A STUDY OF PERIOPERATIVE TEAM MEMBERS' ROLE AND EDUCATIONAL PREPARATION ON COST-CONTAINMENT ATTITUDES

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DEDICATION

This thesis is dedicated to my wife Suzy and children, Natalie and Lucia. To my wife for not shooting me as requested and for proofreading *ad nauseum* and to my wonderful daughters for teaching me what love means and making me smile when I could not find one on my own.

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A STUDY OF PERIOPERATIVE TEAM MEMBERS' ROLE AND EDUCATIONAL PREPARATION ON COST-CONTAINMENT ATTITUDES

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The purpose of this descriptive comparative study was to describe and compare the differences one's role, Registered Nurse (RN) or unlicensed assistive personnel (UAP), length of healthcare experience, and educational preparation play in a perioperative staff member's attitude toward cost-containment in general, and specifically, the reprocessing of disposables. Previous studies have explored the attitudes of nurses (Cyr, 1990; Hemsley-Robinson & Miller, 1995; Takes, 1992), toward cost-containment. However, no studies have specifically investigated the attitudes of UAP toward cost-effectiveness, nor any staff members' attitudes toward reuse of single-use items.

A pilot study was conducted with 17 RNs and 17 UAP to verify the reliability of the instruments modified for this study. The tools used were the Perioperative Staff Cost-Effectiveness Attitude Scale, the Reprocessing Single-Use Items Attitude Scale and a Demographic Data collection tool that included open-ended questions regarding cost-

effectiveness and reuse of single-use items, . The study involved a convenience sample of 70 RNs and 54 UAP from three large teaching facilities in San Antonio, Texas. Mean scores on the Perioperative Staff Cost-Effectiveness Attitude Scale were 74.54 for the RNs and 74.79 for the UAP. The Reprocessing Single-Use Items Attitude Scale also had similar results with the RNs' mean score of 64.71 and the UAPs' mean score at 63.67. The potential range of scores is from 20 to 100, with a score greater than 60 indicating a positive attitude. Analysis of variances (ANOVA) showed no statistically significant differences in the groups with respect to role, education, or experience.

Over half of the responses by the participants identified four common reasons which hindered actually placing a single-use item in a reprocessing receptacle. These reasons were time constraints, inconveniently located reprocessing receptacle, lack of knowledge about which items could be reprocessed, and personnel forgetting to separate items suitable for reuse. Four prevalent themes also emerged when the participants speculated why other staff members do not actually place a single-use item in a reprocessing receptacle. These themes were other staff may be unsure which items could be reprocessed, their coworkers are subject to the time constraints of the busy perioperative environment, possibly their coworkers are lazy, and their coworkers do not consider reuse of single-use items an ethical practice.

A There was no significant correlation between the subjects' self-report of reuse and their scores on the Reprocessing Single-Use Items Attitude Scale. This was determined by ANOVA with a not statistically significant p=.094. The Pearson product moment correlation analysis was also used to examine the relationship of these two variables. The correlation for this relationship was calculated at .009, which is not indicative of any significant relationship.

About 30% of the subjects (N=37) responded to the general open-ended question which asked, "Do you have any comments regarding cost-effectiveness or reprocessing of single-use items?" Nineteen UAP's and eighteen RNs' comments were taken at face value and categorized as positive, negative, or conditional. The mean scores on the Reprocessing Single-Use Items Attitude Scale for subjects who made negative comments regarding reuse of single-use items were 45 for RNs and 52 for UAP which is lower than the overall mean score. The mean for RNs who made positive comments was 76.75 and 74.83 for UAP. These scores on the Reprocessing Single-Use Items Attitude Scale are also higher than the overall means, and means for their respective role. Scores for the two RNs that gave conditional statements were slightly negative (mean = 56). The mean for UAP making conditional statements (68.5) was higher than the overall UAP mean, but fell between the UAP that made positive and negative statements.

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I. INTRODUCTION

Overview and Significance

In an environment of shrinking health care dollars and personnel cutbacks, innovative cost-containment measures are being explored in cost centers throughout hospitals. Surgery is one of the highest cost centers in any medical facility (Takes, 1992), and effective use of supplies is one of the ways hospitals can cut costs without compromising care (Hobson & Blaney, 1987). The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) is also concerned with reducing costs and improving quality (Flanagan, 1997). A strategy being employed in some facilities is reuse of single-use medical devices (Chudley, 1988; Collignon, Grahm, & Dreimanis, 1996; English, 1996; Reichert, 1993); that is, resterilization of supplies traditionally considered disposable. From an economic standpoint, it is obvious that the widespread use of resterilization is cost driven. A recent survey of Kansas and Missouri Nurses in the Kansas City area determined that even though less than half of the survey respondents acknowledged reprocessing, only about one third actually confirmed they do not reuse single-use items (Kleinbeck, English, & Hueschen, 1998).

With capitation of reimbursement secondary to Diagnostic Related Groups (DRGs) and managed care, the potential savings from reprocessing single-use items are appealing. Most major regulatory entities, including JCAHO, accept the practice of judiciously reprocessing one time use items (Furman, 1998). One estimate of the cost savings derived from reprocessing disposables averages $300,000 per year in a facility performing only four hundred surgical cases each month. This savings included the cost of disposing of infectious waste, which can cost between 30 to 50 cents per pound (English, 1996). The environmental impact is also significant: English (1996)

notes that American hospitals send two million tons of waste to landfills and incinerators each year.

The phrases "reuse of single-use items," "reuse of one time use items," and "reprocessing of disposables" are used interchangeably in the literature. The Association of Operating Room Nurses (AORN) refers to the process as "reprocessing single-use items." "Total reuse" refers to a product that has come into contact with a patient. This item may need to be cleaned, decontaminated, resterilized, reconditioned, and function tested prior to reuse on the same or another patient (Pedley, 1998).

Another cost-containment practice involves the increased use of Unlicensed Assistive Personnel (UAP) in roles traditionally held by Registered Nurses (RNs). UAP who function as scrub technicians routinely have the greatest physical contact with the "disposable" being targeted for reuse. Two critical points in the reprocessing cycle are first, grossly decontaminating the product and second, placing single-use items targeted for reuse in a designated reprocessing receptacle. This latter step often occurs during room turnover when the RN or other supervisory personnel are not directly supervising the UAP. Some research indicates educational preparation and experience may impact attitudes toward cost-effectiveness (Hemsley-Robinson & Miller, 1995). Because attitudes can predict behavior (Ajzen & Fishbein, 1980; Cyr, 1990; Hemsley-Robinson & Miller, 1995; Takes, 1992), it can be assumed that the staff members' practices are influenced by their attitude.

Study Purpose

The purpose of this thesis was to describe and compare the differences one's role (RN or UAP), length of experience, and educational preparation play in a perioperative staff member's attitude toward cost-effectiveness in general, and specifically, the reprocessing of disposables. A

descriptive comparative study was planned to accomplish this goal. Previous studies explored the attitudes of nurses (Cyr, 1990; Hemsley-Robinson & Miller, 1995; Takes, 1992), medical students (Hodgson, Wilkes, & Wilkerson, 1993), and physicians (Greene et al., 1989; Ku & Fisher, 1990) toward cost-containment. However, no studies were found that investigated the attitudes of UAP toward cost-effectiveness. No research has been found which addresses any staff members' attitudes toward reuse of single-use items.

Research Questions

1. What is the relationship between surgical team members' educational level and their attitude toward cost-effectiveness in general, and specifically, reprocessing of single-use surgical supplies?

2. What is the relationship between surgical team members' role and their attitude toward cost-effectiveness in general, and specifically, reprocessing of single-use surgical supplies?

3. What is the relationship between surgical team members' level of experience in their respective role and their attitude toward cost-effectiveness and reprocessing of single-use surgical supplies?

4. What factors do participants perceive to be impediments to compliance with reuse protocols in the perioperative environment?

Variables of Interest

The study has two groups of co-variables. The conceptual definition of the first co-variable is the surgical team member's education or role (RN or UAP), and the second co-variable is the surgical team member's experience in healthcare. The participant's score on the Perioperative Staff Cost-Effectiveness Attitude Scale (Appendix A) and Reprocessing Single-Use Items Attitude Scale (Appendix B) will operationally define the subject's attitude toward cost-

effectiveness and reprocessing of single-use surgical supplies. A higher score indicates a more positive attitude toward cost-effectiveness (Blaney et al., 1990). Questions similar to the Blaney/Hobson Nursing Attitude Scale (BHNAS, Appendix C) have been revised to look specifically at attitudes toward reuse of single-use items.

Aims

1. Describe the attitudes toward cost-effectiveness of the participants as reflected by scores on the Perioperative Staff Cost-Effectiveness Attitude Scale.
2. Describe the attitudes toward reuse of single-use items as measured by the scores of the participants on the Reprocessing Single-Use Items Attitude Scale.
3. Describe the effects of role, education, and experience on the participants' attitudes toward cost-effectiveness and reuse of single-use items.
4. Identify factors that are perceived by perioperative staff members as impediments to reuse of single-use item protocols.

Operational Definitions

1. "Registered Nurse" (RN) is defined as a licensed registered nurse who has passed the National Council on Licensure Examination (NCLEX). RNs in this study will have worked at their current institution and position for at least three months, primarily in duties focused on the perioperative environment.
2. "Unlicensed Assistive Personnel" (UAP) is defined as non-licensed staff members who have worked at their current institution and position for at least three months, primarily performing technical duties in the perioperative environment. The terms UAP and technician are used interchangeably.

3. "Experience in healthcare" is defined by the amount of time, measured in years, the surgical staff member has been in healthcare.
4. "Single-use item" is defined as a sterile device intended to be disposable by the original manufacturer, that is, a single-patient use item.
5. "Reuse item" is defined as a single-use item identified by the clinical institution as an acceptable device for commercial reprocessing. This can be universally applied to any reuse item spanning from an open unused item that is resterilized (reprocessed item) to an item that has been used on a patient and resterilized. These items are specifically identified contractually with the commercial reprocessing company. Examples include arthroscopy shavers, most stapling devices, trocars, saw blades, burrs, punches, cannulas, and tourniquet cuffs.
6. "Reprocessing" is defined as commercial packaging and sterilization of a non-critical single-use device that has been opened but not used on a patient (Reichert, 1993).
7. "Attitude Scale" is measured scores on the Perioperative Staff Cost-Effectiveness Attitude Scale and the Reprocessing Single-Use Items Attitude Scale. The potential range of scores is from 20 to 100. A score above 60 is considered a positive attitude toward cost-containment with the attitude being increasingly more positive the closer the score is to 100.
8. "Education" is defined as the highest level of education the participant has completed. The determination will be made by the participant's response on questions 8 or 9 of the Demographic Data form (Appendix D).
9. "Role" is defined as the occupational or professional function the participant performs, UAP or RN. The determination will be made by the participant's response on question 12 of the Demographic Data form (Appendix D).

Assumptions

1. Attitudes are learned predispositions to action (behavior) producing actions that are consistently favorable or unfavorable toward an object (Fishbein & Ajzen, 1975). Thus, attitudes influence behavioral intentions, which in turn cause behavior reflective of this attitude.
2. Surgery is one of the highest cost centers in any medical facility.
3. Participants will be honest in their responses.

Limitations

1. Participation in the survey is voluntary, and therefore to some degree participants are self-selected.
2. The modified scales are based on the BHNAS, which was developed for use within the nursing profession. Consequently, one cannot assume all of the psychometric properties are transferable to UAP.

II. THEORETICAL FRAMEWORK AND REVIEW OF THE LITERATURE

Framework

The framework for this study is the Theory of Reasoned Action (TRA). The TRA holds that a person's behavior is a reflection of the participant's attitude when the measured attitude corresponds closely with the situation being considered (Meyers, 1983). The theory is based on the assumption that human beings are rational and make systematic use of the information they have available (Ajzen & Fishbein, 1980). An individual's intention is a function of two determinants: social influence and personal nature. The personal factor is the person's assessment of performing the behavior, positive or negative. This assessment is the person's attitude toward the behavior. Therefore, if a perioperative staff member has a positive attitude toward cost-efficient practice, then the member's behavior will be more apt to be reflective of that attitude. Conversely, if the perioperative staff member has a negative attitude toward reprocessing single-use items, then the member will be less likely to adhere to those guidelines which facilitate commercial reprocessing. According to the TRA, there is a strong correlation between attitudes and behavioral intentions. Behavioral intentions in turn can predict behavior. Thus, attitudes can predict behavior because attitudes are a function of beliefs. This finding is true if the individual perceives a positive outcome from his or her behavior (Ajzen & Fishbein, 1980; Hemsley-Robinson & Miller, 1995).

Thus, according to the TRA, the disposition toward a behavior, or in this case a practice, is influenced by the following precursors to behavior: beliefs, attitudes, and subjective norms. Beliefs are opinions and attitudes (personal judgement) held by the perioperative team member. In this study, for example, the perioperative team member's personal judgement is reflected by the

member's attitude toward reuse of single-use items. Subjective norms are based on the team member's perception of social pressures to engage in or not to engage in a behavior. Therefore, a team member's perception of the likelihood of being caught in a state of noncompliance or the consequences of not complying with a reuse protocol can impact the member's behavior (i.e. will they suffer loss of employment or other sanctions).

Ajzen and Fishbein's Theory of Reasoned Action has been demonstrated to accurately predict behavior by assessment of attitudes in several studies. Examples include compliance with antihypertensive regimens (Miller, Wikoff, & Hiatt, 1992), smoking activity (Hanson, 1997), and nursing students' intention to care for acquired immune deficiency syndrome (AIDS) patients (Goldenberg & Laschinger, 1991). The BHNAS has a positive correlation between attitude scale scores and actual cost-effective nursing behaviors (Blaney & Hobson, 1988).

Burns and Grove (1997) note that, according to Silva (1981), certain assumptions can be considered true even when these statements have not been subjected to scientific scrutiny. Examples of these assumptions, according to Williams (1980), as described by Burns and Grove (1997), are thirteen truths which are embedded assumptions in nursing literature. Assumptions that are relevant to this proposed study include the following truths: "People are aware of the experiences that most affect their life choices. Most measurable attitudes are held strongly enough to direct behavior. People operate on the basis of cognitive information (Burns & Grove, 1997)."

Review of the Literature

A review of the literature shed no conclusive light on which demographic variables consistently impact healthcare workers' attitudes toward cost-containment. There is no evidence anyone has researched any attitudes regarding reuse of single-use items. No one has investigated UAP's attitude toward cost-effectiveness or reuse of single-use items. Superficially, these two

cost-containment initiatives should be cost-effective and synergistic. The reality of this assumption is unclear.

Reprocessing Single-Use Items

With the exception of hemodialysis membranes, the practice of commercially reprocessing single-use items in the United States was not prevalent until the 1990's. Consequently most of the literature regarding this practice has only recently emerged. The potential monetary savings for a surgical environment by reprocessing single-use items is significant. However, because of the rare attention in the literature that has been paid to commercial reprocessing, many perioperative staff members are unaware of the safe and successful use of this practice.

There is little formal research addressing the utility of the practice of reprocessing single-use items. Canada and Australia have been on the forefront of this process. One of the best research articles regarding outcomes was published in *The Canadian Journal of Surgery* (DesCoteaux, Poulon, Lortie, Murray, & Gingras, 1995). The authors relate that in Canada 86% of hospitals with over 200 beds were reusing disposables, and they conclude the process was neither new nor necessarily unsafe. They conducted a four-year study of 874 laparoscopic and thorocoscopic surgeries using reprocessed disposables. Items were reused from 1.7 times for disposable clip appliers to 68 times for Veress Needles. The infection rate was 1.8%, most of which were at the cholecystectomy specimen removal port. This infection rate compared favorably with a study of laparoscopic cholecystectomies in which the infection rate was 3.2%.

A reuse program model was developed by Reichert (1993) that primarily analyzed the benefits and risks of implementing a reuse protocol in a health care facility. This article clarified some of the practices associated with reuse. For example, resterilization is the sterilization of an

unopened medical device (i.e. outdated) (Reichert, 1993). The model concluded this is a practice that should not be implemented casually, as there is potential for causing a patient harm. Her assessment was that the cost savings were minimal due to labor, microbial validation, and liability (patient's and staff member's). This article does not address commercial reprocessing; however, the issues raised serve as a useful guideline for evaluation of a reuse program that is commercial or in one's own institution. This article offers a testing protocol to verify the efficacy of the cleaning, preparation, and sterilization process in producing a safe product.

English (1996) is very much in favor of the reprocessing of single-use items. In the cost-conscious era of the nineties, procedural costs routinely exceed reimbursement. English notes that, among other organizations, the American Hospital Association (AHA), the Canadian Hospital Association (CHA), the Association of Operating Room Nurses (AORN), and JCAHO have revised standards that previously prohibited reuse of disposables. Historically, some companies have sold the same product in Canada or Europe as a reusable which was considered a disposable in the United States. There are also environmental concerns and the economic burden of waste management that result from a disposable supply item. Governmental agencies and other groups are pressuring hospitals to reduce medical waste.

English reports the liability of the medical facility is no different than when purchasing a new supply item if a commercial reprocessing service is used that is registered by the Food and Drug Administration (FDA). Patient safety is the paramount issue when selecting a device for reprocessing. Suitable examples are supply items that have expired, are opened but not used, or are used but are non-critical items (e.g. a neural perforator). All products should be validated for effective cleaning and sterilization by an independent laboratory. If ethylene oxide (EtO) is the

sterilant used, residual levels should be validated and the device should pass all form and function tests.

The risk management dilemma over reuse of single-use items is explored in an article by Malcolm Parsons (Parsons, 1997). He notes there are no laws which prohibit the practice of reprocessing single-use items. The United States Department of Health and Human Services (DHHS) and JCAHO formerly recommended against the practice secondary to concerns of nosocomial infections, but have since rescinded this policy. The Association of Practitioners in Infection Control (APIC) also has no policy prohibiting reuse. Another issue related to cost and liability involves informed consent. The following questions are raised: Does the healthcare facility have an obligation to ensure the patient is fully informed that he or she is being treated with a reused disposable (Collignon et al., 1996; Parsons, 1997)? Parsons (1997) also pondered if the savings derived from reprocessing single-use medical items should be passed along to the patient, and if so, how would this be accomplished when payments are now based on the surgical procedures performed and not direct reimbursement?

Most recent articles mention ethics (Schultz, 1998), perceived economic pressure to reuse disposables (Anonymous, 1996b), and allude to increased patient risk. However, most evidence does not support the perception that there is an increased risk to the patient. The Association of Medical Device Reprocessors (AMDR), an organization whose members perform approximately 85% of third-party reprocessing, claims there has been no documented cases of an injury to a patient by a device reprocessed by one of its members (Furman, 1998). Similarly, according to the Emergency Care Research Institute (ECRI), a non-profit health care research organization and a Collaborating Center of the World Health Organization, there has been no recent litigation

regarding disposable reuse (Anonymous, 1996a). Hemodialysis membranes have been reused for over 20 years (Schultz, 1998) with rare untoward occurrences.

In essence, current literature suggests commercial reuse of single-use items is an increasingly common cost-motivated practice. Reuse appears safe. There does not seem to be a significant increase in liability or litigation with a properly implemented commercial reuse program. Therefore, assessment of attitudes is an integral part of any supply management program which includes reuse as a cost-containment strategy.

Unlicensed Assistive Personnel

The literature contains numerous articles regarding the rationale and implementation of UAP. The expectation is that UAP save money; however, studies are not in agreement with this presumption. There is no research or other data in the literature addressing UAP's attitudes toward cost-effectiveness or reprocessing of single-use items. Addressing that oversight was the goal of this present research. The intent was to demystify the inconclusiveness of the cost benefits of UAP. Nursing salaries are tempting targets for budget cutting administrative personnel. Nationwide, 56% of full-time RNs make over $40,000 per year (Ventura, 1997). In some geographic areas, experienced staff nurses can make over $70,000 annually (Martin, 1997). Krapohl and Larson (1996) note, according to Eastaugh and Regan-Donovan (1990), UAP make 20% to 40% less than RNs.

Recently, the expanded use of UAP in areas of practice previously considered the realm of RNs only has been explored. This reengineering of nursing care delivery systems is an economically motivated practice. Most professional nursing organizations and nursing boards have position statements regarding the utilization of and supervision of unlicensed assistive personnel. UAP, especially in the role of the surgical technician, have been performing primarily

scrub duties in the perioperative environment for years. The Health Care Financing Administration (HCFA) proposed deleting the requirements regarding the types of personnel who can serve as scrub nurses or perform circulating duties in the operating room. This could replace the current rule with the nonprescriptive language that "surgical procedures be performed only by practitioners with appropriate clinical privileges. RNs are removed from supervisory authority in the operating room (AORN, 1998)." This encroachment into nursing practice could result in the elimination of nurses and their direct oversight during the surgical event.

Delegation to UAP is a critical component of any mixed staffing healthcare delivery system. The American Nurses Association's (ANA) position is that "any nursing intervention that requires independent, specialized nursing knowledge, skill, or judgement cannot be delegated" (Sheehan, 1998, p.53). A great deal of the literature cites the increased cost and time associated with delegation and supervision of UAP and confirmation of appropriate completion of the delegated tasks. A survey of emergency department nurses reported inconsistencies in training and variability in the quality of UAP as but a few of the problems associated with delegation to unlicensed staff (Zimmerman, 1996).

A study (n = 163 nurses) of RN perceptions regarding satisfaction with UAP in three nonprofit acute care hospitals indicated relative dissatisfaction with UAP (Barter, Mclaughlin, & Thomas, 1997). This was especially true if the nurses had not worked in an unlicensed capacity. Among the findings were that the nurses had less time for professional nursing and that there was concern noted regarding the lack of knowledge among UAP in the modern high acuity inpatient setting.

One survey regarding use of UAP in 102 acute care hospitals shed light on their implementation and preparation (Barter, McLaughlin, & Thomas, 1994). Some of the highlights

of this survey included the fact that a high school diploma was not required at 80% of the hospitals, and 88% of the hospitals provided 40 hours or less of training. The implication is that the quality of care suffers and liability costs increase with untrained and uneducated workers delivering care which would previously have been given by an RN. The average cost of classroom instruction for UAP was $615.60 and on the job training was $3187.20 (Barter et al., 1994).

Liability is another area that the literature is replete with anecdotal case scenarios of UAP making inappropriate clinical judgements and assessments beyond their level of training with disastrous and near disastrous results. Not the least of these situations included the fatal result of a post-hysterectomy patient who complained of increasing pain. The UAP who saw the patient documented incisional pain, even though the reported pain was not near her incision site. The patient became septic and died. Her family was awarded three million dollars (Martin, 1997). Long-range costs can rise secondary to increased length of stay associated with UAP. Anecdotal reports of greater numbers of stage four decubitus ulcers have increased at some institutions (Zimmerman, 1996).

The literature regarding the impact of UAP on nursing care delivery is examined and evaluated by Krapohl and Larson (1996). They report that at least five studies have shown UAP save money, but all of these studies were plagued by methodological limitations. They note that one study determined using unlicensed medication administration technicians (UMATs) saved $174,136. This study also determined RNs had 11.38 times as many medication errors (Burruss, Ashworth, & Arikian, 1993). However, the UMAT error rate was based on self-report and a day shift crew. The RNs in the sample were all on night shift. Other studies they review indicate an increased workload reported by RNs, increased use of sick leave, on-call staff, and overtime when UAP ratios are higher. They conclude that the studies were not rigorous enough to measure costs

due to the lack of assessment of the variables of increased supervision costs, re-admission rates, or length of stay. The issues of liability related to patient outcomes, such as nosocomial infection rate and malpractice litigation, are also raised by the authors (Krapohl & Larson, 1996).

Salaries are not the only factor to consider when determining personnel costs. Hidden costs noted in the literature are numerous. Examples include: administrative costs, costs of personnel benefits, the increased number of unlicensed staff required to perform duties one RN can perform, as well as expenses associated with training and competency validation of UAP (Murphy, 1995). The increasing salaries of UAP, caused by their growing role, negate the short-term gains. The decreased number of nurses has actually driven salary costs up by necessitating more overtime and increased use of registry nurses. UAP have greater downtime, ranging from 27% to 40%, versus nurses, who only have 8% to 12% downtime. UAP are also associated with greater turnover and absenteeism (Zimmerman, 1995). Turnover of employees is a costly circumstance. Other studies note more frequent turnover with UAP. Krapohl and Larson (1996) note that, in a study by Garfink (1991), there was a turnover rate of 44% for Patient Care Technicians. In long-term care facilitates the rate is 40% to 75% (Gaddy & Bechtel, 1995).

A descriptive integrated review of the research regarding UAP is presented in a two-part survey and critique (Bernreuter & Cardona, 1997a; Bernreuter & Cardona, 1997b). They report four studies addressing cost savings and increased productivity when UAP were reduced or eliminated from staffing. Most of these were published in the late 1970's to the 1980's when total RN staffing was more popular. This review also finds four studies published after 1990 that indicate the opposite, that is, cost savings and increased productivity when UAP are integrated into the staffing mix. Research from five other studies reviewed indicated mixed results. The authors determine methodological rigor was lacking and "no conclusion could be reached

regarding productivity or cost of patient care related to the use of UAP"(Bernreuter & Cardona, 1997b p. 52).

Another review of the nursing research has similar conclusions (Krainovich-Miller et al., 1997). This review determines definitive research regarding the true cost-effectiveness of UAP has not been accomplished. Indeed, the research indicates inconclusive results with respect to the true cost-effective outcome of UAP. Of those research projects that addressed the issue of outcomes, there have been many which demonstrate that, while decreasing costs in the short-term, increased use of UAP has a negative impact on outcomes. (Krainovich-Miller et al., 1997).

UAP have been associated with nursing care since the days of Florence Nightingale in the Crimea (Edwards, 1997). UAP have been in the perioperative environment in a technical role since at least World War II (Micheli & Smith, 1997). They are here now, in larger numbers, and will continue to be on the healthcare scene. The ramifications with respect to patient outcomes and actual savings due to their increased use are debatable at best.

Nursing and Cost-Effectiveness

Ajzen and Fishbein's Theory of Reasoned Action (TRA) is the theoretical framework for the Blaney/Hobson Nursing Attitude Scale (Appendix C). The BHNAS has been the tool used in most of the research assessing nurses' attitudes toward cost-effectiveness. Cost-effectiveness can be understood as economical in terms of tangible benefits produced by money spent. Various clinical arenas have been the sites for assessment; and the results have varied with respect to demographic differences which were determined to be significant. This research augments that body of knowledge as well as investigates the unique variable of nurses' attitudes toward the reprocessing of single-use items.

The BHNAS was developed in the late 1980's in response to the coming wave of cost-containment and financial challenges spurred by, among other things, payment by Diagnostic Related Groups (DRGs)(Blaney, Hobson, & McHenry, 1988). Until this point, a psychometrically sound tool for assessing nursing attitudes toward cost-effectiveness was not available (Blaney & Hobson, 1988a). Initially, the BHNAS was a ten-item survey. The attitude model chosen was Fishbein and Ajzen's TRA, as it was determined that exhibition of favorable cost-effective behavior needed to be based on favorable attitudes to cost-effectiveness. A pilot study of 85 university nursing students demonstrated the ten-item tool had a coefficient alpha of .82 and two items needed modification. The modified tool was used in later research (Blaney & Hobson, 1988b). The potential range of scores was from 10 to 50. A BHNAS score of 30 or higher indicated a positive attitude toward cost-effectiveness and a score below 30 was considered a negative attitude.

Blaney and Hobson conducted quasi-experimental research at a 750 bed Midwestern hospital, on eight nursing units, with a total of 156 nurses. Input from these nurses indicated there were three areas amenable to cost-effectiveness efforts: inefficient use of supplies, ineffective motivation and teaching of patients, and poor patient scheduling (Hobson & Blaney, 1987). The nurses were divided into two non-randomized 78-member groups, from four nursing units each. One half were part of the control (untrained) group and one half were in the experimental (trained) group. Training consisted of a seven-hour class that presented information to increase participants' knowledge of nurses' power, supply costs, and efficient utilization. The subjects were retested approximately two months later. The mean attitude scales improved for the trained group. Additionally, the length of stay for patients decreased 11%. The responses were tested for internal consistency and the coefficient alphas were calculated at .75. Within two months, 135 of

the nurses were administered the BHNAS again. This time the coefficient alpha was .80, which was considered acceptable. However, the developers determined further work was needed on the tool (Blaney & Hobson, 1988b).

The BHNAS was expanded to 20 questions, one half of which were negatively reflected. That is these 10 questions asked essentially the same questions as the first 10, however, they were phrased so that a question which would indicate agreeing with cost-effectiveness in the original 10, would require a response of disagreement in the new questions to have the same meaning as the original question. As with the previous version of the BHNAS, the Fishbein and Ajzen model was the conceptual basis. This study involved a sample of 110 nurses at a 500 bed Midwestern hospital. The subjects were stratified by role with 18 senior administrators, 44 head nurses, and 48 randomly selected staff nurses. The completed scales were subjected to four statistical analyses. These analyses included computation of the internal consistency reliability of the expanded scale for the entire sample. Analysis of Variance (ANOVA) tested the construct validity using contrasted-group design. The establishment of scaled norms and an assessment of biographical correlates of the total scale scores by use of multiple regression analysis were addressed in the new scale (Blaney, Hobson, & Stepniewski, 1990). A score of 60 or greater was considered indicative of a positive attitude toward cost-effectiveness and a score below 60 was considered a negative attitude toward cost-effectiveness. As one would expect, the groups' scores varied according to their role, with the senior administrators having the highest mean BHNAS scores (90.0), trailed by the head nurses (85.73), and then staff nurses (76.85). One-way ANOVA and *post hoc* comparisons were used to compare the unequally sized groups. Thus, the construct validity was considered validated. The reliability was computed to be a coefficient alpha of .93. The current 20-item version of the BHNAS is therefore more reliable than the ten-item version.

Cyr (1990) investigated critical care nurses' attitudes toward cost-containment. He notes that supply choices by nurses, physicians, and technicians at the point of service could achieve genuine savings in healthcare. He relates that staff attitudes toward financial aspects of healthcare delivery are essential considerations for cost-containment. He conducted a study of 113 intensive care unit (ICU) nurses at two large New England teaching hospitals. The methodology of his research consisted of a three-part questionnaire. Part I was a demographic questionnaire, Part II gathered personal financial background and budgeting habits, and Part III was a 22-item four point Likert Scale. Four major themes which emerged from the data analysis are awareness, education, accountability, and social learning. Most of the respondents did not consider education to be a factor toward cost-containment attitudes and behavior. Formal data analysis discerned that the number of years working as a professional nurse had the biggest positive influence on cost-containment attitudes.

Realizing that nowhere else do judgements and attitudes influence the quality and economy of outcomes more than in the operating room (OR), a research study assessing operating room nurses' attitudes toward cost-effectiveness was conducted (Takes, 1992). A convenience sample of 34 OR nurses at a 500 bed Midwestern not-for-profit hospital completed a demographic survey and the Blaney/Hobson Nursing Attitude Scale (BHNAS). Higher scores on the BHNAS are indicative of a more positive attitude toward cost-effectiveness. As previously noted, a mean score of 60 or greater is considered a positive attitude toward cost-effectiveness and a score below 60 is indicative of a negative attitude. The results of this research indicated baccalaureate prepared nurses had the lowest mean score on the BHNAS (72.6) and Associate Degree Nurses had the highest mean score on the BHNAS (80.6). Other demographic stratification showed a slightly higher score for married nurses and those nurses with fewer than

one year or over ten years of OR experience. Outliers include a nurse with a Bachelors of Science in Nursing (BSN) with over ten years experience had the highest score, and a nurse with an Associate Degree in Nursing (ADN) with one to two years experience had the lowest individual score.

The TRA and BHNAS have also been used in the perioperative and intensive care unit environment in research that sought to determine nurses' cost-effectiveness attitudes (Hemsley-Robinson & Miller, 1995). This research investigated whether there are significant differences between perioperative nurses when they are stratified by their highest educational background. This study used a descriptive design drawing from a convenience sample of 65 OR and ICU staff nurses from a potential pool of 134 nurses at an 1100 bed acute care facility in a South Atlantic state. The research consisted of distributing the BHNAS and a researcher-developed 12-item demographic data form. The demographic data form included an assessment of participants' perception of their facility's mission statement, attendance of CE programs on cost-effectiveness, and the content of their educational preparations relative to cost-effective nursing care practices. The materials were collected within 48 hours.

Results of this study were analyzed using descriptive statistics to calculate frequencies and score patterns. To answer the research question, "What are the differences in attitudes toward cost-effectiveness among RNs in OR and ICU staff positions when they are grouped according to their highest educational preparation?" (Hemsley-Robinson, 1995, p. 404), the data was analyzed further. One-way and two-way analyses of variance were used to answer the research question and determine the influence of extraneous variables. The various RN educational groups varied in their range of BHNAS scores. Baccalaureate nurses ranged from 56 to 98, diploma nurses from 60 to 91, and ADN prepared nurses ranged from 46 to 89. The mean BHNAS scores were

positive for all three groups with scores of 69.9 for the ADN, 76.65 for diploma prepared nurses, and 81.27 for the BSNs. The author reports the *post hoc* comparisons of the means for the diploma and BSN nurses were not statistically different from each group respectively; however, they were both statistically different from the ADN nurses ($p = .05$).

There were no significant differences indicated between the groups when BHNAS scores were compared to age, length of employment at the study location, gender, full-time or part-time employment, preexisting cost-containment education, or any other assessed demographic variable, using one-way and two-way analyses of variance. The authors report they were not surprised the only difference found was the level of educational preparation. The limitations acknowledged are that the study had a relatively small sample size, only staff nurses were surveyed, and the participants came from only one facility.

Noting the universal need for economic responsibility in healthcare, a study addressing cost-containment in the emergency department (ED) examined nurses' attitudes toward cost-effectiveness and their reasons for noncompliance with cost-accounting procedures in the emergency department (Ludwig-Beymer & Jorgenson, 1996). This research also used the TRA as a theoretical framework and the BHNAS as one of its research tools. In conjunction with the BHNAS, a demographic questionnaire and three open-ended questions were used to assess the research questions of this study. The specific research questions addressed were nurses' attitudes toward cost-effectiveness, the relationship of demographics and cost-effectiveness, what factors impede compliance with cost-effectiveness, and an assessment of strategies for improving compliance with cost-accounting procedures in the emergency department. Ludwig-Beymer and Jorgenson (1996) found an overall positive attitude toward cost-effectiveness, with a mean attitude score of 78. Diploma graduates had the highest (most positive) attitudes, however, these

were not deemed as statistically significant. This investigation found no significant differences when the results were explored in relation to the demographic variables of position, initial education, highest level of education, age, years as a nurse, or years in the ED. Qualitative analysis of the open-ended questions synthesized ten potential factors which prevented accurate cost-accounting. The most frequent of these responses included the charging system, time constraints, forgetting, and the type of patient care. No relationship was discerned between the quality and quantity of open-end responses and attitudes as measured by the BHNAS.

As described, several studies have assessed and refined the assessment of nurses' attitudes toward cost-effectiveness. Results have varied regarding which demographic variable most impacts nurses' attitudes. However, none has looked at nurse's attitude toward reuse of single-use items, nor has any study explored UAP's attitudes toward cost-effectiveness or reuse of single-use items.

III. METHODS AND MATERIALS

Research Design

This study employed a descriptive comparative design. A descriptive comparative design examines differences between two or more groups that occur naturally in a setting (Burns & Grove, 1997, p. 252). Table 1 is a model to illustrate these relationships.

Table 1

Relationships between Demographic Variables and Cost-effectiveness and Reprocessing

Participant's:	Participant's General Attitude toward Cost-effectiveness	Participant's General Attitude toward Reprocessing Single-use Items
ROLE		
LEVEL OF EDUCATION		
LEVEL OF HEALTHCARE EXPERIENCE		

Based on prior literature one could expect a relationship between these variables and cost-effectiveness attitudes. The anticipated relationships were that higher education and experience would effect subject attitudes positively. Therefore, subjects with more education or experience would score higher on attitude scales.

Sample and Setting

The goal was to solicit participation from as many eligible perioperative staff members as possible. Data were collected at three large teaching facilities in a southwestern metropolitan area. The facilities included two large military teaching facilities and a large public teaching facility. The

sample consisted of 70 RN and 54 UAP perioperative staff members who work in the operating room at these surgical sites. The locations were chosen as data collection sites based on the organization's operating room nurse manager's willingness to participate, acceptance by the organization's institutional review board (IRB), and an institutional practice of commercially reprocessing single-use items. It should also be noted that the participating institutions all use the same commercial reprocessing company. This factor was chosen to minimize the likelihood of a confounding variable due to corporate differences. If there were differences in the workmanship of the commercial reprocessing company, this could impact the personal factor of the participant with respect to the TRA. A potentially positive or negative attitude toward reprocessing could be related to the company contracted and not the individual staff member's cost-effectiveness attitude, attitude toward reuse, or an unknown variable related to the institution.

Participant inclusion criteria:

1. Eighteen years of age or older.
2. Ability to speak, read, and understand English.
3. Employed at their respective facility for three months or more.
4. Work in either an ambulatory surgery unit or operating room.

Exclusion criterion:

1. Unlicensed Assistive Personnel who do not engage in technical duties.

Ethical Considerations

Approval by the University of Texas Health Science Center at San Antonio (UTHSCSA) Institutional Review Board (IRB) was obtained prior to data collection at any civilian institution or the full implementation of this study. The UTHSCSA IRB approved the study as an exempt protocol on January 15, 1999 (p. 67). Wilford Hall Medical Center Clinical Investigations IRB

approval was given in December, 1998. This allowed access to staff members at Wilford Hall Medical Center to conduct the pilot study. Brooke Army Medical Center was also approved as a site for data collection as it is included on Wilford Hall's Joint Exempt Protocol.

Staff members were invited to participate in the survey and were administered the surveys by the investigator during scheduled staff meetings and inservice times. An explanation of the study, including the voluntary nature of participation and the benefits and risks (Appendix E) was given to each participant. The researcher maintained participant anonymity by not collecting the names of participants or sharing specific demographic data with their employers. Explicit mention that the participant's decision to participate or not to participate will not impact their employment status was included in an information sheet made available to all participants. The information statement, Perioperative Staff Cost-Effectiveness Attitude Scale, and Reprocessing Single-Use Items Attitude Scale all contain the following statement: "Completion of this questionnaire indicates your consent to participate in this study" (Appendixes C, D, and E). All participants were also read the statement in its entirety to standardize briefings and ensure the material was presented to all participants. An additional step to ensure participant privacy was included at the request of the UTHSCSA IRB. After the data was placed in an electronic database and statistical analysis was complete, the participant number was physically removed or obliterated from the survey hardcopies. This step was taken to sever the physical link between the demographic data and the survey responses.

Data Collection

A questionnaire packet containing three assessment tools was used. Two of these tools were modified Blaney/Hobson Nursing Attitude Scales. They are titled Perioperative Staff Cost-Effectiveness Attitude Scale (Appendix A) and the Reprocessing Single-Use Items Attitude Scale

(Appendix B). The third survey tool was the researcher developed Demographic Data questionnaire (Appendix D). During scheduled staff meetings, the questionnaire packets were distributed by the researcher to perioperative staff members meeting inclusion criteria. To standardize the briefing, the IRB approved Information Regarding a Study of Perioperative Team Members' Role and Educational Preparation on Cost-Effectiveness Attitudes (Appendix E) was read to the survey participants. Copies of Information Regarding a Study of Perioperative Team Members' Role and Educational Preparation on Cost-Effectiveness Attitudes were made available to all participating staff members.

Data was collected from the three previously described institutions. At the completion of data collection, there were 124 usable surveys and eight that were excluded from analysis. Six surveys from University Hospital (UHS) were unusable because key demographic data was not answered (i.e. role, education, and experience) or the demographic data was completely omitted. Two UAP subjects at Wilford Hall Medical Center (WHMC) lacked sufficient experience at their institution to meet inclusion criteria. Seventy subjects were nurses and fifty-four were UAP. The distribution of subjects included 33 RNs and 28 UAP from WHMC, 21 RNs and 11 UAP from UHS, and 16 RNs and 15 UAP from Brooke Army Medical Center (BAMC). The opportunity to participate by mail-in response was approved by the UTHSC SA IRB and offered at WHMC and BAMC. However, the researcher received no survey packets via mail.

Subjects participating in the pilot study were read Consent to Participate in a Pilot Study of Perioperative Team Members' Role and Educational Preparation on Cost-Effectiveness Attitudes (Appendix F). These subjects were presented the material by the researcher in groups of one to three. The pilot study was conducted over a six-day period at the convenience of the staff members and management. The pilot study participants were also given the BHNAS.

Instruments

Instruments used for this thesis were the Perioperative Staff Cost Effectiveness Attitude Scale, Reprocessing Single-Use Items Attitude Scale, and the researcher designed demographic collection tool. Because staff members in roles other than nursing were assessed, the BHNAS was modified by changing questions to read "perioperative staff members" or "perioperative or surgical care" in place of "nurse" or "nursing," respectively. Per the request of Dr. Blaney and Dr. Hobson, any modification of the BHNAS would make the new instrument the property of the researcher who modified it. Thus, the names changed to Perioperative Staff Cost Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale.

The Perioperative Staff Cost-Effectiveness Attitude Scale was used to assess the participant's attitude toward perioperative cost-effectiveness in general. The Reprocessing Single-Use Items Attitude Scale tested the participant's attitudes toward reuse. To answer the research questions, mean scores on the Perioperative Staff Cost-Effectiveness Attitude Scale and the Reprocessing Single-Use Items Attitude Scale were stratified by the demographic variables role, education, and experience in healthcare. Open-ended questions at the end of the Demographic Data questionnaire explored which factors are perceived to impede compliance with reuse protocols. After the pilot study, an additional open-ended question was added which asked, "Do you have any comments regarding cost-effectiveness or reprocessing of single-use items?" With the exception of the pilot study, the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale were administered during scheduled staff meetings or inservice times. There was a significant correlation between the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale when measured y the Pearson's Product Moment ($r=.699$).

The BHNAS is a 20-item scale that was developed based on the Theory of Reasoned Action (TRA). Blaney and Hobson have also demonstrated the TRA is a reliable predictor of cost-effective behaviors in nurses when their attitudes toward cost-effectiveness have been assessed with the BHNAS (Blaney & Hobson, 1988; Blaney, Hobson, & McHenry, 1988; Blaney, Hobson, & Stepniewski, 1990). The BHNAS has demonstrated it can be considered a reliable and valid tool for measuring nurses' attitudes toward cost-effectiveness. It has also been shown to have test re-test reliability (Takes, 1992). The BHNAS reliability has been reported to have a computed coefficient alpha of .93 (Blaney et al., 1990). Because the BHNAS was modified for this study, a pilot study was conducted to determine the reliability and validity of the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale. In consultation with statistical scientist Dr. Sondra T. Perdue of the University of Texas Health Science Center at San Antonio, School of Nursing, Office of Nursing Research, it was determined the sample size of the pilot study should be 30 people. It was decided this number of participants was needed to confirm the reliability and internal consistency of the modified tool.

The pilot study also determined the average time required for completing the questionnaires was less than 15 minutes. The pilot study was conducted at the end of December 1998 at Wilford Hall Medical Center. The technique used to test the internal consistency and reliability of the new scales was Cronbach's Alpha. This technique views the instrument as though one conducted split-half reliability. (Burns & Grove, 1997). The original test was designed to have a test retest reliability, and the core of the original BHNAS questions has not been changed. Eleven members of the pilot group were retested within two months of the original test to demonstrate the test retest reliability of the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale. The pilot group also took the original

BHNAS and comparisons among the three scales were used to estimate the validity of the modified tools.

Pilot study participants were surveyed in groups of one to three staff members over a six-day period. The pilot group was intentionally stratified to include 50% RNs and 50% UAP. The sample size consisted of 17 RNs and 17 UAP. Upon completion of the pilot study, no changes were made to the to the Perioperative Staff Cost-Effectiveness Attitude Scale and the Reprocessing Single-Use Items Attitude Scale. Consequently, the pilot group's initial survey results were included in the total sample of 124 participants. As noted, a letter explaining the voluntary nature, anonymity, protection of the study participant's rights, and approximate time needed to complete the survey was given to all participants (Appendix E). Minor modifications to the demographic questionnaire included changing the phrase "budget responsibilities" to "formal budget responsibilities" for question 16. Other changes to the demographic questionnaire explicitly gave the participant the option to clarify whether placing items in the receptacles was not applicable to their role by responding N/A on questions 19 and 20.

The Perioperative Staff Cost-Effectiveness Attitude Scale and the Reprocessing Single-Use Items Attitude Scale contain ten positively phrased questions and ten negatively phrased questions (Appendices A and B). There is a five point Likert Scale. The potential range of total scores is from 20 to 100. Both scales are scored by the same technique. Unchanged from the format of the BHNAS (Blaney et al., 1990), the positively worded questions are 1, 2, 4, 6, 9, 11, 15, 16, 19, and 20. The scoring procedure for the positively worded questions is based on awarding one point for strongly disagree (SD), two points for disagree (D), three points for neither agree nor disagree (N), four points for agree somewhat (A), and five points for strongly agree (SA). The negatively phrased questions are 3, 5, 7, 8, 10, 12, 13, 14, 17, and 18. The

negatively worded questions were reverse scored. Therefore, the scoring will be based on five points for strongly disagree (SD), four points for disagree (D), three points for neither agree nor disagree (N), two points for agree somewhat (A), and one point for strongly agree (SA). Higher scores will be considered reflective of a more positive attitude toward cost-effectiveness or reuse of single-use items.

In addition to the two 20-item questionnaires, a detailed demographic questionnaire was administered (Appendix D) which included variables that had been found to have an impact on cost-effectiveness attitudes in previous research. This form also contained questions allowing the opportunity to self-report an estimate of the percentage of occasions the perioperative staff member places a suitable reusable item in the collection receptacle. From this positively phrased question the researcher determined the self-reported percentages of instances the perioperative staff member does not place a suitable reusable item in the collection receptacle. The second question allowed the participant an opportunity to report the frequency they witness other staff members not placing a suitable reusable item in the collection receptacle. A third and fourth open-ended question asked what the participants consider prevents them or others from placing all suitable items in the appropriate collection receptacle. The order of questioning placed the demographic questionnaire last to minimize a Hawthorne Effect, which might have been triggered by the self-report questions. All of the questionnaire packets indicated the institution by code or test date only.

Reliability of the Instruments

The Perioperative Staff Cost Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale were used in a pilot study and compared to the BHNAS. The results of the Perioperative Staff Cost-Effectiveness Attitude Scale reliability analysis was calculated to have an

α of .9230. The reliability analysis (Cronbach's Alpha) for internal consistency for the 17 nurses in the pilot study on the BHNAS was α = .9404. When all 34 subjects were included, the reliability estimates for the BHNAS only dropped to α =. 9190. The reliability analysis for the Reprocessing Single-Use Items Attitude Scale was α = .9546 when measured on all 34 pilot participants.

Power Analysis

A second power analysis was performed using the means and standard deviations data collected from the 124 participants. The technique used was two sample t-tests for both the Perioperative Staff Cost-Effectiveness Attitude Scale and the Reprocessing Single-Use Items Attitude Scale. Based on the two groups and the two survey tools, the sample size was determined to be large enough to have sufficient sensitivity. It was calculated to be able to detect an eight-unit difference with a power of .95 and to detect a six-unit difference on the Perioperative Staff Cost-Effectiveness Attitude Scale with a power of nearly .80. The Reprocessing Single-Use Items Attitude Scale was calculated to have a power of .807 with enough sensitivity to detect an eight-unit difference.

Test Retest Reliability

Eleven of the original pilot participants were retested using the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale. Analysis was accomplished by a correlation coefficient method as recommended by Waltz (1991). The result of the Pearson's Product-Moment Correlation Coefficient was .942 for the Perioperative Staff Cost-Effectiveness Attitude Scale and .930 for the Reprocessing Single-Use Items Attitude Scale. Additionally a Cronbach's Alpha was used on the retest group comparing the responses individually made on the Perioperative Staff Cost-Effectiveness Attitude Scale. The reliability was

confirmed by an Alpha of .9682. The Alpha for the retest of the Reprocessing Single-Use Items Attitude Scale was .9637. There was a

Data Analysis

The primary investigator coded the survey instruments and the data were input into Microsoft Excel 97. These data were then imported into a statistical computer program, the Statistical Package for the Social Sciences, which was used for data analysis. The scale results were statistically analyzed and compared to demographic data. Descriptive statistics are used to analyze descriptive comparative research. Descriptive statistics measure the frequency of distribution (mode, median, and mean) and dispersion (Burns & Grove, 1997). Comparisons were made by examining the mean scores on the Perioperative Staff Cost-Effectiveness Attitude Scale and the Reprocessing Single-Use Items Attitude Scale with the demographic data. The demographic data was categorized by role (RN or UAP), years of experience in health care, and education of the surgical member. These demographic variables were identified by the subjects self-report in response to questions six, eight, nine, and seventeen of the demographic questionnaire (Appendix D). When experience was analyzed, the subjects were divided into three approximately equally sized groups based on the number of years experience in healthcare. These groups were less than 10 years experience, greater than 10 but less than 15, and greater than 15 years experience. Consultation with statistical scientists at the University of Texas Health Science Center at San Antonio, School of Nursing, Office of Nursing Research or Clinical Investigations of Wilford Hall Medical Center was ongoing.

Descriptive statistics, means, and Analysis of Variance (ANOVA) were used to test results of the Perioperative Staff Cost-Effectiveness Attitude Scale and the Reprocessing Single-Use Items Attitude Scale. ANOVA tested for differences between means. ANOVA was used to test

for significant differences between UAP and nurse mean scores on the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale. ANOVA compared the variance within each group with the variance between groups (Burns & Grove, 1997, p. 467). One of the assumptions regarding ANOVA is that there is an interval level of data. It had been planned to perform Tukey's HSD (Honestly Significant Difference) *post-hoc* tests to locate specific differences when appropriate. However, because no significant differences were detected, Tukey's HSD was not used .

Mr. Joseph Fischer of WHMC Clinical Investigations performed sample size estimation and power analysis. The primary comparison of interest was between the mean scores of the nurse and UAP groups, for each of the two questionnaires, separately. The anticipated sample of 50-100 subjects per group (total of 100-200 subjects) was determined to provide a power of 0.8 for finding a standardized effect size (ES) ranging from 0.6 to 0.4, depending on the number of subjects actually sampled, when testing at the 0.05 two-tailed alpha level. That is, there would be an 80% chance of finding average score differences that are six-tenths (for n=50 per group) to four-tenths (for n=100 per group) the magnitude of the between-subject standard deviation. A second power analysis was performed using the means and standard deviations data collected from the 124 participants. The method used was two sample t-tests for both the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale.

Responses to the open-ended questions regarding impediments to placing items in reprocessing receptacles (Appendix D, questions 21 and 22) have been categorized by responses and the frequency of those responses. Responses to the general open-ended question which asked "Do you have any comments regarding cost-effectiveness or reprocessing of single-use items?" were taken at face value and categorized as positive, negative, or conditional. These were further

separated by the role of the comment writer. After the researcher had categorized the responses, a second face-value analysis was performed by a doctoral prepared RN. This inter-rater reliability found there was one hundred percent agreement on the face-value assessment of responses.

IV. RESULTS

Overview

This chapter reports the results of this descriptive, comparative study. The goal of this research was to describe and compare the differences one's role (RN or UAP), length of experience, and educational preparation play in a perioperative staff member's attitude toward cost-effectiveness in general, and specifically, the reprocessing of disposables. Specifically, the research questions were:

1. What is the relationship between surgical team members' educational level and their attitude toward cost-effectiveness in general, and specifically, reprocessing of single-use surgical supplies?

2. What is the relationship between surgical team members' role and their attitude toward cost-effectiveness in general, and specifically, reprocessing of single-use surgical supplies?

3. What is the relationship between surgical team members' level of experience in their respective role and their attitude toward cost-effectiveness and reprocessing of single-use surgical supplies?

4. What factors do participants perceive to be impediments to compliance with reuse protocols in the perioperative environment?

Demographic Findings

Of the 124 subjects, 70 were nurses and fifty-four were UAP. The distribution of subjects included 33 RNs and 28 UAP from WHMC, 21 RNs and 11 UAP from UHS, and 16 RNs and 15 UAP from Brooke Army Medical Center (BAMC). Nurses in the study were older than the UAP. The mean age for RNs was 40.13 years and 29.64 years for the UAP. More nurses were female.

Twenty-four percent (N= 17) of the RNs were male and 76% (N= 53) were female. The gender prevalence for the UAP was reversed with 65% (N= 35) male and 35% (N= 19) female.

Most of the participants were married and had children. Thirty-one subjects were never married, 67 were married, 24 were divorced, and one was separated. Seventy-eight participants had children, and 46 did not. The number of people certified was very comparable between the UAP and RNs. Thirty-two nurses reported they were a Certified Nurse Operating Room (CNOR) and 30 UAP were Certified Operating Room technicians. Seven reported other certifications to include Emergency Medical Technicians (EMT) and Certified Central Supply Technicians (CST).

Most of the subjects were active duty military (N=71). Thirty-six were civilian, 7 were contract employees, 5 were government service, and 2 were members of an in-hospital float pool. Almost everyone was employed full-time (N=115), two were pool, and six were part-time. Eighty-four participants reported having no formal budgetary responsibility, and 39 said they were assigned formal budget responsibility. The participants were split regarding having had cost-effectiveness training. Sixty-three said they have had, and 59 have not had cost-effectiveness training.

RN Education and Attitude Scores

Most nurses were more educated than UAP with about sixty-five percent of the nurses having a bachelors degree or better. Eighty-seven percent of the UAP's highest education was less than a bachelor's degree (Table 2). The relationship between surgical team members' educational level and their attitude toward cost-effectiveness in general, and specifically, reprocessing of single-use surgical supplies was not statistically significant. The threshold for statistical significance for a p value is a p value under .05. Analysis by ANOVA found no significant differences between the

various educational levels when measured by the Perioperative Staff Cost-effectiveness Attitude Scale or the Reprocessing Single-Use Items Attitude Scale.

Scores on the Perioperative Staff Cost-effectiveness Attitude Scale range from 20 to 100, with a score above 60 entering the range for a positive attitude toward cost-effectiveness. Mean scores for nurses increased slightly with increased education. Overall, the mean scores for diploma prepared nurses was 72.64. Nurses with an associate degree in nursing (ADN) and bachelors of science in nursing (BSN) had a mean score of 75.1. The mean Perioperative Staff Cost-Effectiveness Attitude Scale score for graduate educated nurses was 76.95. ANOVA calculated the p value for the different educational levels of RNs was not statistically significant at .925 for the Perioperative Staff Cost-Effectiveness Attitude Scale.

Secondary analysis of the relationship of Perioperative Staff Cost-Effectiveness Attitude Scale scores and RN educational preparation by institution resulted in similar findings. At WHMC the BSNs scored higher than the ADNs, but this trend changed at the graduate level. Mean scores at this facility were 74.0 for ADNs, 77.54 for BSNs, and 76.94 for masters prepared nurses. There were no diploma level nurses at WHMC. The p value for this group was .964, and therefore, was not statistically significant. The range of scores for BSNs was 45 to 96 and 48 to 95 for graduate prepared nurses.

Analysis of UHS showed a slight decrease in mean scores with an increase in education. Diploma prepared RNs had a mean score of 73.89, ADNs 72.87, and BSNs were 72.75. These scores ranged broadly with scores of 55 to 89 for diploma nurses, 63 to 89 for ADNs, and 48 to 88 for BSNs. There were no graduate prepared subjects at this institution. ANOVA calculated the p value at .985.

At BAMC the higher the level of education, the higher the mean scores. The exception was an ADN prepared nurse (N=1) that had a mean score of 94 on the Perioperative Staff Cost-Effectiveness Attitude Scale. Scores for diploma nurses were 69.52, 71.22 for BSNs, and 77. 0 for masters level nurses. However, the p value for this facility's nurses was .502, and therefore, was not statistically significant.

Overall, mean scores on the Reprocessing Single-Use Items Attitude Scale were lower than the Perioperative Staff Cost-Effectiveness Attitude Scale. As with the Perioperative Staff Cost-Effectiveness Attitude Scale, scores on the Reprocessing Single-Use Items Attitude Scale range from 20 to 100, with a score above 60 entering the level considered a positive attitude toward reuse of single-use items. However, like the Perioperative Staff Cost-Effectiveness Attitude Scale, no statistically significant differences were found. The significance for the different educational levels of RNs was a not statistically significant p =.543. Mean scores on the Reprocessing Single-Use Items Attitude Scale for diploma RNs was 63.28, ADNs were 59.2, BSNs' mean was 66.74, and masters prepared nurses' were 67.63.

There was not a statistically significant trend (p= .629) at WHMC for nurses with greater educational background scoring slightly higher on the Reprocessing Single-Use Items Attitude Scale. Means for BSNs were 66.45 and 67.87 for graduate prepared nurses. The range of scores was broad with BSNs ranging from 33 to 86 and graduate prepared nurses ranging from 26 to 95.

There was no discernable trend at UHS with respect to mean scores on the Reprocessing Single-Use Items Attitude Scale and education. Diploma nurses' mean was 64.2, ADN scores were a negative mean of 56.87, and 69.12 for the BSNs18. Again the scores varied widely, ranging from 34 to 79 for diploma prepared nurses, 35 to 78 for ADNs and 33 to 98 for BSNs. ANOVA showed no significant difference with p=.426.

Findings for BAMC were similar. The means showed no trend with respect to education and the Reprocessing Single-Use Items Attitude Scale. The p value was not statistically significant (p=.564). Scores for diploma nurses were 61.0, 65.33 for BSNs, and 67.0 for RNs with a master's degree.

Table 2

Demographic Characteristics of Study Subjects

Characteristic	RN		UAP		Total	
	N	*(%)*	*N*	*(%)*	*N*	*(%)*
Gender						
Male	17	(24.3%)	35	(64.8%)	52	(41.9%)
Female	53	(75.7%)	19	(35.2%)	72	(58.1%)
Age (in years)						
Mean		40.13		29.64		35.52
Range		20-57		20-52		20-57
Standard Deviation		8.75		7.32		9.66
Marital Status						
Never Married	15	(21.7%)	16	(29.6%)	31	(25%)
Married	38	(55.1%)	29	(53.7%)	67	(54%)
Divorced	16	(23.2%)	8	(14.8%)	24	(20%)
Separated		N/A	1	(1.9%)	1	(1%)
Race						
Caucasian	46	(67.6%)	26	(50 %)	72	(60%)
Hispanic	8	(11.8%)	11	(21.2 %)	19	(15.8%)
African American	9	(13.2%)	7	(13.5%)	16	(13.3%)
Asian	3	(4.4%)	5	(9.6 %)	8	(6.7%)
Other	2	(2.9 %)	3	(5.8%)	5	(4.2%)
Highest Level of Education						
Less than GED HS Diploma		N/A	1	(1.85%)	1	(.08%)
GED or High School Graduate		N/A	35	(64.81%)	35	(28.2%)
Associate Degree		N/A	11	(20.37%)	11	(8.9%)
Diploma in Nursing	7	(10%)		N/A	7	(5.7%)
Associate Degree in Nursing	10	(14.28%)		N/A	10	(8%)
Bachelor's Degree in Nursing	31	(44.28%)		N/A	31	(25%)
Bachelor's Degree Other Field	3	(4.28 %)	7	(12.96%)	10	(8%)
Master's Degree in Nursing	11	(15.71%)		N/A	11	(8.9%)
Master's Degree Other Field	8	(11.42%)		N/A	8	(6.4%)
Institution						
WHMC	33	(47%)	28	(52%)	61	(49%)
UHS	21	(30%)	11	(20%)	32	(26%)
BAMC	16	(23%)	15	(28%)	31	(25%)

UAP Education and Attitude Scores

As with the nurses, ANOVA found no significant differences between the various UAP educational levels when measured by the Perioperative Staff Cost-effectiveness Attitude Scale or the Reprocessing Single-Use Items Attitude Scale. UAP education ranged from one subject that had less than a high school education to seven with bachelor's degrees (Table 2).

There was not a statistically significant difference for the Perioperative Staff Cost-Effectiveness Attitude Scale for UAP based on education (p=.859). There was a trend in scores with respect to education. Mean scores for UAP decreased slightly for those with four-year degrees. For all UAP, the mean scores for those with a high school education or equivalent was 74.17. UAP with an associate degree had a mean score of 74.55. The mean Perioperative Staff Cost-Effectiveness Attitude Scale score for bachelor's educated UAP was the lowest 71.71.

UAP mean scores and ANOVA were also examined by highest level of education and institution. There was no statistically significant difference at any institution regarding UAP education and scores on the Perioperative Staff Cost-Effectiveness Attitude Scale. UAP at BAMC approached statistical significance (p= .085), followed by UHS (p=.408), and WHMC (p=.919). The trends for UAP mean scores and educational level varied by facility (Table 3). Scores at WHMC increased slightly with education. Mean scores at UHS also increased, but not all UHS UAP responded to this question. However, there was an inverse relationship at BAMC.

There were no trends noted for UAP highest education levels and Reprocessing Single-Use Items Attitude Scale mean scores. ANOVA demonstrated no statistically significant relationship between the UAP educational levels (p=.404). Mean scores increased when comparing high school level education, but dipped slightly with those subjects with bachelor's degrees. For all UAP, the mean scores for those with a high school education or equivalent was

61.88. UAP with an associate degree had a mean score of 67.90. The mean Reprocessing Single-Use Items Attitude Scale score for bachelors educated UAP was the lowest at 58.42, which falls below the threshold of 60, and therefore can be considered a negative attitude. UAP mean scores were also investigated between highest level of education and clinical institution (Table 3). ANOVA detected no statistically significant difference at any institution regarding UAP education and scores on the Reprocessing Single-Use Items Attitude Scale. UAP at BAMC had the highest level of statistical significance ($p = .089$), albeit not reaching true statistical significance of $p = <.05$, followed by WHMC ($p=.232$), and UHS ($p=.699$). The trends for UAP mean scores and educational level varied by facility (Table 3). Scores at WHMC increased with education when comparing high school or equivalent to associate degree educated UAP, but dropped again for baccalaureate prepared UAP. Mean scores at UHS also increased with greater education. As with the Perioperative Staff Cost-Effectiveness Attitude Scale, this was an inverse relationship at BAMC, with bachelor's educated UAP scores indicating a negative attitude toward reuse.

Table 3a

UAP Perioperative Staff Cost-Effectiveness Attitude Scale (PCE) Scores and Reprocessing Single-Use Items Attitude Scale (RSU) Scores by Institution and Education

Highest Education	*WHMC PCE*	*P Value*	*UHS PCE*	*P Value*	*BAMC PCE*	*P Value*
UAP High School or GED	72.66	.919	68.14	.408	81.1	.085
UAP Associate Degree	74.58		78.0		73.33	
UAP Bachelors Degree	74.75		N/A		67.66	
Highest Education	*WHMC RSU*	*P Value*	*UHS RSU*	*P Value*	*BAMC RSU*	*P Value*
UAP High School or GED	59.54	.232	55.57	.699	70.50	.089
UAP Associate Degree	70.85		Confidential		63.66	
UAP Bachelors Degree	68.04		N/A		45.66	

Table 3b

RN Perioperative Staff Cost-Effectiveness Attitude Scale (PCE) Scores and Reprocessing Single-Use Items Attitude Scale (RSU) Scores by Institution and Education

Highest Education	*WHMC PCE*	*P Value*	*UHS PCE*	*P Value*	*BAMC PCE*	*P Value*
RN Diploma in Nursing	N/A	.964	73.89	.985	69.52	.502
RN ADN	Confidential		72.87		Confidential	
RN Bachelor's in Nursing	77.54		72.75		71.22	
RN Master's Degree	76.94		N/A		77.00	
Highest Education	*WHMC RSU*	*P Value*	*UHS RSU*	*P Value*	*BAMC RSU*	*P Value*
RN Diploma in Nursing	N/A	.629	64.20	.426	61.00	.564
RN ADN	Confidential		56.87		Confidential	
RN Bachelor's in Nursing	66.45		69.12		65.33	
RN Master's Degree	67.87		N/A		67.00	

A higher score is thought to indicate a more positive attitude toward cost-effectiveness. A neutral attitude should score a 60. Therefore, any score above a 60 is indicative of a positive attitude.

Role and Attitude Scores

Subjects were divided into the two roles RN or UAP and were compared based on their responses on the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale. Based upon the mean scores on the Reprocessing Single-Use Items Attitude Scale and the Perioperative Staff Cost-Effectiveness Attitude Scale, the overall attitudes of RNs and UAP were very similar (Table 4). RNs and UAP were also remarkably similar when standard deviations and ranges for both questionnaires are compared. The groups were not different when compared by ANOVA, which calculated p values that were not statistically significant.

Table 4

Role and Perioperative Staff Cost-Effectiveness Attitude Scale (PCE)
Role and Reprocessing Single-Use Items Attitude Scale (RSU)

Role and Instrument	*Mean*	*N*	*SD*	*Min*	*Max*	*p Value*
RN PCE	74.79	70	12.83	45	96	
UAP PCE	74.54	54	10.92	52	96	.909
RN RSU	64.71	70	15.95	26	98	
UAP RSU	63.67	54	15.01	24	95	.710

A higher score is thought to indicate a more positive attitude toward cost-effectiveness. A neutral attitude should score a 60. Therefore, any score above a 60 is indicative of a positive attitude.

The striking similarities between RNs and UAP prompted a secondary analysis of role by institution. The mean scores varied slightly by role, by institution, and also by instrument (Table 5). However, there were no statistically significant differences when role was analyzed by institution. The Perioperative Staff Cost-Effectiveness Attitude Scale significance level was comparable at WHMC (p= .566), UHS (p= .563) and BAMC (p=.415). At WHMC, RNs scored

slightly higher on the Perioperative Staff Cost-Effectiveness Attitude Scale, but slightly lower on the Reprocessing Single-Use Items Attitude Scale. Higher scores are thought to be indicative of more positive attitudes. The opposite was true at BAMC with RNs scoring slightly lower on the Perioperative Staff Cost-Effectiveness Attitude Scale, but slightly higher on the Reprocessing Single-Use Items Attitude Scale. RNs at UHS scored slightly higher on both instruments. The mean score for UAP at UHS entered the range indicative of a negative attitude for the Reprocessing Single-Use Items Attitude Scale.

Table 5

Perioperative Staff Cost-Effectiveness Attitude Scale (PCE)
Reprocessing Single-Use Items Attitude Scale (RSU) by Institution

Role	*WHMC PCE*	*P Value*	*UHS PCE*	*P Value*	*BAMC PCE*	*P Value*
RN	76.41	.566	73.07	.563	73.69	.415
UAP	74.53		70.72		77.33	
Role	*WHMC RSU*	*P Value*	*UHS RSU*	*P Value*	*BAMC RSU*	*P Value*
RN	64.75	.867	63.28	.411	66.50	.703
UAP	65.42		58.27		64.33	

A higher score is thought to indicate a more positive attitude toward cost-effectiveness. A neutral attitude should score a 60. Therefore, any score above a 60 is indicative of a positive attitude.

Over 84% (N=59) of the RNs scored a 61 or higher on the Perioperative Staff Cost-Effectiveness Attitude Scale, with 50% (N=35) scoring 74 or greater. As noted, a score of 60 or greater on either instrument is considered a positive attitude. UAP scores were comparably distributed with 83% (N=55) scoring greater than 60 and over one half (N=29) of the UAP scoring a 77 or higher. RNs with positive attitudes on the Reprocessing Single-Use Items Attitude Scale were less common, with 68.6% (N=48) scoring above 60 and about one half of the RN

subjects scoring a 68 or higher. A smaller percentage 57.4% (N=23) of UAP scored above 60 on the Reprocessing Single-Use Items Attitude Scale and 51.9% (N=28) scored a 66 or greater .

An analysis of the effect RNs' primary duties or job title has on their attitude scores was also performed. Of those RNs that responded (N=65), the mean scores were nearly identical for the Perioperative Staff Cost-Effectiveness Attitude Scale and indicated a small downward trend on the Reprocessing Single-Use Items Attitude Scale for nurses with increased administrative responsibility. ANOVA detected no statistical significance for these differences (Table 6). UAP functioned primarily in the technical role and therefore no comparison was made by specific UAP job titles.

Table 6

RN and UAP Current Job Title and Scores on Perioperative Staff Cost-Effectiveness Attitude Scale (PCE) and Reprocessing Single-Use Items Attitude Scale (RSU)

Position/duties 50% of the time	*N*	*Percentage*	*PCE*	*RSU*	*RN Job PCE p Value*	*RN Job RSU p Value*
RN Staff Nurse	39	55.7 %	75.73	67.10		
RN Team Leader	18	25.7%	75.53	63.17	.995	.608
RN Administration	8	11.4%	75.25	62.75		
No Response	5	7.2%				
UAP Technical	54	100%	74.54	63.67		

A higher score is thought to indicate a more positive attitude toward cost-effectiveness. A neutral attitude should score a 60. Therefore, any score above a 60 is indicative of a positive attitude.

Experience and Attitude Scores

The subjects were divided into three approximately equally sized groups based on years of experience. These groups were less than 10 years experience, greater than 10 but less than 15, and greater than 15 years experience. While there was some variance when the RNs and UAP

were separated into these various experience groups, there did not appear to be a statistically significant relationship. ANOVA resulted in p values that were not significant. The one area that approached significance was UAP scores on the Perioperative Staff Cost-Effectiveness Attitude Scale. The grouping of UAP with less than 10 years of experience contrasted with the UAP with greater than 15 years of experience found a p value for this comparison of .124. The difference in mean was almost eight points, with the more experienced UAP scoring higher. However, this was not near the threshold for significance of less than .05. Mean scores typically reflected greater scores with greater experience (Table 7). The exception was UAP and the Reprocessing Single-Use Items Attitude Scale. Scores on the Reprocessing Single-Use Items Attitude Scale increased when comparing those UAP with less than ten years experience and those with 10 to 15 years of healthcare experience. However, scores dropped for UAP with over 15 years experience.

Table 7

RN and UAP Experience and Scores on Perioperative Staff Cost-Effectiveness Attitude Scale (PCE) and Reprocessing Single-Use Items Attitude Scale (RSU)

Years of Healthcare Experience	*RN PCE*	*RN RSU*	*UAP PCE*	*UAP RSU*
1 to 10 years	73.5	61.56	72.47	61.58
11 to 15 years	73.93	62.0	77.54	70.81
16 years or greater	76.16	67.21	80.44	63.14

A higher score is thought to indicate a more positive attitude toward cost-effectiveness. A neutral attitude should score a 60. Therefore, any score above a 60 is indicative of a positive attitude.

Analysis of the relationships between experience groups by institution revealed no statistically significant relationships. The most significant was at WHMC (p=.071). A trend that indicated more years of experience results in more positive attitudes was most obvious on the Perioperative Staff Cost-Effectiveness Attitude Scale. Mean scores for subjects with fewer than

10 years experience were 71.96, greater than 10 but less than 15 years experience were 74.57, and for those with greater than 15 years experience the mean was 80.25.

Self-Reported Reuse and Reprocessing

Ninety-six subjects responded to the question asking "Please estimate the percentage of occasions (when given the opportunity) you place a suitable reusable item in the collection receptacle." There was no significant correlation between the subjects' self-report of reuse and their scores on the Reprocessing Single-Use Items Attitude Scale. This was determined by ANOVA with a not statistically significant p=.094. The Pearson product moment correlation analysis was also used to examine the relationship of these two variables. A perfect correlation would be a 1.0 and no correlation would approach 0. The correlation for this relationship was calculated at .009, which is not indicative of any significant relationship. A scatter plot diagram in Figure 1 demonstrates this lack of correlation.

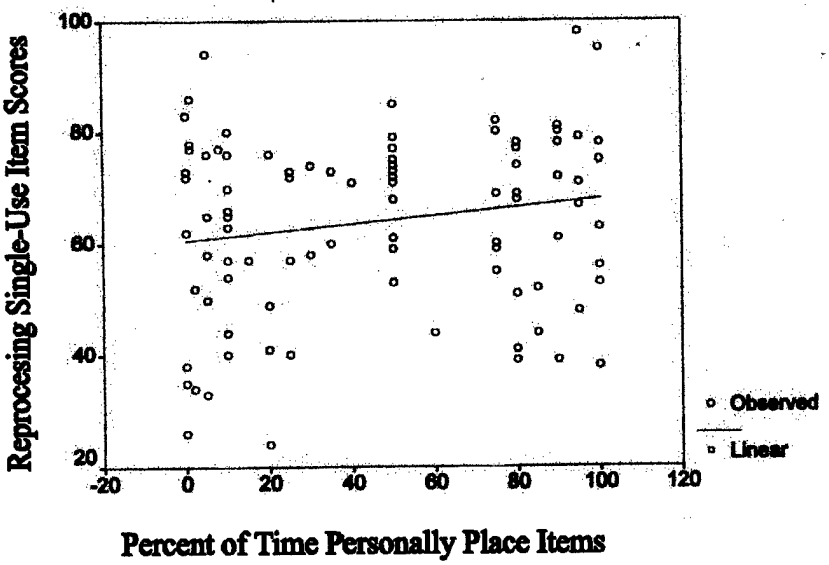

Figure 1

Relationship of Self-Reported Reuse and Reprocessing Single-Use Items Attitude Scale

Perceived Impediments to Compliance

Responses to the open-ended questions regarding impediments to placing items in reprocessing receptacles (Appendix D, questions 21 and 22) have been categorized by responses and the frequency of those responses. Subjects were asked the open-ended question "What do you think prevents you from placing all suitable items in the appropriate collection receptacle?" The participants identified several factors they perceive to be personal impediments to compliance with reuse protocols in the perioperative environment. Over one half of the responses by the participants could be grouped into four common areas that were personal hindrances to actually placing a single-use item in a reprocessing receptacle (Table 8 and Figure 2). These obstacles included time constraints, the receptacle is not conveniently located, the participants are unsure which items are approved for reprocessing, and subjects actually forget to separate items suitable for reuse.

Subjects were also asked "What do you think prevents other staff members from placing all suitable items in the appropriate collection receptacle?" There were also four prevalent themes when the subjects speculated why other staff members do not actually place a single-use item in a reprocessing receptacle. The most commonly sited reasons by participants were that, as with themselves, other staff may be unsure which items could be reprocessed and their coworkers are subject the time constraints of the busy perioperative environment. The subjects also considered the possibilities that their coworkers are lazy or that their coworkers do not consider reuse of single-use items an ethical practice. The frequencies of similar responses are listed in table (Table 9) and appear graphically in a bar chart to demonstrate trends (Figures 3).

Table 8 RN and UAP Self-Reported Reasons for Not Placing Reusable Items in Receptacles

Expressed Reasons	Number Responses
Time constraints ("busy," "in a rush", "time to separate items," "other duties more pressing")	21
Receptacle not conveniently located, access to receptacle inconvenient	16
Not familiar with which items can be recycled ("knowledge," "education")	14
Forget/Oversight	9
Item is perceived as actually broken/not suitable for reuse	9
Ethical considerations ("would not want used on me," ""bad practice," "pt. charged for new," "Morals"	8
Concern for presence of bioburden or "blood stains"	7
Concern for the nature/type/function/safety of reprocessed items ("quality control")	5
Not related to duties	5
Surgeon orders/preference/ or disapproval of reprocessed items	4
Actual experience with a functional failure of a reprocessed item	4
Small number of items are recyclable in my surgical subspecialty	4
Not paying attention/lack of motivation	2
Resistance to change ("...in routine," "mindset," paradigms")	1

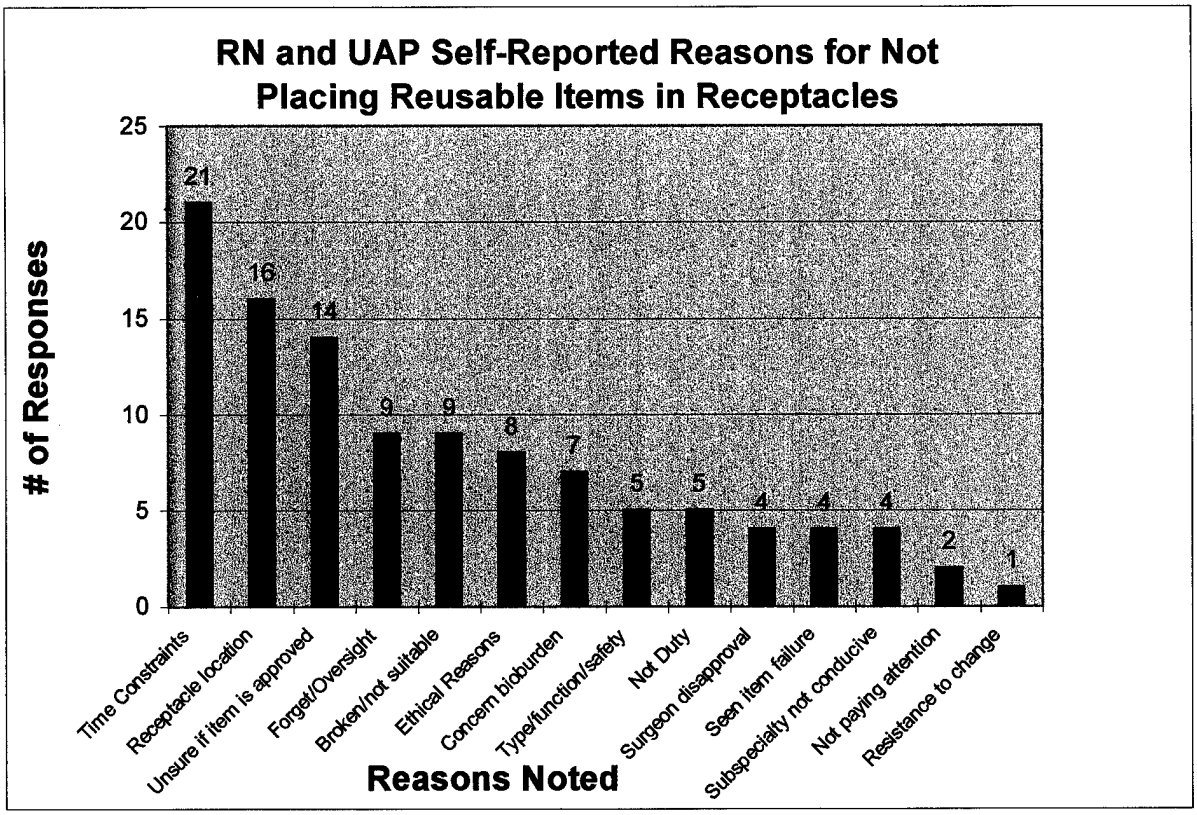

Figure 2 RN and UAP Reasons Participants Personally Do Not Place Reuse Items in Receptacles

Table 9 RN and UAP Perceived Reasons Others Do Not Place Reusable Items in the Receptacles

Expressed Reasons	Number Responses
Not familiar with which items can be recycled ("knowledge," "education")	23
"Laziness" (X14), "easier to throw away," "additional thing to do," "apathy"	21
Time constraints ("busy," "in a rush," "time to separate items")	19
Ethical considerations "would not want used on me," ""bad practice," "pt. charged for new"	9
Resistance to change ("…in routine", "mindset," paradigms")	8
Receptacle not conveniently located, access to receptacle inconvenient	8
Surgeon orders/preference/ or disapproval of reprocessed items	6
Negative attitudes toward reuse ("Disapprove," "Don't like it," Don't feel it will help pt.")	6
Forget	5
"Inattention to detail," "not caring," "not interested in cost savings"	5
Concern for the nature/type/function of reprocessed items "sharpness," "burs, blades," "aortic punch"	4
Actually broken/not suitable for reuse	3
"Misinformation," "myths," "ignorance," "don't see value"	3
Not related to duties	2
Concern for the liability/safety with reuse	2
Concern for presence of bioburden or "blood stains"	2
Actual experience with a functional failure of a reprocessed item	1

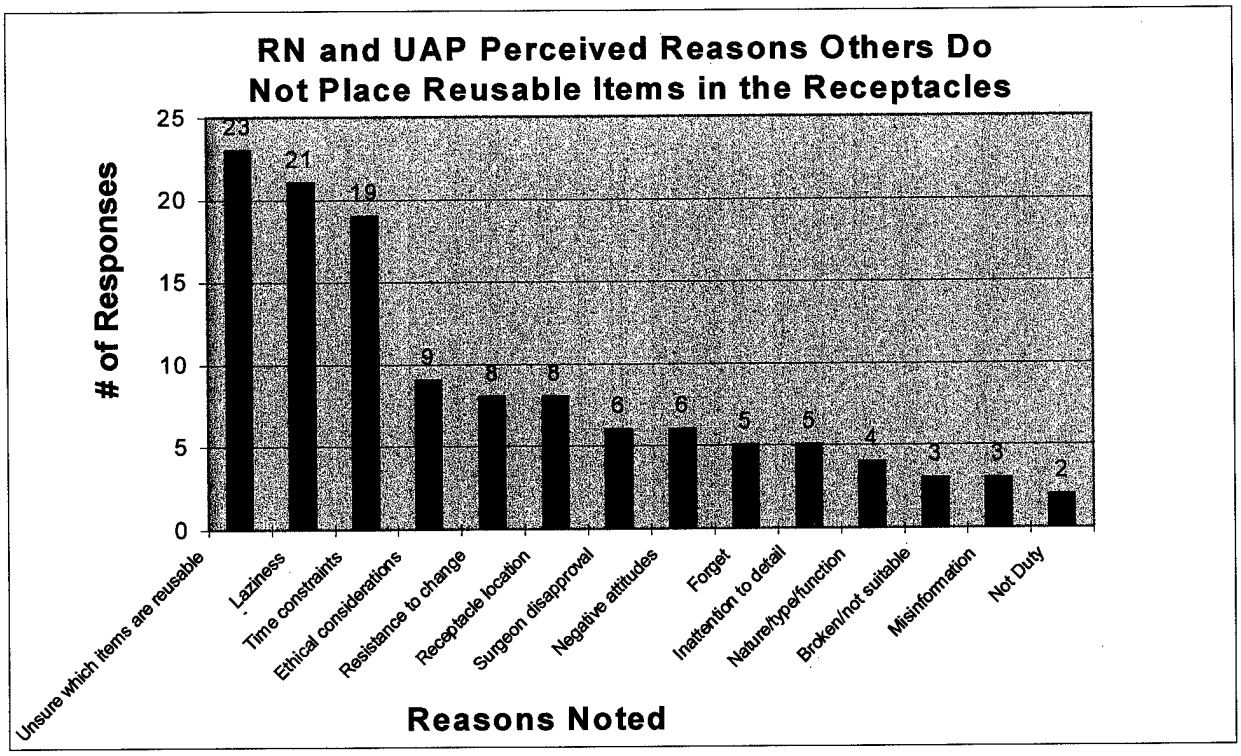

Figure 3 RN and UAP Perceived Reasons Others Do Not Place Reusable Items in the Receptacles

General Comments Regarding Cost-effectiveness

About 30% of the subjects (N=37) responded to the general open-ended question which asked, "Do you have any comments regarding cost-effectiveness or reprocessing of single-use items?" Nineteen UAP's and eighteen RNs' comments were taken at face value and categorized as positive, negative, or conditional. These were further separated by the role of the comment writer. After the researcher had categorized the responses, a second face-value analysis was performed by a doctoral prepared RN. There was one hundred percent inter-rater agreement on the face-value assessment of responses. When the responses are stratified by role, there were essentially no significant differences in the frequency of positive and negative comments given in response to the open-ended question.

Nurses most frequently made positive comments (N=12), and UAP made six. Even though nurses made twice as many positive comments, this difference is not significant because of the differences in group sizes and the infrequency of comments in general. Examples of RN comments categorized as positives include: "I think it is a good idea overall, for the environment and cost savings," "I think it is a great idea," and "The more, the better." Some UAP positive comments were "I think it is a good thing and could be used in underdeveloped countries," and "Put receptacles in all (operating) rooms."

UAP made slightly more negative comments regarding cost-effectiveness or reuse of single-use items (N=9) than RNs (N=4). Examples of negative UAP statements were "Single-use items, the name says it all. They should be single-use," and "The surgeons *can* tell the difference, even when you don't tell them up front." Negative statements by RNs were reflected in statements such as "There are many ways to be cost-effective other than reprocessing," "Staff informed

opinion unimportant, use was not open to debate" and "Fifty percent of the time it doesn't work like new."

Some subjects made statements that were assessed as giving conditional support for reprocessing. There were two conditional statements made by RNs and four by UAP. An example of a RN's conditional statements is "Some are appropriate, e.g. SCD. Sharps e.g. arthroscopy shavers are not." Some UAP conditional comments are "Make sure it is done perfect so there is no transportation of disease," and "We have to make sure standards are high for reprocessing."

The mean score for all participants on the Reprocessing Single-Use Items Attitude Scale was 64.25.This mean was 64.71 for RNs , and 63.67 for UAP. The mean scores on the Reprocessing Single-Use Items Attitude Scale for subjects who made negative comments regarding reuse of single-use items were 45 for RNs and 52 for UAP. These scores are below 60, and therefore, are indicative of a negative attitude toward reuse of single-use items. These scores are consistent with subject comments regarding reuse. The mean for RNs who made positive comments was 76.75 and 74.83 for UAP. These averages are greater than 60, and consequently are suggestive of a positive attitude toward reuse. These scores on the Reprocessing Single-Use Items Attitude Scale are also higher than the overall means, and means for their respective role. Scores for the two RNs that gave conditional statements were slightly negative (mean = 56). The mean for UAP making conditional statements (68.5) was higher than the overall UAP mean, but fell between the UAP that made positive and negative statements.

V. DISCUSSION AND SUMMARY

Discussion

Based on prior literature one could expect a relationship between the variables role, highest level of education, or years of healthcare experience and cost-effectiveness attitudes. The anticipated relationships were that higher education and experience would affect subject attitudes positively. That is, subjects would score higher on attitude scales. Other research has found various staff characteristics are associated with more positive attitudes toward cost-effectiveness. Among these findings are that higher educational levels in nursing (Hemsley-Robinson & Miller, 1995), more experience (Cyr, 1990), and role within the nursing profession (Blaney & Hobson, 1988), that is, staff, management, and administration, were predictors of more positive attitudes toward cost-effectiveness. Therefore, with these examples, attitudes became more positive on a continuum. Still others (Takes, 1992) found less positive cost-effectiveness attitudes for baccalaureate prepared nurses and more positive cost-effectiveness attitudes for married nurses and those nurses with fewer than one year or over ten years of OR experience. Jorgenson (1996) found an overall positive attitude toward cost-effectiveness was highest among diploma graduates.

In this study, the participant's score on the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale operationally defined the subject's attitude toward cost-effectiveness and reprocessing of single-use surgical supplies. A higher score is thought to indicate a more positive attitude toward cost-effectiveness. A neutral attitude should score a 60. Therefore, any score above a 60 is indicative of a positive attitude.

There were no statistically significant differences in the study groups of role, education, or experience, with respect to the research questions. There were no statistically significant

differences with respect to other variables which have been identified in previous research, that is education, position (staff, team leader, or administrative), marital status, or experience. The only statistically significant differences were between the age and gender of RNs as compared to the UAP. However these differences had no impact on the mean scores on the Perioperative Staff Cost-Effectiveness Attitude Scale or the Reprocessing Single-Use Items Attitude Scale. Had there been a difference in the RN and UAP scores, these age and gender differences between the respective roles would have been investigated as potential confounding variables. That is the gender or age difference was the cause of the divergent scores and not a consequence of one's role.

One half of the subjects reported attending formal cost-effectiveness training. That training had no statistically significant impact on the subjects' scores on the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale. This may be related to the current heightened awareness of cost-effectiveness concepts in the managed care environment. This awareness may be a major reason why none of the anticipated variables made a statistically significant difference in mean scores for the survey items.

The results of the qualitative aspects of the study had the most clinically significant findings. Among these findings were the identified impediments to reprocessing for the participants and their coworkers. Also noteworthy was the lack of correlation between attitudes toward reuse and self-report of reprocessing behavior. Other clinically relevant findings from the qualitative dimensions of the research are the strong correlation between positive or negative comments and score on the Reprocessing Single-Use Items Attitude Scale.

Aims

One of the aims of this study was to describe the attitudes toward cost-effectiveness of the participants as reflected by scores on the Perioperative Staff Cost-Effectiveness Attitude Scale. Mean scores for study groups on the Perioperative Staff Cost-Effectiveness Attitude Scale were in the seventies or greater. Therefore, the findings indicated all of the groups had positive attitudes toward cost-effectiveness as measured by mean scores on the Perioperative Staff Cost-Effectiveness Attitude Scale. However, some individual scores fell into the *sub* sixty range, or that which is considered a negative attitude toward cost-effectiveness. Some perioperative staff members may associate cost-effectiveness with cutting corners or reducing staffing levels. Consequently, cost-effectiveness may have a negative connotation to these staff members.

A second aim of this study was to describe the attitudes toward reuse of single-use items as measured by the scores of the participants on the Reprocessing Single-Use Items Attitude Scale. The Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale tests were significantly correlated ($r = .699$). Therefore indicating that, if a subject has a positive attitude to cost-effectiveness, then they would often have a positive attitude toward reuse. Most groups' mean scores on the Reprocessing Single-Use Items Attitude Scale were in the positive range, albeit sometimes marginally so. All groups' mean scores on the Reprocessing Single-Use Items Attitude Scale were lower than their mean score on the Perioperative Staff Cost-Effectiveness Attitude Scale were. There were some groups that entered the negative range (below 60) for the Reprocessing Single-Use Items Attitude Scale. Most notable were UAP at WHMC (mean = 59.54), UAP with high school or equivalent education at UHS (mean = 55.7), and baccalaureate educated UAP at BAMC (mean = 45.66). The only RN group with negative means on the Reprocessing Single-Use Items Attitude Scale were associate

degree RNs at UHS (mean = 56.87). There was a wider range of scores on the Reprocessing Single-Use Items Attitude Scale than on the Perioperative Staff Cost-effectiveness Attitude Scale and some subjects scored in the low twenties. A score of twenty, the lowest possible score, is indicative of responses strongly disagreeing with the reuse of single-use items. At face value, it would appear more groups of UAP have negative attitudes.

There is more to the concept of reuse of single-use items than solely cost-effectiveness. Other issues such as infection control, safety, and reuse item effectiveness impact attitudes toward reuse of single-use items. Commercial reprocessing and reuse of single-use items is also a relatively recent practice issue in the United States. Perioperative education and standards rely heavily on the individual staff members' surgical conscience in maintaining a sterile field. Some subjects' comments are reflective of the marginal attitudes toward reuse as measured by the Reprocessing Single-Use Items Attitude Scale. This could explain why scores and presumably attitudes are less positive for reprocessing single-use items.

A third aim of this thesis was to describe the effects of role, education, and experience on the participants' attitudes toward cost-effectiveness and reuse of single-use items. There were no statistically significant differences between any of these groups. Using the mean scores on the Reprocessing Single-Use Items Attitude Scale and the Perioperative Staff Cost-Effectiveness Attitude Scale the overall attitudes of the RNs and UAP by roles mirrored each other. This would suggest that overall these attitudes are very similar for RNs and UAP. Analysis by ANOVA demonstrated there were no statistically significant differences between UAP and RNs when measured by the Perioperative Staff Cost-effectiveness Attitude Scale or the Reprocessing Single-Use Items Attitude Scale. This was also true regarding job roles within the nursing profession (staff, management, or administration).

When the open-ended question responses were separated by role, there were no major differences in the number of positive and negative comments given in response to the open-ended question, "Do you have any comments regarding cost-effectiveness or reprocessing of single-use items?" Remarkably, these findings are contrary to what has been suggested in the literature. Perhaps, this is because the perioperative environment is one of the highest cost centers in medical facilities, and managed care concepts are present in most facilities, most perioperative staff members have been bombarded with a cost-effectiveness mindset for several years. As previously discussed, the distinctions between study groups may have been blurred by this aspect of the surgical environment.

Attitude scores were not associated with the participants' educational level. As with the other variables, analysis by ANOVA demonstrated there were no statistically significant differences between the various educational levels when measured by the BHNAS (pilot study only), the Perioperative Staff Cost-Effectiveness Attitude Scale or the Reprocessing Single-Use Items Attitude Scale. As expected, RNs were more educated than UAP. The trends (on both instruments) for UAP mean scores and educational level varied by facility, however they were not statistically significant. When stratifying results by education in respective roles, there is essentially no difference in the frequency of positive and negative comments given in response to the open-ended question, "Do you have any comments regarding cost-effectiveness or reprocessing of single-use items?"

Experience was found to make no statistically significant difference in the subjects' attitude toward cost-effectiveness and reuse of single-use items. Some variation was noted when the RNs and UAP were separated into various experience groups. However, the ANOVA analysis resulted in p values that were not significant. Only one area, the UAP's scores on the

Perioperative Staff Cost-Effectiveness Attitude Scale, came close to being significant. The grouping of UAP with under 10 years of experience and the UAP with greater than 15 years of experience found a mean of almost eight points, with the more experienced UAP scoring higher. The p value for this comparison was of .124. However, this was not near the threshold for significance of less than .05. Again, this was an unanticipated finding that was contrary to research based expectations that more experience results in a more positive attitude toward cost-effectiveness.

It is possible that more experience in some subjects results in a resistance to changes in practice. The opposite may also be true. Some experienced staff members, who are able to recognize the necessity for cost-effective practice, may have more positive attitudes toward cost-effectiveness. While other subjects, who have only recently been educated in perioperative practice may also have positive attitudes toward cost-effectiveness. This positive attitude may be influenced by the recent exposure by the subjects to the education program's content.

The fourth aim of this study was to identify factors that are perceived by perioperative staff members as impediments to reuse of single-use item protocols. This aim was assessed by providing subjects an opportunity to respond to open-ended questions regarding obstacles to placing items in reprocessing receptacles. As previously described, comments revealed that there were four prevalent areas perceived to be impediments to compliance with reuse protocols in the perioperative environment. Over 50% of the comments noted time constraints, the receptacle was not conveniently located, the participants are unsure which items are approved for reprocessing, and subjects actually forget to separate items suitable for reuse as the thing which prevents them from personally placing reusable items in a receptacle. Four prevalent concepts surfaced when the subjects speculated why other staff members do not actually place a single-use item in a

reprocessing receptacle. Participants considered some explanations resembling their self-perceived obstacles, including the possibility other staff may be unsure which items could be reprocessed and that they are subject the time constraints of the busy perioperative environment. The subjects also considered the possibilities that their coworkers are lazy or that their coworkers do not consider reuse of single-use items an ethical practice. The fact that many staff members have similar opinions regarding obstacles to reuse is noteworthy. It is indicative of distinct obstacles and not random perspectives. As previously described, the practice of reuse of single-use items has more dimensions than exclusively cost-effectiveness.

After the pilot study another open-ended question was added. The participants were given the opportunity to respond to: "Do you have any comments regarding cost-effectiveness or reprocessing of single-use items?" Most comments were of a positive nature regarding reuse of single-use items and cost-effective practices. As with the two surveys, responses which were identifiable as positive or negative were comparable in number for both RNs and UAP. One of the more thought provoking comments was "The surgeons *can* tell the difference, even when you don't tell them up front." Two other comments related surgeon refusal to use reprocessed items.

The sections with open-ended questions were useful because they demonstrated congruence between the data provided by the Perioperative Staff Cost-Effectiveness Attitude Scale and the Reprocessing Single-Use Items Attitude Scale and comments made by subjects. They also provided a forum that identified concerns that could possibly not be addressed or identified through conventional avenues of communication. Specifically, there is an actual or perceived problem with the quality of certain types of reusable items such as burrs and shavers.

Theory of Reasoned Action

The framework for this study was the Theory of Reasoned Action (TRA). The TRA holds that a person's behavior is a reflection of the participant's attitude when the measured attitude corresponds closely with the situation being considered. The theory is based on the assumption that human beings are rational and make systematic use of the information they have available (Ajzen & Fishbein, 1980). According to the TRA, there is a strong correlation between attitudes and behavioral intentions. Behavioral intentions in turn can predict behavior. Thus, attitudes can predict behavior because attitudes are a function of beliefs.

Because actual behaviors of the subject were not observed, one must rely on the subjects' self-reported estimate of the percentage of occasions (when given the opportunity) they place a suitable reusable item in the reuse collection receptacle. This is particularly interesting in the context of the TRA, when one considers there was virtually no correlation when assessed with the Pearson's Product Moment ($r = .009$) between the reported percentage of time the subjects personally place the items in a receptacle and their scores on the Reprocessing Single-Use Items Attitude Scale. At face value, this finding seems contrary to the TRA. One possible conclusion of this finding is that the Reprocessing Single-Use Items Attitude Scale does not accurately measure attitudes toward reuse of single-use items. However, comparisons of individual scores on the Reprocessing Single-Use Items Attitude Scale with comments made by the subjects suggest scores reflect the subject's true attitude toward reuse of single-use items. Another explanation is the subjects were not accurate or honest in their assessment of the percentage of time they actually place items in the receptacle. One more potentiality is there are institutional differences that do not allow equal opportunity to place reusables in receptacles, thereby, skewing the correlation between self-report of reuse and Reprocessing Single-Use Items Attitude Scale scores.

This finding could also be related to the subjects' identified impediments to reuse, because the subjects and their coworkers may actually have a marginally positive attitude toward reuse, as was reflected by most groups scoring in the 60s on the Reprocessing Single-Use Items Attitude Scale. However, because of the only slightly positive level of their attitudes as measured by the Reprocessing Single-Use Items Attitude Scale, the identified obstacles are an effective hindrance to the subjects reprocessing as often as possible. This explanation does conform to the TRA. According to the TRA, the disposition toward a behavior, or in this case reprocessing, is influenced by the following precursors to behavior: beliefs, attitudes, and subjective norms. Beliefs are opinions and attitudes (personal judgement) held by the perioperative team member. Because the subjects have marginal attitudes toward reuse, they judge the impediment to reuse to be an often-overbearing obstacle. If the subjects had more positive attitudes, there would be greater effort placed on circumventing the perceived impediments to reprocessing.

Limitations

This research was not without limitations. As previously noted, the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale are based on the BHNAS, which was developed for use within the nursing profession. Consequently, one cannot assume all of the psychometric properties are transferable to UAP. Participation in the survey was voluntary. At least eight surveys were not usable due to gross incompleteness. Several other potential subjects declined to participate. Their input could have delivered a more complete picture.

The data were collected in large teaching facilities in one geographic location and most participants were active duty military. These factors may impact the degree to which one may generalize the results of this research.

Another potential limitation is that the modified instruments, the Reprocessing Single-Use Items Attitude Scale and Perioperative Staff Cost-Effectiveness Attitude Scale, may not measure exactly what they were intended to measure. They have not yet withstood the tests of time and scrutiny that the BHNAS has. These instruments may lack the sensitivity to detect the attitude differences between role, education, or experience.

Implications for Nursing Practice

Obviously, if the end user in an authority position refuses to use or even discourages the reprocessing of a single-use item then this would have a negative impact on the success of a reuse program. The corporate culture must be such that all members of the perioperative team are united in their approach.

Some possible practice changes were summarized by the open-ended questions. As previously summarized, the participants identified several potential obstacles to personally complying with reuse protocols (Figure 2). These obstacles included time constraints, the receptacle was not conveniently located, they are unsure which items could be reprocessed, and they actually forget to separate items suitable for reuse. Also, four prevalent themes emerged when the participants speculated why other staff members do not actually place a single-use item in a reprocessing receptacle. Assessment common to why others do not and why the subjects personally do not place items in the receptacle is that everyone may be unsure which items could be reprocessed and they are subject to the time constraints of the busy perioperative environment. The subjects also considered the possibilities that their coworkers are lazy or that they do not consider reuse of single-use items an ethical practice.

These findings did produce some clinically significant information that may be beneficial in the practice environment. For example, convenient simplified reminder lists of items that are

contracted with third party reprocessing companies to be reused. Management could reemphasize that reprocessing is an institutional priority. The one or two minutes it takes to segregate suitable single-use items for reprocessing should be supported by management directives and clinical practice. Another potentially successful technique would be to locate receptacles in locations the staff perceive to be "convenient."

Overall, both groups had positive attitudes toward reuse and even more so toward cost-effective practices. This foundation could be capitalized upon to maximize the level at which reuse protocols are implemented.

The perceived ethical conflicts regarding the reuse of single-use items could be diminished with education. Presentation of the available data, most of which is available in the United States and abroad, indicates this is a relatively safe practice when implemented judiciously. This re-education process, in conjunction with good change management practices, are steps which can help unfreeze the resistance to change (Gawlinski & Kern, 1994).

Recommendations for Future Research

While it appears the instruments developed for this research are reliable and valid, further development and testing of the Perioperative Staff Cost-Effectiveness Attitude Scale and Reprocessing Single-Use Items Attitude Scale is recommended. It is also recommended that research be conducted at more diverse sites to determine whether the findings can be generalized to other surgical settings.

Subject identified impediments to placing reusable items in reprocessing receptacles is another area suitable for further research. A study may be designed to determine if greater savings from reuse protocols can be realized if these identified obstacles are removed. This dimension

could be investigated by reassessing the subjects' self-report of reuse, together with monitoring actual changes in the volume of reprocessed items.

There has been no other research performed regarding attitudes of UAP. Further research to assess perioperative staff members' attitudes using the TRA as a theoretical framework could be pursued. Areas suitable for investigation include comparing RN and UAP attitudes toward patient teaching, education in general, continuing education, certification, care of surgical equipment, patient safety, dealing with difficult patients, or decontamination.

Summary

The purpose of this research was to describe and compare the differences one's role (RN or UAP), length of experience, and educational preparation play in a perioperative staff member's attitude toward cost-effectiveness in general, and specifically, the reprocessing of disposables. Surprisingly, based on the data collected at the three sites there does not seem to be a significant difference between the two roles, educational levels, or experience with regard to attitudes toward reuse of single-use items or cost-effectiveness in general. The anticipated differences between groups were not statistically significant.

The possibility that the current perioperative work environment, including managed care concepts and downsized staffing levels may have blurred expected inter-group distinctions. Current attitudes toward cost-effectiveness in general were assessed as positive. Attitudes toward reuse of single-use items appear to be marginally positive overall, with some small groups of subjects having negative attitudes.

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January 15, 1999

Mark A. Pistone, BSN, RN, CNOR
5602 Timber Trace
San Antonio, TX 78250-4272

Dear Dr. Piston:

Re: IRB Protocol #E-989-031 **A Study of Perioperative Team Members' Role and Educational Preparation on Cost-Effectiveness Attitudes. (UTHSCSA, UH)**

Reference your request, dated December 16, 1998.

This protocol has been determined EXEMPT under DHHS Regulation 46.101(b)(2): Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

RESPONSIBILITIES OF PRINCIPAL INVESTIGATOR:

(1) submit for review and approval by the IRB all modifications to the protocol or consent form(s) prior to the implementation of the change;

(2) for funded projects, submit a copy of renewals/continuations and advise whether the study of specimens, records, or human subjects has changed from the original submission; and

(3) submit a **Status Report** for continuing review by the IRB. A form will be sent to you annually to verify the status of the activity.

Source of Funding: None

NEXT IRB REVIEW: JANUARY 2000

(Note: Approval may need to be obtained from the appropriate hospital committee(s) prior to the implementation of this study).

Wayne P. Pierson, Ph.D., Director, IRB

Appendix A

PERIOPERATIVE STAFF COST-EFFECTIVENESS ATTITUDE SCALE

Participant #_____

Your completion of this questionnaire indicates your consent to participate in this study. Please respond to the following statements dealing with cost-effectiveness in perioperative care practices and procedures by indicating the extent to which you agree or disagree with each one. Complete the questionnaire as truthfully and honestly as possible. Do not spend time pondering over each question. Put down your first reaction and continue on to the next question. Please circle your response.

Strongly Disagree	Disagree Somewhat	Neither Agree Nor Disagree	Agree Somewhat	Strongly Agree
SD	D	N	A	SA

ITEM	RESPONSE				
1. The introduction and use of cost-effective practices and procedures will improve overall perioperative care effectiveness.	SD	D	N	A	SA
2. The introduction and use of cost-effective perioperative practices and procedures will benefit me personally.	SD	D	N	A	SA
3. Operating a surgical unit in order to make a profit is wrong.	SD	D	N	A	SA
4. I look forward to the introduction and use of cost-effective perioperative practices and procedures in surgery.	SD	D	N	A	SA
5. The introduction and use of cost-effective perioperative practices and procedures will result in a decrease in the quality of patient care.	SD	D	N	A	SA
6. The introduction and use of cost-effective perioperative practices and procedures will benefit the surgical profession as a whole.	SD	D	N	A	SA
7. The introduction and use of "cost-effectiveness" into perioperative care makes me uneasy.	SD	D	N	A	SA
8. Hospital surgical units should not be concerned with making or losing money.	SD	D	N	A	SA
9. The introduction and use of cost-effective perioperative practices and procedures will benefit patients.	SD	D	N	A	SA

Appendix A (continued)

PERIOPERATIVE STAFF COST-EFFECTIVENESS ATTITUDE QUESTIONNAIRE

Strongly Disagree	Disagree Somewhat	Neither Agree Nor Disagree	Agree Somewhat	Strongly Agree
SD	D	N	A	SA

ITEM	RESPONSE				
10. Perioperative staff should not be obligated to provide patient care in a cost-effective manner.	SD	D	N	A	SA
11. I look forward to learning more about cost-effectiveness in perioperative care.	SD	D	N	A	SA
12. Cost-effectiveness goes against the basic principles of good perioperative care.	SD	D	N	A	SA
13. The whole idea of cost-effectiveness in surgery upsets me.	SD	D	N	A	SA
14. Cost-effectiveness is bad for perioperative care.	SD	D	N	A	SA
15. I feel good when I save the hospital money.	SD	D	N	A	SA
16. I welcome the new emphasis on cost-effectiveness in perioperative care.	SD	D	N	A	SA
17. Cost-effectiveness programs only mean more work for perioperative staff.	SD	D	N	A	SA
18. Cost-effectiveness programs are a hassle for perioperative staff.	SD	D	N	A	SA
19. Learning more about cost-effectiveness will help me be a better perioperative staff member.	SD	D	N	A	SA
20. I fully agree with the need to improve cost-effectiveness in surgery.	SD	D	N	A	SA

Appendix B

REPROCESSING SINGLE-USE ITEMS ATTITUDE SCALE

Your completion of this questionnaire indicates your consent to participate in this study. Please respond to the following statements dealing with cost-effectiveness in perioperative care practices and procedures by indicating the extent to which you agree or disagree with each one. Complete the questionnaire as truthfully and honestly as possible. Do not spend time pondering over each question. Put down your first reaction and continue on to the next question. Please circle your response.

Strongly Disagree	Disagree Somewhat	Neither Agree Nor Disagree	Agree Somewhat	Strongly Agree
SD	D	N	A	SA

ITEM	RESPONSE
1. The reprocessing of single-use items will improve overall perioperative care effectiveness.	SD D N A SA
2. The introduction and use of reprocessed single-use items will benefit me personally.	SD D N A SA
3. Reprocessing of single-use items in order to make a profit is wrong.	SD D N A SA
4. I look forward to the introduction and use of reprocessed single-use items in surgery.	SD D N A SA
5. The introduction and use of reprocessed single-use items will result in a decrease in the quality of patient care.	SD D N A SA
6. The introduction and use reprocessed single-use items will benefit the surgical profession as a whole.	SD D N A SA
7. The introduction and use of "reprocessed single-use items" into perioperative care makes me uneasy.	SD D N A SA
8. Hospital surgical units should not be concerned with reprocessing of single-use items.	SD D N A SA
9. The introduction and use of reprocessed single-use items will benefit patients.	SD D N A SA

Appendix B (continued)

REPROCESSING SINGLE-USE ITEMS ATTITUDE SCALE

Strongly Disagree	Disagree Somewhat	Neither Agree Nor Disagree	Agree Somewhat	Strongly Agree
SD	D	N	A	SA

ITEM	RESPONSE
10. Perioperative staff should not be obligated to provide patient care with reprocessed single-use items.	SD D N A SA
11. I look forward to learning more about reprocessed single-use items in the perioperative environment.	SD D N A SA
12. Reprocessing of single-use items goes against the basic principles of good perioperative care.	SD D N A SA
13. The whole idea of reprocessed single-use items in surgery upsets me.	SD D N A SA
14. Reprocessing of single-use items is bad for perioperative care.	SD D N A SA
15. I feel good when I use reprocessed single-use items.	SD D N A SA
16. I welcome the new emphasis on reprocessed single-use items in the perioperative environment.	SD D N A SA
17. Reprocessing of single-use items only means more work for perioperative staff.	SD D N A SA
18. Reprocessed single-use items are a hassle for perioperative staff.	SD D N A SA
19. Learning more about reprocessed single-use items will help me be a better perioperative staff member.	SD D N A SA
20. I fully agree with the need to improve utilization of reprocessed single-use items in surgery.	SD D N A SA

Appendix C

BLANEY/HOBSON NURSING ATTITUDE SCALE

Participant #_____

Your completion of this questionnaire indicates your consent to participate in this study. Please respond to the following statements dealing with cost-effectiveness in nursing care practices and procedures by indicating the extent to which you agree or disagree with each one. Complete the questionnaire as truthfully and honestly as possible. Do not spend time pondering over each question. Put down your first reaction and continue on to the next question. Please circle your response.

Strongly Disagree	Disagree Somewhat	Neither Agree Nor Disagree	Agree Somewhat	Strongly Agree
SD	D	N	A	SA

ITEM	RESPONSE
1. The introduction and use of cost-effective practices and procedures will improve overall nursing effectiveness.	SD D N A SA
2. The introduction and use of cost-effective nursing practices and procedures will benefit me personally.	SD D N A SA
3. Operating a nursing unit in order to make a profit is wrong.	SD D N A SA
4. I look forward to the introduction and use of cost-effective nursing practices and procedures in nursing.	SD D N A SA
5. The introduction and use of cost-effective nursing practices and procedures will result in a decrease in the quality of patient care.	SD D N A SA
6. The introduction and use of cost-effective nursing practices and procedures will benefit the nursing profession as a whole.	SD D N A SA
7. The introduction and use of "cost-effectiveness" into nursing makes me uneasy.	SD D N A SA
8. Hospital nursing units should not be concerned with making or losing money.	SD D N A SA
9. The introduction and use of cost-effective nursing practices and procedures will benefit patients.	SD D N A SA

Appendix C (continued)

BLANEY/HOBSON NURSING ATTITUDE SCALE

Strongly Disagree	Disagree Somewhat	Neither Agree Nor Disagree	Agree Somewhat	Strongly Agree
SD	D	N	A	SA

ITEM	RESPONSE
10. Nurses should not be obligated to provide patient care in a cost-effective manner.	SD D N A SA
11. I look forward to learning more about cost-effectiveness in nursing.	SD D N A SA
12. Cost-effectiveness goes against the basic principles of good nursing.	SD D N A SA
13. The whole idea of cost-effectiveness in nursing upsets me.	SD D N A SA
14. Cost-effectiveness is bad for nursing.	SD D N A SA
15. I feel good when I save the hospital money.	SD D N A SA
16. I welcome the new emphasis on cost-effectiveness in nursing.	SD D N A SA
17. Cost-effectiveness programs only mean more work for nurses.	SD D N A SA
18. Cost-effectiveness programs are a hassle for nurses.	SD D N A SA
19. Learning more about cost-effectiveness will help me be a better nurse.	SD D N A SA
20. I fully agree with the need to improve cost-effectiveness in nursing.	SD D N A SA

Appendix D Participant #___ Code #__

DEMOGRAPHIC DATA

(All Responses are confidential, do not sign this or other documents)

1. Gender:

A. Male: ____
B. Female: ____

2. Age in Years: _____

3. Race or Ethnicity:

A. Caucasian ____
B. Hispanic ____
C. African American ____
D. Asian ____
E. Other (Please Specify) _____

4. Current Marital Status:

A. Never Married ____
B. Married ____
C. Divorced ____
D. Separated ____
E. Widowed ____

5. Do you have children?

A. Yes ____
B. No ____

6. Licensure:

A. RN ____
B. None____

7. Certifications (Check all that apply):

A. Certified Nurse Operating Room (CNOR)____
B. Certified Operating Room Technician ____
C. If certified specify year_____
D. Other (Please Specify) _____
E. None ____

8. <u>RNs</u> Highest Educational Preparation (Write in year on all that apply):

A. Diploma in Nursing -year 19_____
B. Associate Degree in Nursing -year 19_____
C. Bachelors in Nursing -year 19_____
D. Masters in Nursing -year 19_____
E. Other(s) Please Specify_____

DEMOGRAPHIC DATA (continued)

9. Technicians Educational Preparation (Write in year on all that apply):

A. Grade 11 or less_____
B. GED or High School Graduate -year 19_____
C. Associate Degree -year 19_____
D. Bachelors in _____ -year 19_____
E. Masters in _____ -year 19_____
F. Other(s) Please Specify_____

10. Technicians -Technical Training (Date of most recent training):

Technical Training -year 19_____

11. Technicians -Source of training (Check all that apply):

A. Military_____
B. Technical Training (specify source)_____
C. On the Job Training (OJT)_____
D. Other(s) Please Specify_____

12. Role:

A. **RN** _____
B. **Technician (unlicensed)**_____

13. RN Current job (position/duties 50% of the time or more):

A. RN Staff Nurse_____
B. RN Team Leader _____
C. RN Administration _____

14. Employment Status:

A. Civilian ____
B. Pool or Per Diem ____
C. Civilian Government Service ____
D. Contract Employee ____
E. Military ____

If Military:
Rank ____
AFSC or MOS _____
Duty Title _____

15. Employment Level:

A. Full-time _____
B. Part-time _____ Please estimate the number of hours/week _____
C. Pool or Per Diem _____ Please estimate the number of hours/week _____

DEMOGRAPHIC DATA (continued)

16. Are you assigned formal budget responsibilities?

A. YES_____
B. NO_____

17. Experience in years *(note: some answers may be the same)*:

A. In health care ____ years
B. At current level of practice (i.e. RN or Technician) ____ years
C. At current level of education ____ years
D. In the operating room____ years
E. At this hospital ____ years

18. Have you had cost-effectiveness training? If yes, answer all that apply:

A. YES____
B. NO____
If yes:
C. Formal Inservice (year)_____
D. In your perioperative training program (year)_____

19. Please estimate the percentage of occasions (when given the opportunity) **you** place a suitable reusable item in the collection receptacle _____% ***If not applicable to your role indicate N/A***

20. Estimate the percentage of occasions you have witnessed **other staff** members ***NOT*** placing a suitable reusable item in the collection receptacle (when given the opportunity) _____% ***If not applicable to your role indicate N/A***

21. What do you think **prevents you** from placing all suitable items in the appropriate collection receptacle? _____

_____

_____

_____

22. What do you think **prevents other staff** members from placing all suitable items in the appropriate collection receptacle? _____

_____

_____

_____

23. Do you have any comments regarding cost-effectiveness or reprocessing of single-use items?

_____

_____

_____

_____

Appendix E

University of Texas Health Science Center at San Antonio School of Nursing
University Hospital

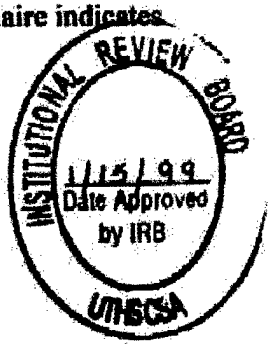
You are being asked to participate in a research survey of Perioperative Team Members' Attitudes Toward Cost-Effectiveness And Reuse Of Single-Use Items. This survey has been designed to establish the relationship between surgical team members' educational level, role, and level of experience with their attitudes toward cost-effectiveness in general, and specifically, reprocessing of single-use surgical supplies. You are being requested to take part in this study because you are a surgical team member.

Your decision to complete this survey is voluntary. Should you decide to participate, you will complete two twenty item surveys and a demographic questionnaire. The sacrifice of your time is the only reasonably expected inconvenience. This should take less than thirty minutes to complete. Complete the questionnaires as truthfully and honestly as possible. Do not spend time pondering over each question. Put down your first reaction and continue on to the next question. Answer the three survey sections in order and please avoid discussions of the content with other potential survey participants.

The potential benefit of participating in this study is to provide information that will provide insight into attitudes of perioperative staff members. There is no guarantee that you will benefit from participation. If you choose not to take part in this survey or decide to stop at any time, it will not impact your future employment in any way. You do not have to respond to any questions that you do not want to answer. The specific responses given will not be shared with your employer. Your name will not appear on the answer sheet and your responses are confidential. Do not sign this or any of the other instruments. If the results of the study are published in a scientific journal or book, you will not be identified in any way.

Mark A. Pistone BSN, RN, CNOR, the principal investigator, can be reached at (210) 543-1754. If you have any questions now, feel free to ask. If you have additional questions later, Mark A. Pistone can be reached at the phone number provided above. The University of Texas Health Science Center at San Antonio committee that reviews research with human subjects (Institutional Review Board) will answer any questions regarding your rights as a research subject. The Institutional Review Board's phone number is 567-2351.

This form is yours to keep. The return of and completion of this questionnaire indicates your consent to participate in this study.



Information Regarding a Study of Perioperative Team Members' Role and Educational Preparation on Cost-Effectiveness Attitudes

University of Texas Health Science Center at San Antonio School of Nursing
Wilford Hall Medical Center

You are being asked to participate in a research survey of Perioperative Team Members' Attitudes Toward Cost-Effectiveness And Reuse Of Single-Use Items. This survey has been designed to establish the relationship between surgical team members' educational level, role, and level of experience with their attitudes toward cost-effectiveness in general, and specifically, reprocessing of single-use surgical supplies. You are being requested to take part in this study because you are a surgical team member.

Your decision to complete this survey is voluntary. Should you decide to participate, you will complete two twenty item surveys and a demographic questionnaire. The sacrifice of your time is the only reasonably expected inconvenience. This should take less than thirty minutes to complete. Complete the questionnaires as truthfully and honestly as possible. Do not spend time pondering over each question. Put down your first reaction and continue on to the next question. Answer the three survey sections in order and please avoid discussions of the content with other potential survey participants.

The potential benefit of participating in this study is to provide information that will provide insight into attitudes of perioperative staff members. There is no guarantee that you will benefit from participation. If you choose not to take part in this survey or decide to stop at any time, it will not impact your future employment in any way. You do not have to respond to any questions that you do not want to answer. The specific responses given will not be shared with your employer. Your name will not appear on the answer sheet and your responses are confidential. Do not sign this or any of the other instruments. If the results of the study are published in a scientific journal or book, you will not be identified in any way.

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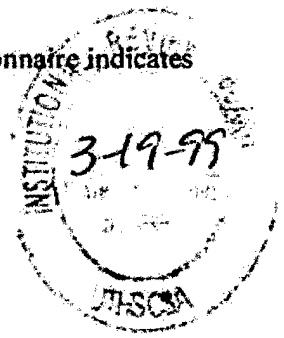


Information Regarding a Study of Perioperative Team Members' Role and Educational Preparation on Cost-Effectiveness Attitudes

University of Texas Health Science Center at San Antonio School of Nursing
Brooke Army Medical Center

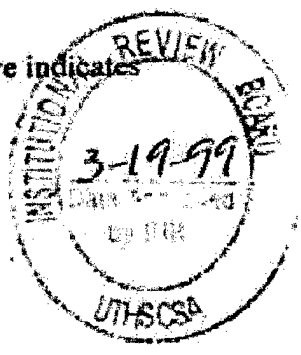
You are being asked to participate in a research survey of Perioperative Team Members' Attitudes Toward Cost-Effectiveness And Reuse Of Single-Use Items. This survey has been designed to establish the relationship between surgical team members' educational level, role, and level of experience with their attitudes toward cost-effectiveness in general, and specifically, reprocessing of single-use surgical supplies. You are being requested to take part in this study because you are a surgical team member.

Your decision to complete this survey is voluntary. Should you decide to participate, you will complete two twenty item surveys and a demographic questionnaire. The sacrifice of your time is the only reasonably expected inconvenience. This should take less than thirty minutes to complete. Complete the questionnaires as truthfully and honestly as possible. Do not spend time pondering over each question. Put down your first reaction and continue on to the next question. Answer the three survey sections in order and please avoid discussions of the content with other potential survey participants.

The potential benefit of participating in this study is to provide information that will provide insight into attitudes of perioperative staff members. There is no guarantee that you will benefit from participation. If you choose not to take part in this survey or decide to stop at any time, it will not impact your future employment in any way. You do not have to respond to any questions that you do not want to answer. The specific responses given will not be shared with your employer. Your name will not appear on the answer sheet and your responses are confidential. Do not sign this or any of the other instruments. If the results of the study are published in a scientific journal or book, you will not be identified in any way.

Mark A. Pistone BSN, RN, CNOR, the principal investigator, can be reached at (210) 543-1754. If you have any questions now, feel free to ask. If you have additional questions later, Mark A. Pistone can be reached at the phone number provided above. The University of Texas Health Science Center at San Antonio committee that reviews research with human subjects (Institutional Review Board) will answer any questions regarding your rights as a research subject. The Institutional Review Board's phone number is 567-2351.

This form is yours to keep. The return of and completion of this questionnaire indicates your consent to participate in this study.



Appendix F

Consent to Participate in a Pilot Study of Perioperative Team Members' Role and Educational Preparation on Cost-Effectiveness Attitudes

(Wilford Hall Medical Center)

You are being asked to participate in a research survey of Perioperative Team Members' Attitudes Toward Cost-Effectiveness And Reuse Of Single-Use Items. This survey has been designed to examine the relationship between surgical team members' educational level, role, and level of experience with their attitudes toward cost-effectiveness in general, and specifically, reprocessing of single-use surgical supplies. You are being requested to take part in this study because you are a surgical team member.

Your decision to participate in this pilot study and complete these surveys is voluntary. Should you decide to participate, you will complete three twenty-item surveys and a demographic questionnaire. You will be re-tested with the same or similar tools in two to four weeks. The sacrifice of your time is the only reasonably expected inconvenience. This should take less than thirty minutes to complete. Complete the questionnaires as truthfully and honestly as possible. Do not spend time pondering over each question. Put down your first reaction and continue on to the next question. Answer the three survey sections in order and please avoid discussions of the content with other potential survey participants.

The potential benefit of participating in this study is to provide information that will render insight into attitudes of perioperative staff members. There is no guarantee that you will benefit from participation. If you choose not to take part in this survey or decide to stop at any time, it will not impact your future employment in any way. Your name does not appear on the answer sheet and your responses are confidential. Do not sign this or any of the other instruments. If the results of the study are published in a scientific journal or book, you will not be identified in any way.

Mark A. Pistone CPT, USAF, NC, the principal investigator, can be reached at (210) 543-1754. If you have any questions now, feel free to ask. If you have additional questions later, Mark A. Pistone can be reached at the phone number provided above. The University of Texas Health Science Center at San Antonio committee that reviews research with human subjects (Institutional Review Board) will answer any questions regarding your rights as a research subject. The Institutional Review Board's phone number is 567-2351. This protocol has also been approved by the Wilford Hall Medical Center Institutional Review Board.

This form is yours to keep. To maintain your anonymity, no record of your name will be recorded. Therefore, you should keep this form as a record of your participant number, as you will need it for the retest. The return of and completion of this questionnaire packet indicates your consent to participate in this study.

VITAE

Mark A. Pistone was born on September 22, 1959 in Galveston, Texas. After graduating from high school in 1978, he enlisted in the United States Air Force (USAF) and served as a medical services specialist. During his initial tour of duty, he became certified as an emergency medical technician paramedic. He spent nearly eight years on active duty working in the emergency department of Wilford Hall Medical Center (WHMC), Lackland Air Force Base (AFB), Texas and at the Hyperbaric Medicine Division, Brooks AFB, Texas.

Mark joined the USAF Reserves at Kelly A.F.B., Texas while completing his Bachelor of Science in Nursing at the University of Texas, Health Science Center at San Antonio. He graduated *Cum Laude* in May 1988, and was commissioned by the USAF Nurse Corps. After completion of a nursing internship at Eglin AFB, Florida, His first assignment was at 48th Tactical Fighter Wing (TFW) Royal Air Force Lakenheath, United Kingdom, on the Surgical/Orthopedic Unit. Following that assignment he cross-trained at WHMC to become an operating room nurse and was assigned to March AFB, California, eventually becoming the General Surgery Team Chief. During this tour, Captain Pistone was temporarily stationed at Cairo West Air Base, Egypt, as the Officer in Charge Surgery/Central Sterile Supply. In 1994, he was transferred to Scott AFB, Illinois, and served as the Nurse Manager Surgical Orthopedics. In December, 1996, Captain Pistone was a Distinguished Graduate of the Flight Nurse Course, Brooks AFB, Texas.

Captain Pistone was selected by the Air Force Institute of Technology to obtain a Master of Science in Nursing with a perioperative focus. He was accepted by the University of Texas Health Science Center at San Antonio School of Nursing and began his studies in August of 1997. He is a member of the Association of Operating Room Nurses and is a Certified Nurse Operating Room (CNOR). Mark is a member of the Delta Alpha Chapter of Sigma Theta Tau International Honor Society of Nursing.

Captain Pistone is married to Susan Meyer Pistone and has two children Natalie Therese and Lucia Celeste.