Perioperative Nurses' Attitudes Toward Computers

Marie A. Bashaw

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PERIOPERATIVE NURSES' ATTITUDES TOWARD COMPUTERS

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science

By

MARIE A. BASHAW
B.S.N., State University of New York at Binghamton, 1981

1997
Wright State University
I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY Marie A. Bashaw ENTITLED Perioperative Nurses' Attitudes Toward Computers BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF Master of Science.

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ABSTRACT

Bashaw, Marie, A. M.S., Wright State University-Miami Valley College of Nursing and Health, Wright State University, 1997. Perioperative Nurses' Attitudes Toward Computerization.

Computer technology continues to expand and grow in health care today. Computers have become an every day part of health care throughout the hospital environment. Computer technology has been a part of the monitoring system in the operating room; now computer technology is on the verge of entering the operating room for patient charting, impacting the perioperative nurses' daily routine.

Determining perioperative nurses' attitudes toward computerization is important in minimizing stress and difficulty of implementing intraoperative computerization. Through understanding demographics associated with these attitudes, a smooth transition can be accomplished to perioperative computerization. Identification of demographics that increase perioperative nurse satisfaction when using computers is paramount to the successful implementation of a computerized system in the operating room. The importance of this study was to determine what perioperative nurses' attitudes were toward computers.

The research questions for this study were: what are perioperative nurses' attitudes toward computerization; and what is the relationship between age, education
level, experience with computers, length of employment, and position with perioperative nurses' attitudes. The study was a partial replication, and extension of a similar study done by Brodt and Stronge (1986), which investigated nurses' attitudes toward computerization in a Midwestern community hospital.

A descriptive correlational design was used in this study. The setting was a 600-bed acute care medical center located in southwest Ohio. The population included 63 perioperative RNs employed at the medical center. Participants were the perioperative nurses who volunteered to complete the 30-item survey (n=51). The attitudes of the nurses were determined from the scores of the Nurses' Attitudes Toward Computerization Questionnaire (NATC) (Stronge & Brodt, 1985).

Findings of this study were that perioperative nurses attitudes were neutral to positive toward computers (interquartile range 80-70, median 75.5). Years of computer experience at home had a strong positive association with attitudes toward computers (rho=0.528, p=0.0001). Study recommendations begin with increasing basic computer education of perioperative nurses. Increased daily use of computers by perioperative nurses will help enhance efficiency and effectiveness of the operating room into the 21st century. Nurses with home computers can be expected to have a more positive attitude and may be more interested in participating in the planning for computer expansion in the operating room. Research recommendations were replication by other perioperative departments to validate this studies findings, and determination of the content of orientation programs and teaching strategies best suited to introduce perioperative staff to computers.
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I. INTRODUCTION

Computer technology continues to expand and grow in health care today. In hospitals, computers surround nurses in nearly every working situation. Nursing professionals' exposure to computers is increasing. Computers are an every day part of health care. Everything from educational requirements to patient classification systems are developed on computers. To function in health care today, the nurse must be computer literate.

Nurses' attitudes toward computerization affect their desire and use of computers. Determining the factors that influence nurses' attitudes toward computers enables hospital administrations to ascertain techniques to use for the successful transition to the technology of computerization. In this era of cost containment, increased technology, and increased demands on nursing's time, the use of computers will enable nurses to keep pace. In the operating room these factors are very appropriate for perioperative nurses.

Nurses' attitudes toward computers will impact their behavior and use of computer technology. Positive attitudes toward computers will increase the nurses' use of expanding computer technology. Favorable attitudes about computers will result in positive behavior toward computers. Negative attitudes toward computers will deter nurses from wanting to use and using computer technology.
In this chapter, the research problem of the study is stated, followed by the significance and justification of the study. Then the purpose of the study and research questions are identified. The definitions of the study and assumptions are discussed next. The chapter concludes with a summary.

Statement of Research Problem

Perioperative nurses' attitudes about computers are not known.

Significance and Justification

Computer technology is part of nursing practice today. Attitudes play a key role in determining behavior. Several studies examining factors that influence student nurses' and registered nurses' attitudes toward computers have been conducted (McBride & Nagle, 1996; Scarpa, Smeltzer, & Jasion, 1992; Brodt & Stronge, 1986).

The key findings of Brodt and Stronge's study (1986) were that educational preparation, length of service in the nursing profession, and the type of nursing units (Rehab-Peds units were more positive and Med-Surg units were more negative) make a difference in nurses' attitudes toward computers. Nurses' attitudes toward computers will influence their use of computers.

Perioperative nurses vary in many demographic variables: age, gender, years of experience, level of education, position in the operating room, and experience using computers. Any or all of these variables may influence their willingness and ability to use
computers. No studies were found in the literature on perioperative nurses' attitudes toward computerization.

One use of computers is in continuing education. Computer learning needs of registered nurses practicing at the bedside have been studied by Carter and Axford (1993). Three distinct content groups of computer knowledge and skill the registered nurse needs to know to use computers in their practice were identified in this study. Registered nurse computer novices identified content they did not know, and through working with expert computer nurses they were able to incorporate this content into their daily practice. The first step in exploring computer use in the OR should be identifying perioperative nurses' attitudes toward computers.

Statement of Purpose

The purpose of this study was to expand the work done by Brodt and Stronge (1986), on nurses' attitudes toward computerization, to a different group of nurses, namely, perioperative nurses. The acquisition of knowledge about nurses' attitudes toward computers will assist in the implementation of intra-operative computers in the operating room suites. Perioperative usage of computers is expanding into the intra-operative setting. The information learned in this study will assist in the planning of computer education for the perioperative nursing staff.
Research Questions

1. What are perioperative nurses' attitudes toward computerization?

2. What is the relationship between age, gender, education level, experience with computers, length of employment, and position with perioperative nurses' attitudes toward computerization?

Definitions

**Perioperative nurse** is a registered nurse, licensed in the state of Ohio, who has successfully completed an operating room orientation to the scrub and circulating roles for surgical procedures. The subjects for the proposed study will be operating room nurses employed at one medical center. The researcher knows the potential participants and can identify them from previous interactions as meeting this definition.

**Computer** is a piece of equipment made up of an electronic combination of circuits that interfaces with humans through storing, retrieving, editing, displaying, printing, sending, and receiving information.

**Nurses' attitudes toward computers** - Attitude is a learned response in a consistently favorable or unfavorable manner with respect to a given object (Ajzen & Fishbein, 1980). In this study, attitude toward computers is measured by nurses' responses to the *Nurses' Attitude Toward Computerization Questionnaire (NATC)* (See Appendix A) developed by Stronge and Brodt (1985). Scores on the survey can range from 20 to 100 with higher scores indicating more favorable attitudes toward computers.
Age is measured in years at last birthday as self-reported on the demographic portion of the survey (Appendix A, item #21).

Educational Preparation is the nurses' academic preparation: Associate degree in nursing, diploma in nursing, bachelor of science in nursing, and/or graduate-prepared nurse as measured by self-report on the demographic portion of the survey (Appendix A, item #23).

Experience is years of computer experience self-reported by each participant on the demographic portion of the survey (Appendix A, item #25).

Gender is the sex, male or female, as self-reported by each participant on the demographic portion of the survey (Appendix A, item #22).

Home computer experience is the time each participant has spent using a computer at home as self-reported by each participant on the demographic portion of the survey (Appendix A, item #26).

Length of employment is the time each participant has spent in the work force of the study setting as self-reported by each participant on the demographic portion of the survey (Appendix A, item #29).

Position in the perioperative department is self-reported by each participant; staff versus management levels on the demographic portion of the survey (Appendix A, item #30).
School computer experience is the time each survey participant has spent using computers in school as self-reported by each participant on the demographic portion of the survey (Appendix A, item #28).

Work computer experience is the time each survey participant has spent using computers in the work setting as self-reported by each participant on the demographic portion of the survey (Appendix A, item #27).

Assumptions
1. Younger perioperative nurses may have more aptitude to understand and use computers because they have been exposed to computer use in their education and training.
2. It is assumed that the participants answered the survey items truthfully.
3. It is assumed that attitudes are important factors in behaviors.

Summary
The purpose of this study was to determine what perioperative nurses' attitudes are about computers. Computer technology is entering the operating room at an increased pace. One area attitudes play a key role in determining behavior, is in use of computers. Successful facilitation and implementation of intra-operative computerization can be enhanced by understanding factors associated with perioperative nurses' attitudes and designing training programs to meet the learning needs of the staff.
An extensive review of literature related to attitudes toward computers are included in Chapter II. An explanation of the research design, method of data collection, and analysis plans are included in Chapter III. The data analysis and findings are presented in Chapter IV. Chapter V provides discussion and implications for nursing and recommendations for future research.
II. REVIEW OF LITERATURE

The purpose of this proposed study was to partially replicate a study by Brodt and Stronge (1986) to determine what perioperative nurses' attitudes are toward computers. In this chapter, commentary literature on computers is reviewed. Then research on nurses' attitudes toward computers is reviewed. The research articles are synthesized and their findings are discussed. The theoretical framework which guided this investigation is presented.

Commentary Literature on Computers

Information is power. Computers manage and display tremendous amounts of information. Nurses who master information technology are best prepared to access and use this information (Simpson, 1996). Information system vendors are developing computer software systems to support the nursing profession's requirements for computerized patient care records. When nursing care tasks are a part of computerized patient care systems, nurses will be empowered to optimize patient care.

Nudging resistant and hesitant nurses into the use of computer technology is important (Bolwell, 1992). By incorporating social functions (parties, gatherings) with computer education, the receptiveness of nurses to computerization is enhanced. When
the least computer literate person is taught to use the computer, other nurses will see that they too, can learn to use the computer. The most important point is to concentrate on the human factors not the technology for successful implementation of computerization.

In the nursing profession today, the knowledge base continues to expand rapidly. Information must be learned quickly, an implication for the use of computer technology in education. Integration of computer technology in nursing education is needed to expose nursing students to the use of computers (Rambo, 1994). Computer anxiety is a problem that exists and becomes evident as computers become more prevalent. Nurses must develop skills related to computer technology.

Research Literature: Nurses' Attitudes Toward Computers

Research articles concerning nurses' attitudes towards computers appear in the literature. The research is varied and divided into two sections: attitudes toward computers and satisfaction with use of computers in the hospital setting. These studies were reviewed: Bongartz (1988); Brodt and Stronge (1986); Burkes (1991); Carter and Axford (1993); McBride and Nagle (1996); McConnell, O'Shea, and Kirchhoff (1989); Scarpa, Smeltzer, and Jasion (1992); Stronge and Brodt (1985); and Sultana (1990). A comparison of the methods used in each study, populations surveyed, and measurement of attitudes is depicted in Table 1.
<table>
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<th>Instrument</th>
<th>Study Purpose</th>
<th>Type of Nurse Population</th>
</tr>
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<td>Stronge &amp; Brodt 1985</td>
<td>Their own Instrument (B&amp;S)</td>
<td>Nursing faculty, junior &amp; senior nursing students</td>
</tr>
<tr>
<td>Bongartz 1988</td>
<td>B&amp;S 20 items</td>
<td>General hospital duty nurses</td>
</tr>
<tr>
<td>Scarpa et al 1992</td>
<td>B&amp;S 20 items</td>
<td>General hospital duty nurses</td>
</tr>
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<td>Burkes 1991</td>
<td>Modified B&amp;S instrument</td>
<td>General hospital duty nurses</td>
</tr>
<tr>
<td>Sultana 1990</td>
<td>B&amp;S 20 items</td>
<td>United Kingdom general hospital</td>
</tr>
<tr>
<td>McConnell et al 1989</td>
<td>Modified Startsman &amp; Robinson instrument</td>
<td>General hospital duty nurses</td>
</tr>
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To determine nurses' attitudes toward computerization, Stronge and Brodt (1985) developed and tested a questionnaire. The Nurses' Attitude Toward Computerization questionnaire (NATC). A descriptive correlational study was done. The pilot sample consisted of 48 nursing faculty and junior and senior nursing students. The participants were requested to respond to the statements in the questionnaire, make written recommendations for improvement of the questionnaire, and return the questionnaire within approximately one week. Forty-eight of the participants (80%) completed and returned the questionnaire. The responses to the questionnaire statements were assigned
a value of one through five as follows: 1 = strongly disagree; 2 = disagree; 3 = uncertain; 4 = agree; 5 = strongly agree. The negative statements assigned values were inverted.

The results of the pilot study were evaluated to determine the effectiveness of the questionnaire. An index of discrimination revealed that 19 statements had an index above .50, which was considered to be acceptable for inclusion in the questionnaire. Job security was one topic that was considered to be inadequately covered so one additional question with an index discrimination level of .48 was added. The final questionnaire was a 20-statement Likert-type scale believed to be valid and reliable for determining nurses' attitudes toward computerization.

Brodt and Stronge (1986) then used this instrument in another study to measure nurses' attitudes toward computerization in a Midwestern community hospital. The questionnaire was distributed to 225 nurses of which 82% completed the survey. Using four separate one-way ANOVA's, no statistically significant difference (p > .05) was found among nurses based on (a) age, (b) length of employment, (c) shift worked, or (d) a computer present on the nursing unit. More favorable attitudes were found with nurses who had worked at least 21 years in health care (p < .01). Nurses with higher educational preparation (p < .001) as well as those nurses working on pediatric rehabilitation and medical-surgical nursing units (p < .001) also had more favorable attitudes based on ANOVA results.

A descriptive study utilizing Stronge and Brodt's questionnaire, was designed to determine what the variation in attitudes and perceptions to computer use in patient care
was by two different groups of nurses (Bongartz, 1988). The groups of nurses were
differentiated by those who had experience with the computer and those who had no
experience with the computer in the hospital setting. The study was conducted at two
hospitals in a large metropolitan city; one hospital was using computers and one hospital
was not using computers. Questionnaires were distributed to 726 nurses at the hospital
where computers were in use; 440 nurses completed the questionnaire (60.6%
participation). In the hospital where computers were not used 483 questionnaires were
distributed with 277 (57.3%) completed. Use of the Spearman-Brown prophesy formula
used to determine the internal consistency of the questionnaire, resulted in a split-half
reliability coefficient of \( r = .90 \), which indicates a reliable and internally consistent
questionnaire (Burns & Groves, 1993). Analysis revealed a significant mean difference
(\( p < .05 \)) between the two groups, with the nurses from the hospital with no computers
having a more favorable attitude toward computers. In contrast to other studies, the
group of nurses from the hospital without computers tended to be younger and had
worked fewer years in nursing. This study identified a new independent variable, nurses
with no computer experience, different from the independent variables studied by Brodt
and Stronge (1986). Table 2 shows these findings.
Table 2

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
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<tr>
<td>Computer users</td>
<td>440</td>
<td>70.052</td>
<td>13.134</td>
<td>-2.10</td>
<td>549.0</td>
<td>0.036</td>
</tr>
<tr>
<td>Noncomputer users</td>
<td>273</td>
<td>72.224</td>
<td>12.829</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n = Sample; SD = Standard Deviation; df = Degrees of Freedom; p = Probability

Stronge and Brodt's NATC questionnaire was used again to assess the attitudes of nurses (n=136) toward computerization (Scarpa et al., 1992). One-way analysis of variance was used to determine if the demographic variables distinguished subjects with more or less favorable attitudes toward computers. The findings reported nurses attitudes were generally favorable toward computers. The only significant difference ($t=4.51$, $df=128$, $p=.001$) found was more positive attitudes with nurses with previous computer experience than nurses with no computer experience. Age, level of education, years of nursing experience, or job title was not significantly associated with nurses' attitudes toward computers. Participants' attitudes with computer experience were significantly ($p<.001$) more favorable toward computers than study participants who reported no previous computer experience. This study's findings contradict Bongartz (1988) who found that nurses with no computer experience in their work setting had more favorable attitudes toward computers.

Another descriptive correlational study to identify and relate nurses' attitudes
toward computer use was based on an adaptation of Vroom's expectancy theory (Burkes, 1991). The study was conducted at a tertiary 520-bed facility in Utah that had implemented computerized nursing programs (computerized charting and computerized care planning) in 1982. The investigator modified Stronge and Brodt's NATC questionnaire (one question was reworded to improve clarity, and two willingness-related items were deleted with Dr. Stronge's permission). The questionnaire contained five sections to measure nurses' (a) knowledge, (b) computer use satisfaction, (c) beliefs, (d) motivation, and (e) individual characteristics relating to computer use in nursing. The study was designed to determine the relationship between nurses' satisfaction with computerized charting: beliefs about computer use in nursing; motivation to use computerized nursing programs; and individual characteristics and demographic variables. Validity was established by four nurses from the Nursing Information System Steering Committee at the study site, with 95% agreement from the reviewers.

Nurses' individual characteristics were correlated with computer use knowledge, satisfaction, beliefs, and motivation (Burkes, 1991). The study found that nurses' computer-use satisfaction and beliefs related significantly to each other, and to their motivation to further use computerized nursing programs ($r = .783, p < .001$); and that length of computer experience and nursing experience related negatively to nurses' computer-use satisfaction. See Table 3 for the correlations of nurses' computer-use attitudes. This study's findings contradicts Brodt and Stronge (1986) and Scarpa et al. (1992) who found more favorable attitudes toward computers with increased experience.
<table>
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<th>Probability</th>
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<td>$r = .783$</td>
<td>$p &lt; .001$</td>
</tr>
<tr>
<td>2. Satisfaction and motivation</td>
<td>$r = .598$</td>
<td>$p &lt; .001$</td>
</tr>
<tr>
<td>3. Beliefs and motivation</td>
<td>$r = .651$</td>
<td>$p &lt; .001$</td>
</tr>
<tr>
<td>4. Computer Experience and Satisfaction</td>
<td>$r = -.265$</td>
<td>$p &lt; .05$</td>
</tr>
<tr>
<td>5. Nursing Experience and Satisfaction</td>
<td>$r = -.239$</td>
<td>$p &lt; .05$</td>
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</table>

To further understand nurses’ attitudes toward computerization, Sultana (1990), designed a descriptive research project to replicate the study of Brodt and Stronge (1986) and to extend and investigate the attitudes of nurses’ toward computers in clinical practice. The study was conducted in a district general hospital in the United Kingdom. The sample consisted of 58 nurses working in a clinical setting. The overall conclusion was that nurses’ attitudes to computers were more unfavorable than favorable. Using ANOVA, no significant difference was found among different age groups. Table 4 lists the findings of the survey. Of the nurses surveyed, 78.8% felt that computers did not make nurses’ jobs easier and paper work was not reduced. Computers did not increase time available for patient care and the efficiency of the nursing staff was not increased by computer applications was the belief of 61.5% of the nurses. The only positive note was 82.4% of the survey subjects believed that patient privacy was not violated because of computers and the majority of the subjects (95%) felt that the use of computers reduced the numbers of possible lawsuits.
This study (Sultana, 1990) does not support Brodt and Stronge (1986) and Scarpa et al., (1992) findings of favorable nurses' attitudes toward computers found in the USA. Sultana's (1990) overall conclusion was that nurses' attitudes to computers were more unfavorable than favorable in the UK. This study does concur with the findings of Bongartz (1988) where nurses without computer experience at one site had more favorable attitudes toward computers.

Table 4
Sultana (1990) ANOVA of Nurses' Attitudes Toward Computers

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Variance</th>
<th>F ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>4</td>
<td>70.6</td>
<td>1.1</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Nursing experience</td>
<td>4</td>
<td>21.2</td>
<td>0.3</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Computer experience</td>
<td>6</td>
<td>102.6</td>
<td>1.7</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Length of stay at hospital</td>
<td>7</td>
<td>67.4</td>
<td>1.08</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Qualification</td>
<td>2</td>
<td>65.7</td>
<td>1.8</td>
<td>&gt; 0.05</td>
</tr>
</tbody>
</table>

McConnell, O'Shea, and Kirchhoff (1989) studied the attitudes of nurses who were now using the Technicon Medical Information System (TMIS), an on-line computer system. Three questions were considered in this study: (a) What is the degree of utilization of computerized functions by different categories of nursing personnel? (b) What are the relationships between demographic variables and current usage? and (c) What are the staff's attitudes about computers?

The questionnaire used by McConnell et al., (1989) included an attitude section of 22 questions, 16 statements with high factor loadings from the Startsman and
Robinson questionnaire plus 6 additional statements that relate to the effect of computers on nurses and their role in health care. The questionnaire was pretested by seven nurses. No changes were made as a result of the pretest. (No pretest statistics were given in the article). A total of 313 questionnaires were distributed to a random, stratified sample consisting of 202 RNs, 47 LPNs, and 64 other nursing service personnel (n =313). Completed, usable questionnaires were received from 168 participants (54%).

The instrument had three sections: (a) Part I assessed usage of the TMIS, (b) Part II addressed attitudes of nursing personnel towards computers, and (c) Part III elicited background information about the staff member completing the questionnaire.

Cronbach's alpha was used to determine the reliability of the attitude survey, resulting in a coefficient of .67 using the data gathered from the 111 RNs. According to Burns and Grove (1993) an alpha coefficient less than .70 is unsatisfactory.

The Pearson Product-Moment correlation coefficients comparing time worked ($r=-.16$), number of years on unit ($r=-.17$), and length of employment ($r=.19$) with attitudes indicated that most nurses were ambivalent about their attitudes towards computers. According to Burns and Grove (1993) an $r$ of .1-.3 is considered a weak linear relationship, .3-.5 a moderate linear relationship, and above .5 a strong linear relationship. Nurses who had worked at the hospital longer agreed that computers improved the quality of patient care, however, they felt that computers dehumanized the nursing care of patients. The RNs in this study were generally undecided about their attitudes toward computers.
McBride and Nagle (1996) utilized Stronge and Brodt's questionnaire to examine factors that influence student nurses (n=299) and registered nurses (n=362) attitudes toward computers. They found that both samples had a positive attitude toward computers. (Mean plus or minus standard deviation for: Years of nursing, 11.5 ± 8.8; age of RN, 35 ± 9.4; student nurse age, 22 ± 4.5).

Computer Learning Needs

One article found on the topic of computers discussed the learning needs of nurses practicing at the bedside (Carter & Axford, 1993). A 75-item knowledge/skill questionnaire was developed through a three-round Delphi technique of computer expert nurses. All nurses known to the state of Victoria Nursing Computer Group, involved with computer system development, were invited to join the expert panel for the Delphi technique. A Delphi consensus occurred at round three with 71 items (96%) receiving a percentage agreement rating of 90% to 100%. The remaining four items received a 60% to 80% agreement rating.

The questionnaire was distributed to a random sample of 150 registered nurses practicing in Melbourne, Australia, with a 64% return rate. Expert Round-Two Delphi responses, were compared with novice responses. Expert and novice response frequency for each of the 75 knowledge/skill items were tallied as essential or nonessential.

Agreement of 50% or greater of the group was required to establish a knowledge/skill item as essential or nonessential. Both groups agreed on 48 items, 17
items were considered to be essential and 31 nonessential. On the 75 knowledge/skill items, expert and novice disagreement was statistically significant on 19 items ($p<.05$).

Carter and Axford found three distinct content groups of knowledge, that practicing RNs need to know to use computers in their practice. First, the emphasis should be on how computers are used in the workplace. Second, the nurse is responsible for information management. Third, expert opinion should be included in determining appropriate content for computer courses. Inclusion of novice opinions helps direct the priorities for topic presentation.

**Compare and Contrast**

A summary of the findings from studies reviewed are in Table 5. The demographic findings were inconsistently related to attitude. In two studies, education was found to be associated with attitudes. Age was associated with attitudes in three studies (two found older nurses more positive; one, younger nurses were more positive).
Table 5
Comparison of Findings Regarding Demographics and Attitudes Toward Computers

<table>
<thead>
<tr>
<th>Author</th>
<th>Age</th>
<th>Education</th>
<th>Years in Nursing</th>
<th>Type NursingUnit</th>
<th>Computer Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brodt &amp; Stronge (1986)</td>
<td>s</td>
<td>s</td>
<td>s</td>
<td>s</td>
<td>not studied</td>
</tr>
<tr>
<td>Bongartz (1988)</td>
<td>s</td>
<td>not studied</td>
<td>ns</td>
<td>not studied</td>
<td>s</td>
</tr>
<tr>
<td>Burkes (1991)</td>
<td>not studied</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>McBride &amp; Nagle (1996)</td>
<td>s</td>
<td>ns</td>
<td>ns</td>
<td>not studied</td>
<td>ns</td>
</tr>
<tr>
<td>McConnell et al (1989)</td>
<td>not studied</td>
<td>s</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Scarpa et al (1992)</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>not studied</td>
<td>s</td>
</tr>
<tr>
<td>Sultana (1990)</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>s</td>
</tr>
</tbody>
</table>

s=significant, ns=not significant

Positive attitudes toward computers were associated with age in studies by Brodt and Stronge (1986), Bongartz (1988), and McBride and Nagle (1996). Brodt and Stronge (1986) study found that years of experience in nursing, older nurses, were associated with a positive attitude toward computers. In contrast, the study results by Bongartz (1988) found nurses who were younger and had fewer years in nursing, tended to have more favorable attitudes toward computers. McBride and Nagle (1996) found both older and younger nurses had favorable attitudes toward computers than Brodt and Stronge's (1986) study.

Level of education was significant in Brodt and Stronge's (1986) original study, higher education level related to more positive attitudes. McConnell et al. (1989) study
also found educational level significant in regards to attitude, more education related to more positive attitudes.

Years of experience in nursing and type of nursing unit was significant in Brodt and Stronge's (1986) study. No other studies reported this variable as significant.

Computer experience was significant in studies by Bongartz (1988), Scarpa et al. (1992), and Sultana (1990). Unlike Bongartz (1988) and Sultana (1990) who found less computer experience resulted in more favorable attitudes, Scarpa et al. (1992) found increased computer experience led to more favorable attitudes.

The study by McBride and Nagle (1996) found both student nurses and registered nurses had more favorable attitudes toward computers than Brodt and Stronge (1986). However, in contrast to Brodt and Stronge (1986), there was no consistent relationship between the variables of age, computer experience and attitudes toward computers.

The only significant contributor to positive attitudes in Scarpa et al. (1992) study was previous computer experience. This contradicts the findings of Bongartz (1988), Brodt and Stronge (1986), and Sultana (1990). Sultana (1990) found no significant relation between attitudes and an of the demographic variables including computer experience.

Burkes (1991) used a modified NATC questionnaire and found significant relationships among satisfaction with computers, motivation to use computers, and computer attitudes. Consistent with several previous studies; age, computer experience, educational level, and years as a nurse had no relation to attitudes. Only computer
knowledge was related significantly to attitude. Finally, the results of McConnell et al. (1989) study showed that nurses were neutral about their attitudes toward computers.

Studies of the population of perioperative nurses' attitudes toward computers have not been found in the literature. It is not known how the demographics of perioperative nurses: age, gender, highest nursing degree attained, previous experience with computers, years of employment at the hospital, and position; influence their attitudes toward computers. The NATC questionnaire has shown validity and reliability in many previous studies. This instrument helped establish a baseline for perioperative nurses' attitudes toward computers.

Theoretical Framework

The purpose of this study was to describe the attitudes and beliefs of nurses concerning the use of computers in the operating room. The theoretical framework for this study was the "theory of reasoned action" which was developed by Ajzen and Fishbein (1980). Ajzen and Fishbein assert that human beings are normally able to reason and make systematic use of the information available to them. They suggest that behavior can thus be predicted and understood. According to this theory, an individual's intentions are a result of two basic determinants: attitudes toward the behavior and subjective norms. Attitudes which influence a person's behaviors are held to be a function of beliefs, performing a given behavior will lead to a positive outcome and a favorable attitude toward that behavior. In contrast, a person who believes that
performing a given behavior will lead to a negative outcome will hold an unfavorable attitude. Subjective norms, or perceived social pressures, are also a function of beliefs, the beliefs of individual's about the expectations of specific individuals or groups for behavior. Subjective norms may exert enough pressure to cause an individual to perform or not perform a given behavior regardless of that person’s own attitude toward the behavior. Below is a model for this framework.

![Diagram of Bashaw Model of Attitudes]

**Figure 1.** Bashaw Model of Attitudes

Attitudes influence behavior. Nurses' attitudes toward computers can be influenced by the social pressure of the unit, the nursing unit, and the nursing community. Inclusion of nursing staff in development of computer selection for the nursing unit can increase staff willingness to participate and use the computer.
Summary

It is well documented that computers are here to stay (Bolwell, 1992; Simpson, 1996). The identification of factors to increase nurse satisfaction when using computers is paramount. The literature reviewed contained concepts of nurses' attitudes toward computers. Six studies found positive attitudes toward computers (Brodtt & Stronge, 1986; Bongartz, 1988; Burkes. 1991; McBride & Nagle, 1996; Scarpa et al., 1992; ). Two studies found ambivalent feelings toward computers ( McConnell et al., 1989; Sultana, 1990).

For computers to be successful, the nurses' needs must be considered in the selection of hardware and software programs. Individual demographics warrant further study as the findings regarding their association with attitudes had inconsistent results. General hospital nurses have been studied but no published study of perioperative nurses' attitudes toward computers was found.

Using Ajzen and Fishbein's (1980) framework that human beings, nurses, are able to reason and make systematic use of information to them, computers can be used to potentiate the care operating room nurses give to their patients. The importance of this study is to identify what perioperative nurses' attitudes are toward computers. This knowledge will be the foundation for developing perioperative computer programs for charting and education.
III. METHODS

The purpose of this study was to expand the work done by Brodt and Stronge (1986), on nurses' attitudes toward computerization, to a new group of nurses. Perioperative nurses' attitudes toward computerization were the focus of this study. This chapter describes the methods for conducting the study, including the research design, setting for the study, and the population studied. Ethical considerations, sampling plan, instruments and measurements used, and procedures, are also addressed in this chapter.

Research Design

A descriptive correlational design was used for this study. According to Burns and Grove (1993) a descriptive correlational design examines the relationships that exist in a situation. This design facilitates the identification of many interrelationships in a short period of time. No attempt was made to control or manipulate the situation. When findings are consistent between two studies, they are viewed as more credible and are considered a truer reflection of the real world. If findings are conflicting this could provide additional insights and different directions for further research (Burns & Groves, 1993). This study expanded the work of Brodt and Stronge (1986) to a new group of
nurses. This study was intended to help determine perioperative nurses' attitudes toward computerization.

This descriptive correlational study investigated the variables of nurses' attitudes toward computerization at a Midwestern medical center. Relationships between the attitudinal variables and the demographic variables were investigated. This study, as in the original study, used the NATC questionnaire developed by Stronge and Brodt (1985) (Appendix A).

Setting

The setting chosen for this partial replication study was a 600-bed, Level II acute care medical center located in Ohio that attracts patients from a seven county area. Two hospitals with a total of 20 operating rooms comprise this medical center. The nursing staff, clinical educators, and nursing administration of the perioperative department in the medical center were surveyed. This center was accredited by the Joint Commission on Accreditation of Health Care Organizations.

Population

The population consisted of all the nurses employed in the perioperative department of the medical center. The current profile included 100 staff nurses, 3 nurse educators, and 10 nurse administrators that included clinical managers (personal communication, Tammye Kaper, Human Resources, 1997). Job classification was the
only demographic available to describe the population. This inability to describe the population in terms of age, experience, or education limited the ability to compare the final sample to the population except for job classification.

Sampling Plan

This study utilized a convenience sample of all registered nurses employed in the operating room at this acute care medical center who attended one of three meetings where the NATC questionnaire was distributed (n = 63). All nurses in the perioperative department were invited to participate. The convenience sample was limited by the voluntary nature of participation.

Convenience samples limit the study because the subjects included in the study happened to be in the right place at the right time (Burns & Grove, 1993). In this case all nurses who attended the scheduled meetings were invited to participate and participation was limited by the number of nurses attending the meetings and the voluntary nature of participation. Multiple biases may exist in the sample. However, serious biases are not always present in convenience samples. Sampling criteria need to be carefully described to allow others to evaluate the possibility of biases. Strengths of convenience samples are they are inexpensive, accessible, and usually require less time to acquire than other samples.

Power analysis is used to determine the risk of a Type II error. Power is the capacity of the study to detect differences or relationships that actually exist in the
population. (Burns & Grove, 1993). A post-hoc power analysis was used to determine the power level recommended for future studies. According to Chaney (Appendix B) an $R^2$ value close to 0.02 represents a small effect size, an $R^2$ value close to 0.13 represents a medium effect size, and an $R^2$ value close to 0.51 represents a large effect size. The variation in attitude scores of this study ($R^2=0.1459$) represent a medium effect size. For statistical significance with a power level of 80% at a 0.05 level of significance, a sample size of 90-95 was necessary (Chaney, Appendix B).

**Ethical Considerations/Human Subjects Protection**

Human rights are defined by Burns and Grove (1993) as the claims and demands that are justified by an individual or group consensus. Rights which must be observed in research are: self-determination, anonymity or confidentiality, privacy, protection from harm and discomfort, and fair treatment.

The principal investigator obtained permission from the medical center's Institutional Review Board (IRB) to conduct the survey (Appendix C). This information was forwarded to the IRB for Human Subjects at Wright State University for review and approval (Appendix D).

A cover letter explaining the issues of confidentiality and human rights protection for the participant was distributed with each survey (Appendix E). Subjects' right to self-determination was protected by allowing for voluntary participation. Participants were informed that it was their choice to participate or not participate, and they could
withdraw at any time during the completion of the survey without penalty. If while they were filling out the survey, participants decided they no longer wished to participate they ceased completing the questionnaire and their survey form was shredded. All surveys were confidential. Completion and return of the questionnaire indicated their consent to participate in the study. Once a questionnaire was submitted, it could not be returned because no identification existed for the participant's survey.

The principal investigator explained the intent of the study and that confidentiality would be assured by keeping the completed questionnaires in a locked file cabinet, accessible to the investigator only. The principal investigator, her thesis chair, and the Statistical Consulting Center were the only individuals who had access to the individual data. No individual data was made available to any participant. At the completion of the study the cumulative survey results were made available to any interested participants by the principal investigator. No risks or benefits to participants were anticipated in this study.

Instrument

The instrument used in this study was the Stronge and Brodt's (1985) Nurses' Attitudes Toward Computers (NATC) Questionnaire. This instrument measures the concept of nurses' attitudes toward computers. The instrument has 20 items answered by likert-type responses on a 5-point scale (1=strongly disagree, 3=undecided, and 5=strongly agreed). A score for the variable attitude is computed by adding the
responses to the 20 items. Six of the items (3, 8, 13, 14, 17, and 19) were positive, with fourteen of the items negative. Negatively worded items were reverse scored. The range of the possible scores are from 20 to 100. The higher the score the more favorable the attitude the respondent has toward computers and a lower score indicates a less favorable attitude toward computers. The summed score can be treated as interval level data.

The instrument was developed by Stronge and Brodt (1985) to determine the attitudes of nurses about computers and the use of computers in the clinical setting. In a previous study by Stockton and Verhey (1995) the internal consistency for these items was found to be .93. According to Burns and Grove (1993) .70 is the minimum acceptable for a new instrument. The Spearman-Brown prophesy formula was applied to the 20 selected items to determine the degree of internal consistency of the questionnaire. The split-half reliability coefficient was $r = .90$ (Stronge & Brodt, 1985).

The content validity was also evaluated by Stronge and Brodt (1985). The selected 19 original statements content were compared with the content of the six topics relative to computerization of nursing tasks. This evaluation revealed that the items were fairly evenly distributed over most of the identified topics. One topic was determined to be inadequately covered, job description. One additional item dealing with job security was selected. The index of discrimination was .48 slightly less than the .50 recommended index but it was nonetheless considered adequate. The instrument has been used with the nursing population.

A factor analysis of the NATC questionnaire was performed by McBride and
Nagle (1963). Following a factor analysis, an examination of the factor loading pattern in the two samples revealed no consistency except for items loaded on factor one (37.1% of the variance for the registered nurses, 27.2% of the variance for the student nurses), the factor that contained all the positively worded items. The difference in factor loadings may be the result of a different understanding of the impact of computers in health care. The results also suggest a single factor instrument.

According to Burns and Grove (1993), a factor analysis examines interrelationships among large numbers of variables and clusters variables most closely linked together. The weights or loadings of each variable express how closely the variable is correlated with the factor. Factor loading is the regression coefficient of the variable on the factor. The minimum acceptable factor loading variable variance is .30. Eigenvalues are the sum of the squared weights for each factor. McBride and Nagle (1996) only used factors with an eigenvalue greater than 1.

Research studies by experts in the field suggested that attitudes towards computers support the belief of Stronge and Brodt 1985, that nursing specialty and education made a significant difference in attitudes toward computers (Scarpa et al., 1992). Those nurses with master's degrees had significantly more positive attitudes toward computers than any other level of education. With unit types, nursing administrators were significantly more positive (Cheatwood & Martin, 1988). However, research studies and surveys by other experts in the field showed inconsistent findings (Table 5). Therefore, the NATC questionnaire was supplemented by demographic items.
regarding: age, gender, years of experience, level of education, position in the operating room, and experience using computers.

**Procedure**

Upon approval of the IRB, the investigator obtained permission from the clinical managers to distribute the questionnaire during three regularly scheduled weekly inservices. The questionnaires were allotted 15 minutes during the one hour time period of the inservices. The principal investigator distributed a cover letter explaining the study, directions for completing the questionnaire, withdrawal procedure, and the participant's rights (see Appendix E). Return of the completed questionnaire indicated consent to participate in the study. The nursing staff had 15 minutes to complete the questionnaire. The anticipated time to complete the questionnaire was 10 minutes. One large envelope was provided for the nursing staff to place their questionnaires in upon completion. The researcher sealed the envelope at the end of the hour and personally retrieved all responses.

The principal investigator is the manager for one of the operating rooms. To maintain confidentiality all surveys from both operating room department meetings were removed from the sealed envelopes and placed into one large envelope by a third party. No survey was reviewed until all surveys had been returned from both survey sites. No survey had any participant identifiers such as name or social security number. Refreshments were provided for all inservice attendees.
Summary

This descriptive correlational study extended the study Brodt and Stronge (1986) did on Nurses' Attitudes Toward Computerization, in an acute care medical center to the perioperative nurse population. Reliability and validity are documented. The acute care medical center's two perioperative units were used as the setting for the study. 51 subjects were the employees of the perioperative units at the medical center. The study was designed to accommodate ethical considerations and human subject concerns of all participants in the sampling. The accessible population (n=63) were all perioperative nurses employed at the medical center who attended the three scheduled inservices. The sample (n=51) were all perioperative nurses who voluntarily chose to participate in the study.
IV. ANALYSIS OF DATA

The research problem for this thesis was that it was not known what perioperative nurses attitudes are about computers. In this chapter, each research question is followed by the results from the data gathered from the Nurses' Attitudes Toward Computerization (NATC) questionnaire. Many details of the findings are presented in table form.

The survey was distributed to all staff members of the operating room at this Midwestern medical center at three scheduled meetings. Professional and non-professional staff were included in the survey. The principal investigator chose to include all staff members during the distribution of the survey to minimize any staff dissention and potential feelings of inferiority related to job title. Inclusion of all staff was thought to foster optimum working relationships. The statistics that were used in this thesis reflect only the professional staff (RNs) responses. A total of 63 surveys were distributed to the RN staff, with a response rate of 81% (n=51).

Demographics of the Sample

The demographic items are found in Appendix A. Interval data including age; experience using computers at home, work, and school; and years of experience working in a hospital setting were found in the survey (items 21, 24, 25, 26, 27, 28, & 29). These
data were analyzed using measures of central tendency (mean, median) and dispersion (standard deviation, interquartile range, and range) (see Table 6). The mean age was 41.9 years and the mean years employed in a hospital was 17.95 years.

The median is the best measure of central tendency when the data are skewed (Burns & Grove, 1993c) evidenced by mean unequal to median. The median for years of experience with computers was 3 years. Median years worked with computers at home was 2 years, with computers at work was 4 years, while years worked with computers at school were zero. Median years employed in a hospital was 17 years, and the median years worked following most recent degree was 16 years.

Table 6
The Sample's Interval Level Demographics

<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEAN</th>
<th>SD</th>
<th>MEDIAN</th>
<th>IQR</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>41.9</td>
<td>7.4</td>
<td>42</td>
<td>48-37</td>
<td>58-28</td>
</tr>
<tr>
<td>Years experience with computers</td>
<td>3.2</td>
<td>2.53</td>
<td>3</td>
<td>4-7.3</td>
<td>10-0</td>
</tr>
<tr>
<td>Years worked with computer @ home</td>
<td>2.8</td>
<td>2.86</td>
<td>2</td>
<td>5-0</td>
<td>12-0</td>
</tr>
<tr>
<td>Years worked with computer @ work</td>
<td>5.1</td>
<td>5.01</td>
<td>4</td>
<td>7-2</td>
<td>25-0</td>
</tr>
<tr>
<td>Years worked with computer @ school</td>
<td>1.5</td>
<td>3.00</td>
<td>0</td>
<td>2-0</td>
<td>14-0</td>
</tr>
<tr>
<td>Years employed in hospital</td>
<td>18.0</td>
<td>8.28</td>
<td>17</td>
<td>26-12</td>
<td>34-2</td>
</tr>
<tr>
<td>Years worked from most recent degree</td>
<td>16.8</td>
<td>9.69</td>
<td>16</td>
<td>26-9</td>
<td>35-1</td>
</tr>
</tbody>
</table>

SD=Standard Deviation, IQR=Interquartile Range

35
Categorical demographic data included gender, level of education, and position in the operating room department (items 22, 23, & 30). These data were analyzed using frequency distribution and percentages (Table 7). The largest percentages of nurses who completed the survey were female, employed at a staff level position, and had an associate degree.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>48</td>
<td>94.1</td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>5.9</td>
</tr>
<tr>
<td>Position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff</td>
<td>44</td>
<td>86.3</td>
</tr>
<tr>
<td>Management</td>
<td>7</td>
<td>13.7</td>
</tr>
<tr>
<td>Level of Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>26</td>
<td>51.0</td>
</tr>
<tr>
<td>Diploma</td>
<td>11</td>
<td>21.6</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>14</td>
<td>27.5</td>
</tr>
</tbody>
</table>

n = number of respondents

Reliability

Prior to analyzing data based on scales, Cronbach alpha’s were computed for internal consistency. A Cronbach’s alpha was calculated for the NATC questionnaire items (items 1-20) (see Appendix F). The overall alpha was 0.94, which indicates a high internal consistency (Burns & Grove, 1993). The calculated alpha’s for the other 19 times when each item was deleted indicated that removing any one item did not improve the internal consistency.
Data Analysis and Findings for the Research Questions

**What are perioperative nurses' attitudes toward computerization?** The attitudes were measured using the 20-item NATC (Appendix A) with a possible range of scores from 20 to 100 based on responses of 1-5 (Strongly Disagree-Strongly Agree). The analysis included frequencies and percentages for individual item responses (see Appendix G). A total attitude score was calculated as the total of the responses to questionnaire items #1-20 after the responses to positive statements were reverse-scored. Items #1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 15, 16, 18, & 20 were reverse scored. Higher scores reflect more favorable attitudes toward computerization. The total attitude score for the group was analyzed using descriptive statistics, (mean, median, standard deviation, interquartile range, and range). The median of 75.5 and the interquartile range of 80-70 indicate an attitude between neutral and positive (Table 8) as 60 would represent a neutral point.

Table 8
Total Attitude Score

<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEAN</th>
<th>SD</th>
<th>MEDIAN</th>
<th>IQR</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Attitude</td>
<td>73.98</td>
<td>12.52</td>
<td>75.5</td>
<td>80-70</td>
<td>97-34</td>
</tr>
</tbody>
</table>

**What is the relationship between age, gender, education level, experience with computers, length of employment, and position with perioperative nurses' attitudes toward computerization?** This research question was answered through a multiple regression analysis. According to the overall F-test, no significant relationship was found between attitude toward computerization and the demographic variables.
(F=1.15 with 7 and 47 degrees of freedom, \( p=0.351 \)). Table 9 presents the analysis for
the individual demographics used in the regression.

Table 9
Multiple Regression Analysis for Total Attitude Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T for HO: Parameter=0</th>
<th>Prob&gt;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.079</td>
<td>0.380</td>
<td>.209</td>
<td>.856</td>
</tr>
<tr>
<td>Sex</td>
<td>1.988</td>
<td>8.873</td>
<td>.224</td>
<td>.824</td>
</tr>
<tr>
<td>Years employed in a hospital</td>
<td>-0.272</td>
<td>0.377</td>
<td>-.721</td>
<td>.475</td>
</tr>
<tr>
<td>Job Title</td>
<td>3.994</td>
<td>5.792</td>
<td>0.690</td>
<td>.495</td>
</tr>
<tr>
<td>Experience with Computers</td>
<td>1.289</td>
<td>0.876</td>
<td>1.471</td>
<td>.149</td>
</tr>
<tr>
<td>Diploma</td>
<td>-3.008</td>
<td>5.324</td>
<td>-0.565</td>
<td>.575</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>-0.034</td>
<td>5.125</td>
<td>-0.007</td>
<td>.995</td>
</tr>
</tbody>
</table>

HO=null hypothesis

The Pearson Product-Moment correlation coefficient was calculated for
perioperative nurses' attitudes toward computers with age, gender, education level,
experience with computers, length of employment, and position. An \( r \) of .1 to .3 is
considered a weak linear relationship, .3 to .5 a moderate linear relationship, and above
.5 a strong linear relationship (Burns & Groves, 1993). The Pearson Product-Moment
correlations indicate weak, non-significant relationships between attitude and
demographic variables. (See Table 10)
Spearman correlation coefficients were calculated rather than Pearson correlation coefficients since the variables (number of years working with computers at home, number of years working with computers at work, number of years working with computers at school, and experience with computers) were not normally distributed. Spearman rho, a nonparametric test, is used when the assumptions of Pearson's analysis cannot be met, when the scores are skewed. When the data are skewed, rho has an efficiency of 91% of detecting a relationship (Burns & Grove, 1993). Using a level of significance of \(0.05/12 = 0.0042\) for each of the 12 tests of correlation (to control the overall error rate at 0.05) experience with computers at home was significantly correlated with attitude (rho=0.528, \(p=0.0001\)) (See Table 11).

Table 11
Spearman Rank-Order Correlation between Attitudes and Years of Computer Experience

<table>
<thead>
<tr>
<th># Years work with computers @ home</th>
<th># Years work with computers @ work</th>
<th># Years work with computers @ school</th>
<th>Experience with computers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>0.528</td>
<td>0.096</td>
<td>0.008</td>
</tr>
<tr>
<td>(p)</td>
<td>0.0001</td>
<td>0.265</td>
<td>0.008</td>
</tr>
<tr>
<td>n=49</td>
<td>n=50</td>
<td>n=48</td>
<td>n=50</td>
</tr>
</tbody>
</table>
**Additional Analysis**

An unplanned correlation analysis comparing age and 3 measures of computer experience (the number of years the respondents worked with computers at home, work, and school); overall experience with computers; and the number of years since the most recent nursing degree was computed (Chaney, Appendix B). The Pearson Product-Moment correlation coefficient was calculated for age and years since the most recent nursing degree, since these variables each have a distribution close to normal. A strong, significant positive relationship exists between age and years since the most recent nursing degree ($r=0.68, p=0.0001$). Only one of these two demographic variables should be used in any regression associated with attitudes. Regression analysis would want non related demographics as independent variables. The other relationships were not significant (see Table 12).

<table>
<thead>
<tr>
<th># Years work with computers @ home</th>
<th># Years work with computers @ work</th>
<th># Years work with computers @ school</th>
<th>Experience with computers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.180</td>
<td>-0.178</td>
<td>0.031</td>
</tr>
<tr>
<td>$p$</td>
<td>0.215</td>
<td>0.231</td>
<td>0.834</td>
</tr>
<tr>
<td>$n=49$</td>
<td>$n=49$</td>
<td>$n=47$</td>
<td>$n=49$</td>
</tr>
</tbody>
</table>

The other variables were not normally distributed, so Spearman Rank-Order correlation coefficients were calculated. Age and computer experience were correlated to see whether an expectation that older nurses have less experience with computers holds true. A weak, but significant negative relationship exists between age and years
worked with computers at school (rho = -0.29, p = 0.048). All other correlations between age and "experience with computers" variables indicate weak, non-significant relationships. (See Table 13)

Table 13
Spearman Rank-Order Correlation between Age and Years of Computer Experience

<table>
<thead>
<tr>
<th># Years work with computers @ home</th>
<th># Years work with computers @ work</th>
<th># Years work with computers @ school</th>
<th>Experience with computers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.058</td>
<td>-0.290</td>
<td>0.007</td>
</tr>
<tr>
<td>p</td>
<td>0.693</td>
<td>0.048</td>
<td>0.964</td>
</tr>
<tr>
<td>n=48</td>
<td>n=49</td>
<td>n=47</td>
<td>n=49</td>
</tr>
</tbody>
</table>

Summary

The NATC questionnaire disclosed information gathered from the 51 respondents. Twenty items used a five point Likert-type scale. Cronbach's alpha was 0.94, indicating that the items in the survey have a high level of internal consistency.

The major finding of this study was perioperative nurses have a neutral to positive attitude toward computers. The neutral point would be 60 (20 items x 3, undecided). The Agreed point would be 80 (20 items x 4, positive). The mean score of 73.98 and median of 75.5 support this finding. Additionally, the interquartile range of 80-70 indicated an attitude between neutral and positive. The demographic data showed a strong, significant relationship with attitudes toward computers and experience with computers at home (rho = 0.528, p = 0.0001).
V. DISCUSSION

This chapter concludes this study on the perioperative nurses' attitudes toward computers. Included in this chapter are the major findings, limitations of the study, conclusions drawn from the findings, discussion, implications of the findings for nursing administration, education, practice, and recommendations for further nursing research.

The purpose of this study was to determine what perioperative nurses' attitudes are about computers. Computer technology is entering the operating room at an increased pace. Nurses' attitudes toward computerization affect their desire and use of computers. Determining factors that influence nurses' attitudes toward computers enables hospital administrations to ascertain techniques to use for the successful transition to the technology of computerization.

This descriptive correlational study extended the original study done by Brodt and Stronge (1986) on Nurses' Attitudes Toward Computerization, in an acute care medical center to the perioperative nurse population. Perioperative nurses' attitudes toward computers were measured using the 20-item Nurses' attitudes toward computerization (NATC) questionnaire (Appendix A). Total attitude scores were calculated to questionnaire items #1-20, after responses to negative statements were reverse-scored. Higher scores reflect more favorable attitudes toward computerization.
Descriptive statistical analysis was used to determine perioperative nurses' attitudes toward computerization and multiple regression was used to explore the relationship between demographics and attitudes. The Pearson Product-Moment correlation coefficient was calculated for attitude with age, gender, education level, experience with computers, length of employment, and position. These variables each had a distribution that was close to normal. An \( r \) of .1 to .3 is considered a weak linear relationship, .3 to .5 a moderate linear relationship, and above .5 a strong linear relationship (Burns & Groves, 1993). Weak, nonsignificant relationships were identified. Spearman Rank-Order correlation coefficients were calculated for attitude and number of years worked with computers.

Attitudes play a key role in determining behavior. Determining perioperative nurses' attitudes toward computers helps determine their willingness to use computers in the perioperative setting.

**Major Findings**

1. The **NATC** is an internally consistent scale for measuring Perioperative nurses' attitudes toward computers (Cronbach's Alpha=0.94).

2. The median of 75.5 and the interquartile range of 80-70 indicate an attitude between neutral (60) and positive (80).

3. A significant correlation was found between years of computer experience at home and attitude (\( \rho=0.528, p=0.0001 \)).
4. An unplanned analysis indicated a strong, significant positive relationship exists between age and years since the most recent nursing degree \( r=0.68, p=0.0001 \); therefore, these 2 variables should not be used together in any regression analysis of demographics and attitudes.

Limitations

1. This study had limited generalizability because the study was conducted at a single site.
2. The perioperative department employed 113 registered nurses, accessible population 63, 51 RNs returned the survey.
3. The findings of this study are limited to the extent to which the respondents were willing to respond to the questionnaire.
4. The data collected were self-reported.
5. The return rate of usable surveys was high, 81\% (n=51).

Conclusions

1. Perioperative nurses have a neutral-positive attitude toward computer use in the hospital setting.
2. Years of computer experience at home have a strong, positive association with attitudes toward computers.
3. To study the influence of demographics on attitudes, a large diverse sample is needed.
Discussion

Brodt and Stronge's (1986) study found that level of education, years of experience in nursing, and type of nursing unit were associated with a positive attitude toward computers. This study found perioperative nurses have neutral to positive attitudes toward computers and years of computer experience at home have a strong, positive association with attitudes toward computers. Home computer experience positively influenced attitudes because individual's chose to use the computer. These findings support Brodt and Stronge's (1986) study: and Scarpa et al. (1992) who found more positive attitudes with nurses with previous computer experience ($p \leq .001$).

<table>
<thead>
<tr>
<th>Author</th>
<th>Age</th>
<th>Education</th>
<th>Years in Nursing</th>
<th>Type Nursing Unit</th>
<th>Computer Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bashaw (1997)</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>not studied</td>
<td>s</td>
</tr>
<tr>
<td>Brodt &amp; Stronge (1986)</td>
<td>s</td>
<td>s</td>
<td>s</td>
<td>s</td>
<td>not studied</td>
</tr>
<tr>
<td>Bongartz (1988)</td>
<td>s</td>
<td>not studied</td>
<td>ns</td>
<td>not studied</td>
<td>s</td>
</tr>
<tr>
<td>Burkes (1991)</td>
<td>not studied</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>McBride &amp; Nagle (1996)</td>
<td>s</td>
<td>ns</td>
<td>ns</td>
<td>not studied</td>
<td>ns</td>
</tr>
<tr>
<td>McConnell et al (1989)</td>
<td>not studied</td>
<td>s</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Scarpa et al (1992)</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>not studied</td>
<td>s</td>
</tr>
<tr>
<td>Sultana (1990)</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>s</td>
</tr>
</tbody>
</table>

$s=$significant, ns=$not significant

Table 14: Comparison of Findings Regarding Demographics and Attitudes Toward Computers
The generalizability of the findings are limited related to the single site used to conduct the study. The group studied had minimal variability. A large, diverse sample is needed to study the influence of demographics on attitude.

The NATC questionnaire was a good instrument to use in this perioperative setting. Validity and reliability of this instrument had been established in many previous studies. The survey completion time took approximately 10 minutes. This instrument helped to establish a baseline for perioperative nurses' attitudes toward computers.

Perioperative nurses have limited time to participate in surveys. Participation was good at this site. This could be related to the short amount of time it took to complete the questionnaire (approximately 10 minutes).

Ajzen and Fishbein's (1980) framework asserts that human beings are normally able to reason and make systematic use of information available to them. Behavior can be predicted and understood. Attitudes influence behavior. Performing a given behavior will lead to a favorable attitude toward that behavior. Perioperative nurses in this study had neutral to positive attitudes toward computers, supporting Ajzen and Fishbein's framework. This supports the Bashaw Model of Attitudes where attitudes toward computers impacts behavior, use of computers. Perioperative nurses with experience using computers at home had a strong, positive attitude toward computers. The interest was there in the first place to use computers.

**Implications for Practice, Education, and Administration**

This study has implications for hospital and nursing administrators.
Administration needs to involve staff in selecting and setting up computer technology in the perioperative setting. The findings indicate that perioperative nurses' attitudes are neutral to positive toward computers. To gain the maximum effectiveness of computers, administrators must determine the needs of their staff in relation to computer technology. Incorporating nursing staff in the development of software for computer charting will increase their acceptance and enhance their ability to use computerization. Research has shown that administrators should survey their staff to determine the areas of resistance to change before introducing a new system (Carter & Axford, 1993). Nurses must be included in ongoing evaluation of computer systems as they relate to nurses' needs and the impact of computers on nursing practice. Administrators need to contemplate how to reward, incentivize, support positive attitudes toward computers.

A role for staff development exists in introducing computer technology to the operating room. More needs to be done to improve perioperative nurses' attitudes toward computers. Strategies to promote attitude change in addition to providing information about the operation of computers are warranted. Inclusion of perioperative staff in the development of intraoperative computer charting screens will increase their familiarity with the computer.

Inservice education programs must provide staff time to orient to computerized charting. Focus should not be on computer technology, but on how perioperative nurses can use computer technology for better information management. Allowing time to practice in orientation will facilitate familiarity with technology in a safe environment.
Prior experience using computer technology in the learning process enhances future use of computers. Educators should emphasize how nurses can better use computer systems for information management. Increased use of computer technology in both undergraduate and graduate education of nurses should have a positive impact on computer use in the workplace.

To maximize perioperative nurses' use of computers, the perioperative department can install computers in the education area of the department. Installation of computers allows all staff to increase computer familiarity. Education of the perioperative nurse can be facilitated by installation of computer workstation's in the classroom. Increased use of computer technology in the education setting will enhance the perioperative nurses' use of computers in the work setting. Awareness of computer function may help perioperative nurses adapt to use of computers. The recommendations that have come from the NATC questionnaire begin with the basic education of perioperative nurses. This may lead to an active involvement in implementation of computer utilization throughout their professional lives.

Recommendations for Further Research

Further research into the attitudes of perioperative nurses toward computerization is needed. Consideration of whether increased computerization replaces other paperwork or just adds additional work needs to be studied. Further research is warranted on the unplanned finding of age and years since most recent degree. Research is needed to determine the content of orientation programs and the teaching strategies best suited to
introduce perioperative staff to computers.

Using the NATC questionnaire for replication by other area perioperative departments would validate the importance of attitude when considering the implementation of computerization in the perioperative setting. Little doubt exists that computerization is here to stay and will increase in use in the operating room.

Summary

The findings of this thesis provide a baseline for perioperative nurses' attitudes toward computers. This baseline can be used as a starting point for the successful implementation of further implementation of computerization in the perioperative setting. Increasing the daily use of computers by the perioperative nurse will help increase efficiency and accuracy in the operating room helping the operating room move into the twenty-first century.
APPENDIX A

Nurses' Attitudes Toward Computerization Questionnaire
Nurses' Attitudes Toward Computerization Questionnaire
Used with permission of Dr. James H. Stronge, 1985

Instructions: It should not take longer than 10 minutes to complete the questionnaire. Do not omit any item. Read each statement carefully then select one of the five responses. Give your first reaction and response to the statement. Circle only one answer for each statement.

SA = Strongly Agree  A = Agree  U = Uncertain  D = Disagree  SD = Strongly Disagree

1. A computer increase costs by increasing the nurses workload.  
   SA A U D SD

2. Computers cause a decrease in communication between hospital departments.  
   SA A U D SD

3. Computers will allow the nurse more time for the professional tasks for which he/she is trained.  
   SA A U D SD

4. Part of the increase in costs of health care is because of computers.  
   SA A U D SD

5. The time spent using a computer is out of proportion to the benefits.  
   SA A U D SD

   SA A U D SD

7. Only one person at a time can use a computer terminal, therefore, staff efficiency is inhibited.  
   SA A U D SD

8. Computerization of nursing data offers nurses a remarkable opportunity to improve patient care.  
   SA A U D SD

9. Computers contain too much personal data to be used in an area as open as a nursing station.  
   SA A U D SD

10. Computers cause nurses to give less time to quality patient care.  
    SA A U D SD

11. If I had my way, nurse would not ever have to use computers.  
    SA A U D SD

12. Computers should only be used in the financial department.  
    SA A U D SD

13. Computers make nurses' jobs easier.  
    SA A U D SD

14. Paper for nurses has been greatly reduced by the use of computers.  
    SA A U D SD

15. Orientation for new employees takes longer because of computers and, therefore, unnecessary work delays occur.  
    SA A U D SD

16. Nursing data does not lend itself to computers.  
    SA A U D SD

17. Computers save steps and allow the nursing staff to become more efficient.  
    SA A U D SD
Nurses' Attitudes Toward Computerization Questionnaire
Used with permission of Dr. James H. Stronge, 1985

SA = Strongly Agree  A = Agree  U = Uncertain  D = Disagree  SD = Strongly Disagree

18. The more computers in an institution, the less number of jobs for employees. SA A U D SD
19. Increased computer usage will allow nurses more time to give patient care. SA A U D SD
20. Because of computers, nurses will face more lawsuits. SA A U D SD

Additional Comments

Demographic Data:
Demographic information is very helpful in describing the sample that participated in the study.

21. Age at last birthday: _______ years
22. Gender: (check one) 1) _______ Male 2) _______ Female
23. Highest Degree Obtained in Nursing: (check one)
   1) _______ Associate Degree  2) _______ Diploma  3) _______ Baccalaureate  4) _______ Masters
24. Year of most recent nursing degree: _______
25. Have you had experience working with computers? (check one) 1) _______ Yes 2) _______ No
26. Number of years you have worked with computers at home? _______ (years)
27. Number of years you have worked with computers at work? _______ (years)
28. Number of years you have worked with computers at school? _______ (years)
29. Number of years employed in a hospital? _______
30. Position: (check one) Management level 1) _______   Staff level 2) _______

Thank you for taking the time to complete this questionnaire.
APPENDIX B

Chaney Analysis from Statistical Consulting Center
Wright State University
Dear Ms. Bashaw:

Enclosed you will find the analyses you requested for your study on perioperative nurses' attitudes toward computerization. Your sample consists of 53 perioperative nurses from a 600-bed Level II acute care medical center in southwestern Ohio. Each participant completed the Nurses' Attitudes Toward Computerization (NATC) Questionnaire and several demographic items.

Pages 1-12 of the enclosed computer output contain frequencies and frequency percentages on each NATC and demographic item. For demographic items #26 and #27, responses of "1" were converted to 0.5. On page 12 you will also find frequencies and frequency percentages on the number of years since the year of the most recent nursing degree; this variable was calculated by subtracting the year response to item #24 from 1997. Frequencies and percentages on the average response to items #26-#28 (the average number of years that the respondent worked with computers at home, work, and school) are given on page 13. A total attitude score was calculated as the total of the responses to questionnaire items #1-#20 after the responses to positive statements were reverse-scored. Frequencies and percentages on this score are shown on page 14; higher scores reflect more favorable attitudes toward computerization.

Other descriptive statistics on the responses to questionnaire items #21 (age) and #26-#29 (years worked with computers and years worked at the hospital), years from the year of the most recent degree, the average of the responses to items #26-#28, and the total attitude score are located on pages 15-22 of the enclosed computer output. On these pages I have highlighted the mean, standard deviation, minimum, first quartile, median, third quartile, and maximum values. For example, the mean age of the nurses in your sample is 40.5 years, the standard deviation is 7.9 years, the median is 39 years, the range is 32 years (the maximum, 58, minus the minimum, 26), and the interquartile range is 13 years (the third quartile, 48, minus the first quartile, 35).

Frequencies and frequency percentages on all variables were also calculated by whether the participant is a nurse or non-professional staff. Frequencies and percentages for the 51 nurses (professional staff) in your sample are located on output pages 42-53 and 63; frequencies and percentages for the 12 non-professional staff are located on pages 54-62 and 64. Other descriptive statistics for the nurses are shown on pages 65-71 and 86, and similar statistics for the non-professional staff are shown on pages 72-78 and 87. Side-by-side boxplots for each variable by whether the staff are professional or non-professional are located on pages 79-85 and 88.
RESEARCH QUESTION #1: WHAT ARE PERIOPERATIVE NURSES' ATTITUDES TOWARD COMPUTERIZATION?

Frequencies, frequency percentages, other descriptive statistics, and boxplots on the total attitude score, located on pages 14, 22, 63, 64, and 36-88 of the computer output, will be used in order to answer your first research question. Frequencies and percentages on the individual NATC items, shown on pages 2-7, 43-47, and 54-58, will also be used in order to answer this research question.

RESEARCH QUESTION #2: WHAT IS THE RELATIONSHIP BETWEEN AGE, GENDER, EDUCATION LEVEL, EXPERIENCE WITH COMPUTERS, LENGTH OF EMPLOYMENT, AND POSITION WITH PERIOPERATIVE NURSES' ATTITUDES TOWARD COMPUTERIZATION?

Multiple regression analysis was used in order to answer your second research question. Two separate analyses were conducted - one using all participants and one using professional staff (nurses) only. A regression analysis was not conducted using non-professional staff only due to the low number of non-professional staff in your sample. In each model, the total attitude score was included as the dependent variable. Age (questionnaire item #21), gender (item #22; 0=female, 1=male), length of employment (item #29), position (item #30), and the average of items #26-42 were included as independent variables in each model. Two new variables (indicator variables) based on item #23, whether the respondent's highest degree was a diploma (1=yes, 0=no) and whether the respondent's highest degree was a baccalaureate (1=yes, 0=no), were also included in each model as independent variables.

The results of the regression analysis including all respondents are located on computer output page 30. According to the overall F-test, there is not a significant relationship between attitude toward computerization and the demographic variables included in the model (F=1.15 with 7 and 47 degrees of freedom; p=0.3511). A total of 55 respondents were used in this analysis; eight respondents were omitted due to missing data. The scatterplots on pages 23-29 show no apparent linear relationships between the total attitude score and any of the demographic variables either. The residual analysis on pages 31-39 indicates that the assumptions of the regression model were met.

The results of the regression analysis including only the professional (nurse) respondents are located on computer output page 103. According to the overall F-test, there is not a significant relationship between attitude toward computerization and the demographic variables included in the model (F=0.98 with 7 and 40 degrees of freedom; p=0.4620). A total of 48 professional respondents were used in this analysis; three professional respondents were omitted due to missing data. The scatterplots on pages 39-95 show no apparent linear relationships between the total attitude score and any of the demographic variables either. The residual analysis on pages 104-112 indicates that the assumptions of the regression model were met. Although I did not conduct a regression analysis using non-professional staff, I did create scatterplots on the total attitude score by the demographic variables of interest for these staff; the results, shown on pages 96-102, do not suggest any patterns of relationship.
Since the regression analyses do not show significant relationships, I conducted a post-hoc power analysis in order to determine the level of power provided by your sample. In the regression using all 55 respondents without missing data, the independent variables in the model account for 14.59% of the variation in the attitude scores ($R^2 = 0.1459$). Since an $R^2$ value around 0.02 represents a "small" effect size, an $R^2$ value around 0.13 represents a "medium" effect size, and an $R^2$ value around 0.51 represents a "large" effect size, the variation in attitude scores due to the independent variables of interest in your study may be defined as roughly "medium" in size. Using the $R^2$ value of 0.1459 and a sample size of 55, the power to detect a significant relationship due to any of the independent variables is 0.51 in your study. A sample size of 90-95 would be required in order to declare relationships of the magnitude found in your study statistically significant with 80% power, using a level of significance of 0.05.

In addition to addressing your research questions I computed Cronbach's coefficient alpha for the 20 NATC Questionnaire items in order to assess internal consistency (reliability). Cronbach's coefficient alpha was calculated using all respondents, using nurse respondents only, and using non-professional staff only. Using all respondents, Cronbach's alpha is 0.933 (page 41). Using nurses only, Cronbach's alpha is 0.939 (page 114), and using non-professional staff only, Cronbach's alpha is 0.921. In each case, a high degree of internal consistency exists.

Your analysis was conducted using SAS Version 6.12 and PASS Version 6.0. A level of significance of 0.05 was used for each statistical test (i.e., p-values below 0.05 indicate significance). A computer file containing your data and SAS programming will be kept by our office for one year. At the end of that year your data will be erased. If you think you would ever want to do any further analysis with these data, I strongly encourage you to purchase a copy of this computer file from us. If you wish to have your own copy, please inform us (preferably in writing) prior to one year from the date of this letter. Our charge for this service is $5.00 for the file transfer plus $5.00 for two 3.5” disks for a total of $10.00.

Enclosed you will also find a satisfaction survey regarding various aspects of our statistical services; any comments you have would be appreciated. If I have missed anything in this analysis or if you would like further explanation on any aspect of these results do not hesitate to contact me. Good luck with your work!

Sincerely,

Joel G. Chaney
Statistical Consultant

SCC #960078
cc: Dr. Patricia Martin
Marie Bashaw

Dear Ms. Bashaw

Enclosed you will find the additional analyses you requested for your study on perioperative nurses' attitudes toward computerization. On page 1 of the computer output you will find the results of a correlation analysis used to compare age to the number of years that the respondent worked with computers at home, work, and school (questionnaire items #26-#28), number of years since the year of the most recent nursing degree, and experience with computers measured as the average of items #26-#28. The results of this analysis are highlighted in yellow; the first number of each highlighted pair of numbers is the correlation coefficient and the second number is the associated p-value. According to the results, a weak, non-significant degree of correlation exists between age and years worked with computers at home, years worked with computers at work, and the average experience with computers (average of items #26-#28). A weak but significant negative relationship exists between age and years worked with computers at school (rho=-0.31424, p=0.0173). A strong, significant positive relationship exists between age and years since the year of the most recent nursing degree (r=0.68009, p=0.0001). The Pearson Product-Moment correlation coefficient was calculated for age and years since the year of the most recent nursing degree (professional staff only) since these variables each have a distribution that is close to normal. However, the other variables are not normally distributed, so Spearman Rank-Order correlation coefficients were calculated instead for these variables.

Similar correlations were calculated for the professional and non-professional staff separately; the results are given on pages 2 and 3. A moderately strong negative yet non-significant relationship exists between age and years worked with computers at home and at school among non-professional staff. A weak but significant negative relationship exists between age and years worked with computers at school (rho=-0.29029, p=0.0478) among professional staff. All other correlations between age and the experience with computers variables indicate weak, non-significant relationships.

On computer output page 4 you will find frequency tables for education by position. The first table shows level of education (item #23) by whether the staff member is professional or non-professional, and the second table shows level of education by whether the job title is management or staff. In each table, the first number in each cell is the frequency for the row/column combination, the second
number is the frequency percentage for the row/column combination, the third number is the row percentage, and the fourth number is the column percentage. For example, 26 respondents were professional staff with an associate degree. These 26 represent 44.07% of all 59 respondents represented in the table, 83.87% of the 31 respondents with an associate degree, and 50.98% of the 51 professional staff respondents.

Descriptive statistics on age by level of education are given on pages 5-7; side-by-side boxplots are shown on page 8. Similar descriptive statistics and boxplots for the professional staff only are located on pages 9-12. Descriptive statistics for non-professional staff only were not given by level of education due to the small number of non-professional staff.

Your analysis was conducted using SAS Version 6.12. If I have missed anything in this analysis or if you have any additional questions do not hesitate to contact me.

Sincerely,

Joel G. Chaney
Statistical Consultant

SCC #960078
c: Dr. Patricia Martin
Dear Ms. Bashaw,

Enclosed you will find the correlations you requested for each of the individual demographic variables with the total attitude score. Pearson Product-Moment correlation coefficients calculated for the total attitude score with age (Q21), years from the year of the most recent nursing degree (YEARS), and years employed at the hospital (Q29) are located on page 1. In each table cell you will find listed the correlation coefficient followed by the associated p-value and sample size. For example, the correlation between the total attitude score and age is \( r = -0.083 \) with a p-value of 0.5094, based on a sample size of 58.

Also included on page 1 are Pearson bipoint serial correlation coefficients for the total attitude score with whether the respondent is male (Q22), whether the respondent has a diploma (DIPLOMA), whether the respondent has a baccalaureate degree (BACCAL), whether the respondent has experience working with computers (Q25), and whether the respondent is a manager (Q30). Each of these dichotomous demographic variables were coded 0='no' and 1='yes', so positive correlation coefficients indicate that respondents with responses of 'yes' have higher attitude scores than respondents with responses of 'no'. Pearson bipoint serial correlation coefficients are calculated in the same manner as other Pearson Product-Moment correlation coefficients, the only difference is that one variable is dichotomous rather than continuous in nature.

On page 2 of the output you will find Spearman Rank-Order correlation coefficients for the total attitude score with the number of years worked with computers at home (Q26), work (Q27), and school (Q28), and the average response to these three items (EXPER). Spearman correlation coefficients were calculated rather than Pearson correlation coefficients since the variables Q26, Q27, Q28, and EXPER are not normally distributed. As on page 1, in each table cell the correlation coefficient is listed followed by the associated p-value and sample size.

On pages 3 and 5 you will find Pearson, bipoint serial, and Spearman correlation coefficients calculated using the professional staff only. Similar statistics using the non-professional staff only are located on pages 4 and 6.
Most of the correlations shown throughout the enclosed analyses indicate weak, non-significant relationships between attitude and demographic variables. However, using a level of significance of 0.05/12 = 0.0042 for each of the 12 tests of correlation (in order to control the overall error rate at 0.05) for all participants, it appears that experience with computers (the average of items Q26-Q28) and in particular, experience with computers at home are significantly correlated with attitude. Examining the correlations by staff group indicate that this relationship is evident among professional staff (rho=0.528, p=0.0001) but not among non-professional staff (rho=0.272, p=0.4189). The relationship between attitude and average experience (EXPER) was not evident from the regression analysis performed last month; I suspect that this was due to (1) the number of non-significant independent variables included in the model in combination with (2) a certain degree of multicollinearity among some of the variables, and (3) a sample size of six less in the regression analysis compared to the correlation analysis (55 instead of 61).

Your analysis was conducted using SAS Version 6 12. If I have missed anything in this analysis or if you have any additional questions do not hesitate to contact me.

Sincerely,

Joel G. Chaney
Statistical Consultant

SCC #960078
cc: Dr. Patricia Martin
APPENDIX C

Approval of Research Involving Human Subjects
Survey site asked not to be identified
April 30, 1997

Marie Bashaw

Dear Ms. Bashaw

This is to inform your revised consent form for protocol #97-006, *Perioperative Nurses' Attitudes Toward Computers.* It was received and reviewed.

It has been approved for you to proceed with your study.

Sincerely,

IRB Chair
GRANTS TO Marie A. BASHAW

a student enrolled in a program of nursing leading to a Master's degree at Wright State University, the privilege of using its facilities in order to study the following problem:

Perioperative Nurses' Attitudes Toward Computers

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.

2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.

3. The agency (wants) (does not want) a conference with the student when the report is completed with Director of Perioperative Services. (per NEC 4.15.97)

4. Other

Date: April 8, 1997

Signature of Agency Personnel/Title

RB Representative

Signature of Student
Marie A. Bashaw, RN

Signature of Faculty Director
Patricia A. Martin, RN, Ph.D.
(937) 775-2579
APPENDIX D

Approval of Research Involving Human Subjects
Wright State University
IRB Attachments include Consent requested by Survey Site
NATC Questionnaire in Appendix A
Cover Letter in Appendix E
Petition for Approval of Research Involving Human Subjects
WSU Office of Research and Sponsored Programs

Date: February 21, 1997
IRB Assignment No.: _____

Marie A. Bashaw
Name of Principal Investigator
(937) 298-0164
Phone Number

College of Nursing and Health
Department
Address

Position: Faculty____ Student____ Other (specify)____

Title of Research Project: Perioperative Nurses' Attitudes Toward Computers

Indicate names of investigators and or agencies participating in the research. If a student is listed as principal investigator, specify a faculty advisor.

Patricia A. Martin, RN, Ph. D.____ Survey site asked to not be identified____
Faculty Advisor

Please answer all questions

1. x Attached is a brief (1-2 page) description summarizing the objectives and procedures to be used in the research (specifically address the subject's role in the research).

2. Does the nature of the research require deception? (Note: Use of placebos is not deception provided the subjects are informed that they may receive them.)

   Yes ____ No _____

   If Yes, then explain fully.

3. Briefly explain the risks to the subjects of their participation in the research and indicate how the benefits outweigh these risks. There is no anticipated risk to the subjects. Their participation is strictly voluntary. They will be answering questions confidentially on a questionnaire.
4. Does this study involve an interview, survey or questionnaire?

   Yes  
   No

If yes, check those that apply:
A. In-person interview
B. Telephone interview
C. Self-administered questionnaire (Attached)
D. Other Survey Instrument (briefly describe and attach copies if applicable)


If yes, respond to one of the following:

   Indicate the procedure for assuring confidentiality of the data subject. The surveys will be kept in a locked safe, restricted access to information on individual surveys is limited to the principal investigator, her faculty chair, and the statistics lab.

5. Provision for informed consent. Indicate the type of form to be used (see "Cover Letter Consent Guidelines," attached). Include copies of the informed consent document (s) with the petition. Also include any written narrative to be presented to the subjects (e.g., cover letter, debriefing information, etc.). You may check more than one response.

   A. Cover letter (s) attached
   B. Consent form (s) attached
   C. Debriefing information attached
   D. If none attached, please explain:

6. I agree that subjects may withdraw from the project at any time without consequences or loss of benefits.

7. Indicate how subjects will be able to obtain an abstract or summary of the completed study results after their participation. Subjects may obtain a summary of the completed study by contacting Marie Bashaw (Survey site asked to not be disclosed) after August 1997.

   I agree that individual results from other participants will not be made available to any subjects nor will any individual results be interpreted in reference to the study objectives.

67
8. Remuneration to subjects:

- [ ] Cash State amount $____
- [ ] Course credit
- [X] No Remuneration
- [ ] Other (attached explanation)

9. Where and how will the subjects be recruited by the principal investigator? The subjects will be recruited from the perioperative departments of (Survey site asked not to be disclosed). Following IRB approval of WSU and (X), the clinical nurse managers will be asked to allow the principal investigator to distribute the survey during a weekly inservice. The questionnaire will be distributed to the invited group during a regularly scheduled weekly inservice. The principal investigator has knowledge of who the perioperative nurses are and will be able to identify them as meeting the inclusion criteria of "perioperative registered nurses".

10. Are radioisotopes, radiation, or x-rays involved in the study?

   Yes____   No [X]

Signature of Principal Investigator
Marie A. Bashaw, RN

Signature of Faculty Advisor
Patricia A. Martin, RN, Ph. D.
Bashaw IRB Summary

It is not known what perioperative nurses' attitudes are towards computers. The objective of this research study is to determine what one sample of perioperative nurses' attitudes are toward computers. The *Nurses' Attitudes Toward Computerization Questionnaire* by Dr. Stronge will be used to gather the data.

A cover letter explaining the confidentiality and human rights protection for the participants will be distributed with each survey. Subjects rights will be protected by allowing for voluntary participation and keeping responses confidential. Participants will be informed that it is their choice to participate and they may withdraw at any time during the completion of the survey without penalty. If while they are filling out the survey they decide they no longer wish to participate, they cease completing the questionnaire and their survey form will be shredded. All surveys are confidential. Completion and return of the questionnaire will indicate their consent to participate in the study. Once a questionnaire is submitted it may not be returned because there is no way to identify that participant's completed survey.

The principal investigator will explain the intent of the study and that confidentiality will be assured by keeping the completed questionnaires in a locked file cabinet, accessible to the investigator only. Two research questions will be answered: (1) What are perioperative nurses' attitudes toward computerization and (2) What is the relationship between age, education level, experience with computers, length of employment, and position with perioperative nurses' attitudes toward computerization. The analysis will be descriptive statistics and multiple regression.
The research study will take place at (survey site asked not to be identified).

Perioperative nurses are nurses who specialize in the field of operating room nursing. They are registered nurses employed in the operating room, who are oriented and trained to circulate, scrub, and assist on surgical procedures.
DATE: May 6, 1997

TO: Marie A. Bashaw, P.I., Student
    Patricia A. Martin, Ph.D., Faculty Advisor
    College Of Nursing & Health

FROM: Robyn Simmons, Sponsored Programs Assistant
      Secretary, WSU Institutional Review Board

SUBJECT: SC# 1836
    Preoperative Nurses' Attitudes Toward Computers

The above human subjects study was approved by the Screening Committee
on the condition that you respond to the Committee’s comments. Please
note that the activities covered by this action may not be
initiated until your responses to these conditions have been
received and accepted.

In order for us to remove the conditions, would you please respond by
sending a cover letter explaining the additions or changes along with a copy
of any revised pages and/or consent document (with changes highlighted) as
indicated.

Send your response to Robyn Simmons, Secretary to the Institutional
Review Board, 122 Allyn Hall.

If you have any questions concerning the condition(s), please contact me at
775-2425.

Thank you!

Enclosures
PLEASE RESPOND:

*NOTE: When responding, please Hi-lite the requested changes made to your revised document(s). Unless otherwise noted, only one (1) copy of the requested item(s) need be submitted for your response.

Please be aware that the activities covered by this action may not be initiated until all conditions have been removed and subsequent final approval has been recommended.

*Recommended for Expedited Review provided the following conditions are met:

a. Receipt, when available, of a letter of permission from

b. Receipt of a revised Dear Nurse letter in which the following changes have been made:

1. Paragraph 1: Delete "The purpose...toward computers" (lines 5-6). This information is redundant.

2. Paragraph 2: Replace "my" with "this" (line 2).

3. Paragraph 4: Delete "upon completion of the thesis" (line 4).

4. Insert "Faculty" before "Advisor" in Dr. Martin’s signature line.

**The above conditions have been lifted upon receipt of the items, as requested above, from PI noting that she has conformed to the Conditions the Screening committee placed on this research study. This study now has final approval and the Principal Investigator may proceed with this research protocol.
Title: Preoperative Nurses' Attitudes Toward Computers

Contract No.: 

Principal Investigator: Marie A. Bashaw, P.I. Student  
Patricia A. Martin, Ph.D., Faculty Advisor 
Department: College of Nursing & Health 

The Institutional Review Board named above has taken the following action with regard to the use of human subjects on this proposed project:

Approved

X Approved pending receipt of the items listed

The conditions, if any, are attached and are signed by the Committee Chairer. If disapproved, the reasons are attached and are signed by the Committee Chairer and by other consultants, if any.

REMINDER: FDA regulations require prompt reporting to the IRB of any changes in research activity, changes in approved research during the approval period may not be initiated without IRB review (submission of an amendment), and prompt reporting of any unanticipated problems (adverse events).

Signed Coordinator, WSU:IRB 
Date: March 7, 1998

This approval is effective only through: March 7, 1998

This activity may be initiated only after any restrictions that may have been placed on this study by the Board have been addressed and removed. To continue the activities approved under this protocol you should receive the appropriate form(s) from Research and Sponsored Programs (RSP) two to three months prior to the required due date. If you do not receive this notification, please contact RSP at 373-2473.
Consent to participate

This is a research study being conducted as part of my graduate program of study at Wright State University College of Nursing and Health. This is a questionnaire designed to identify Perioperative nurses' attitudes toward computers. The results of the study will be reported as group data only. No individual data will be reported.

1. ______________________________ (subject), agree to participate in this research study. I understand that the information I give on the questionnaire will be used only as group data, no individual data will be reported. Participation in the study will not influence your employment status in any way.

Date __________________________ Signature __________________________

Witness __________________________

Thank you

Mane A Bashaw, R.N.
Principal Investigator

Faculty Advisor
Patricia A. Martin
Associate Professor
College of Nursing and Health
Wright State University
(937) 775-3577
DATE: May 6, 1997
TO: For the Record
FROM: Eugene P. Hem, Ph.D., Coordinator
WSU Institutional Review Board
SUBJECT: Administrative Approval RE: Marie A. Bashaw, P.I., Student
SC# 1836 Amendment #1

Preoperative Nurses' Attitudes Toward Computers

This amendment was approved by RSP per Board Policy of May, 1994. This amendment does not contain significant changes nor does it impact on subject treatment/care. This amendment resulted from:

X Grammatical Correction(s)/Change(s)
   Correction of Typographical Error(s)
   Correction of Spelling Error(s)
   Addition(s)/Deletion(s) that are Non-Significant and/or clarify previous wording(s)

Comments:

Administrative approval was given to allow the use of the Consent to Participate document which was requested by the IRB.

The P.I. and Dr. Hem discussed this document relative to the project and the P.I. is aware that the Consent to Participate document is not an informed consent document and must be used in conjunction with the cover letter that was approved by the Committee.

Per memo received 5/7/97 from M. Bashaw.

The Screening Committee and Full Board will be notified of this action at their next regularly scheduled meetings.

EPH/rds
APPENDIX E

Cover Letter
Dear Nurse

My name is Marie Bashaw and I am a graduate student at Wright State University-Miami Valley College of Nursing and Health. Computer technology is increasing in hospitals, and is on the threshold of entering the operating room. I am interested in studying perioperative nurses' attitudes toward computerization. No studies have been found in the literature on this population.

This research is being done as part of my graduate program. I invite you to participate in this research study. Your participation is entirely voluntary. Your decision to participate or not participate will not affect your work status in any way. You may discontinue participation at any time while completing the survey. Simply stop completing the survey and shred it. Only fully completed surveys will be used in the study.

I am enclosing the Nurses' Attitude Toward Computerization Questionnaire. I would greatly appreciate if you will please take 20 minutes of your time to complete the survey, seal the envelope and return your completed form to me at the end of the hour. Completing and returning the questionnaire implies your consent.

Please do not add your name or any identifying information to the questionnaire. The confidentiality of your replies is assured, so please answer questions frankly. Results of the study will be reported only as group results. No individual data will be reported. Group results will be available to any participants by contacting Marie Bashaw after August, 1997 as indicated below.

Thank you in advance for your participation. If there are any questions or concerns please contact my advisor or myself, as indicated below.

Again thank you for your participation.

Sincerely,

Faculty Advisor
Patricia A. Martin, RN, Ph.D
Associate Professor
College of Nursing and Health
Wright State University
(937) 775-3577

Principal Investigator
Marie Bashaw, RN
APPENDIX F

Cronbach Alpha Coefficient for NATC Questionnaire
Table F
Cronbach Alpha Coefficient for NATC Questionnaire (Total Cronbach Alpha was 0.94)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CORRELATION with TOTAL</th>
<th>ALPHA without ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computers increase cost by increase RN work</td>
<td>0.728</td>
<td>0.934</td>
</tr>
<tr>
<td>Computers decrease communication between dept</td>
<td>0.652</td>
<td>0.934</td>
</tr>
<tr>
<td>Computers allow RN more time for professional tasks</td>
<td>0.532</td>
<td>0.938</td>
</tr>
<tr>
<td>Increase cost in health care because computer</td>
<td>0.532</td>
<td>0.938</td>
</tr>
<tr>
<td>Time using computers out of proportion to benefits</td>
<td>0.782</td>
<td>0.934</td>
</tr>
<tr>
<td>Computers violate patient privacy</td>
<td>0.637</td>
<td>0.936</td>
</tr>
<tr>
<td>Staff efficiency is inhibited</td>
<td>0.425</td>
<td>0.939</td>
</tr>
<tr>
<td>Offers RN opportunity to improve patient care</td>
<td>0.576</td>
<td>0.937</td>
</tr>
<tr>
<td>Too much personal data for open area</td>
<td>0.734</td>
<td>0.934</td>
</tr>
<tr>
<td>Cause RN to less time for patient care</td>
<td>0.789</td>
<td>0.933</td>
</tr>
<tr>
<td>If I had my way RN’s would never use computer</td>
<td>0.709</td>
<td>0.935</td>
</tr>
<tr>
<td>Should only be used in financial dept</td>
<td>0.659</td>
<td>0.936</td>
</tr>
<tr>
<td>Computers make RN jobs easier</td>
<td>0.716</td>
<td>0.935</td>
</tr>
<tr>
<td>Paperwork for RN’s reduced by use of computers</td>
<td>0.339</td>
<td>0.941</td>
</tr>
<tr>
<td>Orientation takes longer, work delays occur</td>
<td>0.665</td>
<td>0.936</td>
</tr>
<tr>
<td>RN data does not lend itself to computers</td>
<td>0.723</td>
<td>0.935</td>
</tr>
<tr>
<td>Save steps, allow staff to become more efficient</td>
<td>0.806</td>
<td>0.933</td>
</tr>
<tr>
<td>More computers, less number of jobs</td>
<td>0.573</td>
<td>0.937</td>
</tr>
<tr>
<td>Increase use allow RN’s more time for care</td>
<td>0.612</td>
<td>0.937</td>
</tr>
<tr>
<td>Because of computers, RN’s will face more lawsuits</td>
<td>0.593</td>
<td>0.937</td>
</tr>
</tbody>
</table>
APPENDIX G

Item Analysis NATC Questionnaire
Table G
Item Analysis NATC Questionnaire

<table>
<thead>
<tr>
<th>Item</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computers increase cost by increase RN work</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>Computers decrease communication between dept</td>
<td>1</td>
<td>6</td>
<td>5</td>
<td>27</td>
<td>12</td>
</tr>
<tr>
<td>Computers allow RN more time for professional tasks</td>
<td>5</td>
<td>17</td>
<td>20</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Computer increase cost in health care</td>
<td>1</td>
<td>8</td>
<td>11</td>
<td>23</td>
<td>8</td>
</tr>
<tr>
<td>Time using computers out of proportion to benefits</td>
<td>1</td>
<td>1</td>
<td>12</td>
<td>25</td>
<td>12</td>
</tr>
<tr>
<td>Computers violate patient privacy</td>
<td>3</td>
<td>3</td>
<td>18</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>Staff efficiency is inhibited</td>
<td>2</td>
<td>11</td>
<td>16</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>Offers RN opportunity to improve patient care</td>
<td>8</td>
<td>28</td>
<td>11</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Too much personal data for open area</td>
<td>4</td>
<td>2</td>
<td>12</td>
<td>23</td>
<td>10</td>
</tr>
<tr>
<td>Cause RN less time for patient care</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>29</td>
<td>11</td>
</tr>
<tr>
<td>If I had my way RN's would never use computer</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>Should only be used in financial dept</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>Computers make RN jobs easier</td>
<td>8</td>
<td>22</td>
<td>15</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Computers reduce RN paperwork</td>
<td>2</td>
<td>26</td>
<td>10</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Orientation longer. work delays occur</td>
<td>2</td>
<td>6</td>
<td>14</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>RN data does not lend itself to computers</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>29</td>
<td>15</td>
</tr>
<tr>
<td>Save steps. allow staff to become more efficient</td>
<td>4</td>
<td>26</td>
<td>18</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>More computers. less number of jobs</td>
<td>1</td>
<td>3</td>
<td>14</td>
<td>24</td>
<td>9</td>
</tr>
<tr>
<td>Increase use allow RN's more time for care</td>
<td>5</td>
<td>16</td>
<td>23</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Because of computers. RN's will face more lawsuits</td>
<td>0</td>
<td>4</td>
<td>15</td>
<td>21</td>
<td>11</td>
</tr>
</tbody>
</table>

SA = Strongly Agree, A = Agree, U = Uncertain, D = Disagree, SD = Strongly Disagree, f = frequency Note: Shaded cells are the mode. Note: *=positive items
APPENDIX H

Correspondence with Instrument Author
E-mail correspondence with Instrument Author

From: Dee Hutt <dhutt@ennet.com>
To: Mane Bashaw
Date: 1/31/97 3:12pm
Subject: Re: Permission for questionnaire

> Date: Fri, 31 Jan '97 6:02:32 -0500
> To: Dee Hutt <ahutt@ennet.com>
> From: James Strange <jstron@facstaff.wm.edu>
> Subject: Re: Permission for questionnaire
>
> I am responding to your letter I received last fall. Yes, I would like to
> use your questionnaire. Please email the contract to this email address
> (dhutt@ennet.com). I will send you the $100.00 professional use fee
> Please indicate where you would like the fee and signed contract sent
> Thank you for your permission to use your questionnaire
>
> Sincerely,
> Mane A. Bashaw
>
> As per your request, I am pleased to grant permission for the use of the
> "Nurses' Attitudes Toward Computerization Questionnaire." Please return a
> copy of the enclosed contract with your payment of the professional use fee.
> Please note that the fee is $100.00 rather than the $350.00 professional use fee
> that you are using the study as part of your graduate work.
>
> Please note that the questionnaire was designed as a global measure of
> nurses' attitudes. For additional information regarding the development
> and use of the questionnaire, please refer to the articles published in Computers in Nursing (3, 154-158; 4, 82-86). Also,
> you may want to refer to the professional literature for other articles and
> research reporting the use of the questionnaire (e.g., Stockton & Verhey,
>
> Please contact me if I may be of additional assistance. Let me wish you success in your study.
>
> Sincerely,
>
> James H. Strange, Ph.D.
>
> AGREEMENT
>
> James H. Strange grants permission for use of the Nurses' Attitudes Toward
> Computerization Questionnaire to Mane A. Bashaw under the following conditions:
>
> 1. A user fee of $100.00 US paid by Mane A. Bashaw to James H. Strange for
> the right to reprint, copy, and distribute the questionnaire to nurses
> and/or health professionals included in a student research study conducted
> by Mane A. Bashaw. Payment should be mailed to the following address

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2. The user fee payment in the amount specified in Item 1 received by James Stronge shall entitle permission to reprint, copy, and distribute the questionnaire to personnel for the study identified in Item 1.

3. Permission to reprint, copy, and distribute the questionnaire extends solely to the study identified in Item 1.

Mana A. Bashaw

Date
> Date: Tue, 11 Feb 1997 15:40:16 -0500
> To: Dee Hutt <dhutt@ennet.com>
> From: James Strange <jhstro@facstaff.wm.edu>
> Subject: Re: Questionnaire

> MARIE,
>
> You may change the demo section as needed. Also, feel free to retype the
> questionnaire. Best wishes with your study.

> James Strange

>>> From: Mane Bashaw
>>> May I have your permission to change the demographic section of your
>>> questionnaire or
>>> would you prefer I copy the questionnaire exactly as you have written?
>>> is it OK if I retype the questionnaire for distribution or should I
>>> make copies of the
>>> one you are sending?
>>> Thank you, you may reply to this email address
>>> Sincerely,
>>> Mane Bashaw
>>> via dhutt@ennet.com

>
REFERENCES


