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NURSING ATTITUDES TOWARD THE USE OF REPROCESSED
SINGLE-USE MEDICAL DEVICES

by

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A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in Nursing
in the College of Nursing
and in The Burnett Honors College
at the University of Central Florida
Orlando, Florida

Summer Term 2012

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ABSTRACT

Background: Before the implementation of single-use devices (SUD) in health care, medical equipment was sterilized and reused. Now many medical devices are used once and then thrown away, contributing to the 5.9 million tons of medical waste produced yearly. This project explores nursing attitudes toward single-use medical devices, evaluates current recycling practices and examines whether student nurses would be likely to use reprocessed SUDs in their practice if given the option.

Methodology: After obtaining IRB approval, students enrolled in nursing research courses were invited to participate in this exploratory study. 157 undergraduate nursing students completed the 46-question survey. Descriptive statistics were used to analyze the survey results, independent t-tests were used to compare groups and content analysis was used to analyze open-ended responses.

Results: The typical student was female, age 30, licensed as a registered nurse and enrolled in the RN to BSN program. Most students (84.7%) viewed themselves as environmentally conscious, and most recycle at home (75.5%) and at work (54.7%). Most agreed (96.8%) that hospitals produce a lot of hazardous waste and that it is the hospitals responsibility for environmentally friendly waste disposal. The majority also agreed (80%) that nurses have the ability to impact waste production at a hospital. More than half (67.7%) agreed that SUD disposal contributes to environmental pollution and many (76.6%) felt that nurses should be responsible for environmental health concepts.

Most (81.6%) felt that SUDs should be thrown out after one use and few (28.5%) felt that SUDs can be reused if sterilized. Most (74.0%) also believed that SUD reuse contributes to

hospital acquired infections, but a little more than half (56.3%) were willing to reuse a SUD that had only touched intact skin if sterilized for reuse. Additionally, most respondents (79.1%) would consider joining a “green team” at work.

Those who recycle at home were more likely to identify as environmentally conscious than those who do not recycle at home. No generational differences existed when considering environmental consciousness. Generation X was more likely to recycle at home than Generation Y, but no generational differences existed when analyzing work recycling habits. Generation X was also more likely to see single-use device disposal as contributing to environmental pollution than Generation Y. Home recyclers were more likely to agree that nurses have the ability to decrease the amount of hospital trash production, and more likely to join a green team than non-recyclers. They also believed that SUD disposal contributes to environmental pollution, SUDs can be reused if sterilized, and disagreed that SUD reuse contributes to hospital acquired infections when compared to those who do not recycle at home.

Discussion: While most students agree that hospitals produce large amounts of waste and should be responsible for the disposal of it in an environmentally friendly manner, most are hesitant to use reprocessed SUDs as a means to make the hospital more environmentally friendly. Student responses indicated the largest perceived barriers to SUD reuse were fears of inadequate sterilization and fears of the spread of disease.

Conclusions: Most students, especially home recyclers, believe themselves to be environmentally conscious and most were willing to consider reusing some SUDs. Translating this belief into action can happen through education in line with the Scope and Standards of practice for nursing, as well as establishing the safety of SUDs through further research.

This dissertation is dedicated to my husband, my family, and my friends.

To my husband, Nathan, thank you for all of your support. I love you for entertaining all my crazy ideas, including when I decided to return to school. Now it's your turn.

To Rusty, Ken and Cyndy, thanks family. Your constant encouragement kept me motivated throughout nursing school. From little notes in lunches you packed for me to corny text message jokes, your love for me is always evident.

To Christa, the most hippie momma I know. I am so fortunate to have you in my life and I'm blessed to be Carine's godmother. I can't wait to see how she grows up!

To friends I have made in the college of nursing, I would not have survived nursing school without you all. Thank you Pine Hills, and my P.O.E., and especially friends who have been my saving grace.

Thanks guys. I love you all. Lauri

ACKNOWLEDGEMENTS

I would like to acknowledge the Burnett Honors College for their guidance and assistance as I completed this project. Thank you for providing opportunities for research and learning.

I also acknowledge the faculty and staff at the College of Nursing for providing me with a superior nursing education. Thank you for helping me become a UCF nurse. I know I've learned from the best, and this is not CCDT.

I also am grateful to my committee members, Dr. Bernardo Ramirez, Dr. Linda Howe and Dr. Victoria Loerzel.

Dr. Ramirez, thank you for looking for sustainable and green health care systems. You have been a source of inspiration for me, knowing that others are looking to reduce waste in the system.

Dr. Howe, thank you for being willing to jump right in and help with my HIM project. I appreciate all the support and encouragement, and am glad to be called a national treasure. Your love for nursing, and for continuing education, is contagious.

Dr. Loerzel, thank you for helping me find a way to combine my passion for the environment with a new found passion for nursing. Thank you for going through countless revisions with me, and for helping me learn the art and science of nursing research. You were always available with words of encouragement and guidance that facilitated my understanding. I am grateful to have you as a professor and mentor.

Thank you.

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INTRODUCTION

Statement of the Problem

Florence Nightingale recognized the connection between creating a clean environment and enhancing human health. Her experience while caring for soldiers injured during the Crimean War transformed how medical care was delivered. With improved sanitary conditions, Nightingale discovered that patients were less likely to die as a result of infection. She identified clean air, clean water and general sanitation as necessary elements for a healthy environment (Maurer & Smith, 2009). This discovery became the foundation for modern nursing care.

In the years that followed, nurses and other health care staff maintained a sanitary environment through the wash and reuse of medical equipment. By soaking these instruments in disinfectants between uses, nurses and medical staff were able to sterilize the glass, metal and rubber components (Federal Drug Administration [FDA], 1999). These procedures allowed nurses to keep waste to a minimum while maintaining a sanitary care environment.

Practice regarding the reuse of medical equipment changed in 1948 when the first disposable single-use device (SUD) was developed for medical practice (Tinkham, 2010). Shortly after their introduction, SUDs comprised the majority of medical equipment used by nurses and other health care providers in the hospital setting. In addition, the demand for disposable medical equipment increased in the 1980s due to the emerging human immunodeficiency virus (H.I.V.) epidemic (Chen, 2010). Fears over inadequately sterilized equipment and erosion of equipment with reprocessing further increased the demand for SUDs,

and they became increasingly common in medical practice (Chen, 2010; FDA, 1999). Single-use devices represent a wide range of medical equipment used every day in health care. These include disposable stethoscopes, paper gowns, catheters, needles, drills, blades, biopsy needles, endoscopic/laparoscopic scissors, graspers, and surgical clamps. However, Healthcare without Harm (2001), an international coalition of hospitals, medical workers and other healthcare related agencies, states “manufacturers began to label certain medical products as ‘single-use’ rather than ‘reusable’ without significantly changing the product” (para. 28).

Today, nearly every item in the operating room, from drapes to clamps to scalpels, is discarded after use (Nussbaum, 2008, Tinkham, 2010). While SUDs were introduced to maximize sanitation, the result has been an increase in medical waste. Single-use devices make up a significant portion of the 5.9 million tons of waste generated by hospitals on an annual basis (Rastogi, 2010). Given that one ton of trash takes up approximately 4.5 cubic feet once compacted, hospitals in the United States would need 1.3 million cubic feet to contain their waste each year. This amount of waste could fill the 45,301-seat football stadium at the University of Central Florida one and a half times annually.

As the health care industry has moved away from a culture of washing and reusing medical equipment to one of spending money on single-use disposable items, hospitals can potentially detract from their communities’ clean air and water with the trash produced. Much of the waste created by hospitals is either incinerated, releasing dioxins and other carcinogenic toxins into the atmosphere, or sent to landfills, where it becomes a potential reservoir for infectious diseases (Forsyth, 2000). The amount of waste created by hospitals may be minimized through reevaluating the use of SUDs and through using reprocessed SUDs.

A Federal Drug Administration (FDA) survey conducted in 2002 noted that only 24% of US hospitals make use of reprocessed SUDs, with larger hospitals being half as likely to use them (FDA, 2002). As reprocessed SUDs cost 50% less than newly manufactured devices and benefit the environment by reducing hospital waste, different reasons exist for such a low rate of use (Metcalf, 2011). Hospitals that chose not to use reprocessed SUDs identified concerns about increased risk of infection, patient safety and legal liability for negative outcomes as reasons for their decision (Polisena, et al., 2008; FDA, 1999; Collier, 2011).

Studies conducted with data reported to the FDA regarding device related adverse effects have not drawn definitive conclusions about reprocessed SUD safety when compared to SUDs used for the first time (US Government Accountability Office, 2008). However, many nurses and doctors do not wish to use recycled devices in their own practice. The Center for Patient Advocacy, as cited by Tinkham (2010), states that more than 75% of nurses and doctors do not want to use a reprocessed medical device in their practice, as they believe it may cause an increased risk of infection or injury to the patient. Daniel Shultz, an employee of the FDA, in testimony given before Congress, stated that due to poor tracking within hospital facilities, it is not always possible to link the reprocessed SUD as the source of a patient's injury or infection (Tinkham, 2010; Shultz, 2006).

Additionally, the FDA released data demonstrating that reprocessed SUDs do not present any additional health risk, and that many hospitals in the United States are using them without adverse affects (United States Government Accountability Office, 2008). The perception among health care professionals appears to be that reprocessed single-use devices cause more injury or

infection than new single-use devices without sufficient evidence to support these concerns. This misperception is one of the largest barriers to the use of reprocessed single-use devices.

Using reprocessed single-use devices can reduce the environmental impact created by the health care industry as well as reduce the financial cost of providing quality health care. Hospitals nationwide are creating “green teams” to analyze and implement ways hospitals can become more environmentally friendly. The green teams are often nurse-lead as nurses are involved in nearly every hospital department (Mejia & Sattler, 2009). In 2009, a nurse at the University of Minnesota Medical Center Fairview collaborated with colleagues to identify extraneous items in operating room packs. By eliminating unused items from the operating room, the hospital was able to reduce their waste production by 7,800 pounds and save \$104,658 in a single year (Chen, 2010). Another hospital estimated a savings of \$5,000 in waste disposal costs, a reduction in greenhouse gas production of 34 metric tons, and a savings of 632 million BTUs of energy after implementing a hospital recycling program (Riedel, 2011). While exact data is not available for other hospital units, nurses working in a variety of specialties dispose of syringes, personal protective equipment, stethoscopes, catheters, bedpans, and water pitchers among other things on a daily basis, many of which can be reused or recycled once cleaned.

Despite evidence showing how reprocessed single-use devices are cost effective and safe, negative perceptions about their use still persist. Forming nurse led green teams are one way nurses can work to offer alternative views to these negative perceptions, but this must begin by identifying current attitudes towards the use of reprocessed single-use devices.

Identifying attitudes toward the use of reprocessed medical devices can help with predicting behavior regarding their use (Ajzen & Fishbein, 2005). Overcoming negative attitudes

toward the use of reprocessed single-use devices is one of the first steps toward creating a healthy environment.

PURPOSE OF STUDY

The purpose of this study is to examine undergraduate baccalaureate nursing student attitudes toward the use of reprocessed medical devices, evaluate their current recycling practices and whether they would be likely to use reprocessed SUDs in their future nursing practice.

Research Aims

1. Explore current recycling habits of students at home and work.
2. Explore beliefs related to recycling medical devices.
3. Explore students' comfort with reusing various medical devices.
4. Explore differences between groups of students based on age, gender, academic program, and environmental consciousness.
5. Explore relationships between demographic variables and current habits, beliefs, and comfort.

METHODS AND PROCEDURES

Design

This study used an exploratory, descriptive design. A survey developed by the investigators was made available through SurveyMonkey™ to nursing students enrolled in the core Nursing Research courses NUR 3165 and NUR 3167. The research was completed through the Honors in the Major program under the supervision of Dr. Loerzel.

Subjects

The subjects in the study were undergraduate Bachelor of Science nursing students enrolled in the core nursing research courses. Subjects were invited to participate in the study through an introductory letter (appendix A) posted in their online class delivered through Webcourses. The introductory letter informed students of the research being conducted and asked them to follow a link to the survey (appendix B) if they would like to participate. Upon completion of the survey, students were given 1 point of extra credit in their nursing research course.

Inclusion and Exclusion Criteria

Inclusion criteria: Participants in the study must be at least 18 years of age; an undergraduate nursing student; and currently enrolled in a nursing research course at the University of Central Florida.

Exclusion criteria: Students in the Master's program at the UCF College of Nursing.

Procedures

The study began by obtaining approval from the University of Central Florida's Institutional Review Board (appendix C). Permission was also obtained from the lead research course faculty, Dr. Victoria Loerzel, as well as from all professors teaching the course. Students were informed of the study on April 2, 2012 through an email sent by their course instructor. The email contained an introductory letter that provided a link to an online survey (SurveyMonkey™). The survey was kept open for a two-week period. Consent was implied if they completed the survey. Participants were free to withdraw from the survey at any point.

Since participation was tied to an extra credit point, students were asked to create unique identification number that was given to the instructors after the survey. This unique identifier verified participation in the study so the extra credit point could be awarded. An alternative assignment was provided for students to earn an extra point if they chose not to participate in the study. The researcher never had access to student names or grades. Course instructors did not have access to any students' individual answers on the survey.

All information collected from the online survey was kept confidential, and no identifying data was collected. Data from Survey Monkey™ was downloaded into an Excel™ file and uploaded into SPSS statistical software. Data was kept in a password protected file on the PI's laptop.

Instruments

This study used a 46 question, investigator developed survey designed to explore recycling habits of students, examine attitudes toward reprocessed SUDs and evaluate whether they would be likely to use them in their future practice (see appendix B). This survey used a

combination of categorical items, likert type scale questions, yes/no questions, and open-ended responses.

Six questions obtained demographic information. Four questions asked students about their recycling habits at home and work. Three questions asked for students' opinion on hospital waste, another question on whether nurses should be familiar with environmental health concepts. Two questions asked whether student nurses had the ability to impact waste produced by a hospital. Two questions examined opinions about reprocessed device use. Three questions evaluated students' likelihood to use a reprocessed device. A series of 22 questions examined comfort with reusing specific single-use devices. One question addressed whether or not a student would join a green team, another on how environmental consciousness and one asking for any further comments.

This survey was pilot tested with a group of basic undergraduate nursing students, n=5, who were not eligible to take the survey. The pilot testers were asked to take the survey and provide feedback on its clarity. They stated they were able to understand the questions. However, the question regarding reusing specific SUDs was clarified to indicate that each item has been reprocessed for reuse.

Given that the study used an investigator-developed survey, item analyses were conducted to explore the internal consistency of those items that utilized a likert type set of response options. Initial analyses suggested that the 13 items using these response options appeared to measure a variety of distinct constructs, not a single construct. Hence, the internal consistency for two subgroups of items designed to measure two different constructs was examined. Results indicated that three items assessing comfort with recycling items based on

skin/no skin penetration formed a scale with good internal consistency (Cronbach's $\alpha = .84$). Five items that assessed recycling of hospital waste and responsibility for waste items formed a scale with acceptable internal consistency (Cronbach's $\alpha = .63$). The remaining 5 items were treated as single item measures of beliefs about using single-use medical devices once, if they can be reused if sterilized, if reuse would contribute to hospital acquired infections, impact of single-use devices on environmental pollution and consideration of joining a "green team" in the workplace.

Data Analysis

This study used descriptive statistics to answer the research questions. Frequencies and percent's were run on all variables. Variables were explored for ways to create summation scores for use in analysis. Comparisons between groups were analyzed using cross-tab analysis, chi squared, mean comparisons and ANOVA tables, and independent t-tests. A statistician was consulted to assist with the analysis of data.

FINDINGS

Sample Characteristics

Nursing students in the University of Central Florida baccalaureate program enrolled in the core nursing research course were invited to participate in the survey. Of 264 enrolled students, 157 completed the survey. It is unknown how many students opted to complete the alternative assignment or why 107 students chose not to participate in the study since students self-selected and were not required to provide an explanation to the researcher.

Demographic information

The sample was mostly female (91.1%, n=143), licensed registered nurses (76.4%, n=120), enrolled in the RN to BSN program (72.6%, n=114), and more than half were under the age of 30 (56.4%, n=88). The mean age of those surveyed was 32.1 years. The majority of students also reported that they consider themselves very much or somewhat environmentally conscious (84.7%, n=133).

For this study, age was further separated into generation, and generation categories were used to make comparisons. For this study, Generation Y was defined as students 30 years old and younger and Generation X was defined as students 31 years and older. Although 7 students were over the age of 50, placing them in the Baby Boomer generation, they were included in Generation X as they were too small a group to be considered separately.

Research aim 1: Recycling habits of students at home and work.

The majority of students reported recycling at home (75.5%, n=120) and work (54.7%, n=87). Plastics, paper, aluminum cans and glass were the items most frequently recycled at home. Table 1 provides the items students reported recycling at home.

Students who recycled at work reported recycling plastics, aluminum cans, paper, newspaper, magazines, Styrofoam, batteries, ink cartridges, cardboard boxes, blood pressure cuffs, pulse oximeters, medical equipment, and sharps. Table 2 provides a list of the items students reported recycling at work.

Table 1: Items recycled at home (n=120).		
Plastics	n=110	24.0%
Paper	n=81	17.7%
Aluminum cans	n=79	17.2%
Glass	n=76	16.6%
Tin cans	n=42	9.2%
Styrofoam	n=21	4.6%
Cardboard	n=21	4.6%
Electronics	n=10	2.2%
Oil or chemicals	n=5	1.1%
Batteries	n=4	0.9%
Clothing	n=4	0.9%
Compost	n=3	0.7%
Light bulbs	n=2	0.4%

Table 2: Items recycled at work (n=87).		
Aluminum cans	n=50	26.7%
Plastics	n=46	24.6%
Paper	n=45	24.0%
Medical Equipment	n=17	9.1%
Glass	n=12	6.4%
Pulse Oximeters	n=5	2.7%
Styrofoam	n=2	1.1%
Cardboard	n=2	1.1%
Ink cartridges	n=2	1.1%
Batteries	n=2	1.1%
Tin cans	n=1	0.5%
Blood Pressure Cuff	n=1	0.5%
Staples	n=1	0.5%
Sharps	n=1	0.5%

Research aim 2: Explore beliefs related to recycling medical devices.

Students were asked questions regarding their opinions on hospital waste, responsibility for waste disposal, and whether medical device disposal contributed towards environmental

pollution. They were also asked whether nurses can impact hospital waste production and whether nurses were responsible for environmental health concepts.

Most students (96.8%) agreed or strongly agreed that hospitals create a lot of hazardous waste. Most students (96.8%) also agreed that it is the hospitals responsibility to ensure that the waste is properly disposed of in an environmentally friendly way. Most students agreed or strongly agreed that nurses can impact the amount of trash produced by a hospital: 80.3% agreed or strongly agreed that nurses can *increase* the amount of trash produced and 79.7% agreed or strongly agreed that nurses can *decrease* the amount of trash produced. The majority of students (76.6%) also agreed or strongly agreed that nurses are responsible for having knowledge of environmental health concepts. Most students (67.7%) also agreed or strongly agreed that single-use device disposal contributes to environmental pollution. Table 3 lists student nurses' beliefs towards waste creation, waste disposal, and environmental health concepts.

Table 3: Beliefs toward waste creation, disposal and environmental health concepts (n=158).

	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
Hospitals generate a lot of hazardous waste.	65.2% (n=103)	31.6% (n=50)	2.5% (n=4)	0.6% (n=1)	0.0% (n=0)
It is the hospital's responsibility to ensure their waste is disposed of in a manner that is environmentally beneficial.	76.6% (n=121)	20.3% (n=32)	1.9% (n=3)	1.3% (n=2)	0.0% (n=0)
Nurses have the ability to increase the amount of trash produced by a hospital.	35.4% (n=56)	44.9% (n=71)	14.6% (n=23)	3.8% (n=6)	1.3% (n=2)
Nurses have the ability to decrease the amount of trash produced by a hospital.	31.6% (n=50)	48.1% (n=76)	13.3% (n=21)	5.7% (n=9)	1.3% (n=2)
Nurses are responsible for environmental health concepts.	27.2% (n=43)	49.4% (n=78)	15.2% (n=24)	7.6% (n=12)	0.6% (n=1)
Disposing of single-use devices contributes to environmental pollution.	23.4% (n=37)	44.3% (n=70)	22.2% (n=35)	8.9% (n=14)	1.3% (n=2)

Students were also asked questions about their attitudes regarding the reuse of single-use medical devices. The majority of students (81.6%) believed that single-use medical devices should only be used once. Few students (28.5%) agreed or strongly agreed that single-use devices can be reused if sterilized. Most (74.0%) agreed or strongly agreed that single-use device reuse contributes to hospital-acquired infections. Table 4 lists responses to survey questions regarding attitudes toward single-use device reuse.

Table 4: Attitudes regarding single-use device reuse (n=158).

	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
Single-use medical devices should be used only once.	52.5% (n=83)	29.1% (n=46)	10.8% (n=17)	5.7% (n=9)	1.9% (n=3)
Single-use medical devices can be reused if properly sterilized.	10.1% (n=16)	18.4% (n=29)	19.6% (n=31)	27.2% (n=43)	24.7% (n=39)
Reusing single-use medical devices contributes to hospital-acquired infections.	35.4% (n=56)	38.6% (n=61)	18.4% (n=29)	7.0% (n=11)	0.6% (n=1)

Most students (79.1%) also reported that they would be willing to join a green team at their work place. A green team was defined as a group that works to make a hospital more environmentally friendly.

Research aim 3: Student comfort with reusing medical devices.

The survey asked questions designed to find out if students would consider reusing certain single-use devices if sterilized for reuse. Students were asked if they would be willing to reuse single-use medical devices in different categories: items that had only come in contact with the skin, items that had touched mucous membranes and items that had penetrated the skin.

Few (14.8%) agreed or strongly agreed that they would reuse an item that had penetrated the skin. Few also (24.7%) agreed or strongly agreed that they would reuse an item that had contacted mucous membranes. However, more than half (56.3%) agreed or strongly agreed that they would reuse a single-use device that had only touched intact skin. See Table 5 for details.

Table 5: Likelihood of reusing single-use devices by category (n=158).

	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
I would consider reusing single-use devices that have penetrated the skin if sterilized before reuse.	4.4% (n=7)	10.4% (n=17)	13.3% (n=21)	31.0% (n=49)	40.5% (n=64)
I would consider reusing single-use devices that have come into contact with mucous membranes but have not penetrated the skin- if sterilized before reuse.	6.3% (n=10)	18.4% (n=29)	13.3% (n=21)	26.6% (n=42)	35.4% (n=56)
I would consider reusing single-use devices that have only been in contact with intact skin if sterilized before reuse.	19.0% (n=30)	37.3% (n=59)	14.6% (n=23)	12.7% (n=20)	16.5% (n=26)

Students were then asked if they would reuse certain specific single-use medical devices if they were sterilized for reuse. Students responded more often responded yes to sterilized items that have only contacted the skin including stethoscopes (95.5%), pulse oximeters (93.0%), blood pressure cuffs (93.0%) and water pitchers (66.9%). Students were less likely to reuse a medical device if it was perceived as more invasive, but sterilized. Few students were willing to reuse hypodermic needles (5.7%), catheter needles (6.4%), or blood lancets (7.0%). A complete list of student responses can be found in Table 6.

Table 6: Willingness to reuse specific single-use devices.

		Yes		No	
<i>Items contacting intact skin</i>	Stethoscope	95.5%	(n=150)	4.5%	(n=7)
	Pulse oximeter	93.0%	(n=147)	7.0%	(n=11)
	Blood pressure cuffs	93.0%	(n=147)	7.0%	(n=11)
	Sequential compression devices	82.5%	(n=130)	17.5%	(n=28)
	Water pitcher	66.9%	(n=105)	33.1%	(n=52)
	Bed pan	51.0%	(n=81)	49.0%	(n=77)
	Emesis basin	51.0%	(n=81)	49.0%	(n=77)
	Protective gowns (PPE)	47.8%	(n=75)	52.2%	(n=82)
	Syringe	17.8%	(n=28)	82.2%	(n=129)
<i>Items contacting mucous membranes</i>	Oxygen masks	47.5%	(n=75)	52.5%	(n=84)
	Suture removal kit	43.9%	(n=69)	56.1%	(n=89)
	GYN speculum	36.0%	(n=57)	64.0%	(n=102)
	Nasal catheters/cannulas	29.9%	(n=47)	70.1%	(n=110)
	Thermometer covers	24.2%	(n=38)	75.8%	(n=119)
	Suction catheter	17.8%	(n=28)	82.2%	(n=129)
	Nasogastric tubes	14.0%	(n=22)	86.0%	(n=135)
	Tracheal tube	12.1%	(n=19)	87.9%	(n=138)
	Straight catheter	8.9%	(n=14)	91.1%	(n=143)
<i>Items penetrating the skin</i>	Foley catheter	7.0%	(n=11)	93.6%	(n=147)
	Blood lancets	7.0%	(n=11)	93.0%	(n=146)
	Catheter needles	6.4%	(n=10)	93.6%	(n=147)
	Hypodermic needle	5.7%	(n=9)	94.3%	(n=148)

Research aim 4. Explore differences between groups of students based on age, gender, academic program, and their environmental consciousness.

One aim of this project was to explore statistical differences between groups based on demographic variables, including age, gender, program of study, or current licensing and environmental consciousness. However, these planned comparisons could not be done due to unequal group sizes. Group comparisons that could be made involved individuals varying in generation (age) and those who did and did not recycle at home and at work.

Most students (84.7%) considered themselves somewhat or very environmentally conscious. Mean scores of environmental consciousness were compared for the different generation (X and Y) and home recycling (Yes/No). No differences existed between generations

when students were asked whether they consider themselves environmentally conscious. As a higher mean score indicated higher environmental consciousness, Generation X (mean=3.03; s.d.=0.521) and Generation Y (mean=2.91; s.d.=0.631) viewed themselves equally environmentally conscious ($t(153) = -1.263$; $p=0.209$). However, people who recycled at home reported being more environmentally conscious (mean=3.10; s.d. = 0.460) than those who did not recycle at home (mean=2.54; s.d. = 0.720; $t(155)=-5.693$, $p \leq 0.001$).

Research aim 5. Explore correlations between demographic variables and current habits, beliefs, and comfort.

Another aim of this project was to analyze relationships and associations between demographic variables such as age, gender, program of study or licensing and current recycling habits, beliefs about and comfort using reprocessed single-use devices. Chi squared and correlation analysis were conducted to assess these relationships and associations between home recycling habits, generation, and beliefs and comfort with single-use devices.

A two-way contingency table was conducted to evaluate if recycling at home and work differed between age generation. Generation and recycling at home were found to be significantly associated ($\chi^2(1, n=155)=4.791$, $p = 0.029$). Generation X (Give %) was more likely to recycle at home than Generation Y (give %). There was no association between generation and recycling at work($\chi^2(1, n=155)=0.050$, $p = 0.822$). Both generations were just as likely to recycle at work.

While more non-recyclers were found to be in Generation Y, Generation X and Y did not differ with respect to intention to recycle items ($t(153)= -1.253$, $p=0.125$). Subjects in Generation

X were willing to reuse an average of 9.30 items (s.d.=5.164), and subjects in Generation Y were willing to reuse 8.05 items (s.d.=4.982). However, there were statistical differences in means between those who recycle at home and those who do not when the researchers examined the number of single-use devices students would consider reusing. Subjects who recycled at home reported a willingness to use an average of 9.29 items (s.d. = 4.121) compared to 6.41 items (s.d. = 5.128) reported by people who do not recycle at home ($t(155) = -3.180, p=0.002$).

Several items regarding attitudes and beliefs toward waste and single-use device reuse were examined by comparing mean and median values between those who recycled at home and those who did not. A higher mean score indicated a stronger agreement with a statement. Statistical significance was determined with the t statistic and is reported in Table 7. In summary, students who recycle at home agreed more strongly that nurses have the ability to decrease the amount of trash produced by a hospital and that disposing of single-use devices contributes to environmental pollution than students who do not recycle at home. Home recyclers agreed more strongly that single-use devices can be reused if properly sterilized and disagreed more strongly that reusing medical devices contributes to hospital acquired infections. They were also more willing to consider the reuse of a device that has penetrated the skin and expressed a greater intention to join a green team. Mean values and statistical significance are listed in Table 7.

Attitudes and beliefs toward waste production and single-use device reuse were examined by comparing mean and median values between Generation X and Generation Y. No statistical differences existed between generations except with regard to beliefs about the impact of single-use device disposal on environmental pollution. When asked whether disposing of single-use devices contributes to environmental pollution and with a higher mean score indicating a

stronger agreement, Generation X agreed more strongly (mean=4.03, s.d.= 0.953) than Generation Y (mean=3.66, s.d=0.883) that disposing of SUD contributed to environmental pollution ($p = 0.013$).

Table 7: Beliefs and attitudes towards waste/ SUD reuse for those who do and do not recycle at home.

	Recycles at home: (n=119)		Does not recycle at home: (n=39)		t- statistic	Significance
	Mean (standard deviation)	Median	Mean (standard deviation)	Median		
Belief questions:						
Hospitals generate a lot of hazardous waste.	4.64 (0.563)	5.00	4.54 (0.600)	5.00	0.899	0.344
It is the hospital's responsibility to ensure their waste is disposed of in a manner that is environmentally friendly.	4.76 (0.499)	5.00	4.59 (0.715)	5.00	2.872	0.920
Nurses have the ability to increase the amount of trash produced by a hospital.	4.16 (0.823)	4.00	3.90 (0.995)	4.00	2.680	0.104
Nurses have the ability to decrease the amount of trash produced by a hospital.	4.12 (0.815)	4.00	3.77 (1.063)	4.00	4.587	0.034
Nurses are responsible for environmental health concepts.	3.99 (0.888)	4.00	3.82 (0.855)	4.00	1.093	0.297
Disposing of single-use devices contributes to environmental pollution.	3.88 (0.875)	4.00	3.54 (1.097)	4.00	3.983	0.048
Attitude questions:						
Single-use medical devices should be used only once.	4.14 (1.044)	4.00	4.56 (0.718)	5.00	5.488	0.020
Single-use medical devices can be reused if properly sterilized.	2.81 (1.336)	3.00	2.05 (1.050)	2.00	10.359	0.002
Reusing single-use medical devices contributes to hospital-acquired infections.	3.85 (0.997)	4.00	4.46 (0.555)	4.00	13.342	0.000

	Recycles at home: (n=119)		Does not recycle at home: (n=39)		t- statistic	Significance
	Mean (standard deviation)	Median	Mean (standard deviation)	Median		
Willingness to join a green team:						
I would consider joining or creating a "green team" in my work place.	4.14 (0.751)	4.00	3.62 (1.067)	4.00	11.611	0.001
Willingness to reuse SUD by category:						
I would consider reusing single-use devices that have penetrated the skin if sterilized before reuse.	2.20 (1.190)	2.00	1.69 (1.030)	1.00	5.731	0.018
I would consider reusing single-use devices that have come into contact with mucous membranes but have not penetrated the skin if sterilized before reuse.	2.44 (1.313)	2.00	2.03 (1.224)	2.00	2.979	0.086
I would consider reusing single-use devices that have only been in contact with intact skin if sterilized before reuse.	3.38 (1.392)	4.00	3.05 (1.450)	3.00	1.713	0.193

Student responses regarding reprocessed medical devices

Students were also asked for any comments they might have about the use of reprocessed medical devices. The biggest concern brought up by students was the risk of spreading disease or contributing to a hospital-acquired infection due to a potentially ineffective sterilization process. Reuse of something labeled for single-use was also a concern. Responses indicated that students felt either the device could not be sterilized sufficiently for a second use or that the product was not made to withstand sterilization. Comments were also made that indicated students would like to reuse devices and reduce waste in the workplace, but do not know how to get started.

Table 8: Open-ended Question Responses.

	Sample Responses
Contribute to infections	"There are too many bugs in the community to consider reusing devices."
	"I would be extremely worried about spreading infectious or the device getting worn out since it was only made for a one time use."
	"While the thought of being able to recycle items so they do not end up in a landfill sounds great on paper, seeing the aftermath of a used bedpan, foley catheter, emesis basin, etc. does not seem hygienic to be used on multiple persons. The spread of disease is a definite factor in my viewpoint as well."
	"It would be great to reuse devices to be environmentally conscious. However, it is not worth it if we are risking an increase in the incidence of hospital acquired infections. Also, because we, as nurses, will be responsible for recycling these materials, it seems like we would be at greater risk of exposure to pathogens before they get sterilized. For example, messing with a needle after sticking a patient so it can be reused may lead to more nurses getting needle sticks...."
Rule Following	"I'm reluctant to reuse things that have come into contact with bodily fluids just out of 'feeling yucky.'"
	"I think that if we consider the reuse of single-use devices, it should be with the same patient only."
	"Single-use items are designed as single-use for a purpose. I'd prefer to use them once, regardless of environmental hazards."
Sterilization concerns	"Single-use devices should be disposed of per protocol after each use."
	"I would need to have extreme confidence in the sterilization process in order to not just agree but strongly agree with this action."
	"I'm all for sterilizing and reusing nonporous products, such as metal scissors and Kelly clamps. However, I don't think that porous materials, such as plastic tubing, should be reused. I don't think that I would trust that those items could be fully sterilized."
	"I have no problem with reuse of any device assuming it can be sterilized effectively."
	"I feel like reuse of metal equipment is easier to be sterilized than plastic would be. Plastic is so easily manipulated that the slightest bend may prevent from proper sterilization and could promote hospital-acquired infections."
	"The materials used for the devices in question dictate my feelings."

Plastics and vinyls give me pause.”

“I remember the “old fashioned” steel bedpans and reusable glass syringes. The bedpans made sense, but I don’t think I want to revisit reusable syringes.”

“Since some of the people we, as nurses, take care of are very ill, who can guarantee us that the sterilization procedure will completely get rid of all the infectious agents on medical equipment.”

Receptive to reuse

“Philosophically, I’m totally on board here; however, I imagine that confronting fears/ buy-in at this level may be a major obstacle to this endeavor.”

“I always feel so guilty throwing so much away but I’ve never been given a choice.”

“I personally think that it would be a great idea. Hospitals are responsible for creating so much unneeded waste. I feel that they should be responsible for making ‘reduce, reuse, recycle’ part of their motto.”

DISCUSSION OF FINDINGS

This exploratory study appears to be unique in that it examined attitudes and beliefs toward SUDs and explored students' comfort with SUD reuse. This study also identified perceived barriers to SUD reuse. Information obtained from this survey can be used as a launching point to explore ways for hospitals to reduce waste through reprocessing medical devices, based on students' comfort with reuse of certain items.

Research aim 1: Recycling habits of students at home and work.

Most students surveyed recycle both at home and at work. It was surprising to see that only slightly more than half of the respondents recycled at work, especially since the majority reported being a licensed registered nurse and in the RN to BSN program, implying they are

currently working as nurses. This suggests that they are practicing nurses. It was also interesting to see that the items recycled at work were very similar to the items recycled at home. This could indicate limited options for recycling in the workplace.

Research aim 2: Explore beliefs related to recycling medical devices.

Most students believed that hospitals generate a lot of waste and that SUD disposal contributes to environmental pollution, but also that nurses have the ability to impact waste production. They also believed that nurses should be responsible for environmental health concepts. This suggests that students have a general awareness of the issue of hospital waste and environmental pollution. However, nearly a quarter of those surveyed were unsure or disagreed with this statement. The American Nurses' Association (ANA) includes environmental health as one of the scope and standards of practice including "attaining knowledge of environmental health concepts, such as implementation of environmental health strategies" (ANA, 2010, p. 61). In order for all student nurses to agree or strongly agree that environmental health concepts are within the scope of practice for nursing, more education is needed.

Most students also believed that single-use devices should only be used once, that they cannot be reused if sterilized, and that their reuse contributes to hospital acquired infections. So while students have an awareness of pollution and waste, there is a reluctance to use SUDs as a means to reduce hospital waste. This is not surprising as the literature review revealed that most doctors and nurses would not want to use reprocessed medical devices in their own practice due to concern about safety and infection (Tinkham, 2010). Student responses mirrored this concern for patient safety and infection with SUD reuse.

Research aim 3: Student comfort with reusing medical devices.

Students felt more comfortable thinking about reusing items that have only touched intact skin, and felt less comfortable thinking about reusing items perceived as more invasive.

Comments provided by students indicated that they felt uncomfortable with the sanitation process for single-use devices and were uncertain as to whether these devices could be adequately sterilized.

Some research has been done on non-invasive single-use devices such as plastic bath basins to determine if they can be sterilized for reuse. A quasi-experimental study done at Baylor Regional Medical Center looked at patients' plastic bath basins as a potential reservoir for bacterial colonization and risk factor for the transmission of hospital acquired infections (Denke, et al, 2012). Plastic basins were tested for bacterial growth after use: before cleaning, 60% of the samples had no bacterial growth and 40% of the samples had bacterial growth including *S.aureus*, bacilli, and streptococci. After wiping the bath basins with a germicidal wipe, only 2% of the basins had bacterial growth with bacilli. The researchers concluded that germicidal wipes were an effective means to clean plastic bath basins to limit bacterial growth, even if the patients had a previous history of a MRSA or VRE infection (Denke, et al, 2012). If nurses are confident that plastic single-use personal care items, including water pitchers, bedpans, bath basins, or emesis basins, have been adequately sterilized for reuse, then perhaps they would be willing to use these items in their nursing care.

In addition to plastic basin reuse, personal protective equipment (PPE) is another item that can be reused. In the local area, one large hospital chain uses disposable PPE, while the

other large hospital chain uses reusable PPE. Approximately half the students surveyed were willing to reuse PPE while the other half were not. While it is unknown which hospital chains the respondents work for, perhaps half the students felt it is acceptable to reuse PPE because this is what is in practice already at their hospital. But, again, PPE is another item that can be easily reused when sterilized, thus reducing waste.

Another positive effect of reusing certain medical items is cost effectiveness. Some nurses have been observed getting a new bedpan daily for their patients, but by reusing bedpans, hospitals can save money on purchasing costs and on disposal costs. The cost of a bedpan at a regional hospital is approximately \$1.00, and estimating that one bedpan is used per patient day, this is approximately \$570,000 spent on bedpans (AHA, 2012). This cost is then billed to patients as admission kits. The cost of disposing of the bedpans is \$0.04 per pound, making the annual cost of bedpan disposal \$5,700 (Brannen, 2007). If bedpan usage were reduced to one per every other patient day through sterilization and reuse, this would represent a \$285,000 savings in purchasing costs, which could be passed onto lower the cost of care for patients.

Research aim 4. Explore differences between groups of students based on age, gender, academic program, and environmental consciousness.

While most differences between demographic variables could not be explored, those who reported recycling at home were more likely to perceive themselves as being environmentally conscious. Even though Generation Y is less likely to recycle at home than Generation X, no generational differences were found in the respondents' perception of environmental consciousness. This is significant because nurses who consider themselves as environmentally

conscious may be more likely to be involved in a "green team" and look for ways hospitals can reduce waste.

Research aim 5. Explore correlations between demographic variables and current habits, beliefs, and comfort.

While younger students, those in Generation Y, were less likely to recycle at home, no differences among generations existed when analyzing recycling habits at work. This could be because younger students may not have easy access to recycling. Younger students may be more likely to live in apartment complexes that may not provide recycling. Other student research undertaken at the University of Central Florida suggests that there is a relationship between environmental messaging and behavior: students were more likely to recycle in public than recycle at home if those students thought environmental messaging was excessive (Griffin, 2011).

Younger students were also less likely to see single-use device disposal as a source of environmental pollution but no differences existed between generations with regard to the number of single-use devices they were willing to reuse at work. This supports Griffin's (2011) claim that UCF students are more likely to recycle in public than in private, perhaps due to peer pressure or saving face in public.

Students who recycled at home were also more willing to consider reusing a medical device, regardless of the level of skin penetration, than students who do not recycle at home. Home-recyclers are also more likely to believe that medical devices can be reused if sterilized and disagree that reuse contributes to hospital acquired infections. This suggests that home

recycling habits can be an indicator of intention to reuse single-use device among student nurses. Home recyclers may have a greater awareness of and are more invested in the environmental issues. This would be an asset for hospitals looking to become more “green,” but barriers do exist for hospitals looking to reuse SUDs as a means to become more environmentally friendly. The safety of reprocessed SUDs would need to be established before nurses would consider using them in practice.

LIMITATIONS

This study had several limitations. First, this study used a convenience sample, which may not adequately represent student nurses outside of the local area. Some demographic groups were underrepresented in this study including males and non-licensed student nurses. The small convenience sample and underrepresentation of certain segments of the population limit the generalizability of this study. Second, most of the demographic variables could not be grouped as planned for comparison due to small group sizes. This limited the extent of the analyses possible. However, other groups such as groups based on generation and recycler/not recycler provided interesting insights to the overall study. Third, some of the key concepts in the study were never defined for the respondents. The terms “waste” and “environmental consciousness” were left for the respondents to interpret for themselves. This could have led to respondent confusion about the meaning of some items. More testing of the investigator developed survey is warranted for future studies.

NURSING IMPLICATIONS

This study, which appears to be the first of its kind, has several indications for practice and research. For practice, this study demonstrates nurses have an awareness of their actions regarding hospital waste and the need for changes. It also indicates specific items (equipment that has not broken through the skin) that nurses may be more receptive to reusing in order to start making changes that have an impact on the environment and reduce waste. Nurses should be made aware of the waste within their own daily practice and be encouraged to find ways to limit that waste, starting with items that can be decontaminated or cleaned out for additional use (Denke et al, 2012) or given to the patient to take home. For example, water pitchers or bath basins can be given to patients to take home instead of disposed of at the hospital. Nurses can also think about how to improve recycling at work of everyday items, such as plastic bottles and paper, and become more involved in programs or “green teams” to generate awareness and interest in reuse and recycling of medical equipment. In addition, environmentally friendly changes in a hospital may begin with encouraging staff to begin recycling at home. Changes in habits at home can lead to changes in habits at work.

For research, one of the fears nurses and other medical professionals have mentioned as a barrier to reusing equipment is the risk for infection. Although the spread of infectious disease is a real risk, more studies need to be conducted to determine the actual instead of the perceived risk for infection. Currently disposable equipment may contribute to the spread of disease as landfills become potential reservoirs for bacteria (Forsyth, 2000). Researchers should also evaluate the impact of SUD disposal. Hopefully, these studies can be used to support reuse and recycling, and reduce the burden of hospital waste on the environment.

In education, most importantly, broader environmental education is needed that encourages recycling both at home and at work. Environmental health education is needed focusing on environmental pollution, hospital waste management, as well as general environmental health concepts in line with the Scope and Standards of Nursing practice. Continuing education programs can be developed and incorporated in to hospital training to increase environmental awareness.

SUMMARY

Hospitals create 5.9 million tons of trash per year, greatly contributing to landfill waste. Single-use devices make up a significant portion of this waste and their reuse can potentially help reduce landfill waste. Students in this study felt that hospitals should be responsible for ensuring that their waste is disposed of in an environmentally friendly way. Students believed that nurses can contribute to this by decreasing waste production, but are hesitant about single-use device reuse. Differences in comfort with single-use device reuse existed between generation and between those who recycle at home. Generation X and home recyclers in general felt more comfortable with using reprocessed medical devices. Environmental health education can help bring positive green changes to the hospital workplace.

APPENDIX A: INDRODUCTORY LETTER

APPENDIX A
INDRODUCTORY LETTER

April 2012

Dear student,

My name is Laura Maben-Tenney and I am a BSN student in the UCF College of Nursing. I am conducting a research study to examine the attitudes student nurses have regarding the use of recycled medical devices. This research is being conducted under the supervision of Dr. Victoria Loerzel. You are being asked to participate in this research study since you are a student at the UCF College of Nursing and are enrolled in Nursing Research. You must be 18 years or older and a student in the college of nursing to participate.

The survey consists of 46 of questions and should take approximately 10 to 15 minutes to complete. Your participation is voluntary. However your instructor has agreed to offer you 1 extra credit point in your Nursing Research course if you choose to participate. Therefore, we will ask you to create a unique identifier that you will email to your instructor through webcourses. Once the survey period is over, I will send the unique identifiers to the instructors to verify your participation. At no time will I, the researcher, have access to your names or grades in the course. In addition, your instructor will not have access to your answers on the survey. An alternative assignment will be available from your instructor to earn the extra credit point if you do not wish to participate in this survey.

If you would like to participate, please follow this link: <https://www.surveymonkey.com/s/D272SQR>

If you have any questions about the survey, please feel free to contact Dr. Loerzel or me at any time.

Laura Maben-Tenney
UCF, College of Nursing
Laura.Tenney@knights.ucf.edu

Dr. Victoria Loerzel
UCF, College of Nursing
Victoria.Loerzel@ucf.edu
407-823-0762

Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board. Questions or concerns about research participants' rights may be directed to the UCF IRB office.

University of Central Florida
Office of Research and Commercialization
12201 Research Parkway, Suite 501
Orlando, FL 32826-3246

The UCF IRB board can also be contacted through campus mail, 32816-0150. The hours of operation are 8am until 5pm, Monday through Friday except on University of Central Florida official holidays. The telephone numbers are (407) 882 – 2276 and (407) 823 – 2901.

Thank you for your consideration,
Laura Maben-Tenney

Dr. Victoria Loerzel

APPENDIX B: SUD REUSE SURVEY

APPENDIX B REUSE SURVEY

Introduction and informed consent

1. Thank you for your interest in this survey. This survey will take approximately 15 minutes to complete. By continuing on to answer the questions on this survey, you are consenting to participate. Please check the "Yes" box if you would like to continue.

☐ Yes

☐ No

Recycling at home

2. Do you recycle products at home?

☐ Yes

☐ No

3. What kinds of products do you recycle at home? (Examples: plastics, paper, aluminum cans, tin cans, glass, styrofoam, electronics, household chemicals etc.)

Recycling at work

4. Do you recycle at work or at your clinical site?

☐ Yes

☐ No

5. What kinds of products do you recycle at work or clinical site? (Examples: plastics, paper, aluminum cans, tin cans, glass, styrofoam, medical equipment, etc.)

Beliefs towards recycling medical devices

6. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
Hospitals generate a lot of hazardous waste.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the hospital's responsibility to ensure their waste is disposed of in a manner that is environmentally beneficial.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nurses have the ability to increase the amount of trash produced by a hospital.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nurses have the ability to decrease the amount of trash produced by a hospital.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nurses are responsible for environmental health concepts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Single use medical devices should be used only once.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Single use medical devices can be reused if properly sterilized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reusing single use medical devices contributes to hospital-acquired infections.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disposing of single use devices contributes to environmental pollution.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
I would consider re-using single use devices that have penetrated the skin if sterilized before reuse.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would consider reusing single use devices that have come into contact with mucous membranes but have not penetrated the skin- if sterilized before reuse.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would consider reusing single use devices that have only been in contact with intact skin if sterilized before reuse.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would consider joining or creating a "green team" in my work place. (A green team works to make hospitals more environmentally friendly.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Consideration of recycling

8. I would consider reusing the following single use devices if sterized for reuse:

	Yes	No
Blood pressure cuffs	<input type="checkbox"/>	<input type="checkbox"/>
Catheter needles	<input type="checkbox"/>	<input type="checkbox"/>
Nasal Catheters (canuala's)	<input type="checkbox"/>	<input type="checkbox"/>
Nasogastric tubes	<input type="checkbox"/>	<input type="checkbox"/>
Thermometer covers	<input type="checkbox"/>	<input type="checkbox"/>
Blood lancets	<input type="checkbox"/>	<input type="checkbox"/>
Sequential compression sleeves	<input type="checkbox"/>	<input type="checkbox"/>
Oxygen masks	<input type="checkbox"/>	<input type="checkbox"/>
Protective gowns (PPE)	<input type="checkbox"/>	<input type="checkbox"/>
Suture removal kit	<input type="checkbox"/>	<input type="checkbox"/>
Suction catheter	<input type="checkbox"/>	<input type="checkbox"/>
Stethoscope	<input type="checkbox"/>	<input type="checkbox"/>
Pulse oximeter	<input type="checkbox"/>	<input type="checkbox"/>
Foley catheter	<input type="checkbox"/>	<input type="checkbox"/>
Straight catheter	<input type="checkbox"/>	<input type="checkbox"/>
Bed pan	<input type="checkbox"/>	<input type="checkbox"/>
Emesis basin	<input type="checkbox"/>	<input type="checkbox"/>
Water pitcher	<input type="checkbox"/>	<input type="checkbox"/>
Syringe	<input type="checkbox"/>	<input type="checkbox"/>
Hypodermic needle	<input type="checkbox"/>	<input type="checkbox"/>
GYN speculum	<input type="checkbox"/>	<input type="checkbox"/>
Tracheal tube	<input type="checkbox"/>	<input type="checkbox"/>

About you

9. What is your age?

10. What is your gender?

☐ Male☐ Female

11. Are you currently a nurse (RN license)

☐ Yes☐ No

12. What program are you currently enrolled in?

- ☐ Accelerated BSN
- ☐ Basic BSN
- ☐ Concurrent
- ☐ RN to BSN

13. How environmentally conscious do you consider yourself?

	Very much	Somewhat	Neutral	Not really	Not at all
How environmentally conscious do you consider yourself?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Do you have any thoughts about using reprocessed or recycled single use devices in your nursing practice that you would like to share?

15. Who is your instructor?

- | | |
|----------------------------------|------------------------------------|
| <input type="checkbox"/> Decker | <input type="checkbox"/> Weinstein |
| <input type="checkbox"/> Loerzel | <input type="checkbox"/> Urquhart |

16. Please create a unique identifier that can be used to give you extra credit for participating. Please use your mothers first name and your birth year: Example: Joyce1967

Thank you

Thank you for your participation!

APPENDIX C: IRB APPROVAL LETTER

APPENDIX C
IRB APPROVAL LETTER



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Victoria Loerzel** and Co-PIs if applicable: **Laura M. Maben-Tenney**

Date: **March 26, 2012**

Dear Researcher:

On 3/26/2012, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review: UCF Initial Review Submission Form
Project Title: Nursing Attitudes Toward the use of Reprocessed Single-use
Medical Devices
Investigator: Victoria Loerzel
IRB Number: SBE-12-08285
Funding Agency: None

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Janice Turchin on 03/26/2012 11:59:47 AM EST

A handwritten signature in black ink that reads "Janice Turchin".

IRB Coordinator

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