students are aware of what will be addressed; the traditional teaching strategy has no written objectives, that are shared with the students. 2) The adult teaching strategy allows active student participation; students are given choices and they pace themselves through a learning situation. The traditional teaching strategy does not allow active student participation, students are given no choices and in fact are asked to stay together throughout the course of instruction. 3) With the adult teaching strategy the instructor assists the students to learn, while in the traditional teaching strategy approach adults are taught as children are taught, step by step.

Dependent Variable - Attitude

Attitudes of hospital personnel toward a computerized MIS can markedly affect the implementation of such a system in a hospital. The instrument used by Hardy, Young and Armstrong (1978), to measure attitudes of hospital personnel toward a computer system was selected for use in this

study. The instrument measured attitudes in four categories: 1) computers in general and use of computers in hospitals, 2) the impact of computers on individual staff members, 3) impact of computers on patient care, and 4) impact of computers on information management.

The instrument (see Appendix E) is a 50 item questionnaire - 37 items are attitudinal in nature, and 13 items relate to the characteristics of the subjects. The first 13 items of the questionnaire were designed to provide information regarding possible extraneous variables that might influence the data analysis. Question number 3 related to the shift the individual works - i.e., day, evenings or nights. The expectation was that registered nurses on the night shift might have more actual computer usage time than registered nurses on other shifts, because of the smaller numbers of staff utilized on the night shift. Questions 6 through 10 describe the actual length of time the individual has had in contact with the hospital based computer. Questions 11 and 12 examine the extent of actual and desired involvement of the subjects in the decision to implement a hospital based computer system. This related to the idea that changes are viewed in a more positive way when the persons affected by the change have been involved in the decision making.

The attitudinal items are statements to which participants were asked to respond on a 7-point Likert scale of: strongly agree, midly agree, agree, uncertain, mildly disagree, disagree, strongly disagree. Twenty-one of the 37 attitudinal items were analyzed and used in this study. The remaining 16 attitudinal items were added to the questionnaire as filler. Appendix F contains a list of the 21 items employed in this study.

Responses (strongly agree, agree, etc.) were given values from 1 to 7, where 7 represented a pro-computer response. Some of the questions were stated in a reverse order to avoid a conditioned response pattern. In these questions, 1 represented a pro-computer response, however for purposes of scoring and analysis consistency, these were reversed. Pre and post-test means were analyzed and compared.

A mean value greater than 4.0 represented a positive attitude toward computers, a mean value less than 4.0 represented a negative attitude and a 4.0 represented a neutral or uncertain response.

Category I measured attitudes toward computers in general and hospital based computers. Six questions addressed this category. The possible range for Category 1 is 6 to 42.

Category II measured attitudes toward the impact of computers on individual staff members. Five questions addressed this category. The possible range for Category II is 5 to 35.

Category III measured attitudes toward the impact of computers on patient care. Four questions addressed this category. The possible range for Category III is 4 to 28.

Category IV measured attitudes toward the impact of computers on information management. Six questions addressed this category. The possible range for Category IV is 6 to 42.

Data Collection Procedures

A pilot study involving four registered nurse participants was conducted to evaluate the clarity and readability of the questionnaire. Based on the responses there were no revisions to the questionnaire.

During the data collection process data were collected in the following manner: Classes for the CS module had been randomly assigned to

either an experimental teaching strategy or a traditional teaching strategy. During the first 10 minutes of each class the researcher explained the research project, asked for cooperation from the participants, had informed consent forms signed and the pre-test questionnaire completed. Class continued for 45 minutes based on the teaching strategies outlined previously. One person did all of the instruction for the experimental teaching strategy and one person, the researcher, did all of the instruction for the traditional teaching strategy. Three weeks later the researcher hand carried the post-test questionnaire to each participant to complete. The researcher tried to schedule the post-test at the convenience of the participant. By this time the CS module had been "on-line" or in use for three weeks. The time for the post-test was chosen for the following reasons: 1) The reality shock of the first week on-line would be less, and 2) the participants would not be so experienced with the system that they would forget how it "used to be".

CHAPTER III

RESULTS

The study was conducted to determine the attitudes of the nursing
personnel toward a hospital based computer system, and to determine
whether changes in attitude occurred as a result of a training program
which focused on preparing nursing personnel for implementation.

Demographic Data

A total of 68 females participated in the study with 65 of those
individuals completing both the pre and post-attitude questionnaires.
Of the three individuals who did not complete the post-attitude question-
naire, one was vacationing overseas and two were at home on a work-injury.
The ages of the sample ranged from 23 years to 66 years with a mean age
of 36.5 years.

Participants were asked to indicate the job position they held in
the hospital. Of the 65 participants in the study, 13 (20%) were unit
secretaries, 52 (80%) were registered nurses holding the following job
titles: 6 nursing unit supervisors (9.2%), 4 nursing unit charge nurses
(6.2%), and 42 nursing unit staff nurses (64.6%).

Participants were asked to indicate the length of time (in number
of months) they had been in their current job title and to indicate
length of time they had been employed at the study hospital. Figures 1.0
and 2.0 illustrate that the nursing staff was a stable, long time employed
group, with an influx of new individuals of one year or less employment
at the study hospital.

The majority (51 or 78.5%) of the participants worked the 7:00 AM
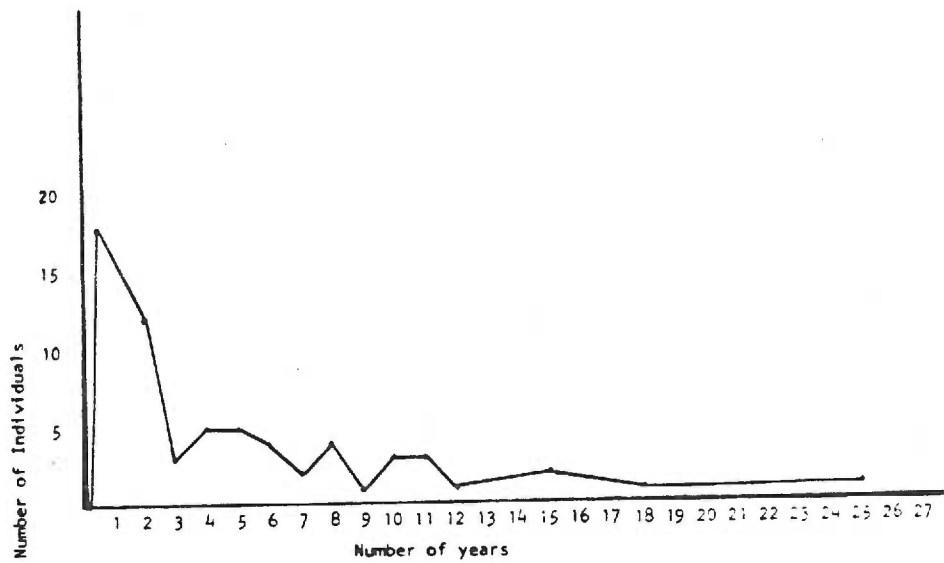
Figure 1.0   Length of time (in years) employed at study hospital
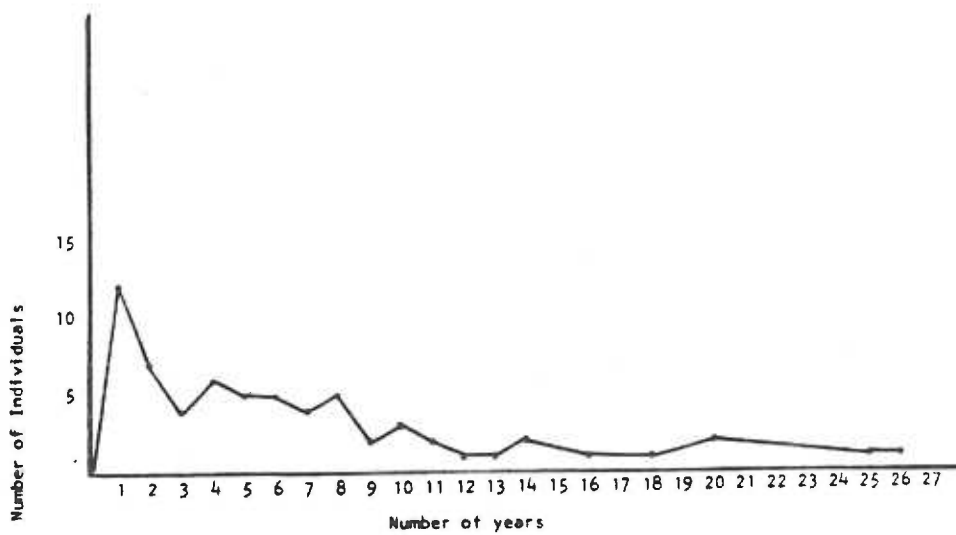
Figure 2.0   Length of time (in years) at present job title

to 3:30 PM "Day" Shift. Eight persons (12.3%) worked the 3:00 PM to 11:30 PM "Evening" Shift, and six persons (9.2%) worked the 11:00 PM to 7:30 AM "Night" Shift.

Educational level of the participants was requested. The registered nurses involved in the study had the following educational backgrounds: Bachelor of Science Degree - 25 (38.5%), Diploma Degree - 14 (21.5%), Associate Degree - 13 (20.0%), and Masters Degree - 0. Although no statistics were available it was the belief of the nurse staffing director of the hospital that most of the registered nurses employed were BSN graduates, followed by Diploma nurses and Associate Degree nurses.

Participants were asked to indicate when they had received training in the use of the computer system. The majority (83.1%) of the respondents had received their initial training when the training was first offered in May or June 1980. Dietary training was first offered in July and August 1980. This also seems to be the time that the majority (86.1%) received training. Only 13.7% of the population studied received their training, both initial and dietary after August 1980.

Participants were asked to indicate the number of times they used the computer system to request or enter data during their shift. The majority reported using the computer system regularly. The largest number of the sample studied, 29 (44.6%), used the system 2-5 times a day. Four individuals (6.2%) reported using the system 6-10 times a day, while 11 (16.9%) individuals indicated use at greater than 10 times a day. Only 21 individuals (32.3%) reported use of the system at one time a day or less. Figure 3.0 illustrates the data on graph form.

Participants were asked if they had any prior experience using computers, either in a hospital setting or in any other setting. 87.7% (57

individuals) reported no prior experience with computers. 12.4% (eight individuals) had used computers in a hospital setting.
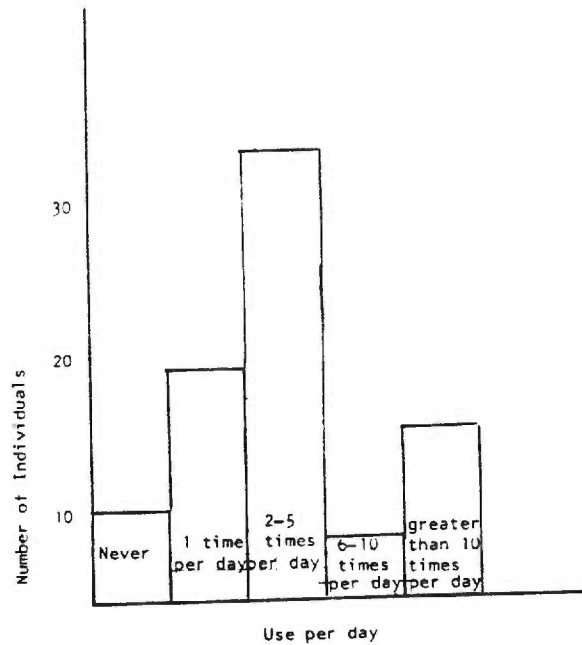
Figure 3.0   Use of the Computer System

Participants were asked how much involvement they had in the decision to consider the installation of a hospital computer system. Participants were also asked how much involvement they would have liked to have had. Table 2.0 illustrates that the majority (93.8%) of individuals had no involvement in the decision to consider a hospital computer system installation, while 56.9% would have liked some involvement in the decision.

Attitude Questionnaire

The 37 item questionnaire was divided into four categories. Table I through IV of Appendix G compare the sample means 'before', with the sample means 'after' per question and indicate the direction of change for each question. Category I (Table I) measured attitudes toward computers in

Table 2.0

Involvement in the Decision
to Install a Computer System

	Actual Involvement		Desired Involvement	
	Number	%	Number	%
No Involvement	61	93.8%	26	40.0%
Some Involvement	4	6.2%	37	56.9%
Extensive Involvement	0	0	2	3.1%
TOTAL	65	100.0%	65	100.0%

general and hospital based computers in particular. Six questions
addressed this category. Category II (Table II) measured attitudes toward
the impact of computers on individual staff members. Five questions ad-
dressed this category. Category III (Table III) measured attitudes
toward the impact of computers on patient care. Four questions addressed
this category. Finally, Category IV (Table IV) measured attitudes toward
the impact of computers on information management. Six questions address-
ed this category.

Table 3.0 illustrates the total mean by category. As one can observe,
the 'before' mean in all cases was on the high end of the possible range
by category. Category I had the greatest degree of movement in attitude,
however it is notable that in all categories any change in attitude amount-
ed to less than 1.0. In summary for the total sample there was little
change in the attitude scores before and after. When change did occur it
was very slight, less than 1.0 in all cases. In fact the overall mean
moved only .137 (100.677 before compared to 100.814 after).

Table 3.0

Means (Before and After) per Category

CATEGORY	MEAN/CATEGORY		
	BEFORE	AFTER	OVERALL DIRECTION OF CHANGE
CATEGORY I	31.125	30.857	.732 (−)
CATEGORY II	23.875	23.523	.352 (−)
CATEGORY III	16.877	17.852	.025 (+)
CATEGORY IV	28.500	28.492	.008 (−)

The researcher hypothesized that 1) Registered nurses who have had training utilizing adult educational teaching principles will have a more positive attitude toward a hospital based computer system, than registered nurses who have not had an adult teaching strategy.

Table 4.0 illustrates the mean scores for the experimental and control groups. As one can observe there was little overall change. Again the mean scores both before and after were on the high end of the possible range of 21 to 147. The experimental group mean decreased somewhat after the instruction was given; while the control group mean increased slightly. The increase in the control group mean was due to the unit secretaries. By job title the unit secretaries had a more positive attitude than the registered nurses.

Analysis of Variance (ANOVA) was used to test the first hypothesis. Table 5.0 illustrates ANOVA using the before scores as co-variants. It is clear that the before scores had a significant effect on the attitude scores of the experimental group. However, after removing the variation caused by the before scores, the teaching strategy used on the experimental group had little effect on the after scores. ANOVA was also done to test

the possible interaction of position (Registered Nurses or Unit Secretaries) and type of educational teaching strategy. Table 6.0 illustrates no significant interaction in the after scores between these two groups.

Table 4.0

Mean Scores on Attitude Questionnaire
'After' Training Session by Type
of Training and Job Title

Type of Training	Job Title		
	RN	UNIT SEC.	TOTAL
Adult Education Strategy(Experimental)	100.56 (34 Ind)	96.75 (4 Ind)	100.16 (38 Ind)
Traditional Strategy (Control)	100.62 (13 Ind)	104.00 (8 Ind)	102.00 (21 Ind)
Total	100.62 (47 Ind)	101.58 (12 Ind)	100.81 (59 Ind)

Table 5.0

Analysis of Variance
Effects of Adult Educational Teaching Strategy
on Attitudinal Scores with 'Before' Scores as Covariants

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Covariants ('Before' scores)	2637.357	1	2637.357	31.819	.001
Adult Educational Strategy	99.103	1	99.103	1.196	.280
Explained	2736.460	2	1368.230	16.507	.001
Residual	3564.149	43	82.887		
TOTAL	6300.609	45	140.014		

Covariate - Regression coefficient adjusted for all other covariants

Before - .658

Table 6.0

Analysis of Variance
Effects of Adult Educational Teaching Strategy
on Attitudinal Scores

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Adult Ed. Teaching Strategy	46.554	2	23.277	.170	.844
Exp. Cont. Group	37.628	1	37.628	.275	.602
RN's/US's	.658	1	.658	.005	.945
2-Way Interaction	102.955	1	102.955	.753	.389
Explained	149.509	3	49.836	.364	.779
Residual	7521.440	55	136.573		
Total	7670.949	58	132.258		

The researcher also hypothesized that: 2) Registered nurses new to the study hospital would have a more positive attitude toward a hospital based computer system, than registered nurses who were not new to the study hospital.

Stepwise Multiple Regression Analysis was done to test the second hypothesis. Table 7.0 illustrates that length of employment did not contribute significantly to the variation in after scores.

Multiple Regression Data

VARIABLE	MEAN	STANDARD DEVIATION	CASES
After	100.8136	11.5003	59
Education	2.7797	1.1754	59
Length of Employment	52.5254	57.5926	59

Table 7.0

Multiple Regression Correlation:
Attitudinal Scores with Length of Employment, and Educational Level;
Educational Level with Length of Employment

	Attitude Scores After	Education
Education	-.05666	
Length of Employment	.10542	-.04767

N = 59

In summary the data did not support the hypothesis that registered nurses who received training utilizing an adult educational teaching strategy would have a more positive attitude toward a hospital based computer system, than registered nurses who did not have an adult educational teaching strategy; nor did the data gathered support the hypothesis that registered nurses new to the study hospital would have a more positive attitude toward a hospital based computer system, than registered nurses who were not new to the study hospital.

CHAPTER IV

DISCUSSION AND SUMMARY

Interpretation

This study was conducted to determine the attitudes of the nursing personnel toward a hospital based computer system, and to determine whether changes in attitude occurred as a result of a training program based on Adult Learning Principles which focused on preparing nursing personnel for the computer implementation. The following hypotheses were addressed:

1. Registered nurses who have had training utilizing adult educational teaching principles will have a more positive attitude toward a hospital based computer system than will registered nurses who have not had an adult teaching strategy.

2. Registered nurses new to the study hospital will have a more positive attitude toward a hospital based computer system than will registered nurses who are not new to the study hospital.

The first hypothesis was not supported by the data gathered. Analysis of variance indicated there was no significant difference between the attitudes of the experimental and control groups, either before or after the teaching strategies were applied.

Hypothesis number two was also not supported. Multiple regression analysis indicated that length of employment did not explain the attitude toward computers.

It is difficult to compare these results with the results obtained by Young, et al (1978) because of the vast differences in the sample, the

amount of time that elapsed between the pre and post-tests and the fact that the study by Young, et al, did not involve a teaching strategy. However, both studies did demonstrate a generally positive attitude by the pre-test (i.e., scores of greater than 4.0 on the questionnaire), and this attitude seemed to prevail through the duration of the study. When the data from both studies is reviewed by category, the following are similar.

1. Attitudes displayed in Category I indicate that computers are necessary in general life and do not need to be avoided in the hospital setting.

2. A positive attitude was also reflected by the questions addressed in Category II which focused on the impact of computers on the hospital staff.

3. Items addressed in Category III focused on the impact of computers on patient care. Both studies reflected positive attitudes in this area. Computers were perceived as contributing to improved patient care and as contributing to the amount of time available for patient care.

4. Finally, computerized information was perceived as better than manual systems. (See Appendix H - Table V)

The present research demonstrates no change in the attitudes of registered nurses regarding computers after a teaching strategy utilizing adult educational teaching principles was applied. Many events and processes occurred during the three weeks between the pre and post-test questionnaires, which acting alone or in concert could have contributed to the observed results. Among these potentially important intervening variables which were not controlled for were: the user-system interface, registered nurse managements attitude toward the system, registered nurse

managements involvement with implementation, system performance and staff characteristics. In addition, methodological limitations could have accounted for the absence of differences between groups after the teaching.

Limitations

The study was conducted for six days and consequently the sample was small. Though the sample was representative of the general hospital, both in terms of nursing unit speciality and type of registered nurse hospital population, it was less than one-fourth of the total registered nurse population employed by the hospital. It also included few of the evening and night personnel.

The CS module used for the base of the teaching strategy involved a considerable amount of terminology change and standardization with the hospital departments involved. This module was chosen because of time constraints for the completion of the research and because this was the only module the hospital was going to implement in 1981.

The researcher was the instructor for the control group. Since the researcher is also the coordinator for the hospital computer system, it may have had some bearing on the attitudes of the participants. The experimental teaching strategy was developed by the researcher, however, the researcher was not the instructor for this strategy. This was done to avoid any bias on the part of the researcher and any undue conditioning of the participants toward the adult educational teaching approach. However, the instructor may have incorporated, unwittingly, some of the principles in the control teaching, thereby reducing the expected differences.

Recommendations

The researcher feels another study utilizing an adult teaching strategy compared to a more traditional teaching approach would be appropriate. Recommendations for a repeat study would include: 1) conducting the study with a computer module where changes in terminology are not so important, 2) having someone other than the researcher do the teaching of both groups, and 3) involving the entire department of nursing to increase the sample size.

Retesting the attitudes of the sample at six months and one year would provide additional data on changes in attitude. This would allow time to negate any halo effects, to allow the change to stabilize, and to allow a more realistic clinical situation to exist.

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APPENDIX A

Study Population

STUDY POPULATION

Class Sequence	Date	Teaching Strategy	Number of Participants	%RN - %UC
000	5/1/81	EXP	4	100% RN
001	5/15/81	EXP	2	100% RN
002	5/15/81	CONT	3	33 1/3%RN-66 2/3% UC
003	5/18/81	EXP	4	100% RN
004	5/18/81	CONT	2	100% RN
005	5/18/81	CONT	2	100% RN
006	5/18/81	EXP	4	50% RN-50% UC
007	5/18/81	EXP	3	100% RN
008	5/19/81	EXP	3	100% RN
009	5/19/81	EXP	1	100% RN
010	5/19/81	EXP	System down class canc.	Person (1RN) re-schedule for EXP
011	5/19/81	EXP	3	100% RN
012	5/19/81	CONT	3	33 1/3%RN-66 2/3% UC
013	5/20/81	EXP	2	100% RN
014	5/20/81	CONT	2	50% RN-50% UC
015	5/20/81	EXP	3	100% RN
016	5/20/81	EXP	2	50% RN-50% UC
017	5/20/81	CONT	1	100% RN
018	5/21/81	CONT	2	100% RN
019	5/21/81	CONT	2	50% RN-50% UC
020	5/21/81	CONT	1	100% RN
021	5/21/81	CONT	3	66 2/3%RN-33 1/3%UC
022	5/21/81	CONT	4	75% RN-25% UC
023	5/22/81	CONT	1	100% RN
024	5/22/81	CONT	1	100% RN
025	5/22/81	EXP	1	100% RN
026	5/22/81	EXP	4	75% RN-25% UC
027	5/22/81	EXP	5	100% RN

APPENDIX B

Adult Teaching Strategy

I. Introduction

    1. Objectives of class

        By the end of class the student will be:

    A. Familiar with the operational procedures for the CS module.

    B. Able to input requests for Central Supply items into Spectra.

    C. Able to input a CS request for more than one item per patient.

    D. Able to input a CS request for more than one patient.

    E. Able to input a request for a new item (i.e., an item not

        found on the display screens).

    F. Able to input a request for a credit of an item.

    2. Goals of computer system for Hospital and for Central Supply module.

    3. Student objectives for CS module.

II. Operational Procedures

    A. Review operational procedures for the following:

        1. Central Supply Request—Floor Stock Inventory Item (when item not

           available) Non-floor stock item, Patient Equipment Item

        2. Handling Confirmation of Input

        3. Standardization of Terminology for CS items

        4. Request for Miscellaneous Items

        5. Stat Item (7AM—11PM)

        6. Stat Item (11PM—7AM)

        7. Credit of Unused item

        8. Credit of item ordered on wrong patient

        9. Urology Cart

      10. Dr. Nathan's Cart

      11. System Back-up and Recovery

    B. Demonstrate operational procedure when appropriate

III. Student Practice Experience

    A. CS Situation

    B. Student practices on own

OBJECTIVE	CONTENT/ACTIVITY
1. By the end of class the student will be familiar with operational procedures for the CS module	1. Operational Procedure covered point by point with students. 2. Overhead projector used. 3. Students asked to recite operational procedures 4. Students asked to demonstrate operational procedures
2. By the end of class the student will be able to input requests for CS items into Spectra.	1. Student will be given a CS situation which requires input of requests for CS items. 2. Student must demonstrate completion of CS Situation by sharing output with instructor.
3. By the end of class the student will be able to input a CS request for more than one item per patient (batching of items).	1. The student will be given a CS situation that requires input of several items on one patient. 2. Student must demonstrate completion of CS situation by sharing output with instructor
4. By the end of class the student will be able to input a CS request for more than one patient (batching patients).	1. The student will be given a CS situation that requires input of items on several patients. 2. The student must demonstrate completion of CS situation by sharing output with instructor.

OBJECTIVE	CONTENT/ACTIVITY
5. By the end of class the student will be able to input a request for a new item.	1. The student will be given a CS situation that requires input of an item not found on the CRT displays. 2. The student must demonstrate completion of a CS situation by sharing the output with the instructor
6. By the end of class the student will be able to input a request for a credit of an item.	1. The student will be given a CS situation that requires input of a credit of an item. 2. The student must demonstrate completion of a CS situation by sharing the output with the instructor.

Operational Procedures

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CENTRAL SUPPLY REQUEST FLOOR STOCK INVENTORY ITEM
(WHEN ITEM NOT AVAILABLE) NON-FLOOR STOCK ITEM,
PATIENT EQUIPMENT ITEM (NONCHARGEABLE & CHARGEABLE)

NURSING
PERSONNEL
REQUESTS
ITEM(S)

CONFIRMATION
OF INPUT OCCURS
ON NSG. UNIT.

REQUISITION
OCCURS IN
CS

C OF I PLACED
IN DESIGNATED
AREA.

SAVE FOR 24hr WITH
OTHER LAB, EKG, DEPT.
CHG REQ. ETC. TO RECON-
CILE ANY DISCREPANCIES.

WAIT

CS RESERVES RIGHT TO
DECIDE ON MODE OF TRANS-
PORTATION IN REGARDS TO
FRAGILITY OR STERILITY
OF ITEM. DELIVERY TIME
DEPENDS ON MODE OF TRANS.
CHECK MESSENGER SCHEDULE.

ITEM DELIVERED
TO NSG. UNIT

IF EQUIP; NOTE EQUIP.
TAG. IF USED ON ANOTHER
PT. IT WILL BE NECESSARY
TO CHANGE THE EQUIP. TAG
& TO NOTIFY CS.

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HANDLING CONFIRMATION OF INPUT

NSG PERSONNEL REQUESTS ITEM.

C OF I OCCURS ON NSG UNIT

REQ. OCCURS IN CS

C OF I TAKEN FROM PRINTER

C OF I PLACED IN DESIGNATED AREA.

C OF I KEPT FOR 24hr WITH OTHER LAB, EK DEPT CHG REQ. FOR RECONCILIATION OR ANY DISCREPANCY.

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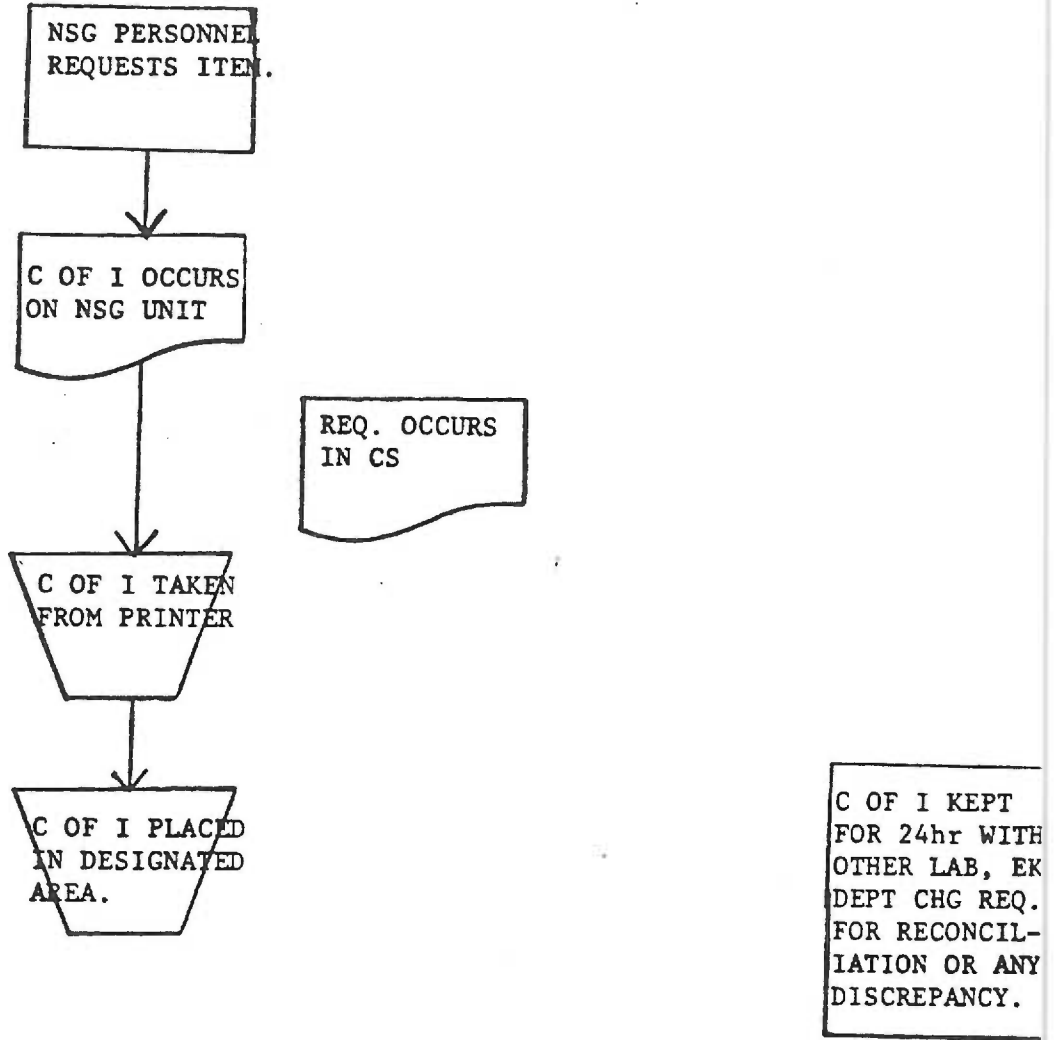
MISCELLANEOUS ITEMS (THOSE ITEMS NOT FOUND IN CS SYSTEM)
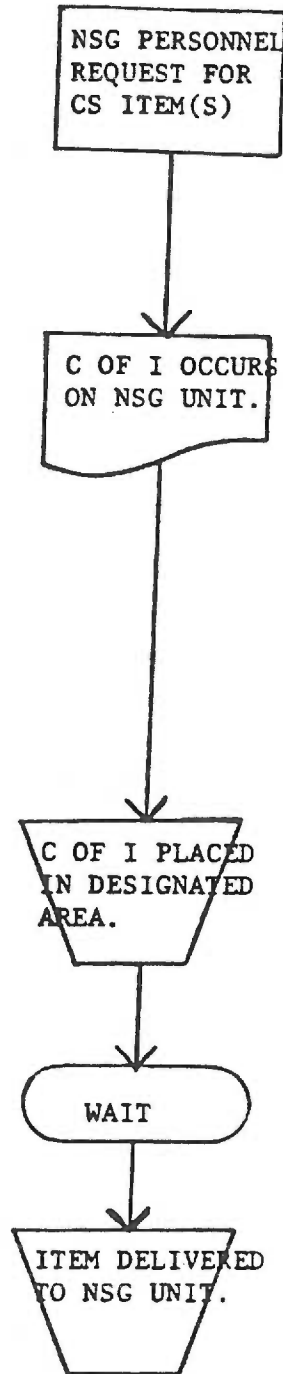
```
┌─────────────────┐              ┌──────────────────┐
│ NSG PERSONNEL   │              │ WILL BE NEW      │
│ REQUEST FOR     │              │ ITEMS NOT YET    │
│ CS ITEM(S)      │              │ ADDED AS A       │
└─────────────────┘              │ SELECTABLE       │
         │                       │ ITEM. ITEMS      │
         ▼                       │ TYPED CAN ONLY   │
┌─────────────────┐              │ BE ITEMS APP-    │
│ C OF I OCCURS   │              │ ROVED BY NSG     │
│ ON NSG UNIT.    │              │ CS COMMITTEE.    │
└─────────────────┘              └──────────────────┘
         │
         │              ┌──────────────┐   ┌──────────────────┐
         │              │ REQ OCCURS   │   │ ACCESS "MISC     │
         │              │ IN CS DEPT.  │   │ ITEM TYPE"       │
         │              └──────────────┘   │ UNDER "M" IN     │
         │                                 │ THE ALPHA.       │
         ▼                                 └──────────────────┘
┌─────────────────┐
│ C OF I PLACED   │              ┌──────────────────┐
│ IN DESIGNATED   │              │ LIST OF APPRO-   │
│ AREA.           │              │ VED ITEMS WILL   │
└─────────────────┘              │ BE DISTRIBUTED   │
         │                       │ AS CHANGES       │
         ▼                       │ OCCUR.           │
   ╭───────────╮                 └──────────────────┘
   │   WAIT    │
   ╰───────────╯                 ┌──────────────────┐
         │                       │ REFER TO INDEX   │
         ▼                       │ NO 4             │
┌─────────────────┐              └──────────────────┘
│ ITEM DELIVERED  │
│ TO NSG UNIT.    │
└─────────────────┘
```

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STANDARDIZATION OF TERMINOLOGY FOR CS ITEMS

CS ITEM ADDED/DELETED
CHANGE IN TERMINOLOGY
TAKEN TO CS/NURSING
WEEKLY COMMITTEE.

STANDARDIZATION OF
TERMINOLOGY APPROVED
BY CS/NURSING COMMITTEE

CS PERSONNEL CONTACT
SPECTRA OFFICE TO IDENTIFY
CS ITEMS TO BE ADDED/DELETED
OR CHANGED IN SPECTRA.

CS PERSONNEL CONTACT ACCOUNTING
TO IDENTIFY CS ITEMS TO BE ADDED,
DELETED OR CHANGED IN THE FINANCIAL
SYSTEM.

A LIST WILL BE UPDATED
AND DISTRIBUTED BY CS TO
ALL DEPARTMENTS AFFECTED
AS CHANGES OCCUR.

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STAT ITEM 7AM-11PM

```
┌─────────────────┐                              ┌─────────────────┐
│ NSG PERSONNEL   │                              │ STAT URGENTLY   │
│ ENTERS REQUEST  │                              │ NEEDED ITEM.    │
│ FOR STAT CS     │                              │                 │
│ ITEM(S)         │                              │                 │
└────────┬────────┘                              └─────────────────┘
         │
         ▼
┌─────────────────┐
│ C OF I OCCURS   │
│ ON NSG UNIT     │
└────────┬────────┘
         │        ┌─────────────────┐
         │        │ REQ OCCURS      │
         │        │ IN CS           │
         │        └─────────────────┘
         │
         ▼
┌─────────────────┐                              ┌─────────────────┐
│ ITEM OBTAINED   │                              │ NSG UNIT IS     │
│ BY UNIT PERSONNEL,│                            │ RESPONSIBLE     │
│ TUBE SYSTEM OR  │                              │ TO PHONE TRAN-  │
│ TRANSPORTATION. │                              │ SPORTATION      │
└─────────────────┘                              │ UNTIL 9PM.      │
                                                 └─────────────────┘
```

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STAT ITEM 11PM-7AM

STAT URGENTLY
NEEDED ITEM.

NSG PERSONNEL
PHONES TO IDENTIFY
IF CS CLERK IN DEPT.

TO CLERK
IN DEPT?

YES

NO

NSG PERSONNEL
IDENTIFIES STAT
ITEM(S)

NSG MAKES CALL
TO PBX TO PAGE
CS PERSONNEL

UNIT PERSONNEL
OBTAINS ITEM(S)

WAIT

CS CLERK CALLS
UNIT & UNIT IDENTIFIES
NEED OF STAT ITEM(S)

UNIT PERSONNEL
OBTAINS ITEM(S)

NSG PERSONNEL
MUST ENTER ITEM(S)
INTO SPECTRA DURING
THIS SHIFT.
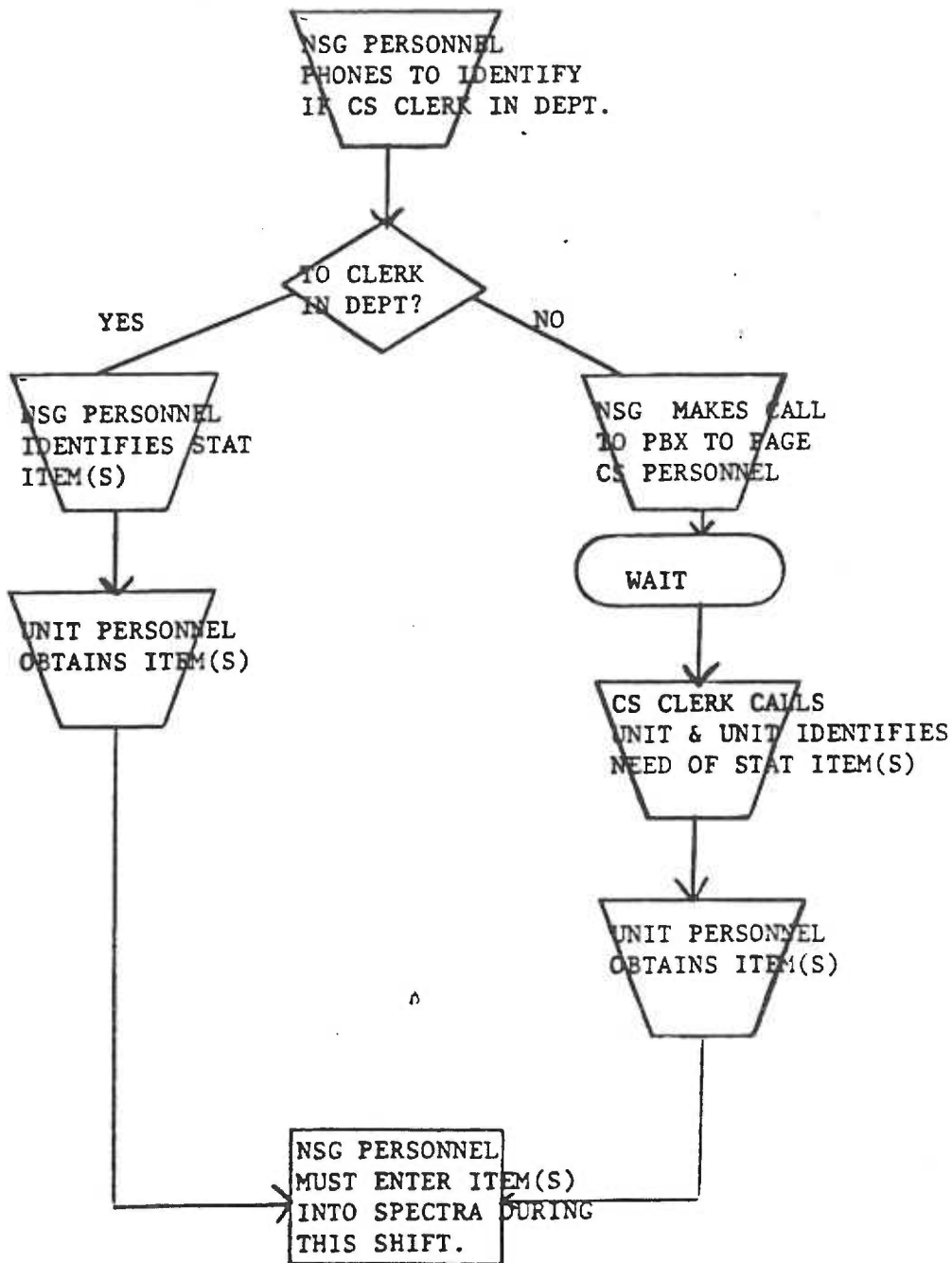
CS CLERK MAY
DELIVER ITEM
TO SPECIAL
CARE AREAS O
IN EXTREME
SITUATIONS.
MAY DELIVER
TO UNIT.

IF NOT DONE
PRIOR TO SHIF
END, CS WILL
CALL UNIT TO
ASK THAT THEY
ENTER THE
ITEM(S).

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CREDIT OF UNUSED ITEM

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CREDIT OF ITEM ORDERED ON WRONG PATIENT

NSG PERSONNEL IDENTIFIES IN-CORRECT CHARGE TO PATIENT.

NSG PERSONNEL REQUESTS CREDIT OF CS ITEM

CS ITEM AUTO MATICALLY CHG UPON RE-QUEST IN SPECTRA.

NSG PERSONNEL ENTERS THE CHARGE ON THE CORRECT PT. INDICATING "HAS BEEN RECEIVED"

SELECT "MISC ITEM TYPE", TYPE CREDIT & IDENTIFY THE ITEM.

C OF I OCCURS ON NSG. UNIT

"HAS BEEN RECEIVED" WILL PREVENT DELI-VERY OF THE ITEM AGAIN.

REQ OCCURS IN CS

CS PERSONNEL WILL REVERSE CHG ON WRONG PATIENT.

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UROLOGY CART (STAT)
(PATIENT CHARGEABLE ITEMS)

UNIT PHONES CS
TO REQUEST CART.

NO CHARGE
FOR CART.

CART TAKEN
BY UNIT PERSONNEL
TO SPECIFIC UNIT.

ITEM TAKEN
FROM CART

REQ REMOVED AND
STAMPED WITH PT.
ADDRESSOGRAPH PLATE.
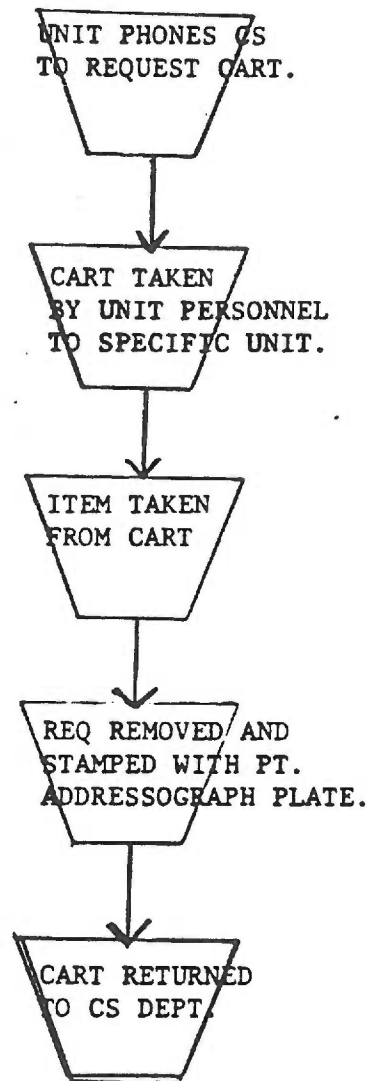
EACH ITEM
ON CART HAS
A REQ.

CART RETURNED
TO CS DEPT.

REQ. PLACED
ON CART BE-
FORE RETURNING
TO CS.

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DR. NATHANS CART

UNIT PHONES CS TO REQUEST CART

↓

DR NATHAN TAKES CART PT TO PT

↓

ITEM TAKEN FROM CART.

↓

RETREIVE REQ FROM BOX TO CHG PATIENT.

↓

WAIT

↓

CART MAY BE RETURNED OR RETREIVED BY CS DEPT
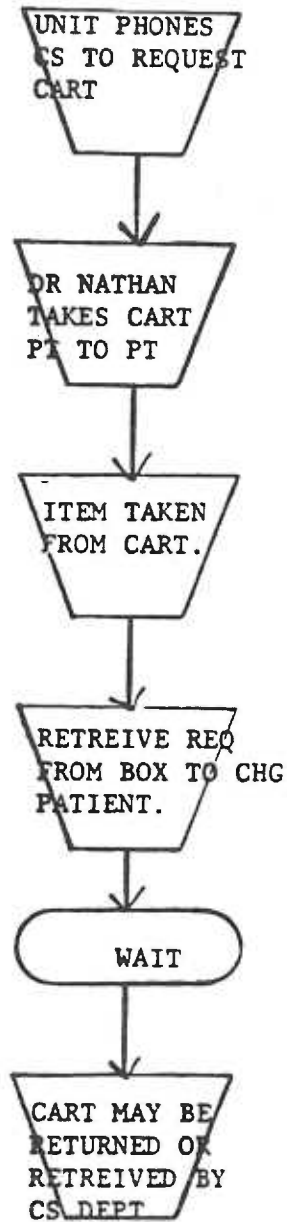
NO CHARGE FOR CART.

REQ. MUST BE STAMPED WITH PT. ADDRESS-OGRAPH PLATE & PLACED ON CART BEFORE RETURNING TO CS.

SYSTEM BACK UP AND RECOVERY

NSG PERSONNEL
PHONES ITEM
TO CS

WAIT

ITEM DELIVERED
TO UNIT BY MESSENGER,
UNIT PERSONNEL,
TRANSPORTATION, OR
TUBE SYSTEM.

STICKER FROM ITEM
PLACED ON KARDEX
IN CLEAN UTILITY
ROOM.

WAIT

SPECTRA SYSTEM
UP

NSG PERSONNEL
THEN REQUESTS
ITEMS AS BEFORE
DOWNTIME.
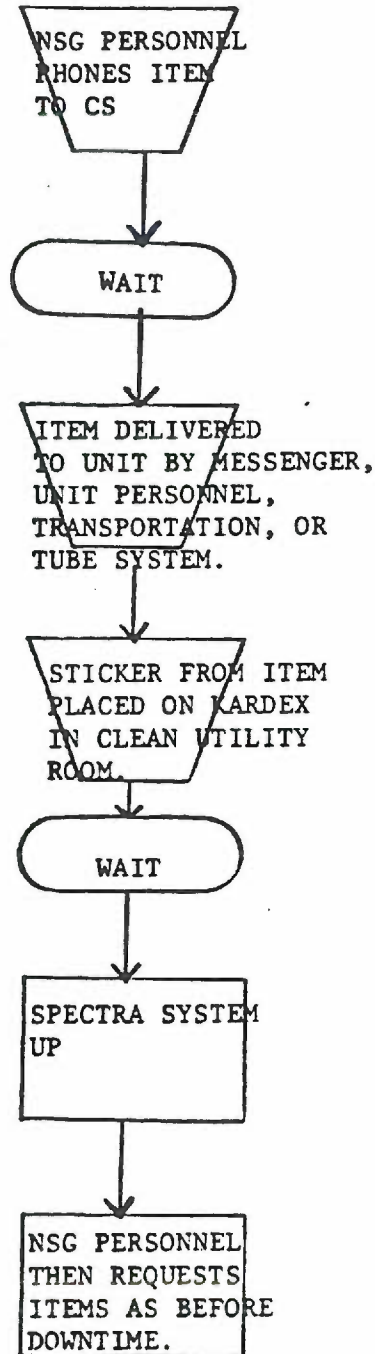
REFER TO
INDEX #1

Teaching Situation

Your patient has developed an abdominal infection 3 days post operatively with a large amount of drainage.

The physicians orders include:

- Skin and wound isolation

- Apply HWP Q4°

- Change dressing q 4° and prn

- Irrigate wound with 22cc normal saline with each dressing change.

Assuming you are all out of floor stock, what are some of the items you think you will need to order from CS? (list the items below).

1.   7.

2.   8.

3.   9.

4.   10.

5.

6.

Now enter the request for the above items from CS on Test, Patient #82. If you need assistance, ask your instructor.

After you have completed the above exercise, go onto the next page.

Suppose that after you received all the items that you ordered from CS you decide that Test, Patient _____ doesn't need the _____ (Pick an item that you just ordered from CS).

Following the operational procedure: Credit of unused item, enter a request for CS to credit the above item.

If you need assistance, Check with your instructor.

After you have completed the above exercise, go onto the next page.

I. List some items that you frequently order from CS from the Unit(s) on which you work.

1.

2.

3.

4.

5.

Now, input the request for items 1 and 2 on Test, Patient _____;

before entering your items request items 3, 4 and 5 on Test Patient_____.

II. What is one item you frequently need to order "stat" from CS?

_____

Enter the request for that "stat" item from CS.

SUMMARY SHEET
CS/NURSING

CHARGING

Charging of floor stock remains the same. Take green sticker from
item and place on Patient's kardex card.
Charging of floor stock depleted, non floor stock and equipment will
be done through Spectra.
When you order through Spectra, selectng and entering an order will
automatically charge the patients account if it is a chargeable item.
Type in only those items which have been approved by the CS/Nursing
Committee.

CREDITING

A message to CS to credit an item needs to be typed in to avoid charging
the patient again.
Enter a request for a credit as soon as possible. At 11PM on the day after
the patient is discharged, the patient's records are no longer in the
Spectra System. His account can't be credited after that time.

MESSENGER DELIVERY SCHEDULE FROM CS

SATURDAY: 8:30 - 9:30 - 10:30 - 12:15 - 1:30 - 2:30 - 3:15 - 4: 15

SUNDAY: 10:15 - 12:15 - 1:30 - 2:30 - 3:30 - 4:30 - 6:00 - 7:00 - 8:00

WEEKDAYS: 8:30 - 9:30 - 10:30 - 12:30 - 1:30 - 2:30 - 3:30 - 4:30 - 6:00 -
7:00 - 8:00 - 9:00

APPENDIX C

Computer System Vendor Instructional Material

UNIT_____

USE ONLY TEST PATIENTS FOR PRACTICE

Select "CS REQUEST" from your "GUIDE"

Select "ALL TEAMS"

      "TRAINING A"

      "SELECT A TEST PATIENT"

1. Order the following items for your test patient:

      1 K-Pad

      2 Dextrose 5%/.45% Sodium Chloride 1000 ML

      1 Menghini Biopsy Needle 1.6

      Walker (4-point)

      "REVIEW"

      "ENTER"

   You have "BATCHED" items for one patient

2. You may also "BATCH" patients. Order the following:

      Pedi Cut-down tray for "TEST" patient #1

      Lactated Ringers 1000 ML for "TEST" patient #2

NOTE: You can select either "P" for Pedi...or "T" for trays and can select "L"

      for Lactated Ringers or "I" for I.V. solutions.

      "REVIEW"

      "ENTER"

3. Order JOBST STOCKINGS on a "TEST" patient

      Select "J"

      Notice that JOBST STOCKINGS is not a selectable item

      Select "RETURN"

      Select "MISC. CS ITEM"

      Type in "JOBST STOCKING"

      Select "QUANTITY AND INSTRUCTIONS"

      Select Quantity = 1

4. Order the following items on a "TEST" patient

    Remember to include the quantity.

    50 ABD Pads

    Thoracotomy Tray—STAT

    Trach (Jackson) Tube—STAT

    1 Stop—Cock, plastic (Disp.)

    Suction machine (throat)

    Airway

    Blakemore tube

    "REVIEW"

    "ENTER"

Retrieve your confirmation of input and verify with this Task Sheet and your

NCC or Resource Person on your unit.

REPORT ANY DIFFICULTY TO YOUR NCC.

APPENDIX D

Traditional Teaching Strategy

CENTRAL SUPPLY - PHASE IV

NURSING

* Review Operational Procedures 1 & 4

* Sign-on

* Note Guide Functions

* Remember to use only Test patients for practice.

* Select "CS Request" from your Guide

* Select "Training Team B"

* Select Test Patient _____

* Note how the CS Request Guide is arranged - Letters of the alphabet A through

  Z; Green categories in lower left hand corner of display. Many items in the

  CS Request pathway have been cross indexed for ease in ordering - i.e., sheep-

  skin and acrilon pad.

* Order the following items for Test Patient_____

        Hot wet packs - quantity 2

        Hot pack heater

        Sodium chloride irrigation

        ABD Pads - quantity 17

* Review

* Enter

  You have just BATCHED items for one patient.

* Now BATCH several patients by ordering the following items for Test

  patient_____

        Urinary Drainage Bag

  _   # 16 Foley Silastic Catheter

* Select "Next Patient"

* For Test Patient_____order the following:

        Soap suds enema

        Gauze sponge 4X4 - quantity 6

        Rectal tube - size 12

*   Review

*   Enter

*   Review Operational Procedures 5 & 6

*   Order a Volumetric Pump for your patient

*   Select V

    Note: Volumetric pump is not a selectable item.

*   Select RETURN

*   Select M

*   Select Miscellaneous CS Item

*   Type in Volumetric Pump

*   Select quantity "1", and instructions if necessary

*   Review

*   Enter

*   Review Operational Procedures 7 & 8

    Suppose only 10 of 17 ABD pads were used by your test patient.

*   Review Operational Procedures 2 & 3

*   Review remaining Operational Procedures 9, 10, and 11

*   Answer Questions

APPENDIX E

Instrument

–

1. Job Title:_____

2. Length of Time (# of months) in current job title:_____

3. Which shift do you work most often: _____ Day _____ Evening _____ Night

4. Sex: _____ Female _____ Male

5. Nursing Education Preparation: (Please indicate highest degree held)
   _____ Diploma _____ AD _____ BS _____ Master's

6. How long have you been employed at St. Vincent's Hospital:

   _____ Years _____ Months

7. When did you receive your initial training for the Spectra System:

   _____ May, 1980 _____ June, 1980 _____ (Other, please state month)

8. When did you receive training for the Dietary part of the Spectra System:

   _____ July, 1980 _____ August, 1980 _____ (Other, please state month)

9. How many times a day do you enter or request information from the Spectra System:

   _____ Never _____ One time a day _____ Two to five times a day

   _____ Five to ten times a day _____ More than ten times a day

10. Have you had experience working with computers before coming to St. Vincnet:

   _____ No _____ Yes * _____ Yes, but not in a hospital *

   * If yes, please describe:_____

   _____

11. To what degree were you involved in the decision to install a computer at

   St. Vincent Hospital:

   _____ Not at all _____ Somewhat (i.e., was your opinion polled?)

   _____ Extensively (i.e., on the task force)

12. How much involvement would you have wanted:

   _____ None _____ Some _____ Extensive

13. Age _____ (to nearest year)

                                        Teaching Strategy_____

                                        Mixed/unmixed

PLEASE CHECK THE SPACE ON EACH SCALE WHICH
MOST CLOSELY AGREES WITH YOUR FEELINGS
ABOUT THE FOLLOWING STATEMENTS. THE SCALE
RANGES FROM "STRONGLY AGREE" TO "STRONGLY
DISAGREE" IN THIS MANNER:

STRONGLY DISAGREE
DISAGREE
MILDLY DISAGREE
UNCERTAIN
MILDLY AGREE
AGREE
STRONGLY AGREE
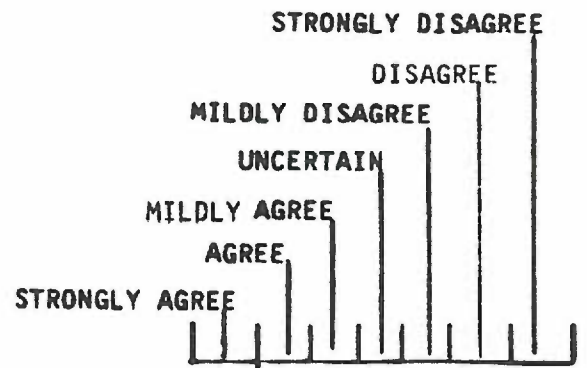
14.   Use of computers in our lives is necessary.

15.   Equipment in this hospital is better than average.

16.   Installation of a comprehensive computer system
       will improve hospital employee morale.

17.   Health care is too expensive for the average
       citizen.

18.   It takes at least a year or more of training to be
       able to work around computers.

19.   All of the best hospitals make extensive use of
       computers.

20.   Patient care would be improved if the federal
       government ran all hospitals.

21.   Computer systems are a major cause of high
       hospital costs.

22.   Computers tend to overwhelm a person using them
       with the amount of information they provide.

23.   All hospital personnel should be employed by the
       federal government.

24.   In order to avoid increased use of computers, we
       should look for non-computer ways of doing things.

25.   Information stored in computers is easier to
       retrieve than information on manual records.

26.   The use of computers in a hospital increases the
       quality of patient care.

27.   Using a computer is faster than using manual systems.

28.   The whole idea of the use of computers in a
       hospital turns me off.

	SA	U	SD

29. Installation of computers in a hospital means there will be fewer employees.

30. Hospital rates are too high.

31. Information stored in computers can be misused.

32. Doctor's fees are too high.

33. This hospital provides better than average patient care.

34. Changes may be made faster in manual systems than in computer systems.

35. Computers in hospitals save the patient money.

36. If computers are introduced in hospitals, the role of the individual will be less important.

37. Management in this hospital is better than average.

38. To increase efficiency and keep up with technological advances, hospitals should rely more on computers.

39. Use of a computer in a hospital for handling medical information will lead to less personal attention to the patient.

40. More errors are made using the computer than in doing things manually.

41. This hospital has better than average employee morale.

42. When mistakes are made on a computer, they are easy to correct.

43. National health insurance will improve patient care and reduce costs.

44. If medical information were available on a computer, it would be easier to protect the confidentiality of such information.

45. If I were a hospital board member, I would vote to install a computer system in a hospital.

SA   U   SD

46. Computers can help reduce the length of stay for the hospital patient.

47. Using a computer can be fun.

48. Too much time and expense is devoted to keeping hospital statistics and records.

49. If one is going to work in a situation where computers are used, it is necessary to understand how computers work.

50. In general, I like my job very much.

APPENDIX F

Questions Utilized in Study

<u>Questionnaire Items by Category</u>

<u>Category I</u> - Measured attitudes toward computers in general and hospital based
        computers.

Question 14 - Use of computers in our lives is necessary. (Recorded value -
        Strongly agree = 7)

Question 19 - All of the best hospitals make extensive use of computers. (SA = 7)

Question 24 - In order to avoid increased use of computers, we should look for
        non-computer ways of doing things. (SA = 1)

Question 28 - The whole idea of the use of computers in a hospital turns me off.
        (SA = 1)

Question 38 - To increase efficiency and to keep up with technological advances,
        hospitals should rely more on computers. (SA = 7)

Question 45 - If I were a hospital board member, I would vote to install a
        computer system in a hospital. (SA = 7)

<u>Category II</u> - Measured attitudes toward the impact of computers on individual
        staff members.

Question 16 - Installation of a comprehensive computer system will improve
        employee morale. (SA = 7)

Question 18 - It takes at least a year or more of training to be able to work
        around computers. (SA = 1)

Question 22 - Computers tend to overwhelm a person using them with the amount
        of information they provide. (SA = 1)

Question 29 - Installation of computers in a hospital means there will be fewer
        employees. (SA = 1)

Question 36 - If computers are introduced in hospitals, the role of the individual
        will be less important. (SA = 1)

Category III – Measured attitudes toward the impact of computers on patient care.

Question 26 – The use of computers in a hospital increases the quality of patient care.

Question 35 – Computers in hospitals save the patient money.

Question 39 – Use of computers in a hospital for handling medical information will lead to less personal attention to the patient.

Question 46 – Computers can help reduce the length of stay for the hospital patient.

Category IV – Measured attitudes toward the impact of computers on information management.

Question 25 – Information stored in computers is easier to retrieve than information on manual records. (SA = 7)

Question 27 – Using a computer is faster than using manual systems. (SA = 7)

Question 34 – Changes may be made faster in manual systems than in computer systems. (SA = 7)

Question 40 – More errors are made using the computer than in doing things manually. (SA = 1)

Question 42 – When mistakes are made on a computer, they are easy to correct. (SA = 7)

Question 44 – If medical information were available on a computer, it would be easier to protect the confidentiality of such information. (SA = 7)

APPENDIX G

Mean Scores (Before/After) by Category

Table I

Category 1

Attitudes Toward Computers in General and Computers in Hospitals

	Mean Scores per Question		
	Before	After	Direction of Change
Question 14	5.631	5.646	0
Question 19	4.172	4.547	+
Question 24	5.277	5.092	-
Question 28	5.862	5.656	-
Question 38	4.954	4.877	0
Question 45	5.108	5.154	0
Category Total	31.125	30.857	-

N = 65

Table II

Category 2

Attitudes Toward the Impact of Computers on Individual

| | Mean Scores per Question | | |
	Before	After	Direction of change
Question 16	4.154	4.369	+
Question 18	4.438	4.523	0
Question 22	4.800	4.385	-
Question 29	4.908	4.923	0
Question 36	5.569	5.323	-
Category Total	23.875	23.523	-

N = 65

Table III

Category 3

Attitudes Toward the Impact of Computers on Patient Care

	Mean Scores per Question		
	Before	After	Direction of Change
Question 26	4.431	4.723	+
Question 35	4.031	4.194	+
Question 39	5.200	5.277	0
Question 46	3.215	3.656	+
Category Total	16.877	17.852	0

N = 65

<u>Table IV</u>

Category 4

Attitudes Toward the Impact of Computers on Information Management

	Mean Scores per Question		
	Before	After	Direction of Change
Question 25	5.892	5.954	0
Question 27	5.385	5.492	+
Question 34	3.369	3.554	+
Question 40	5.200	5.123	0
Question 42	4.828	4.615	-
Question 44	3.831	3.754	0
Category Total	28.500	28.492	0

N = 65

APPENDIX H

Comparison of Attitudes Toward
Computers Pre and Post-Test Results
Hardy vs Jacobs

TABLE V

Comparison of Attitudes Toward Computers Pre and Post-Test Results
Hardy vs Jacobs

	Hardy et al, 1978			Jacobs, 1981		
	PRE	POST	DIFF	PRE	POST	DIFF
CATEGORY I						
1	5.03	5.45	+.42	5.631	5.646	+.015
2	4.24	4.62	+.38	4.172	4.547	+.375
3	4.21	4.74	+.53	5.277	5.092	-.185
4	5.20	5.66	+.46	5.862	5.656	-.206
5	4.41	4.63	+.22	4.954	4.877	-.077
6	4.65	5.22	+.57	5.108	5.154	+.046
CATEGORY II						
7	3.99	4.09	+.10	4.154	4.369	+.215
8	4.18	4.78	+.60	4.438	4.523	+.085
9	4.24	4.47	+.23	4.800	4.385	-.415
10	4.25	4.79	+.54	4.908	4.923	+.015
11	4.93	5.27	+.34	5.569	5.323	-.246
CATEGORY III						
12	4.09	4.55	+.46	4.431	4.723	+.292
13	3.87	4.05	+.81	4.031	4.194	+.163
14	4.81	5.02	+.21	5.200	5.277	+.077
15	3.41	3.14	-.27	3.215	3.656	+.441
CATEGORY IV						
16	5.41	5.58	+.17	5.892	5.954	+.062
17	5.49	5.74	+.25	5.385	5.492	+.107
18	4.31	4.95	+.64	3.369	3.554	+.185
19	4.61	4.98	+.37	5.200	5.123	-.077
20	3.67	4.36	+.69	4.828	4.615	-.213
21	3.71	3.35	-.36	3.831	3.754	-.077

AN ABSTRACT OF THE CLINICAL INVESTIGATION OF

PATRICIA ALLEN JACOBS

For the MASTER OF NURSING

Date Receiving this Degree: June 11, 1982

TITLE: EFFECTS OF A TEACHING STRATEGY ON ATTITUDES OF REGISTERED

NURSES TOWARD A HOSPITAL BASED COMPUTER SYSTEM

Approved: _____
Sa▮▮▮▮ ▮▮▮▮▮, ▮.▮.▮., ▮.▮.▮., Clinical Investigation Advisor

The purpose of this experimental study was to determine whether or not a teaching strategy utilizing adult educational learning principles would have an effect on the attitudes of Registered Nurses toward a hospital based computer system. Additionally, the variable of length of employment at the study hospital was hypothesized to have bearing on attitudes toward a hospital based computer system.

Subjects included 52 registered nurses and 13 unit secretaries who were scheduled to receive training in the use of the Central Supply module of the hospital based computer system. The 18 hospital nursing units were randomly assigned to either an adult educational teaching strategy or a traditional teaching strategy for the week utilized in the study.

An instrument developed by Hardy (1976) was employed to measure attitudes. A demographic sheet plus a pre-test and post-test question-naire of 37 Likert scale items were utilized in the study.

Two hypotheses were tested:

1. Registered nurses who have had training utilizing adult educational teaching principles will have a more positive attitude toward a hospital based computer system than will registered nurses who have not had an adult teaching strategy.

2. Registered nurses new to the study hospital will have a more positive attitude toward a hospital based computer system than will registered nurses who are not new to the study hospital.

ANOV and multiple regression analysis were employed to analyze the data in reference to the above stated hypotheses. Neither hypothesis was supported. The data did reveal a positive attitude (4.0 or greater) toward the computer system among the sample studied.