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Autonomic Dysreflexia: An Educational Intervention for First Responders to Recognize this Medical Emergency

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Executive Summary

This knowledge enhancement capstone project regarding Autonomic Dysreflexia (AD) was an evidence based practice educational intervention project performed in a variety of emergency health care provider organizations in a large metropolitan Midwestern city.

Problem

Approximately 265,000 persons in the United States are living with a spinal cord injury (SCI). Of this population, 16-24% (The National SCI Statistical Center, 2011), are at risk of developing Autonomic Dysreflexia (AD) a potentially life threatening condition unique to spinal cord injured (SCI) persons.

Purpose

The purpose of this evidence-based practice project was to examine the impact of an educational program aimed at the improvement of knowledge of emergency healthcare providers who have the potential of caring for SCI persons at risk of developing AD.

Goal

The overall goal of this Capstone Project was improved knowledge enhancement regarding Autonomic Dyreflexia (AD) for emergency healthcare providers who have the potential of caring for SCI persons at risk for AD.

Objectives

The desired short-term objective of this project was knowledge enhancement of healthcare personnel who have the potential of working with an SCI person at risk of developing AD. The long-term objective of this project was; enhancing the lives of those SCI persons at risk of developing AD, and decreasing the potential for adverse outcomes.

Plan

After conducting a needs assessment and literature review, this investigator with the help of content experts, designed a pre and post educational lecture questionnaire, a demographic data collection questionnaire, and an educational presentation structured to enhance the knowledge of emergency healthcare providers regarding AD. Following Institutional Review Board approval from Regis University, the project was implemented and data was collected. Finally, pre and post tests were coded, data inputted into spreadsheets and the Statistical Package for Social Sciences (SPSS) was utilized to process data and determine outcomes and results. A paired t-test was utilized to compare pre and post test data.

Outcomes and Results

A total of 169 participants with varying levels of education completed both the pre and post education questionnaire. Results of this study displayed statistical significance (p=.000), indicating achievement of this capstone project goal of improved knowledge enhancement of emergency care services providers. Pre and post lecture questionnaire comparisons revealed a significant difference in scores for pretest knowledge regarding AD (M=4.57, SD 2.25) and posttest (M=8.11, SD 1.91) after the educational presentation; t (-17.45) =-3.14. These outcomes indicated increased knowledge enhancement regarding AD for the study participants.

Acknowledgements

This project is dedicated to my husband and our two sons who encouraged me every step of the way through this Doctorate of Nursing Practice program.

I am grateful for the support provided for this capstone project by the leadership team and staff members of Craig Hospital. Without their assistance and support this capstone project would not have been successful.

I am also grateful to the current and past patients at Craig Hospital who inspired me to create this capstone project; giving back to those I serve, making a difference in the lives of those who suffer from a spinal cord injury.

I would also like to acknowledge and thank my mother whose eternal pride in my accomplishments helped inspire me to treasure the experiences provided to me through this Doctorate of Nursing Practice degree program.

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Autonomic Dysreflexia Background

Approximately 265,000 persons in the United States are living with a spinal cord injury (SCI). Of this population, 16-24% (The National SCI Statistical Center, 2011), are at risk of developing autonomic dysreflexia (AD). This disease process is unique to SCI persons with an injury level of the sixth thoracic vertebrae level (T6) and above, with rare cases reported at the eighth thoracic vertebrae level (T8). AD is the result of an exaggerated response from the autonomic nervous system (ANS) causing an abrupt onset of excessively high blood pressure. This abrupt onset of excessively high blood pressure can be life threatening and must be identified and addressed immediately.

The pathophysiology of AD involves a noxious or painful stimulus below the level of the SCI (Dunn, 2004). The stimulus is mediated through the ANS, which includes the parasympathetic autonomic nervous system (PANS) and the sympathetic autonomic nervous system (SANS) (Cole, 2009). The ANS is responsible for the signs and symptoms of AD, as it normally maintains homeostasis via the PANS and the SANS. The PANS and SANS play important complementary roles in maintaining homeostasis through a negative feedback system, when one branch is stimulated, the other branch is simultaneously suppressed (Cole, 2009).

In an able bodied person, the PANS and SANS systems typically complement one other, working together to correct issues with homeostasis. However, according to Cole (2009), in a SCI person, this typically complementary system is disrupted as intact lower motor neurons sense the painful stimuli below the level of injury and the message is interrupted at the level of the SCI preventing a relay of information to the cerebral cortex. A SCI interrupts the two branches of the ANS (PANS and SANS) and disconnects this

feedback loop. This causes the two branches of the ANS to function independently rather than in a complementary manner disrupting homeostasis or the body's ability to maintain a stable, constant condition (Cole, 2009).

The ascending information reaches the major splanchnic sympathetic outflow at spinal level fifth and sixth thoracic vertebrae (T5-T6) and stimulates a sympathetic response. The sympathetic response creates a fight or flight response (Cole 2009), creating widespread vasoconstriction, resulting in acute hypertension. Typical symptoms or patient complaints include a pounding headache, visual changes, anxiety, pallor, and goose bumps below the level of injury (Hentschke, 2006).

This acute hypertensive episode stimulates the baroreceptors in the carotid sinuses and aortic arch. The PANS is unable however, to counteract these effects through the injured spinal cord. Instead, the PANS attempts to maintain homeostasis by slowing down the heart rate (Cole, 2009). The brainstem stimulates the heart, through the vagus nerve, causing bradycardia and vasodilatation above the level of injury. The PANS impulses are unable to descend past the lesion and therefore signals cannot reach below the level of injury (Hentschke, 2006). Due to this acute hypertensive episode and it's dangerously high blood pressure, AD is a potentially life threatening medical emergency.

Problem Recognition and Definition

According to Cole (2009), AD can occur any time after spinal shock has been resolved. Patients may seek medical attention for treatment of AD at an emergency room or through any Emergency Medical Services (EMS). Patients may also present with this

disorder during routine medical transport. Thus, it is important that all healthcare professionals become aware of this disease process.

The first step in managing AD is to identify the potential disease process, and recognize it as a medical emergency. According to Dunn (2004), standard level curriculum for healthcare providers typically does not typically include information regarding this unique disease process or the specialty care required for treatment. "Emergency medical service (EMS) and hospital staff are generally uninformed about this condition and lack resources for identification and management," (Dunn, p. 256, 2004).

AD must be addressed quickly and properly in order to avoid potentially life-threatening complications related to a dangerously high rapid elevation in blood pressure. Complications of this unique condition include but are not limited to seizures, myocardial infarction, stroke, cerebral hemorrhage, retinal hemorrhage, cardiac arrest and death (Hentschke, 2006).

Treatment for AD revolves around lowering the blood pressure and eliminating the noxious stimuli. However, caution must be used when regulating the blood pressure of SCI persons, as their blood pressures are extremely labile and quick reversal of hypertension (high blood pressure) can result in severe hypotension (low blood pressure) (Consortium for Spinal Cord Medicine, 2003).

Typically, people with a SCI who are at risk for AD are able to identify its occurrence, signs, symptoms, and potential management (Dunn, 2004). However, emergency responders who have knowledge of other conditions with vastly different treatments may not be receptive to patient suggestions regarding care.

The facility supporting this study is in a large Midwestern Metropolitan area has a nurse advice line (NAL) employing four full time nurses licensed in all fifty states who are able to legally provide advice regarding the specialty care of spinal cord or traumatic brain injury via the telephone.

Frequently these NAL nurses receive telephone calls regarding care former patients have received in local hospitals and emergency care facilities including emergency ambulance transport services. Over the last twelve months, these NAL nurses have received comments from six former patients regarding misdiagnosis and mismanagement of care when they sought treatment for an episode of AD (C. Davis personal communication, 2012).

Comments from the NAL nurses prompted calls to seek direct responses from patients and their family members regarding specific medical care for episodes of suspected AD. The patients and families who had contacted the NAL agreed to provide opinions regarding emergency care for an episode of AD when they called to discuss the issue with these NAL nurses.

Statements regarding treatment modalities experienced by these former patients and their family members reinforce the need to provide education regarding AD, a condition unique to SCI persons. Feedback from these former patients and family members included common themes such as; a feeling of dismissal from emergency healthcare providers, a sense of helplessness, and a lack of regard for the patient or family members knowledge regarding the condition of AD. Although the patients and family members had been educated about AD, displayed a wallet card for care instruction

for treatment of AD, they believed their statements were typically dismissed (C. Davis, personal communication, 2012).

Statement of Purpose

The purpose of this study was to enhance the knowledge of healthcare providers regarding AD. To evaluate outcomes and fulfill this purpose, this researcher created a pre and post educational presentation questionnaire utilizing the assistance of content experts, with identical questions regarding AD to evaluate each participant's knowledge level regarding AD pre and post presentation to assess participant knowledge enhancement.

Problem Statement and PICO

A knowledge gap regarding identification and treatment of AD in this large Midwestern Metropolitan area was identified by this investigator. This knowledge gap involved the treatment received by persons suffering from AD who had been transported by emergency medical health care personnel this large Midwestern Metropolitan area. This lack of knowledge regarding AD was concerning as lack of identification and emergent care can lead to adverse outcomes for the person suffering from AD.

This is an evidenced-based practice (EBP) project. EBP models use a process for framing a question, locating, assessing, evaluating, and repeating as needed. Writing the information in the form of a question helps to identify the necessary practice elements using a structured PICO format (New York Libraries, 2013).

Information for the acronym PICO is identified as follows; P-population or disease, I-Intervention or Issue of Interest, C-Comparison or current practice, and O-Outcome (Zaccagnini and White, 2011).

This capstone project's PICO statement is:

- **P**= Healthcare providers in a large Midwestern Metropolitan Area.
- **I**= One hour interactive educational session about the importance of identifying AD in SCI persons.
- **C**= No interactive educational session.
- **O**= Enhanced knowledge.

PICO Question: Does participation in this educational presentation enhance the knowledge of participants regarding AD?

Study Questions

This study asked ten questions regarding AD (see Appendices A and B for study questionnaires) to evaluate participant knowledge enhancement. Although the questionnaires contained identical questions, the questions were numbered differently on the pretest and posttest to discourage memorization of the questions, creating a potential study limitation.

Significance and Scope

This study was significant because as a disabled and vulnerable population, SCI persons deserve the highest level of medical care possible. AD, a condition unique to spinal cord injured persons can be life threatening if left undiagnosed and untreated.

This project used a convenience sample of participants from a large Midwestern Metropolitan area's firehouses, hospitals with emergency rooms, and local urgent care centers. The participants included emergency medical technicians (EMTs), first responders, paramedics, firemen and firewomen, nurses, physicians, and urgent care clinic personnel These first line emergency healthcare providers are essential because they have the potential of working with patients who may experience AD, and their knowledge regarding this condition may mean the difference between proper identification and care or misdiagnosis and mismanagement of this unique condition.

Theoretical Foundation

Joanne Duffy's Quality Caring Model middle range nursing theory supports this Doctorate of Nursing Practice (DNP) practice issue. This nursing theory emphasizes the professional nurse's responsibility to gain knowledge and to enhance this knowledge throughout their nursing career. "Caring is not just a mind-set or simple acts of kindness; rather, clinical caring requires knowledge and skills" (Parker & Smith, 2010, p. 407). Given the unique nature of AD, knowledge related to this unique condition is specialty care acquired knowledge supporting knowledge enhancement.

According to Parker & Smith (2010), another applicable aspect of Duffy's theory for this practice issue is the need to include family members in patient care. This caring model reinforces the "affiliation needs making sure that patients are not only allowed access to their families, but also that families are included in care decisions" (Parker & Smith, 2010, p. 408). This type of family inclusion is very important concerning rehabilitation for spinal cord injured patients. Rehabilitation in this particular patient

population must center on the patient, however it is imperative to incorporate the needs and desires of the family to promote a positive outcome for the entire family unit.

This study focuses on providing education to the adult learner; all participants were 18 years of age or older. According to Russell (2006), Malcom Knowles was a pioneer in the field of adult learning and described adult learning as a process of self-inquiry. Participants for this project are emergency healthcare providers; compassionate caregivers in a profession of choice.

This educational offering embraces the adult learning theory created by Malcolm Knowles. According to Malcolm Knowles, adult learners engage in learning to create change, through a process of self-directed inquiry (Russell, 2006).

"The reason most adults enter any learning experience is to create change. This could encompass change in (a) their skills, (b) behavior, (c) knowledge level, or (d) even their attitudes about things" (Russell, 2006, p. 349). According to Knowles, adults learn best when they are convinced of the need for knowing the information or motivation to learn. This study compels the participants to learn about AD as a unique condition and provide them with the tools to enhance care of the people they serve.

"Adults have a greater depth, breadth, and variation in the quality of previous life experiences than younger people" (Russell, p. 350, 2006). As emergency healthcare professionals, participants in this study potentially possess previous experience treating patients with unique conditions and may incorporate these unique learning experiences, enhancing their knowledge base.

According to Russell (2006), adult learners embrace a level of engagement in learning. Engaging adult learners is best facilitated through application of learning. Adult learners learn best by doing; return demonstration and verbal response regarding the incorporation of knowledge enhance knowledge incorporation from the adult learner. This study is geared to enhance the knowledge of adult learners. Through an interactive educational presentation, participants are encouraged to ask questions, to seek responses and guidance, and to challenge their current knowledge base regarding the treatment needs of SCI persons.

Theory Justification

According to Parker & Smith (2010), there are four main concepts in Duffy's Quality Caring nursing theory. The first concept is *humans in relationships*, (Parker & Smith, 2010, p. 404). This concept embraces the fact that humans are multidimensional. They have different characteristics that make them unique and individual. This concept also embraces the fact that persons are part of a community. The patient is often not a single entity but part of a unique culture system established by a whole family.

The second concept according to Duffy is *relationship-centered professional encounters*, (Parker & Smith, 2010, p. 404). This concept displays the independent relationship the nurse has with the patient and/or family members, and the incorporation of this relationship with multidisciplinary care provision.

Patient advocacy embraces this relationship by guiding patient specific care. This according to Duffy's quality caring model creates a sense of "feeling cared for" (Parker & Smith, 2010, p. 404). "This concept of *feeling cared for* is Duffy's third concept in her

quality caring model. Feeling cared for is created by an approach of patient care provision that supports the uniqueness of each individual patient" (Parker & Smith, 2010, p.404).

While the application of nursing care could be 'cookie cutter' in nature, this creates a sense of categorized nursing care. Provision of the same care for the same level of injury regardless of the unique patient needs is not patient specific and undermines Duffy's concept of feeling cared for. The patient and/or family member feel supported by care provision that is specifically adapted to their unique needs and desires. This includes education supporting individual care a process incorporated in this capstone project through the provision of education regarding AD a disease process unique to SCI persons.

Parker & Smith (2010), note the fourth main concept according to Duffy as *self-caring.* This concept is one that evolves over time based on caring relationships or encounters regarding provision of care (Parker & Smith, 2010, p.405). It is a relationship built on trust developed over time between patient and caregiver. It "represents quality in that it is dynamic and enhances an individual's well-being" (Parker & Smith, 2010, p.405). Concerning rehabilitation, this is a sense of self-security and independence for patients. They feel empowered by the relationships they have developed with their care providers and this relationship enhances their sense of self-worth and ability.

According to Parker & Smith (2010), sub concepts of Duffy's Caring Model emphasize the responsibilities of professional nurses to:

- Attain and continually advance knowledge and expertise.

- Initiate, cultivate and sustain caring relationships.
- Maintain a perspective unique to patients and family members.
- Embrace self-caring.
- Advance quality healthcare through research and knowledge acquisition.
- Be involved with the community.
- Contribute to the professionalism of nursing.
- Be open minded and flexible with new learning.

As noted, Duffy's Caring Model nursing theory applies to this DNP capstone project as it helps to gain knowledge and expertise through experience; with translation of this experience exhibited through patient and community education (see Appendix C Duffy's Caring Model).

Malcolm Knowles adult learning theory applies to this study as it strives to enhance the knowledge base of emergency care providers eighteen years of age or older. This adult learning theory focuses on adult learners as self-directed, motivated, and experienced healthcare providers.

Taking into account individual learning styles, this educational presentation allows for provision of information using three learning style needs identified by Malcolm Knowles (Russell, 2006). This educational presentation will use visual aids in the form of a power point presentation to enhance the learning of visual learners, and handouts for reference enhancing the educational experience of kinesthetic learners.

With an interactive component, verbal provision of the educational information will enhance the learning of auditory learners. Adult learners have life experiences that carry forward enhancing the outcomes of learning for this presentation.

Review of the Evidence

"A systematic literature review is a means of evaluating and interpreting all available research relevant to a particular research question, topic area, or phenomenon of interest," (Keele, 2007). The purpose of this literature review was to identify research regarding AD, including treatment interventions and provision of care. A comprehensive literature review was performed to identify supportive literature for this evidenced based project.

The databases searched include Medline, PubMed, Google Scholar, Cochran and Cumulative Index to Nursing and Allied Health Literature (CINAHL). Essential terms included "autonomic dysreflexia", "emergency medical providers and autonomic dysreflexia" "spinal cord injury and autonomic dysreflexia", and "emergency medical provider education and autonomic dysreflexia."

Limiting factors for returned articles included publication dates between 2003 to 2013, articles written in the English only language, and scholarly articles. This literature search originally identified one hundred forty-two articles, with 32 articles relevant for consideration. This literature review included scholarly articles, systematic reviews and case studies.

Utilizing the seven levels of evidence according to Houser & Oman (2011) (see figure 1), this literature search produced 32 articles with relevant information.

- Level I=4 articles
  - Level III=2 articles
  - Level IV=13 articles
  - Level VI=8 articles
  - Level VII=3 articles

Figure 1-Levels of Evidence:

Seven Levels of Evidence
Level I: Systematic review or meta-analysis
Level II: Well-designed randomized control study (RCT)
Level III: Quasi-experimental studies
Level IV: Case control and cohort studies; retrospective
Level V: Systematic review of descriptive or qualitative studies
Level VI: Descriptive or qualitative study; survey
Level VII: Expert or regulatory opinions, reports from expert committees

(Houser & Oman, p. 141, 2011).

The information gained from this systematic literature review supports what this investigator as a spinal cord injury expert has experienced, more research regarding AD and the treatment of AD is necessary.

Listed below is one example from each applicable level of evidence utilized for this study; a comprehensive list of all articles used in the creation of this study is readily available via document link (See Appendix D for document link to systematic review excel spreadsheet).

A level I or systematic and scientific reviews article by Furlan (2011) states, "Given that autonomic dysreflexia can be a life-threatening clinical condition, its prompt recognition and adequate management is crucial (Furlan, 2011, p. 796).

A level III or quasi-experimental studies example article with information relevant to this study states, "Severe hypertension should be taken into consideration during diagnostic or therapeutical stimulation of pudendal afferent fibers," (Reitz, Schmid, Curt, Knapp, & Schurch, 2003, p. 542).

Level IV evidence or case control/cohort retrospective studies were the most abundant of articles identified as containing information relevant to this study. A level IV articles, according to Ho & Krassioukov (2010), "Documentation and early recognition of AD should be included as part of the standard neurological assessment and management of individuals with SCI," (Ho & Krassioukov, 2010, p. 715).

Level V evidence or systematic review of descriptive or qualitative studies literature is displayed by Schottler, Vogel, Chafetz, & Mulcahey (2009), "AD seems to be more common in patients with traumatic injuries, older ages at injury, greater injury severity on the AISA and level of injury at or above T6," (Schottler, et al., 2009, p. 686).

Level VI evidence includes descriptive or qualitative study; survey. A level VI study, according to McGillivray, Hitzig, Craven, Tonack & Krassioukov (2009);

> "When patients are treated at the facility that I work for they are typically educated on AD if they have an injury level that makes them susceptible to AD. However, patients often return for follow up evaluation in the outpatient clinic and state they have never heard of AD before-even though it is documented in their inpatient chart as education was completed. When a patient is newly injured they have such an influx of information it is not surprising that some of the information is forgotten," (McGillivray, et al. 2009, p.60).

Level VII evidence includes expert or regulatory opinions, or reports from expert committees. This study utilized information gained from Alexander (2008) "The addition of a standard form of communicating the impact of spinal cord injury on autonomic responses should improve clinical care and research related to spinal cord injury," (Alexander, 2008, p. 403,).

Background and Rationale

This investigator found the literature supported comments from the Nurse Advice Line; healthcare provider knowledge of AD is lacking in the community (C. Davis, personal communication, 2012). This literature review is indicative of the fact that limited literature is available regarding treatment of AD or knowledge regarding the treatment of AD, and indicates a need for enhanced education for healthcare providers regarding autonomic dysreflexia (AD).

According to Cole (2009), all medical professionals should educate the patient and family members or caregivers regarding this potentially life-threatening complication

of SCI. Such instruction should include prevention strategies, signs and symptoms of AD, and proper management of the condition.

"Patients may seek medical assistance at any emergency room or through any EMS provider. Also, patients may present with this disorder during routine medical transport or contact for unrelated reasons. Therefore, it is important that all healthcare professional, not just those who work with clients with SCI become aware of this disease process" (Cole, 2009, p.3).

This literature review indicates patient education regarding AD is not consistent or could be unreliable. According to Schottler, Vogel, Chafetz and Mulcahey (2009), of 215 study participants with a positive history of AD, 15% did not know the definition of AD, 20% could not identify three signs/symptoms of AD and 6% said they did not know how to treat an AD episode if it were to occur. This literature review reveals the need for emergency healthcare provider education regarding AD, as the patient may not always know their unique care needs.

Project Plan and Evaluation

Market/Risk Analysis

A Strengths/Weaknesses/Opportunities and Threats (SWOT) (Management study style, 2013), assessment was used to analyze this project for potential (see figure 2).

- *Strengths* identified included available funding, strong leadership, and champion expertise. Funding, project leadership, and champion expertise were all provided by,

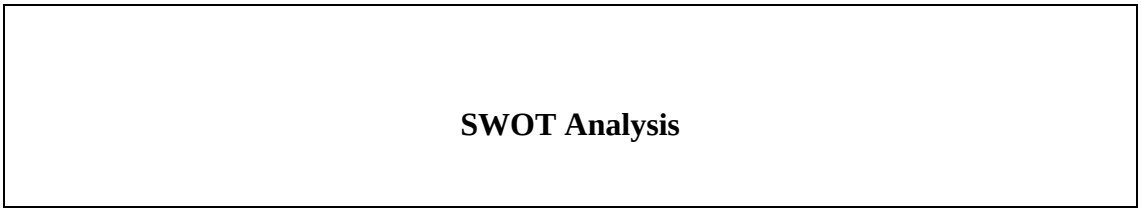
a world-renowned leader in spinal cord injury rehabilitation in this Midwestern Metropolitan area.

- W*eaknesses* identified were economic trends, facility Institutional Review Board (IRB) oversight, and care specific to a limited population. Changes in the economy have an effect on the budget and monies available to facilities to provide this educational offering. Economic fluctuation has the potential of creating a weakness for this presenter to provide the education embraced by this project. Due to economic constraints, facilities may be unable to pay participants to attend this presentation, creating a project weakness. IRB oversight by a specific organization limited this investigators ability to provide this educational provision at any facility. The third identified weakness was provision of education regarding care specific to a limited population due to the fact that (AD) only occurs in SCI patients with a thoracic level six and above, a limited population.

- *Opportunities* identified include promoting unique care specific to SCI person(s), decreased healthcare costs, spinal cord injury expert participation, developing a model for presentation on (AD), and a large sample size. The opportunities to enhance the lives of those suffering from AD by educating emergency care providers regarding this unique condition potentially decreases the risk of adverse outcomes related to misdiagnosis and mistreatment of this unique condition. Decreased healthcare costs arise from proper identification, diagnosis and treatment of AD. A major opportunity for this project was the large sample size of participants available for participation.

- *Threats* identified were limited time constraints for presentation, and opposition to change. Time constraints for presentation included a tight time frame of typically one hour to pass out the pre-educational presentation questionnaire, collect the questionnaire, present the educational interactive lecture, pass out the post-educational presentation questionnaire and collect the questionnaire in a one hour time frame. With small groups of participants this task was fairly simple but with audiences over 30 persons it was a challenge. Opposition to change was identified as a threat due to the potential for some participants to feel they were being challenged on their knowledge level and preparedness to provide emergency care to this unique population of persons. As an outsider, it is difficult to enter a new facility and provide advice on what others may interpret as what they are doing wrong and need to do differently. This presenter strived to acknowledge this fear and state the clear intention of this project which was to enhance knowledge regarding AD.

Figure 2: SWOT Analysis



Strengths	**Opportunities**
Funding available	Promotes unique SCI care
Strong leadership	Decreased healthcare cost
Champion expertise	**Threats**
Weaknesses	Limited time constraints
Facility specific IRB oversight	Opposition to change
Economic trends	
Care specific to limited population	

Driving and Restraining Forces

According to Connelley (2015), "Kurt Lewin wrote that "An issue is held in balance by the interaction of two opposing sets of forces - those seeking to promote change (driving forces) and those attempting to maintain the status quo (restraining forces)," (Connelley, p. 1, 2015). Connelley (2015) notes the stages of Kurt Lewin's theory of change includes unfreezing, change, and refreezing.

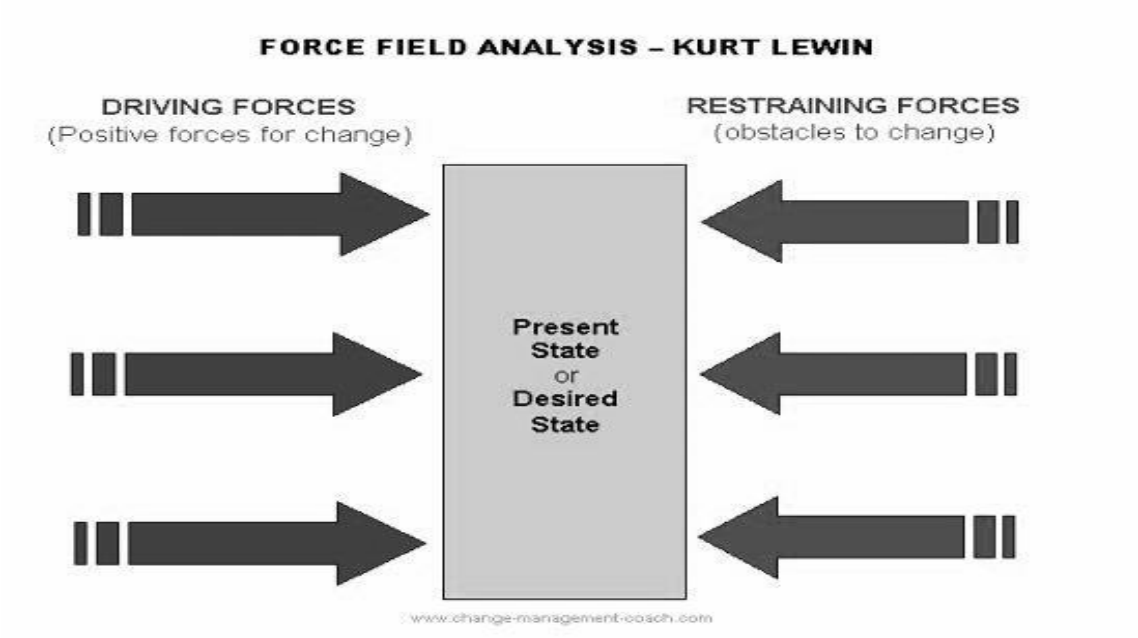
For this study driving forces or those seeking to promote change noted as part of the unfreezing stage included preparing for change. This stage included a literature review to evaluate study need, preparation of the study content, encouraging facility

participation, promoting change among healthcare providers and creating motivation for change through positive promotion of this study and its content information.

Included in this study was the second stage utilizing Kurt Lewin's theory of change (see Figure 3), change itself a driving force. This stage was displayed by the informational material presentation, interactive participant engagement, and feedback. Study members embraced opposition to change by acknowledging participant's lack of knowledge as a system error in lack of education provision rather than a provider error in learning or knowledge acquisition. Study members strove to acknowledge the current knowledge level of participants embracing opposition to change and creating an atmosphere that promoted independent adult learning.

The third stage as defined by Kurt Lewin of refreezing displayed by this study included the provison of new knowledge as displayed by post-educational questionnaire outcomes. New knowledge was attained and measured, displaying enhanced knowledge of AD by participants.

Figure 3: Force Field Analysis



(Connelley, M., 2015)

Resources

Human resources for this project included this investigator, two spinal cord injury expert nurses, a biostatistician, a statistician, an administrative leadership and the research department members for support. Key resources outside of the project included hospital, firehouse, and urgent clinic educators who created the opportunities for this researcher to provide education regarding AD to facility employees and volunteers.

Study Sponsor/Resources

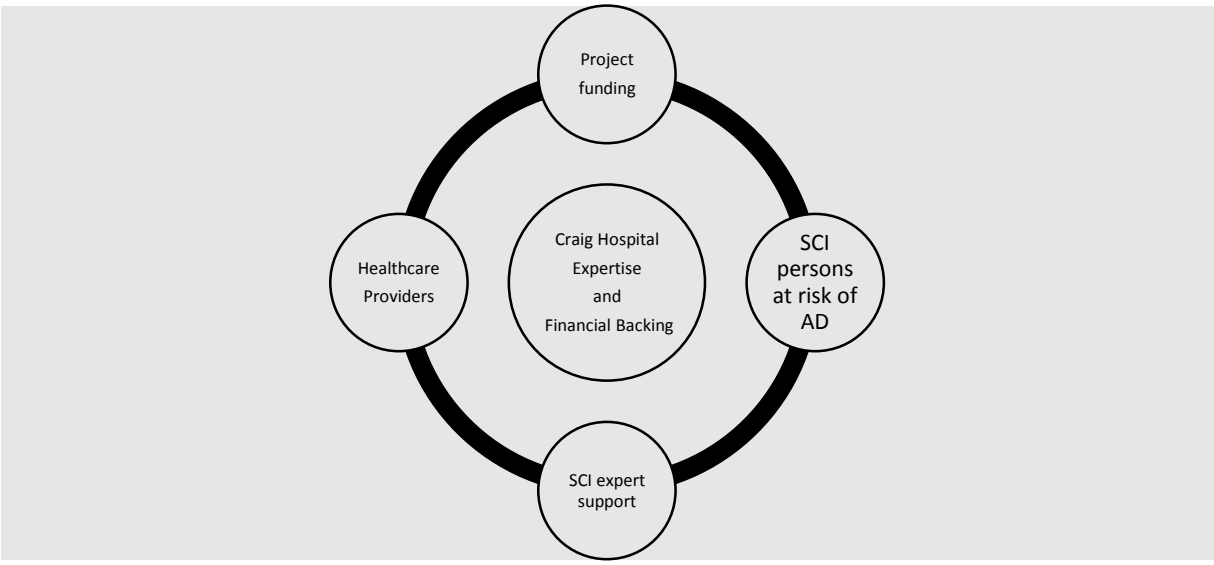
The sponsor of this study is a not-for-profit acute care spinal cord and brain injury rehabilitation facility located in a large Midwestern Metropolitan area (see Appendix E for agency letter of support). This facility is a leader in spinal cord and traumatic brain injury rehabilitation.

Resources for this project include funding for materials, wages for this researcher and two expert nurses to assist with presentations needs, and the spinal cord injury care expertise of this rehabilitation hospital. Hosting facilities provided CEUs for participants from the facility; this researcher did not provide CEUs or any other form of payment to participants.

Future Sustainability

This researcher secured funding and facility support to continue this project though January of 2020 (see figure 4). This project is sustainable through dedicated funding and the unique partnership that this researcher has created with educators at facilities of interest.

Figure 4-Future Sustainability



Cost/Benefit Analysis

Actual cost for this project includes material and presenter provision expenses. Each information packet costs approximately $0.50 to print. The average audience

projected at 30 participants equates to $15.00 per educational session for material. This researcher has estimated on average six educational offerings per year, therefore, the total cost per year for materials would equal $90.

Development of this educational presentation estimated at 80 hours total for presentation development and institutional contact. With an average of $40.00/hr., this would equate to $3,200. Fuel is not included in the cost as presentation staff are paid for their time, not including mileage reimbursement. This adds $120.00 to the overall presentation cost for 2 nurses at an average wage of $40/hr. (30 minute average commute) for six sessions this expense would equal $720. A budget amount of $600 is included in expenses for unexpected expenses incurred for this project. Total expenses for the development cost of this educational presentation would be $4595.

Benefit cost of this education presentation evaluates the average cost of transportation to the emergency department (ED) via ambulance at approximately $5,500.00 with an average expense of $2,600.00 for the ED visit, not including specialty tests that may be ordered. This calculation does not account for patient time, discomfort or adverse outcomes related to misdiagnosis or mistreatment.

When the outcome of misdiagnosis and mistreatment leads to an adverse outcome, obviously the cost is immeasurable. Patient cost would equal $8100.00 at minimum for a single event. This cost analysis shows a benefit over cost ratio of $3,505. This amount includes total presentation development expenses; a single event may potentially display a benefit over cost ratio of $7,331 with $769/educational session expense and the expense of a single patient emergency intervention estimated at $8,100.

The main identified benefit of this project is prepared emergency healthcare providers. The education provided with this project creates the potential of decreasing adverse outcomes related to misdiagnosis and mistreatment of AD, enhancing the lives of those served by this provider group.

Risk/Benefit Analysis

Risks to participants were identified for this project include the potential for participants to feel anxious about filling out questionnaires or feeling as if they are being graded on content knowledge. Benefits for this project include the potential for enhanced knowledge regarding AD by participants attending this educational presentation.

Stakeholders

Stakeholders for this study include SCI persons at risk for developing AD, community members including friends, family members and neighbors of SCI persons at risk for developing AD. Other stakeholders are healthcare providers including physicians, nurses, paramedics, firemen, and emergency medical technicians. Legislators, lawyers, insurance providers, corporate owners, tax payers and employers are also noted stakeholders.

Project Objectives

Mission/Vision/Core Values of this Capstone Project

The *mission* of this project was to increase knowledge of EMS providers regarding AD including cause(s), symptoms, and potential treatment interventions to enhance the care of SCI persons.

The *vision* of this project is to promote the health and well-being of SCI persons susceptible to AD by educating emergency healthcare providers about this unique condition.

The *core values* of this project include respect for persons, autonomy in learning, diversity of participants, dignity, collaboration in care, and ethically centered quality education presentation.

Additionally, according to Chism, L. (2013), ethical leaders such as Doctorate of Nursing professionals possess behavioral traits necessary enhance the profession of nursing.

Behavioral traits Supporting Core Values (Chism, 2013)

- Ethically conscious, having an appreciation for ethics regarding daily actions and decision.
- Ethically committed, committed to doing the right thing.
- Ethically competent, having the understanding and knowledge necessary to do what is right.
- Ethically courageous, acting upon your competence to do the right thing even if it is not popular.
- Ethically consistent, establishing and maintaining an ethical standard.
- Ethically candid, open and honest about questions and answers (Chism, 2013).

Presentation Goals

By the end of this educational presentation, the participant will:

1. Be able to identify the potential for AD according to level of spinal cord injury.
2. Be able to identify four signs and symptoms of AD.
3. Be able to list four potential causes of AD.
4. Be able to list three appropriate interventions by priority.

Project Goals

The overall goal of this study was participant knowledge enhancement. Targeting EMS in this large Midwestern Metropolitan area, it was the overall goal of this educational presentation to enhance knowledge of healthcare providers regarding AD. Provision of knowledge to for this educational presentation included identification, symptoms, complaints, cause(s), and treatment interventions; increasing provider awareness of the unique needs of a SCI person concerning AD.

Project Outcomes

The desired short-term outcome of this educational presentation was enhanced knowledge regarding the unique condition of AD for healthcare personnel who have the potential of working with a SCI person at risk of developing AD.

The long-term outcome of this educational presentation is; enhancing the lives of those SCI persons at risk of developing AD through education of healthcare personnel who may treat a SCI person suffering from AD. This was accomplished by supplying

healthcare providers with the tools necessary to identify persons at risk for developing AD, identify the signs and symptoms associated with AD, and understanding the initial treatment options for AD through this educational presentation.

Needs Assessment

According to Cole (2009), AD can occur any time after spinal shock has been resolved. Patients may seek medical attention at any ED or through any EMS. Patients may present with this disorder during routine medical transport. It is important that all healthcare professionals become aware of this disease process. The first step in managing of AD is to identify the potential disease process, and recognize it as a medical emergency (Autonomic Dysreflexia & Hyperreflexia, 2013).

Many people with spinal cord injuries who are at risk for AD are able to identify its occurrence, signs and symptoms and potential management, yet emergency responders who have knowledge of other conditions may not be receptive to patient suggestions (Hentschke, 2006). "EMS and hospital staff are generally uninformed about this condition and lack resources for identification and management" (Dunn, 2004, p. 256).

"The most disappointing feature of these patient scenarios was the fact that the patient stated they believed they were experiencing an episode of AD and tried to voice this concern to ED personnel with their complaints often falling on deaf ears" (Dunn, 2004, p.256). This displays a need in the healthcare community to educate personnel on the unique needs of SCI patients, to increase awareness of AD as a potential condition, and increase awareness and knowledge regarding the proper treatment regimen for AD.

Population/Recruitment

The population identified for this study included participants from a major Midwestern Metropolitan city's EDs, firehouses, and urgent care clinics; educating first responders, emergency medical technicians (EMTs), nurses, physicians, and urgent care clinic personnel.

Recruitment for this project consisted of a convenience sample, with participant contact made via department and facility educators in the major Metropolitan Midwestern city area. Facilities of educational provision were provided oversight by the Institutional Review Board of a large hospital system in this major Midwestern Metropolitan area.

Sample Size

A power analysis was performed using a confidence interval of 95%, an alpha of .05 with a Cohen's d of .995 (large effect); this power analysis indicated an estimated sample size of 26 was necessary for this study (Polit, 2010). Although a sample size of 26 was deemed adequate, this study originally estimated participation at 225 for IRB study application purposes; actual participant number was 169 (n=169). A sample size of 169 (n=169) was large enough to reduce the probability of a type II data error.

Project Inclusion Criteria

- Healthcare provider
- 18 years of age or older

Project Exclusion Criteria

- Not willing to participate, participation in this project is completely voluntary

Provision for Informed Consent

Waiver of informed consent was requested for this DNP Capstone project. This project qualifies as an Exempt research study, 45 CFR 46.101 (b); this study involves no more than minimal risk and involves no procedures for which consent is normally required; educational tests. This study involved provision of education; it involved no procedures that would typically require consent in a commonly accepted educational setting (Regis University, 2013).

Human Rights Protection

To fully protect participants, this investigator obtained exempt research study status for this project from Regis University and the facility's Institutional Review Boards (see Appendix F, G, and H for IRB approval letters). This study qualifies for 45 CFR 46.101 (b) status as this study involved no more than minimal risk and involves no procedures for which consent it normally required; educational tests. This study involves the provision of education; it involves no procedures which would typically require consent in a commonly accepted educational setting.

This study involved de-identified information gathering. No information was gathered for this study that would identify unique participants. All information was numbered to allow for comparison of outcomes related to pre and post educational knowledge but lacked a subject identifier. All questionnaires were numbered sequentially to allow for comparison of pre and post educational presentation knowledge without

specific participant identifiers used in data collection; for example pretest #1 and posttest #1 for participant #1.

Protection of Human Rights training through CITI has been fulfilled and is up to date for this researcher as evidenced by certificates of CITI training completion (See Appendix I-P for Jenn Wahl CITI training).

Confidentiality of Data

All information gathered was treated confidentially. Demographic data and questionnaires were anonymous with no participant. No study identifiers were assigned; the questionnaires did not contain names of participants, merely responses to pre-established questions. No names or other identifiers are included in reporting, presenting, or publishing the results of this research study.

Completed surveys were stored in a locked cabinet accessible only by the researchers and the person(s) entering the survey information; these surveys will be stored in this locked cabinet for three years post study completion. Analyzed survey information is maintained on a password protected computer with de-identified participant information accessible only by this researcher.

Demographic Data

Using the following questions, demographic data was collected from project participants (see Appendix Q for demographic questionnaire).

1. What is your highest level of education?

2. What is your current role as a healthcare provider?

3. Have you ever cared for a SCI person?

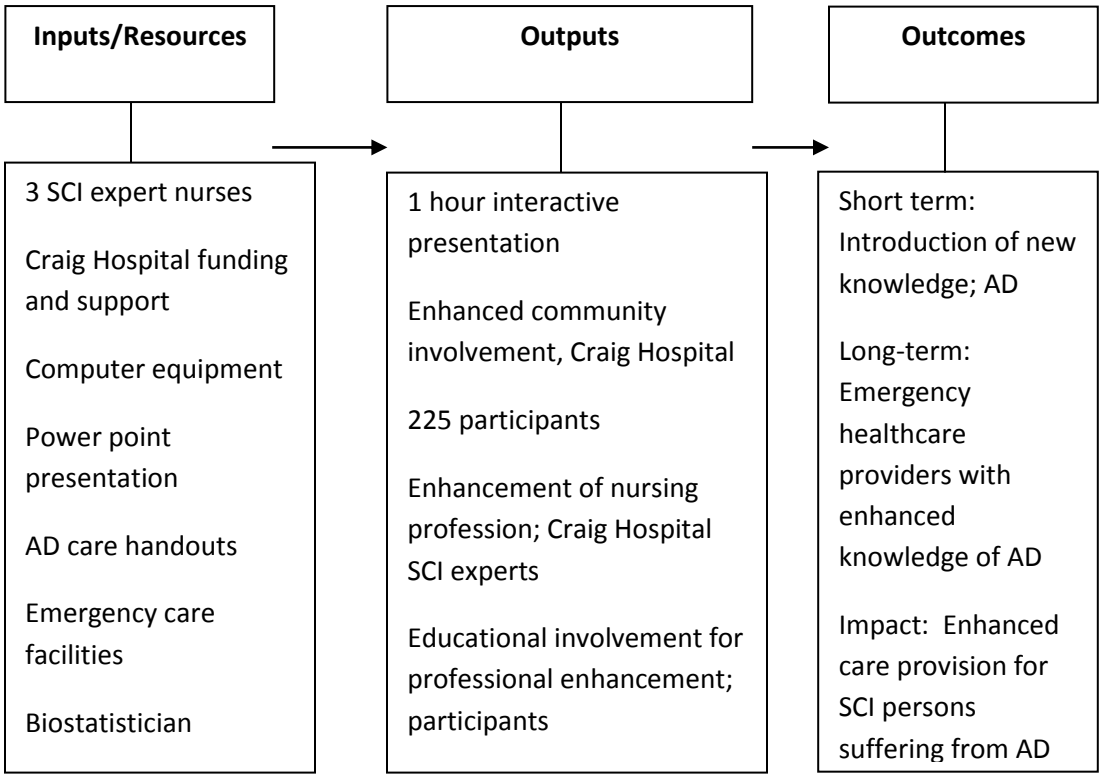
4. Do you have any current knowledge regarding AD?

Evaluation Plan

Logic Model

According to (Zaccagnini & White, 2011), a logic model is a systematic and visual way to present and share your understanding of the resources available to produce your project, the plan to present your project information, and outcomes you plan to achieve (see figure 5).

Figure 5-Logic Model



(Zaccagnini & White, 2011).

Study Methodology

This project is an evidence-based practice (EBP) project in which a quality improvement plan, program evaluation, or simple educational or standard of care

intervention will be completed. In most cases, a simple pre-test/post-test evaluation will assess the effect of the intervention. The project will be internal to an agency and will inform the agency of issues regarding health care quality, cost, and patient satisfaction. The results of this project are not meant to generate new knowledge or be generalizable across settings but rather seek to address a specific population, at a specific time, in a specific agency. These projects translate and apply the science of nursing to the greater health care field.

Projects utilize the acronym "PICO", rather than stating a formal research hypothesis. The acronym stands for: Population or Disease (P), Intervention or Issue of Interest (I), Comparison group or Current Practice (C), and Outcome (O) and is usually framed as a question (Melnyk and Fineout-Overholt, 2011, p. 31). The question this study seeks to address is: Does participation in this educational presentation enhance the knowledge of participants regarding AD?

This study incorporated a quasi-experimental research design using a pre and post presentation questionnaire(s) to evaluate knowledge enhancement. According to Harris, et al (2006), this is the appropriate type of research design to determine the causal impact of the educational presentation on participant knowledge. Quasi-experiments aim to demonstrate causality between an intervention and an outcome without the use of randomization and was chosen by this researcher as it was the most appropriate way to evaluate knowledge enhancement for this study.

There were three stages for this project application. Stage I, the participants were given a pre educational presentation questionnaire (pretest) and demographic survey; prior to the educational presentation, the completed questionnaires were collected from

participants. Stage II, was the interactive educational presentation. Stage III, the participants were given a post educational presentation (posttest), upon completion the posttest and demographic data sheets were collected from all participants.

Variables

This project incorporated a quasi-independent variable, interactive educational presentation. The dependent variable(s) for this project was the educational presentation participants.

Intervention

The intervention for this research study is a pre-structured educational presentation regarding AD using a power point presentation and interactive lecture. This educational presentation was interactive; participants were encouraged to ask questions at any time during the presentation with adjunct information provided as requested by the project participants.

Knowledge Assessment Tool

The assessment tool used for this project consists of identically numbered pre and post presentation questionnaires. Pre-presentation questionnaires were distributed and collected before the presentation. The educational presentation took place, and then a post-presentation questionnaire identical to the pre-presentation questionnaire was distributed and collected.

Comparison of these identical questionnaires only identified by document numbering, allowed this researcher measure knowledge enhancement as evidenced by answers to pre and post presentation questionnaires.

Data Analysis

A statistician performed the data analysis for this study. Information gathered from this research project was analyzed using a Likert scale of ranking to obtain ordinal data, however to complete a t-test, this ordinal data was changed to interval data to allow for analysis. The in a nominal fashion using a paired t-test statistical data analysis. Information gathered from pre and post presentation questionnaires in conjunction with demographic data was used to draw conclusions for this study using descriptive and inferential statistics.

SPSS version 21 was used to evaluate the data and provide statistical outcomes for this study. Using a paired t-test, outcomes indicating enhanced knowledge of participants were obtained. Data analysis for a population of 169 participants (n=169) with a 95% confidence interval revealed a pre-test mean score=4.57, standard deviation (sd) =2.25, post-test mean score=8.11, sd=1.90. Statistical outcomes for this study displayed a p value of .000. This p value displays statistical significance for this study as any probability value (p value) less than .05 is statistical significant (Polit, p. 101, 2010). **(**See Appendix R for paired t-test data).

Threats to Validity and Reliability

Statistical validity is threatened when inappropriate statistical measures are applied to data analysis (Bogue, 2010). Statistical validity is assured for this study through the application of a nominal fashion t-test for data analysis utilizing descriptive and inferential statistics.

Construct validity is threatened by the use of inappropriate instruments for presentation and/or evaluation, or an alternative answer for project results. Construct

validity for this study was strengthened through the application of a well-developed theory based application for information presentation. Additionally, the power point presentation used for the provision of information in this presentation was pre-determined and did not change throughout the project presentation period.

The instruments for this project included a pre and post presentation questionnaire with ten identical questions on each form. Questions for this study were developed by this researcher and the Medical Director allowing for content inclusion relevant to AD by SCI experts.

Questionnaires were uniquely numbered for comparison of pre and post lecture answers from participants while maintaining participant de-identification. For example for participant number one, the pre and post presentation questionnaires numbered as #1. The questionnaires were sequentially numbered to avoid duplication. A Pearson correlation analysis for the study questionnaires displayed a low correlation with high significance (0.01 level; 2-tailed) indicating reliability for the measurement tool in that it measured what it intended to measure consistently (See attachment S for Pearson correlation).

External validity for this project was threatened by generalization of project findings beyond the scope of this convenience sample (Bogue, 2010). External validity strengthened with this study through application of gathering a representative convenience sample without bias and clearly describing the demographics of the participants in the data analysis.

Internal validity is threatened by confounding variables, which may include variation such as inconsistent information provision in the presentation (Bogue, 2010). Internal validity strengthened in this study through the application of controls to reduce or eliminate confounding variables with presentations; standardized presentations used to eliminate variation in information provision, variable control.

Study Timeframe

The following timeframe was developed for this study:

- December 2013 through January of 2014; project planning, identification of facilities for presentation, organizing facilities and audiences for presentation, ensuring that the information provided in this educational presentation was consistent and accurate.
- February 2014 through June of 2015; conduction of the provision of presentations to pre-established audiences as determined by individual facilities chosen for inclusion in this educational offering and data gathering.
- June 2015 through July 2015; data analysis of the pre and post presentation questionnaires as well as demographic information of study participants.
- July 2015 through August 2015; organization of materials for publication and presentation of study findings.

Budget and Resources

This study was allocated $5,000 for initial development and presentation expenses for year one. After the first year, a budget expense of $1,500 was forecasted and

allocated to cover all project expenses including salary payment, materials cost, and unexpected expenses.

This rehabilitation hospital in a large Midwestern Metropolitan city is dedicated to the enhancement of the profession of nursing. This hospital has allowed for participation by this researcher and two spinal cord expert nurses for this educational presentation. The expert nurses participating in this study are a resource with immeasurable worth; the average SCI experience level of these three project champions is twelve years. Capitalizing on unique SCI knowledge and expertise, this educational offering will serve to share this specialized knowledge to enhance the lives of those we are committed to serve.

This rehabilitation facility and its employees dedicate themselves to enhancing the lives of those persons who incur a spinal cord or traumatic brain injury. This study supports the mission of this facility by educating emergency healthcare providers on the unique needs of SCI population it serves.

Other resources necessary for this study include facilities for presentation. This pre-designated team of expert SCI nurse traveled to firehouses, EDs, and hospital conference rooms within the large Midwestern Metropolitan area to provide this educational presentation. This allowed the presentation team to use the resources of established facilities for presentation eliminating the need participant travel, and expense related to facility rental for presentation.

Project Findings

Of the 169 emergency healthcare providers who participated in this study, 98% of these participants completed both the pre and post educational presentation questionnaires for data analysis. The participants were chosen from a convenience sample and participated voluntarily in this study.

Tests and Analysis on Demographics

The study team gathered data on the participants from the demographic questionnaire included in this study (See Appendix T for participant level of education). The total number of participants who completed the demographic questionnaire was 172, three of the 172 participants had posttest questionnaires that were left entirely bland and could not be included in this study's data analysis.

Descriptive analysis of the demographic information for study participants revealed the following information regarding educational background according to the demographic data questionnaire:

- Bachelor of Science in Nursing 31%; (n=53).
- Some college education 20%; (n=35).
- Associate's Degree 15%; (n=26).
- Bachelor of Arts degree 14%; (n=24).
- High School education 9%; (n=15).
- Master's Degree 6%; (n=11).

- Doctorate degree 3%; (n=5).
- PhD 1%; (n=1).
- Bachelor of Science 1%; (n=2).

Descriptive analysis of the demographic information for study participants revealed the following information regarding previous experience caring for a SCI person and previous knowledge of AD. (See Appendix U for AD knowledge and SCI experience).

- Yes had previously cared for a SCI person 88%; (n=152).
- No, had not previously cared for a SCI person 12%; (n=20).
- Yes, had previous knowledge of AD 57%; (n=98)
- No, had no previous knowledge of AD 43%; (n=74)

Tests and Analysis on Written Exam

Participants in this study took a written exam in stage I (pre-presentation) and stage III (post-presentation). A paired t-test comparison of pre and post educational presentation scores revealed that results on the post educational presentation examination were higher on average for participants (m=8.1124) as compared to pre-educational presentation scores (m=4.5740); mean difference was -3.53846; t=-17.446; p=.000, CI -3.9388 to -3.13805; correlation .203; Significance .008. These paired t-test results display knowledge enhancement for participants; achieving the goal of this study, enhance participant knowledge regarding AD.

Limitations, Recommendations, Implications for Practice

Limitations

This study used a convenience sample for participation, which according to Polit (2010) means bias can exist making the study not generalizable. However, because the participants in this study are from a variety of healthcare settings, this researcher believes that this convenience sample is representative of the general population of healthcare providers who have the potential of working with a SCI person suffering from AD.

Facility participation is noted as one of the greatest challenges for this study. This researcher was able to make successful contact with facility educators to discuss the possibility of providing this education and the potential for this presentation; however, it was difficult to obtain follow through with educators to schedule presentation times. Meaning, that while facility educators were interested in providing this information, they were ‘unavailable’ for presentation scheduling.

Participant impact was also noted as a study limitation. Due to a variation in levels of education and experience among participants, this educational presentation provided new knowledge to some participants while reinforcing knowledge for others. This variation created a limitation regarding prior knowledge base. Some participants had a lot of knowledge regarding AD, while others had little or no knowledge of this unique condition.

Another limitation for this project was noted as data collection depending upon audience size. It was a challenge to manage the distribution and collection of the pre-educational presentation questionnaire prior to the educational presentation. It was

essential to collect the pre-educational presentation questionnaire before giving the educational presentation in order to disallow participants from filling out the content information during the presentation. Although the participants were informed that the pre and post educational presentation questionnaires were not graded and were strictly used for educational purposes only, some participants expressed a fear of choosing the wrong answer on the pre-test.

A final noted study limitation was created by having the post-test questionnaire filled out immediately after the educational presentation. This researcher was unable to determine if the participants gained long term knowledge retention and thus long term knowledge enhancement due to the fact that the learning was evaluated immediately after the information was presented rather than being tested after an extended period of time such as one-year.

Recommendations for Change

Recommendations for change for future project enhancement would include the provision and completion of the pre-educational presentation questionnaire upon class enrollment. The greatest challenge for this project was administration and collection of the pre-educational presentation questionnaire pre-presentation.

For the purpose of time constraints it would have been more efficient to hand out both the pre and post educational presentation together and collect both questionnaires post lecture. However, as stated previously some participants felt that they would be 'graded' on their responses and were reluctant to hand in the pre-educational presentation questionnaire before they had learned about AD.

This researcher went to great lengths to ensure the participants that they were not being graded on their responses and that the information was for educational purposes only, however some participants were still reluctant to fill out the questionnaire for fear of 'failing.' This created a need to collect the pre-test questionnaire before the presentation; to ensure participants were not filling out the questions during the presentation.

A final change for this study would be the inclusion of demographic information regarding age and gender to identify differences between participants and the acquisition of knowledge according to age and gender.

Implications for Change

Outcomes for this study displayed a need to continue this education provision as evidenced by a pre-test questionnaire mean score of 4.57 and a post-test questionnaire mean score of 8.11. Study outcomes also indicate a need to expand provision of this information to a more broad audience base including police departments, free standing rehabilitation facilities and general hospitals with an intensive care unit, an ED, and/or a rehabilitation unit.

Beneficial to this project would be information that is more tailored to specific audience needs rather than standardized information provision. Information provision that is more tailored to target audiences would allow for the delivery of information in a more or less technical manner depending upon the audience education and experience level.

An additional implication for change will incorporate a change in educational provision depending upon spinal cord injured persons feedback about treatment from healthcare providers in the large Midwestern Metropolitan area. Meaning, former patients and their family members could assist in identifying facilities in need of education and specific treatment needs to be addressed with educational provision.

A research study could potentially be created from the changes in patient outcomes according to patient feedback. A qualitative study could be performed in order to evaluate whether or not people who had been treated for AD by emergency medical personnel in the large Midwestern Metropolitan area had been correctly diagnosed and treated.

Conclusion

As stated by Duffy's Caring Model, the professional nurse has certain responsibilities (Parker & Smith, 2010). These responsibilities include advancing knowledge and expertise, create and sustain caring relationships, and providing exemplary patient centered care. This includes embracing a culture of self-caring, commitment to community involvement, personal contribution to the profession of nurse, and a commitment to the advancement of quality healthcare through research and knowledge acquisition (Parker and Smith, 2010).

The mission statement of Regis University supports this caring model. Mirroring the Regis University Mission statement (Regis University, 2013), this DNP capstone project helps answer the question, "How ought we to live?" We as professional nurses should live to serve those we care for. This includes our patients, their family members,

friends, and society as a whole. This study serves to enhance the lives of those suffering from a spinal cord injury by educating healthcare providers on their unique needs.

As an underserved population, SCI persons not unlike other members of society deserve respect for their unique needs. SCI persons deserve a dedication to professional knowledge enhancement, social responsibility to enhance care of this underserved population through communication and education, and a commitment to the development of skills and professional leadership abilities, demonstrated by this study.

AD is a condition unique to SCI persons thoracic level sixth vertebrae and above (Hentschke, 2006). Embracing the expertise of Craig Hospital as a nationally renowned leader in spinal cord and brain injury rehabilitation, this study strove to capture this expertise knowledge serving to enhance the lives of SCI persons through education of healthcare providers regarding AD. Enhancing the knowledge of emergency care providers regarding AD, this study hopes to enhance exemplary patient care for SCI persons through a commitment to research and knowledge attainment.

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Appendix A

Pre-test ***Autonomic Dysreflexia***

1. Autonomic dysreflexia is an exaggerated response of the sympathetic nervous system that occurs in patients with a SCI located:

    a. At or above the T6 level

    b. At the C2-C3 level

    c. Below the L4-L5 level

    d. At or below the T7 level

2. When does autonomic dysreflexia typically occur after SCI?

    a. 2 to 3 months after the spinal cord injury

    b. Before spinal shock begins

    c. Only after recovery from spinal shock

    d. During the manifestations of acute spinal shock

3. Which condition listed below would NOT cause an episode of autonomic dysreflexia?

    a. Fecal impaction

    b. Ingrown toenail

    c. Infected tooth

    d. mosquito bite on the big toe

4. What are three serious complications that may result with an episode of autonomic dysreflexia?

    a. Cerebral hemorrhage, myocardial infarction, seizures.

    b. Pulmonary edema, congestive heart failure, diabetes.

    c. Seizures, respiratory failure, coma.

d. Pulmonary edema, cellulites, sepsis.

5. When a patient begins to manifest symptoms of autonomic dysreflexia, the first action is to :

    a. Check the catheter for kinks

    b. Check the bowel for an impaction

    c. Elevate the patients head

    d. Remove tight clothing

6. Identify four typical signs and symptoms of autonomic dysreflexia:

    a. Headache, backache, confusion, decreased attention.

    b. Headache, goose bumps, nasal stuffiness, facial flushing.

    c. Facial flushing, sweating, heartburn, anxiety.

    d. Headache, tingling in extremities, loss of movement, loss of sensation.

7. Identify the most common cause of autonomic dysreflexia listed below:

    a. Urinary, a blocked catheter.

    b. Gastrointestinal, a full bowel.

    c. Pressure on skin.

    d. Menses.

8. In the adult, how high does the blood pressure have to be to suspect AD?

    a. 60-80 mm Hg over baseline blood pressure.

    b. 30-50 mm Hg over baseline blood pressure.

    c. 20-40 mm Hg over baseline blood pressure.

d. 40-60 mm Hg over baseline blood pressure.

9. In the adolescent how high does the blood pressure have to be to suspect AD?

a. 20-40 mm Hg over baseline blood pressure.

b. 15-20 mm Hg over baseline blood pressure.

c. 40-50 mm Hg over baseline blood pressure.

d. 10-20 mm Hg over baseline blood pressure.

10. What medications are used for treatment for patients with autonomic dysreflexia?

a. Vasodilators, nitrates, oral clonidine.

b. Vasopressors, bronchodilators, oral valium.

c. Bronchodilators, antiemetic, laxatives.

d. Antihistamines, stool softeners, Ativan

Appendix B

Post-test ***Autonomic Dysreflexia***

1. When does autonomic dysreflexia typically occur after SCI?

    a. 2 to 3 months after the spinal cord injury

    b. Before spinal shock begins

    c. Only after recovery from spinal shock

    d. During the manifestations of acute spinal shock

2. Identify four typical signs and symptoms of autonomic dysreflexia:

    a. Headache, backache, confusion, decreased attention.

    b. Headache, goose bumps, nasal stuffiness, facial flushing.

    c. Facial flushing, sweating, heartburn, anxiety.

    d. Headache, tingling in extremities, loss of movement, loss of sensation.

3. Which condition listed below would NOT cause an episode of autonomic dysreflexia?

    a. Fecal impaction

    b. Ingrown toenail

    c. Infected tooth

    d. mosquito bite on the big toe

4. What are three serious complications that may result with an episode of autonomic dysreflexia?

    a. Cerebral hemorrhage, myocardial infarction, seizures.

    b. Pulmonary edema, congestive heart failure, diabetes.

    c. Seizures, respiratory failure, coma.

    d. Pulmonary edema, cellulites, sepsis.

5. Autonomic dysreflexia is an exaggerated response of the sympathetic nervous system that occurs in patients with a SCI located:

a. At or above the T6 level

b. At the C2-C3

a. Below the L4-L5 level

b. At or below the T7 level.

6. In the adult, how high does the blood pressure have to be to suspect AD?

a. 60-80 mm Hg over baseline blood pressure.

b. 30-50 mm Hg over baseline blood pressure.

c. 20-40 mm Hg over baseline blood pressure.

d. 40-60 mm Hg over baseline blood pressure.

7. When a patient begins to manifest symptoms of autonomic dysreflexia, the first action is to:

e. Check the catheter for kinks

f. Check the bowel for an impaction

g. Elevate the patients head

h. Remove tight clothing

8. Identify the most common cause of autonomic dysreflexia listed below:

a. Urinary, a blocked catheter.

b. Gastrointestinal, a full bowel.

c. Pressure on skin.

d. Menses.

9. In the adolescent how high does the blood pressure have to be to suspect AD?

a. 20-40 mm Hg over baseline blood pressure.

b. 15-20 mm Hg over baseline blood pressure.

c. 40-50 mm Hg over baseline blood pressure.

d. 10-20 mm Hg over baseline blood pressure.

10. What medications are used for treatment for patients with autonomic dysreflexia?

a. Vasodilators, nitrates, oral clonidine.

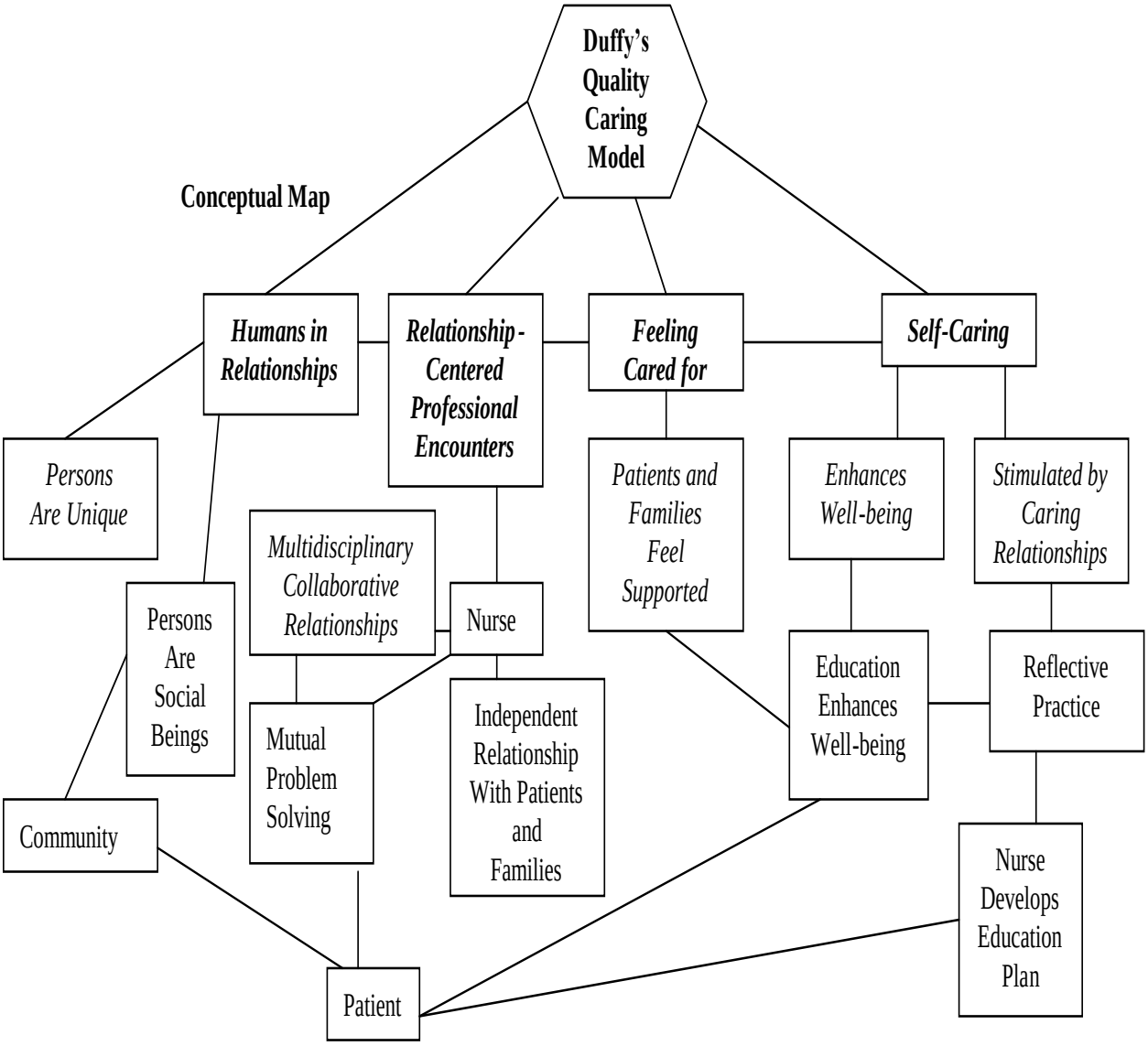
b. Vasopressors, bronchodilators, oral valium.

c. Bronchodilators, antiemetic, laxatives.

d. Antihistamines, stool softeners, Ativan.

Appendix C

Duffy's Caring Model



Appendix D

Systematic Literature Review

Systematic Review Evidence Table Format [adapted with permission from Thompson, C. (2011). Sample evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), Evidence-based practice: An implementation guide for healthcare organizations (p. 155). Sudbury, MA: Jones and Bartlett.] Systematic table information provided by Jennifer Wahl, MS, RN, CRRN.				SREvidenceTable v15.xls
Article Title and Journal	Anderson, K., Borisoff, J., Johnson, R., Stiens, S., & Elliott, S. (2007). The impact of spinal cord injury on sexual function: concerns of the general population. *Spinal Cord*, 45(5), 328-337.	Dunn, K. (2004). Identification and management of autonomic dysreflexia in the emergency department. *Topics In Emergency Medicine,* 26(3), 254-259.	Aitken, L., Marshall, A., Elliott, R., & McKinley, S. (2009). Critical care nurses' decision making: sedation assessment and management in intensive care. *Journal Of Clinical Nursing* , 18(1), 36-45. doi:http://dx.doi.org.dml.regis.edu/10.1111/j.1365-2702.2008.02318.x	Alexander, M., Biering-Sorensen, F., Bodner, D., Brackett, N., Cardenas, D., Charlifue, S., & ... Wyndaele, J. (2009). International standards to document remaining autonomic function after spinal cord injury [corrected] [published erratum appears in *Spinal Cord* 2009 Jul;47(7):575]. *Spinal Cord,* 47(1), 36-43. doi:http://dx.doi.org.dml.regis.edu/10.1038/sc.2008.121
Database and Keywords	EBSCO/Spinal cord injury; sexual function; complications; bladder and bowel; autonomic dysreflexia; quality of life	EBSCO/Spinal cord injury, Autonomic Dysreflexia, Hyperreflexia.	CINAHL/Critical care, decision making, nurses, nursing, sedation.	CINAHL/Autonomic nervous system; spinal cord injury; human; international standards.
Research Design	Secure, web-based survey	Case study	Observational exploratory study	Expert opinion
Level of Evidence	VI	IV	VI	VII
Study Aim/Purpose	To obtain information from the spinal cord injured (SCI) population regarding sexual dysfunctions, with the aim of developing new basic science and clinical research and eventual therapies targeting these issues.	To present an overview of autonomic dysreflexia including the pathophysiology, etiology, signs and symptoms, and management appropriate for the emergency department setting.	This study was designed to examine the decision making processes that nurses use when assessing and managing sedation for a critically ill patient, specifically the attributes and concepts used to determine sedation needs and the influence of a sedation guideline on the decision making processes.	To develop a common strategy to document remaining autonomic neurologic function following spinal cord injury (SCI).

Appendix E

Facility Letter of Support

Craig Hospital

Redefining Possible for People with Spinal Cord and Brain Injuries

August 18, 2015

Letter of support for Jenn Wahl's research study titled:
Autonomic Dysreflexia a First Responders First Response

Dear Dr. Cullen,

As the Vice President of Patient Care Services/ Chief Nursing Officer at Craig Hospital, I fully support Jenn Wahl's capstone project titled Autonomic Dysreflexia a First Responders First Response. The study was first approved by the HealthONE IRB on Feb 12, 2013.

The proposed capstone project is highly relevant for those caring for Spinal Cord Injury patients, and in line with the research focus of the nursing department at Craig Hospital. Publication of this information will be very informative for all clinicians.

Yours sincerely,

Diane Reinhard

Diane Reinhard, RN,DNP,MBA,MSCIS,CRRN, NE-BC

3425 S. Clarkson St. • Englewood, CO 80113 • 303.789.8000 • www.craighospital.org

Appendix F

REGIS UNIVERSITY
Academic Grants

3333 Regis Boulevard, H-4
Denver, Colorado 80221-1099

303-458-4206
303-964-5528 FAX
www.regis.edu

IRB – REGIS UNIVERSITY

March 6, 2014

Jennifer Wahl
2725 Marlin Way
Castle Rock, CO 80109

RE: IRB #: 14-130

Dear Ms. Wahl:

Your application to the Regis IRB for your project, "Autonomic Dysreflexia: A Medical Emergency," was approved as an exempt study on March 2, 2014. This study was approved per exempt study category of research 45CFR46.101.b(#1).

The designation of "exempt" means no further IRB review of this project, as it is currently designed, is needed.

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be resubmitted to the Regis IRB for approval.

Sincerely,

Patsy Cullen

Patsy McGuire Cullen, PhD, PNP-BC
Chair, Institutional Review Board
Professor & Director
Doctor of Nursing Practice & Nurse Practitioner Programs
Loretto Heights School of Nursing
Regis University

cc: Dr. Colleen McCallum

Appendix G

Rose Medical Center
Sky Ridge Medical Center
Swedish Medical Center
LEADING HOSPITALS. TRUSTED CARE.

303.584.2300 Phone
303.584.2305 Fax
www.HealthONEcares.com

DATE: April 16, 2012

TO: Jenn Wahl, MS
FROM: HCA-HealthONE IRB

PROJECT TITLE: [321418-1] Enhancing Knowledge Regarding Autonomic Dysreflexia A First Responders First Response

SUBMISSION TYPE: New Project

ACTION: **DETERMINATION OF EXEMPT STATUS**
DECISION DATE: April 16, 2012

REVIEW CATEGORY: Exemption category #1

"Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods."

Thank you for your submission of New Project materials for this project. The HCA-HealthONE IRB has determined this project is **EXEMPT FROM IRB REVIEW** according to federal regulations.

It has been noted that this project is designed to enhance knowledge among emergency care personnel regarding autonomic dysreflexia (AD) including cause(s), symptoms, and potential treatment interventions; increasing provider awareness of the unique needs of a spinal cord injured person concerning AD.

The requirement to obtain a signed consetn form has been waived from all of the subjects per 45 CFR 46.117(c)(2) becuase the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context.

Because of this Exempt status, you will not be required to submit a continuing review report. However, should any study procedures change that could affect the exempt status of this study please contact the IRB office immediately.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the HCA-HealthONE IRB Administrative Office at 303-584-2300. Please include your project title and the IRBNet reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within HCA-HealthONE IRB's records.

Appendix H

The Medical Center of Aurora
North Suburban Medical Center
Presbyterian/St. Luke's Medical Center &
Rocky Mountain Hospital for Children
Spaulding Rehabilitation Hospital
Rose Medical Center
Sky Ridge Medical Cente
Swedish Medical Center

DATE: December 20, 2013

TO: Jenn Wahl, MS

FROM: HCA-HealthONE IRB

LEADINGHOSPITALS.TRUSTEDCARE.
HCA - HealthONE
Institutional Review Board
4900 South Monaco Street
Suite 230
Denver, Colorado 80237
303.584.2300 Phone 303.584.2305 Fax
www.HealthONEcares.com

PROJECT TITLE: [321418-3] Autonomic Dysreflexia A Medical Emergency

SUBMISSION TYPE: Amendment/Modification

ACTION: ACKNOWLEDGED

Thank you for submitting the Amendment/Modification materials for the above research project. The HCAHealthONE IRB has ACKNOWLEDGED your submission and receipt of the materials listed below.

It was noted that you requested to make the following minor revisions:

- Update study title
- Add Demographic Questionnaire, not dated

Based on the documentation submitted to the HCA-HealthONE IRB, you have stated that the risk/ benefit ratio remains acceptable to continue the study in its current configuration and no revisions are required in the protocol or the consent form. No further action is required. This information will be posted electronically in IRBNet. The Board will be notified of this update at the next convened meeting.

The following items are acknowledged in this submission:

- Amendment/Modification - Amendment Modification (UPDATED: 12/5/2013)
- Other - Demographic data collection (UPDATED: 12/5/2013)
- Protocol - Study protocol clean copy v2 (UPDATED: 12/5/2013)
- Protocol - Study protocol tracked changes v2 (UPDATED: 12/5/2013)

If you have any questions, please contact the HCA-HealthONE IRB Administrative Office at 303-584-2300. Please include your project title and IRBNet ID number in all correspondence with the IRB.

This letter has been electronically signed in accordance with all applicable regulations and a copy is retained within the HCAHealthONE IRB's records. Generated on IRBNet

Appendix I

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Jennifer Wahl (ID: 2204539)
- **Email:** jwahl@craighospital.org
- **Institution Affiliation:** HCA-HealthONE (ID: 1234)
- **Phone:** 303-789-8525

- **Curriculum Group:** Basic/Refresher Course - Human Subjects Research
- **Course Learner Group:** IRB Member (INACTIVE)
- **Stage:** Stage 2 - Refresher Course

- **Report ID:** 12016618
- **Completion Date:** 01/17/2014
- **Expiration Date:** 01/16/2017
- **Minimum Passing:** 85
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
SBE Refresher 1 – Defining Research with Human Subjects (ID:15029)	01/17/14	2/2 (100%)
SBE Refresher 1 – Privacy and Confidentiality (ID:15035)	01/17/14	2/2 (100%)
SBE Refresher 1 – Assessing Risk (ID:15034)	01/17/14	2/2 (100%)
SBE Refresher 1 – Research with Children (ID:15036)	01/17/14	2/2 (100%)
SBE Refresher 1 – International Research (ID:15028)	01/17/14	2/2 (100%)
Biomed Refresher 2 - Instructions (ID:764)	01/17/14	No Quiz
SBE Refresher 1 – Instructions (ID:943)	01/17/14	No Quiz
Biomed Refresher 2 – History and Ethical Principles (ID:511)	01/06/14	3/3 (100%)
Biomed Refresher 2 – Regulations and Process (ID:512)	01/06/14	2/2 (100%)
Biomed Refresher 2 – Informed Consent (ID:514)	01/06/14	3/3 (100%)
Biomed Refresher 2 – SBR Methodologies in Biomedical Research (ID:515)	01/06/14	4/4 (100%)
Biomed Refresher 2 - Populations in Research Requiring Additional Considerations and/or Protections (ID:519)	01/06/14	1/1 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Children (ID:521)	01/06/14	3/3 (100%)
Biomed Refresher 2 – FDA-Regulated Research (ID:524)	01/06/14	3/3 (100%)
Biomed Refresher 2 – HIPAA and Human Subjects Research (ID:526)	01/06/14	9/9 (100%)
Biomed Refresher 2 – Conflicts of Interest in Research Involving Human Subjects (ID:681)	01/06/14	3/3 (100%)
HCA-HealthONE (ID:12656)	01/17/14	No Quiz
HCA - Custom Module (ID:12719)	01/17/14	5/5 (100%)
Biomed Refresher 2 – Genetics Research (ID:518)	01/06/14	2/2 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

Appendix J

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Jennifer Wahl (ID: 2204539)
- **Email:** jwahl@craighospital.org
- **Institution Affiliation:** HCA-HealthONE (ID: 1234)
- **Phone:** 303-789-8525

- **Curriculum Group:** Basic/Refresher Course - Human Subjects Research
- **Course Learner Group:** IRB Member (INACTIVE)
- **Stage:** Stage 2 - Refresher Course

- **Report ID:** 12016618
- **Report Date:** 07/20/2015
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT SCORE	
Biomed Refresher 2 - Instructions (ID:764)	01/17/14	No Quiz
Biomed Refresher 1 - Instructions (ID:960)	01/06/14	No Quiz
HCA - Custom Module (ID:12719)	01/17/14	5/5 (100%)
Biomed Refresher 2 – History and Ethical Principles (ID:511)	01/06/14	3/3 (100%)
Biomed Refresher 2 – Regulations and Process (ID:512)	01/06/14	2/2 (100%)
Biomed Refresher 2 – Informed Consent (ID:514)	01/06/14	3/3 (100%)
Biomed Refresher 2 – SBR Methodologies in Biomedical Research (ID:515)	01/06/14	4/4 (100%)
Biomed Refresher 2 – Records-Based Research (ID:516)	01/06/14	3/3 (100%)
SBE Refresher 1 – Instructions (ID:943)	01/17/14	No Quiz
Biomed Refresher 2 – Genetics Research (ID:518)	01/06/14	2/2 (100%)
SBE Refresher 1 – International Research (ID:15028)	01/17/14	2/2 (100%)
Biomed Refresher 2 - Populations in Research Requiring Additional Considerations and/or Protections (ID:519)	01/06/14	1/1 (100%)
SBE Refresher 1 – Defining Research with Human Subjects (ID:15029)	01/17/14	2/2 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Prisoners (ID:520)	01/06/14	2/2 (100%)
SBE Refresher 1 – Assessing Risk (ID:15034)	01/17/14	2/2 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Children (ID:521)	01/06/14	3/3 (100%)
SBE Refresher 1 – Privacy and Confidentiality (ID:15035)	01/17/14	2/2 (100%)
Biomed Refresher 2 – Vulnerable Subjects – Pregnant Women, Human Fetuses, Neonates (ID:522)	01/06/14	2/2 (100%)
SBE Refresher 1 – Research with Children (ID:15036)	01/17/14	2/2 (100%)
Biomed Refresher 2 – FDA-Regulated Research (ID:524)	01/06/14	3/3 (100%)
Biomed Refresher 2 – HIPAA and Human Subjects Research (ID:526)	01/06/14	9/9 (100%)
Biomed Refresher 2 – Conflicts of Interest in Research Involving Human Subjects (ID:681)	01/06/14	3/3 (100%)
HCA-HealthONE (ID:12656)	01/17/14	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970

Appendix K

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Jennifer Wahl (ID: 2204539)
- **Email:** jwahl@craighospital.org
- **Institution Affiliation:** HCA-HealthONE (ID: 1234)
- **Phone:** 303-789-8525

- **Curriculum Group:** CITI Good Clinical Practice
- **Course Learner Group:** Biomedical Researchers-GCP
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 12016619
- **Completion Date:** 01/17/2014
- **Expiration Date:** N/A • **Minimum Passing:** 85
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
The CITI Good Clinical Practice Course for Clinical Trials Involving Drugs and Devices (ID:1350)	01/17/14	3/3 (100%)
Overview of New Drug Development (ID:1351)	01/17/14	5/5 (100%)
Overview of ICH GCP (ID:1352)	01/17/14	4/4 (100%)
FDA Regulated Research and ICH for Investigators Archived 1353 (ID:1353)	01/17/14	5/5 (100%)
ICH - Comparison Between ICH GCP E6 and U.S. FDA Regulations (ID:1354)	01/17/14	4/4 (100%)
Conducting Investigator-Initiated Studies According to FDA Regulations and GCP (ID:1355)	01/17/14	3/3 (100%)
Investigator Obligations in FDA-Regulated Research (ID:1356)	01/17/14	5/5 (100%)
Managing Investigational Agents According to GCP Requirements (ID:1357)	01/17/14	5/5 (100%)
Overview of U.S. FDA Regulations for Medical Devices (ID:1358)	01/17/14	3/3 (100%)
Informed Consent in Clinical Trials of Drugs, Biologics, and Devices (ID:1359)	01/17/14	4/4 (100%)
Detecting and Evaluating Adverse Events (ID:1360)	01/17/14	4/4 (100%)
Reporting Serious Adverse Events (ID:1361)	01/17/14	4/4 (100%)
Audits and Inspections of Clinical Trials (ID:1363)	01/17/14	5/5 (100%)
Monitoring of Clinical Trials by Industry Sponsors (ID:1362)	01/17/14	8/8 (100%)
Completing the CITI GCP Course (ID:1364)	01/17/14	No Quiz
HCA-HealthONE (ID:12656)	01/17/14	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
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Phone: 305-243-7970
Web: https://www.citiprogram.org

Appendix L

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Jennifer Wahl (ID: 2204539)
- **Email:** jwahl@craighospital.org
- **Institution Affiliation:** HCA-HealthONE (ID: 1234)
- **Phone:** 303-789-8525

- **Curriculum Group:** CITI Good Clinical Practice
- **Course Learner Group:** Biomedical Researchers-GCP
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 12016619
- **Report Date:** 07/20/2015
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
The CITI Good Clinical Practice Course for Clinical Trials Involving Drugs and Devices (ID:1350)	01/17/14	3/3 (100%)
Overview of New Drug Development (ID:1351)	01/17/14	5/5 (100%)
Overview of ICH GCP (ID:1352)	01/17/14	4/4 (100%)
ICH - Comparison Between ICH GCP E6 and U.S. FDA Regulations (ID:1354)	01/17/14	4/4 (100%)
Conducting Investigator-Initiated Studies According to FDA Regulations and GCP (ID:1355)	01/17/14	3/3 (100%)
Investigator Obligations in FDA-Regulated Research (ID:1356)	01/17/14	5/5 (100%)
Managing Investigational Agents According to GCP Requirements (ID:1357)	01/17/14	5/5 (100%)
Overview of U.S. FDA Regulations for Medical Devices (ID:1358)	01/17/14	3/3 (100%)
Informed Consent in Clinical Trials of Drugs, Biologics, and Devices (ID:1359)	01/17/14	4/4 (100%)
Detecting and Evaluating Adverse Events (ID:1360)	01/17/14	4/4 (100%)
Reporting Serious Adverse Events (ID:1361)	01/17/14	4/4 (100%)
Audits and Inspections of Clinical Trials (ID:1363)	01/17/14	5/5 (100%)
Monitoring of Clinical Trials by Industry Sponsors (ID:1362)	01/17/14	8/8 (100%)
Completing the CITI GCP Course (ID:1364)	01/17/14	No Quiz
FDA Regulated Research and ICH for Investigators Archived 1353 (ID:1353)	01/17/14	5/5 (100%)
HCA-HealthONE (ID:12656)	01/17/14	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

Appendix M

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Jennifer Wahl (ID: 2204539)
- **Email:** jwahl@craighospital.org
- **Institution Affiliation:** HCA-HealthONE (ID: 1234)
- **Phone:** 303-789-8525

- **Curriculum Group:** CITI Health Information Privacy and Security (HIPS)
- **Course Learner Group:** CITI Health Information Privacy and Security (HIPS) for Clinical Investigators
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 12016621
- **Completion Date:**
- **Expiration Date:** N/A
- **Minimum Passing:** 75
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
About the Course (ID:1416)	01/17/14	1/1 (100%)
Basics of Health Privacy (ID:1417)	01/17/14	16/16 (100%)
Health Privacy Issues for Researchers (ID:1419)	01/17/14	10/10 (100%)
Basics of Information Security, Part 1 (ID:1423)	01/17/14	No Quiz
Basics of Information Security, Part 2 (ID:1424)	01/17/14	5/5 (100%)
Protecting Your Computer (ID:1425)	01/17/14	8/8 (100%)
Security Rules: Introduction to Federal and State Requirements* (ID:1432)	01/17/14	6/6 (100%)
Completing the Privacy and Security Course (ID:1434)	01/17/14	No Quiz
HCA-HealthONE (ID:12656)	01/17/14	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

Appendix N

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Jennifer Wahl (ID: 2204539)
- **Email:** jwahl@craighospital.org
- **Institution Affiliation:** HCA-HealthONE (ID: 1234)
- **Phone:** 303-789-8525

- **Curriculum Group:** CITI Health Information Privacy and Security (HIPS)
- **Course Learner Group:** CITI Health Information Privacy and Security (HIPS) for Clinical Investigators
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 12016621
- **Report Date:**
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
HCA - Custom Module (ID:12719)	01/17/14	5/5 (100%)
About the Course (ID:1416)	01/17/14	1/1 (100%)
Basics of Health Privacy (ID:1417)	01/17/14	16/16 (100%)
Health Privacy Issues for Researchers (ID:1419)	01/17/14	10/10 (100%)
Basics of Information Security, Part 1 (ID:1423)	01/17/14	No Quiz
Basics of Information Security, Part 2 (ID:1424)	01/17/14	5/5 (100%)
Protecting Your Computer (ID:1425)	01/17/14	8/8 (100%)
Completing the Privacy and Security Course (ID:1434)	01/17/14	No Quiz
Security Rules: Introduction to Federal and State Requirements* (ID:1432)	01/17/14	6/6 (100%)
HCA-HealthONE (ID:12656)	01/17/14	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

Appendix O

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Jennifer Wahl (ID: 2204539)
- **Email:** jwahl@craighospital.org
- **Institution Affiliation:** HCA-HealthONE (ID: 1234)
- **Phone:** 303-789-8525

- **Curriculum Group:** Responsible Conduct of Research
- **Course Learner Group:** Biomedical Responsible Conduct of Research Course
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 12016620
- **Completion Date:**
- **Expiration Date:** N/A
- **Minimum Passing:** 75
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Responsible Conduct of Research (RCR) Course Introduction (ID:1522)	01/17/14	No Quiz
Introduction to the Responsible Conduct of Research Archived 1248 (ID:1248)	01/17/14	No Quiz
Case Study - Truth or Consequences (RCR-Biomed) (ID:1470)	01/17/14	3/3 (100%)
Case Study - Data Management - Share and Share Alike (RCR-Biomed) (ID:1199)	01/17/14	3/3 (100%)
Case Study - Data Management 'Who Owns Research Data?' (RCR-Biomed) (ID:1444)	01/17/14	3/3 (100%)
Col Case Study The Case of the Promising New Technology (RCR-Biomed) (ID:1220)	01/17/14	4/4 (100%)
Responsible Conduct of Research (RCR) Course Conclusion (ID:1043)	01/17/14	No Quiz
HCA-HealthONE (ID:12656)	01/17/14	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

Appendix P

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Jennifer Wahl (ID: 2204539)
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- **Institution Affiliation:** HCA-HealthONE (ID: 1234)
- **Phone:** 303-789-8525

- **Curriculum Group:** Responsible Conduct of Research
- **Course Learner Group:** Biomedical Responsible Conduct of Research Course
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 12016620
- **Report Date:**
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
CoI Case Study The Case of the Promising New Technology (RCR-Biomed) (ID:1220)	01/17/14	4/4 (100%)
Case Study - Truth or Consequences (RCR-Biomed) (ID:1470)	01/17/14	3/3 (100%)
Responsible Conduct of Research (RCR) Course Introduction (ID:1522)	01/17/14	No Quiz
HCA - Custom Module (ID:12719)	01/17/14	5/5 (100%)
Case Study - Data Management - Share and Share Alike (RCR-Biomed) (ID:1199)	01/17/14	3/3 (100%)
Introduction to the Responsible Conduct of Research Archived 1248 (ID:1248)	01/17/14	No Quiz
Case Study - Data Management 'Who Owns Research Data?' (RCR-Biomed) (ID:1444)	01/17/14	3/3 (100%)
HCA-HealthONE (ID:12656)	01/17/14	No Quiz
Responsible Conduct of Research (RCR) Course Conclusion (ID:1043)	01/17/14	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

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Appendix Q

Demographic Questionnaire

1. What is your highest level of education? _____
2. What is your current role as a healthcare provider? _____
3. Have you ever cared for a spinal cord injured person? Yes _____ No _____
4. Do you have any current knowledge regarding autonomic dysreflexia?

   Yes_____ No_____

Appendix R

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PreTest	4.5740	169	2.24580	.17275
	PostTest	8.1124	169	1.90997	.14692

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PreTest & PostTest	169	.203	.008

Paired Samples Test

		Paired Differences			
					95% Confidence Interval of the Difference
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	PreTest - PostTest	-3.53846	2.63674	.20283	-3.93888

Paired Samples Test

		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	PreTest - PostTest	-3.13805	-17.446	168	.000

Appendix S

Pearson Correlation

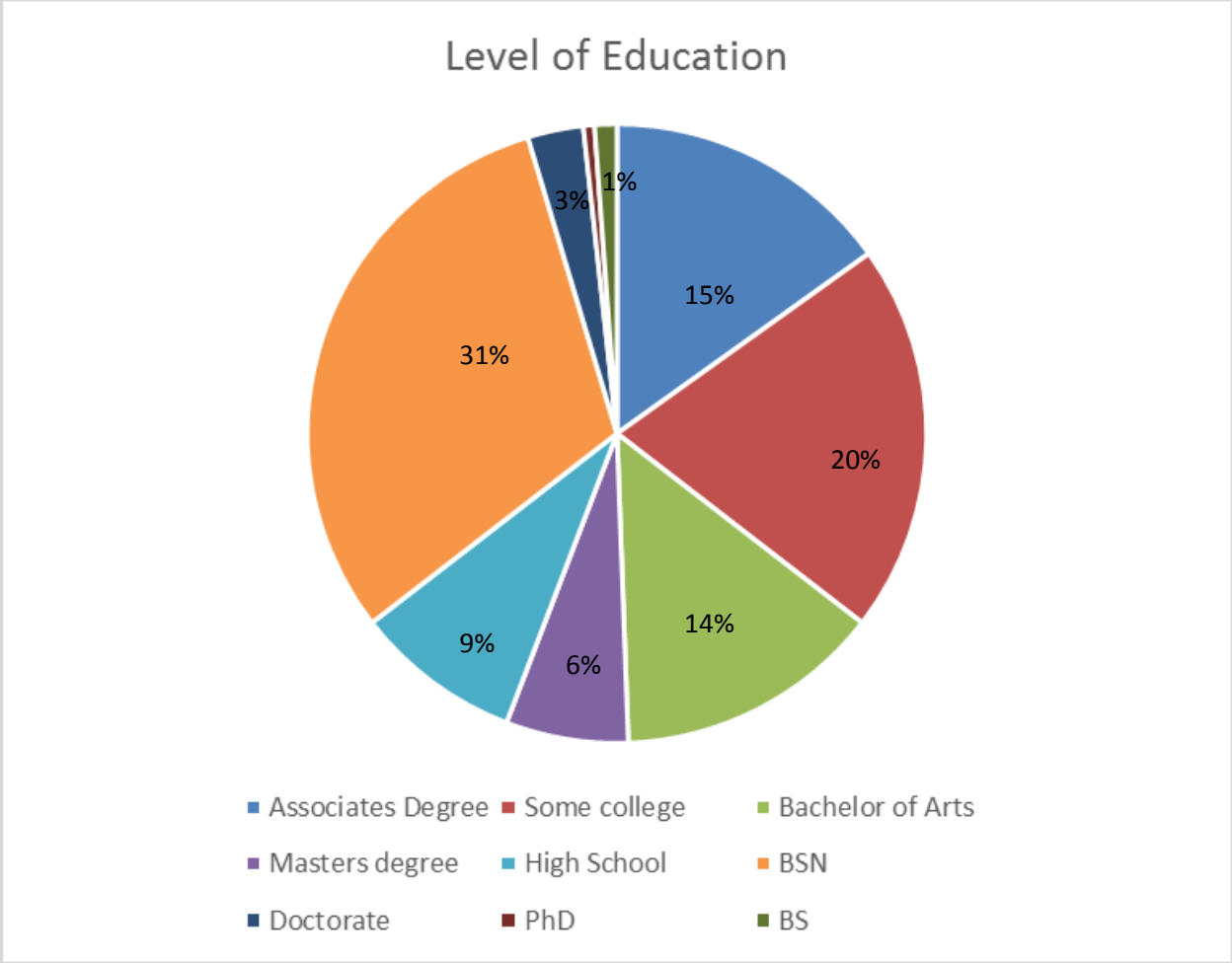
Correlations

		PreTest	PostTest
PreTest	Pearson Correlation	1	.203**
	Sig. (2-tailed)		.008
	N	170	169
PostTest	Pearson Correlation	.203**	1
	Sig. (2-tailed)	.008	
	N	169	169

**Correlation is significant at the 0.01 level (2-tailed).

Appendix T

Participant Level of Education



Appendix U

Autonomic Dysreflexia and Care of a Spinal Cord Injured Person