A COMPARISON BETWEEN THE USE OF INTRAVENOUS BAGS AND THE HEELIFT SUSPENSION BOOT TO PREVENT PRESSURE ULCERS

Abstract

Problem: The heel is the second most common area where patients develop pressure ulcers. Some of the interventions that are commonly used today to prevent pressure ulcers have not been empirically tested, such as intravenous (i.v.) bags. Other interventions, such as the Heelift Suspension Boot have been studied and shown to prevent heel pressure ulcers. There are no specific studies comparing the Heelift Suspension Boot and the use of i.v. bags.

Purpose: The use of i.v. bags and the Heelift Suspension Boots was compared in this quasi-experimental study. The objective of this study was to investigate if one of the interventions provided better heel pressure relief than the other.

Methods: The conceptual framework stated that the increased use of i. v. bags would increase heel/Achilles pressure signs and symptoms and/or pressure ulcers, while the increased use of the Heelift Suspension Boot would decrease heel/Achilles pressure signs and symptoms and/or development of pressure ulcers. The target population consisted of a convenience sample of 30 patients admitted to the hospital for hip or knee surgery. Subjects were randomized to i. v. bags or Heelift Suspension Boots. Daily assessment of heels and Achilles area were completed to assess pressure problems using validated pressure scales. Data was also collected on staff satisfaction with the Heelift Boots.

Results: Data was analyzed using the SPSS statistical program and included descriptive statistics, Pearson's correlations, and Chi-Square Tests to assess differences between the groups. A χ^2 Test of Independence was calculated to determine whether signs and symptoms of pressure were associated with the intervention. No patients with the boot showed signs or symptoms of pressure, while six patients with the i.v. bag intervention did. A significant difference was determined, $\chi^2(1,N=30) = 7.50$, $p = .006$.
Pearson's r indicated significant correlations between design and ease, ($r = .569$, $p=.043$), design and texture ($r = .786$, $p = .001$), and design and prevention ($r = .788$, $p = .001$) for staff's satisfaction statistics.

Conclusion: The results demonstrated a significant difference between the Heelift Suspension Boot and the i.v. bag as heel pressure relief methods. Based on the statistical results of this study, the Heelift suspension boot was statistically and clinically the best intervention for patients with decreased mobility when compared to the i. v. bags. The nursing staff was satisfied with the design and ease, design and texture, ability of the boot to prevent pressure ulcers.

Implications: Based on the results of this study, practice needs to change. The use of the i.v. bags should be eliminated and the Heelift Suspension Boots should be used on patients who have hip or knee surgery.

A Comparison Between The Use Of Intravenous Bags And The Heelift Suspension Boot To Prevent Pressure Ulcers

Background and Significance

Pressure ulcer development to the heel is the second most common site of skin breakdown.[1] The risk for mortality is increased for patients that develop pressure wounds. According to Nakagami et al.,[2] the prevalence of pressure ulcers in the acute-care setting ranges from 14 to 17 percent. Not only do pressure ulcers affect the quality of life for both the patient and their caregivers; they also impose a financial burden related to medical costs.[2] Patients with immobile legs due to a joint replacement surgery are at high risk for the development of this type of wound.[3] The development of a pressure ulcer to the heel may occur within the first few days to weeks of the patient's admission to the facility.[4] It is imperative for the healthcare providers in these facilities to recognize the importance of preventing these types of ulcers.

The best method for reducing pressure to the heel has not been identified. This may create disagreement between healthcare providers as to whether the method used at their facilities provides the most benefit to the patient in the prevention of pressure ulcers to the heel. Prevention of pressure ulcers is the best intervention to provide while caring for at risk-hospitalized patients. The problem is that some of the interventions that are being used may not be the most appropriate. For this reason, it is important to determine whether the methods used in the acute care setting are providing the pressure relief necessary to prevent the development of an ulcer to the heel.

Problem Statement

Heel and Achilles pressure ulcers are not only costly, but if not treated promptly they may place the patient at risk to develop osteomyelitis and other types of infections that could cause the loss of a limb or even death. It is important to use the appropriate interventions to combat this issue in the healthcare system. The problem is that some of the interventions that are being used based on tradition or practice may not be the most beneficial for the patient. Decisions for type of prevention should be based on evidence-based findings available versus traditional practice patterns. Research on the best type of device to use to prevent pressure ulcers should be conducted to guide practice.

Literature Review

A decade or so ago, doctors and patients chose to put off orthopedic joint implants as long as possible because prostheses would only last about 10 years, and replacement surgery becomes less effective and more dangerous each time it is done. Now some prostheses are expected to last 25 years. This type of surgical procedure is usually performed on patients 55 years or older.[5] The incidence of pressure ulcers among surgical patients can be as high as 45%, and especially the older adult experience the highest incidence.[6]

Skin breakdown due to pressure is a health risk frequently, encountered by hospitalized geriatric patients[7]. The development of pressure ulcers will increase the cost of care for the patient and the hospital length of stay. Of all the bony prominences in the human body, the measured pressure over skin surfaces in a recumbent man measured highest on the heel[8]. A study done by Versluyen[9] found that 66% of patients with fractured hips developed pressure ulcers in the hospital. Of the patients that participated

in this study, 83% developed ulcers within five days of admission and 90% were over 70 years of age, confirming the prevalence in elderly patients[10]. Many studies have been done to study the etiology and prevention of this health issue. There are many commercial interventions available, and it is important to use the research studies available to select appropriate preventive measures.

De Keyser et al.[7] completed a research study to test different commercially available pressure-reducing materials to evaluate whether and to what extent they were able to reduce the vertical heel pressure. They found that the use of several heel protectors did significantly lower the pressure exerted on the heel when a patient is lying on a bed; however, not all of the protective devices yielded the same result[7]. Pinzur et al.[11] conducted a study to objectively compare the capacity for pressure dissipation in several popular, commercially available body-support systems used for the prevention of heel ulcers. They concluded that the more elaborate pressure-dissipating devices are clearly more effective in decreasing and dissipating pressure and protecting the bedridden patient from developing disabling pressure ulcers[11].

An intervention used at the orthopedic service at the Sheffield Children's Hospital was water-filled gloves. The controversy about the use of water-filled gloves arose from a study done by Lockyer-Stevens and involved the measurement on three volunteers using different size gloves with varying amounts of water[12]. Studies that involved this traditional intervention showed equivalent pressures between water-filled gloves and standard mattresses and therefore gloves should not be regarded as a useful pressure relieving aid[12]. In a study that included 41 patients admitted to an orthopedic ward over a three month period, Zernike[10] studied the effectiveness of different pressure relief

methods and found that eggshell foam boots were more effective in relieving pressure than duoderm and heel protector boots.

In a study done on orthopedic patients being transferred to a rehabilitation ward, London[13] concluded that when considering a device to relieve pressure on the heel, several factors must be considered: effectiveness of the device, ease and accuracy of application, and patient comfort. London and his team monitored the overall incidence of pressure ulcers for a period of three months. They reported the incidence at 5.6 percent of the total number of admissions[13]. Of all the ulcers found, 29 ulcers (47 percent) were on the heel[13]. The product studied by London, the Repose foot/heel protector, met the characteristics mentioned above. London concluded that the use of a heel pressure relief device in conjunction with meticulous nursing care enhanced the maintenance of skin integrity.

Therefore, research has demonstrated that appropriate pressure relief devices can reduce the incidence of pressure ulcers, especially in the heel area. However, only a few studies have compared traditional prevention practices such as intravenous (i.v.) bags and more commercially tested devices. Nursing staff and physicians many times tend to rely on measures based on tradition and practice rather than more potentially beneficial commercial devices that may seem more difficult to utilize. Hospitals that use both types of prevention interventions, traditional and commercial products, for their orthopedic populations have a lack of standardization and difficulty in determining which method is the most effective in prevention of pressure ulcers, so it is necessary to determine if one method is more beneficial with the goal of standardizing a hospital's heel care practice.

A research study comparing i.v. bags and pressure relief boots would assist in standardizing practice, especially for the orthopedic population.

Research Questions/Hypothesis:

1. Is the use of i. v. bags for foot pressure relief as effective in the prevention of heel pressure ulcers as a pressure relief boot?
2. Are more signs and symptoms of pressure noted when the i. v. bags are used for pressure relief when compared to the boots?

Hypothesis: The use of the Suspension Heelift Boots is more effective in the prevention of foot pressure ulcers than the use of i. v. bags.

The purpose of this study was to compare the use of i. v. bags for pressure relief to the heel and the use of the Heelift Suspension foam boot especially designed to offload the foot. It was important to make this comparison because of the increased incidence and prevalence of pressure ulcers to the heel in patients that have been admitted to the hospital for a hip or knee replacement[3].

Conceptual Framework

↑ use of i. v. bags

⇓

↑ heel/Achilles pressure signs/symptoms or pressure ulcers

↑ use of Heelift Suspension Boot

⇓

↓ heel/Achilles pressure/signs/ symptoms or pressure ulcers

The conceptual framework was created due to evidence that newer products may be more beneficial than traditional practices at the orthopedic surgical floor at a Central Illinois hospital. In this orthopedic unit, i. v. bags are used to relieve pressure to the Achilles or heel areas. There is no evidenced-based research that shows that this intervention is an effective measure to relieve pressure to the areas mentioned with the goal of preventing the development of pressure ulcers. The use of the i. v. bags for pressure relief may present challenges, such as keeping the heel offloaded on a regular basis due to the patient repositioning and moving the lower extremity around causing the foot to slide off the i. v. bag. Another concern is that as pressure may be relieved from the heel area, pressure is being exerted on the Achilles area placing the patient at risk to develop a pressure ulcer. The i. v. bags have not been designed for pressure relief. The Heelift Suspension Boot is a pressure relief measure that is used in other areas of the hospital. These boots have been designed to relieve pressure from the heel and Achilles area, and are made from soft, firm, medical grade foam. The hospital chose the convoluted design with an elevation pad that disperses pressure evenly across the entire calf. The boot has a smooth tricot fabric on the outside for increased patient mobility, air holes that provide optimal ventilation, and two adjustable hook-and-loop straps that secure the boot to the patient's leg. These two interventions were compared to determine if the use of the heel suspension boot is a better choice for pressure relief to the heel and Achilles areas.

Conceptual and Operational Definitions

Dictionary.com[14] defines the term use as to make practice of, to practice habitually or customarily, to employ for some purpose, or to put into practice. The

Merriam-Webster Online Dictionary[15] defines use as habitual or customary. For the purpose of this study, use is defined as the customary employment of the pressure relief intervention, i. v. bags or the Heelift Suspension Boot when the patient is in bed or at any time when the patient is positioned so that pressure may be applied to the heels or Achilles area.

Pressure is defined as the application of continuous force by one body on another that it is touching; compression[16]. Mosby's Medical, Nursing, & Allied Health Dictionary[17] defined pressure as a force or stress applied to a surface. For the purpose of this study evidence of pressure is defined as redness, warmth, coolness, or pain noted to the heels or Achilles area after repositioning.

MedicineNet.com[18] defined pressure ulcer as a sore area of skin that develops when the blood supply to it is cut off for more than two to three hours due to pressure on the area and lack of movement. According to Zeller, Cassio, and Glass[19], a pressure ulcer is an injury to the skin as a result of constant pressure due to impaired mobility. The National Pressure Ulcer Advisory Panel[20] defines pressure ulcer as localized areas of tissue necrosis that develop when soft tissue is compressed between a bony prominence and an external surface for a prolonged period of time. For the purpose of this study pressure ulcer is the development of a Stage 1, Stage 2, Stage 3, or Stage 4 pressure ulcer to the heel or Achilles area. The following are definitions by the National Pressure Ulcer Advisory Panel[21] of the different pressure ulcer stages and tissue damage:

Stage I:

Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area.

Stage II:

Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister.

Stage III:

Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon, or muscle are *not* exposed. Slough may be present but does not obscure the depth of tissue loss. *May* include undermining and tunneling.

Stage IV:

Full thickness tissue loss with exposed bone, tendon, or muscle. Slough or eschar may be present on some parts of the wound bed. Often includes undermining and tunneling.

Unstageable:

Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green, or brown) and/or eschar (tan, brown, or black) in the wound bed.

Operational Definitions

Use – the use of the i. v. bags or the Suspension Heelift Boots will be documented on the data collection sheet. Yes or no will be marked on the data collection sheet daily if the patient has had the intervention in place when in bed or when in any position that may exerted pressure to the heel or the Achilles area (e.g. sitting on a reclining chair with the feet elevated on the foot rest.

Pressure – each of the study participants' heels and Achilles area will be assessed daily for signs and symptoms of pressure: redness, warmth, coolness, and pain. The information will be documented as yes or no on the data collection sheet if these are noted upon assessment.

Pressure ulcers – each of the study participants' heels and Achilles area will be assessed for the development of pressure ulcers. The development of a Stage 1 pressure ulcer, Stage 2 pressure ulcer, Stage 3 pressure ulcer, Stage 4 pressure ulcer, or Unstageable will be documented on the data collection sheet if these are noted when the patient is assessed.

Method

A quasi-experimental study was used to compare the effectiveness of pressure relief to the heel and Achilles area between the i. v. bags and the Suspension Heelift Boot. The target population consisted of individuals admitted to the hospital for a hip or knee replacement between the ages of 55 to 70 years old. The sample was randomized by alternating the application of each intervention when the patients were admitted to the unit. Patients that were included in this study consisted of people that were ambulatory prior to admission to the hospital, had a normal albumin, had not been diagnosed with diabetes or peripheral vascular disease, and had no evidence of pressure ulcers to the heels or Achilles area. The research study took place in a Central Illinois area orthopedic unit. Approval from the Peoria Institutional Review Board was obtained for the study.

Data Collection

Variables and Their Measurement

The independent variable was the application of the i. v. bags or the Suspension Heelift Boots for pressure relief.

Operational Definition: The i. v. bags or the Suspension Heelift Boots are to be applied to the patient's foot when in bed or at any time when increase amount of pressure may be exerted to the heel or Achilles areas.

The dependent variable was the decreased signs and symptoms of pressure (redness, warmth, coolness, and pain) or the development of a Stage 1, Stage 2, Stage 3, Stage 4, or Unstageable pressure ulcers to the heel or Achilles areas.

Operational Definition: The heel and Achilles areas of the study participants were assessed daily for signs or symptoms of skin breakdown.

The signs and symptoms of skin breakdown (redness, pain, warmth) that were assessed during this study added external validity to the measures, because these have been documented on previous and current literature as the effect of pressure on normal tissue. The definitions provided for the different pressure ulcer stages are the result of five years of research started in 2001 by the National Pressure Ulcer Advisory Panel[21]. These definitions are the current guidelines followed at the hospital for the identification of skin breakdown as a result of pressure. The same guidelines may be applied to any patient in any type of healthcare setting. The exclusion criteria for this study added internal validity because with the inclusion and exclusion criteria the researcher eliminated other factors that may cause skin breakdown to the heel and the Achilles areas other than pressure.

Data Collection Procedures

A data collection sheet (see Appendix A) was developed for data analysis to determine if the Suspension Heelift boot provided more adequate pressure relief to the heel or Achilles areas than the i. v. bags. Demographic data included age, gender, and comorbidities. A consent form was obtained from each of the patients that agreed to participate in the study. The researcher collected the data every morning by assessing the participant's heels and Achilles areas and by reviewing the patient's medical record. During data collection, the patient's name was kept confidential by only identifying each patient with a code number. A questionnaire (see Appendix B) was constructed using a Likert scale and was administered to the orthopedic unit's nursing staff after data for 30 patients had been collected. The nursing staff evaluated each measure and expressed, based on their experience utilizing them, which measure better provided pressure relief, had the most appropriate texture, better accommodated the patient's size, custom fitted the patient's offloading needs, allowed better mobility, easier to apply, and easier to keep in place. The questionnaire was validated for content by administering it to 4 nurses that specialized in wound care. The data collection sheet and returned questionnaires were kept in a locked cabinet.

Analysis of Data

All data was analyzed using the SPSS statistical program. Descriptive statistics were performed regarding age, gender, and comorbidities. Correlational statitstics were performed on staff satisfaction surveys, and Chi-Square Tests were used to analyze the difference between i.v. bags and Heelift Suspension Boots.

Description of the Sample

During the time the study was conducted, there were thirty-nine hip surgeries and sixty-two knee surgeries. Of these totals, thirty-four patients met the criteria for the study. Three patients refused to participate and one patient dropped out of the study. This resulted in a sample size of 30 patients that met the criteria without confounders. The average age of the participants was 60.97 years (see Appendix C) and the average length of stay four days (see Appendix D). Of the total number of participants, 63.3 percent were female and 36.7 were male (see Appendix C). Seventy percent of the participants were admitted to the hospital for knee surgery and 30 percent had hip surgery (see Appendix C). Fifty percent of the participants had the Heelift boot as the intervention and 50 percent had the intravenous bag (see Appendix D). Of the total patients in the study, 63.33 percent had arthritis, 60 percent had hypertension, 26.67 had hypercholesterolemia, 16.67 had thyroid disease, 10 percent had sleep apnea, 10 percent had obesity, and a smaller percentage had other comorbidities (see Appendix E).

A χ^2 Test of Independence was calculated to determine whether signs and symptoms of pressure was associated with the intervention. No patients with the boot showed signs or symptoms of pressure, while six patients with the i. v. bag intervention did. A significant association was determined, $\chi^2(1,N=30) = 7.50$, $p = .006$ (see Appendix F).

Pearson's r indicated significant correlations between design and ease, ($r = .569$, $p=.043$), design and texture ($r = .786$, $p = .001$), and design and prevention ($r = .788$, $p = .001$) (see Appendix G).

Discussion

The results of this study demonstrated that the Heelift Suspension Boot is the best intervention for heel/Achilles pressure relief when compared to the i.v. bags. None of the patients that used the boot developed signs or symptoms of pressure, while of the 15 patients that used the i.v. bags as the pressure relief intervention, six developed signs and symptoms of pressure (see Appendix H). Of the two interventions, the nurses felt that the bulkiness of the boot is a disadvantage for the type of patient they care for in this particular unit. Pearson's r indicated that the nurses believed that the design, texture, and ability of the boot to prevent signs and symptoms of pressure were satisfactory. Three nurses commented that the boots are too big and bulky. One of the nurses stated that the i.v. bags are a makeshift way of keeping pressure off heels. Based on the observations made by the researcher, the i.v. bag is not an effective way of relieving pressure to the heels due to the patient's foot not remaining in place and as the patient repositions in bed, the heel touched the surface of the bed as the i.v. bag was displaced. It was noted that the patients had positive comments about the intervention that was being used. Whether it was the i.v. bag or the Heelift Suspension Boot, patients verbalized satisfaction with how the intervention felt on their feet and how the intervention relieved the pressure.

Since both groups of patients were satisfied with either intervention, they depend on the healthcare provider's expertise to identify which interventions are best in order to protect them from skin breakdown. Based on the data obtained during this study, the Heelift Suspension Boot statistically performed the best. The research questions posed by the researcher were answered at the completion of the study. More patients had signs and symptoms of pressure when the i.v. bag was used than with the Heelift Suspension

Boot. The Heelift Suspension Boot was a more effective intervention for relieving pressure to the heel and Achilles area. The use of the i.v. bags as a pressure relief method increased the signs of pressure for the study's participants, while the use of the Heelift Suspension Boot decreased them.

Limitations

Limitations to this study include the small sample. Only thirty patients participated in this study. Since a convenience sample was used, it would be difficult to generalize the results to other populations outside of hip and knee surgery. Further research may be needed in other populations such as medical patients, patients with more risk factors, and patients in long-term facilities. None of the patients that participated in this study developed pressure ulcers, but if the i. v. bags were used in higher risk, sicker, or more debilitated patients, it is possible that the result would be a pressure wound. Implications of this study include the need to eliminate the use of the i. v. bags with patients that have decreased mobility due to knee or hip surgery. Based on the results of this study, practice needs to change. The use of the i. v. bags must be eliminated and an intervention proven to be effective, such as the Heelift Suspension Boot, should be used in its place.

Further studies should be conducted to determine if patient's satisfaction and compliance with the pressure relief method is affected by the size of the intervention used. Studies should provide nursing staff with the opportunity to provide feedback in regard to the intervention's design for the type of patient being cared for. A boot design especially developed for orthopedic patients should be developed in order to provide pressure relief for these high-risk patients while maintaining comfort.

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APPENDIX A

DATA COLLECTION SHEET

CODE #	AGE	GENDER	DIAGNOSIS	ALBUMIN	S/SPRESSURE	PRESSURE ULCER	COMORBIDITIES	INTERVENTION	USE CRITERIA Y/N

APPENDIX B

PRESSURE RELIEF INTERVENTION EVALUATION QUESTIONNAIRE

Thank you for taking the time to evaluate the recent comparison done between the use of the intravenous (i.v.) bag and the Heelift Suspension Boot. Based on your experience using these interventions, please select the best answer:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. When comparing the two, the Heelift boot design accommodates the foot better than the i. v. bag.	1	2	3	4	5
2. When comparing the two the Heelift boot design is easier to apply than the i.v. bag.	1	2	3	4	5
3. When comparing the two, the Heelift boot texture is more appropriate for protection of the patient's skin.	1	2	3	4	5
4. The Helift boot accomodates all patient sizes when compared to the i. v. bag.	1	2	3	4	5
5. The best choice for preventing pressure ulcers to the heel and Achille's areas is the Heelift boot.	1	2	3	4	5
6. It is easier for the patient to move when the Heelift boot is applied than when the i.v. bag is used.	1	2	3	4	5
7. The patient's foot stays positioned best when the Heelift boot is used than when the foot is positioned over the i.v. bag.	1	2	3	4	5
8. When applied you have noticed the i.v. bag relieves pressure to the heel but not to the Achilles area.	1	2	3	4	5
9. One advantage that you see with a foam boot is that it can be custom fitted to the patient's offloading needs.	1	2	3	4	5
10. Overall the Heelift Boot is a better product for relieving pressure to the heel and the Achilles area.	1	2	3	4	5

ADDITIONAL COMMENTS:

_____

_____

APPENDIX C

FREQUENCY TABLE

DIAGNOSIS

		Frequency	Percent	Valid Percent	Cummulative Percent
Valid	1	21	70	70	70
	2	9	30	30	100
Total		30	100	100	

AGE

		Frequency	Percent	Valid Percent	Cummulative Percent
Valid	51	2	6.7	6.7	6.7
	52	1	3.3	3.3	10
	54	2	6.7	6.7	16.7
	56	4	13.3	13.3	30
	57	2	6.7	5.7	36.7
	58	1	3.3	3.3	40
	59	2	6.7	6.7	46.7
	61	1	3.3	3.3	50
	62	3	10	10	60
	64	1	3.3	3.3	63.3
	65	2	6.7	6.7	70
	66	2	6.7	6.7	76.7
	67	1	3.3	3.3	80
	68	3	10	10	90
	69	1	3.3	3.3	93.3
	70	2	6.7	6.7	100
Total		30	100	100	

GENDER

		Frequency	Percent	Valid Percent	Cummulative Percent
Valid	1	19	63.3	63.3	63.3
	2	11	36.7	36.7	100
Total		30	100	100	

S/S PRESSURE

		Frequency	Percent	Valid Percent	Cummulative Percent
Valid	1	6	20	20	20
	2	24	80	80	100
Total		30	100	100	

APPENDIX D

FREQUENCY TABLE

LENGTH OF STAY

					Cummulative Percent
		Frequency	Percent	Valid Percent	
Valid	3	10	33.3	33.3	33.3
	4	15	50	50	83.3
	5	3	10	10	93.3
	6	2	6.7	6.7	100
Total		30	100	100	

INTERVENTION

					Cummulative Percent
		Frequency	Percent	Valid Percent	
Valid	1	15	50	50	50
	2	15	50	50	100
Total		30	100	100	

APPENDIX E

Condition	Number of patients	%	Condition	Number of patients	%
Arthritis	19	63.33	Stroke	1	3.33
Hypertension	18	60.00	Kidney stone removal	1	3.33
Hypercholesterolemia	8	26.67	Umbilical hernia	1	3.33
Thyroid disease	5	16.67	Psoriasis	1	3.33
Pain	4	13.33	Restless leg syndrome	1	3.33
Sleep apnea	3	10.00	Narcolepsy	1	3.33
Obesity	3	10.00	Dyslepedemia	1	3.33
Heart Murmur	2	6.67	Hx Bell's Palsy	1	3.33
Depression	2	6.67	Hx PAC's	1	3.33
Fibromyalgia	2	6.67	Hypercalcemia	1	3.33
CAD	2	6.67	Edema	1	3.33
GERD	2	6.67	DJD	1	3.33
Asthma	2	6.67	R hip infected wound	1	3.33
Allergic Rhinitis	2	6.67	Tachycardia	1	3.33
History of Hep C	2	6.67	Diverticulitis	1	3.33
Osteoporosis	2	6.67	Acid Reflux	1	3.33
Urinary Frequency	1	3.33	Migraine HA	1	3.33
Hx Brest Cancer	1	3.33	Hx MI	1	3.33
Varicose veins	1	3.33	CHF	1	3.33
Seizures	1	3.33	COPD	1	3.33
Hx Brain Tumor	1	3.33	Nocturia	1	3.33
Chronic Kidney Disease	1	3.33	Insomnia	1	3.33

APPENDIX F

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.500[b]	1	0.006		
Continuity Correction[a]	5.208	1	0.022		
Likelihood Ratio	9.834	1	0.002		
Fisher's Exact Test				0.017	0.008
Linear-by-Linear	7.25	1	0.007		
Association					
N of Valid Cases	30				

a. Computed only for a 2x2 table
b. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.00.

APPENDIX G

CORRELATIONS

		DESIGN	EASE	TEXTURE	SIZES	PREVENTION
DESIGN	Pearson Correlation	1	.569*	.786**	0.179	.788**
	Sig. (2-tailed)		0.043	0.001	0.559	0.001
	N	13	13	13	13	13
EASE	Pearson Correlation	.569*	1	0.295	0.132	0.451
	Sig. (2-tailed)	0.043		0.328	0.668	0.122
	N	13	13	13	13	13
TEXTURE	Pearson Correlation	.786**	0.295	1	-0.129	.826**
	Sig. (2-tailed)	0.001	0.328		0.673	0.001
	N	13	13	13	13	13
SIZES	Pearson Correlation	0.179	0.132	-0.129	1	0.209
	Sig. (2-tailed)	0.559	0.668	0.673		0.494
	N	13	13	13	13	13
PREVENTION	Pearson Correlation	.788**	0.451	.826**	0.209	1
	Sig. (2-tailed)	0.001	0.122	0.001	0.494	
	N	13	13	13	13	13
REPOSITIONING	Pearson Correlation	0.048	0.454	-0.4	.571*	0.279
	Sig. (2-tailed)	0.877	0.119	0.896	0.042	0.355
	N	13	13	13	13	13
POSITION	Pearson Correlation	.835**	0.421	0.463	0.153	0.395
	Sig. (2-tailed)	0	0.152	0.111	0.617	0.182
	N	13	13	13	13	13
HEEL	Pearson Correlation	.801**	.580*	0.379	0.405	.554*
	Sig. (2-tailed)	0.001	0.038	0.202	0.17	0.05
	N	13	13	13	13	13
FITTING	Pearson Correlation	0.34	-0.074	0.425	0.014	0.255
	Sig. (2-tailed)	0.256	0.81	0.148	0.963	0.401
	N	13	13	13	13	13
BETTER	Pearson Correlation	.811**	.626*	.718**	0.347	.824**
	Sig. (2-tailed)	0.001	0.022	0.006	0.245	0.001
	N	13	13	13	13	13

APPENDIX H

Crosstabs

S/S PRESSURE * INTERVENTION Crosstabulation

		INTERVENTION		
		1	2	Total
S/S PRESSURE	1	0	6	6
	2	15	9	24
Total		15	15	30