

Initiating Vital Signs in an Outpatient Physical Therapy Practice: Incorporating
Interprofessional Care

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Dedication

To Claire and Nora.

Abstract

This DNP project implemented vital sign screenings at a physical therapy clinic prior to starting physical therapy, based on the *Guide to Physical Therapy Practice* recommendation. The literature review showed that many physical therapists were not performing a vital sign assessment on patients prior to starting physical therapy. This DNP project provided education to physical therapists, developed an algorithm for assessing patient's blood pressure and pulse, and how to communicate those results with the primary care provider. This was done by providing a teaching session to the physical therapy staff, development of a system to screen for blood pressure and pulse by the physical therapist, and what to communicate with the primary care provider. The results showed a 100% increase in screening blood pressure and pulse after implementation of the project. Physical therapists and primary care providers engaged in interprofessional communication during this process improvement project. Results showed an increase in interprofessional communication between physical therapists and the primary care providers. This project implemented safe and efficient care while improving interprofessional communication at this project site.

Key words: interprofessional communication, physical therapist, physical therapy, vital signs

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Chapter One: Overview of the Problem of Interest

Physical therapists are recommended to perform blood pressure, pulse, and respiratory rate assessments on all patients who present for outpatient physical therapy sessions, yet they often fail to make this part of their routine patient care. Cardiovascular disease is a disease that is very prevalent in America (Centers for Disease Control and Prevention [CDC], 2016). To help identify at-risk patients, providers other than physicians, should be assessing the cardiovascular status of their patients. Assessing a patients' cardiovascular status at every encounter will ensure that the standard of care is met, and that patient safety is placed first.

This project aimed to unite physical therapists and advanced practice nurses to provide patient-centered interprofessional care. Information shared between practitioner and therapist is vital to patient safety.

Background Information

Role of the Physical Therapist

Physical therapists are licensed health care professionals who lessen patients' pain and improve patient mobility and practice in a variety of settings, including outpatient rehabilitation centers, hospitals, schools, nursing homes and sports facilities (American Physical Therapy Association [APTA], 2015). Physical therapists have increasing autonomy because patients may not need referrals to initiate physical therapy treatment. (APTA, 2018). All accredited physical therapy programs are producing the Doctor of Physical Therapy (DPT) degree (APTA, 2018).

The *Guide to Physical Therapy* recommends that a cardiovascular screening consisting of pulse, blood pressure, and respirations should be performed before any physical therapy sessions (APTA, 2014). Performing review of systems and assessments are part of the education that physical therapists receive (APTA, 2009). However, many physical therapists do not obtain vital

signs before outpatient therapy (Allen & Mulderink, 2014). Physical therapists' ability to take accurate assessments is necessary to the interprofessional relationship with providers as they can intervene when they find an abnormal assessment and refer back to the patient's primary care provider. Vital signs are an integral part of assessing a patient's status. The interprofessional approach between practitioners and physical therapists improves patient care and safety.

Vital Signs

Assessing a patient's blood pressure gives an objective measurement on their cardiovascular system. Blood pressure is used to assess the ability of arteries to stretch, how much blood volume is present and the vascular resistance when the heart beats (Patel, Munroe, & Curtis, 2016). Pulse rate is the number of times that the heart beats per minute. A normal adult pulse is 60-100 beats per minute. Variations in this can indicate how hard their heart is working to pump blood to their vital organs.

Regarding blood pressure, the American Heart Association (AHA) recently recommended that the target blood pressure for Americans should be lower than 130/80 mmHg (American Heart Association [AHA], 2016). This new recommendation indicates that 46% of Americans are hypertensive (AHA, 2016).

Increased heart rate is a risk for cardiovascular mortality (Perret-Guillaume, Joly, & Benetos, 2009). A pulse increase of 10 beats per minute at rest or an increase in 10 mm Hg systolic blood pressure increases chance of cardiac death by 20% in those with cardiac risk (Perret-Guillaume, Joly, & Benetos, 2009). These studies illustrate the importance of assessing cardiovascular status. Since individuals can self-refer to physical therapy in all states, assessment of their cardiovascular status is even more important. It is unknown when they last time their

vital signs were assessed by the primary care provider if they were a direct access patient without a referral.

Cardiovascular Response to Exercise

Exercise is a stimulus that causes an increased demand for oxygen in the myocardium (Duncker & Bache, 2008). An increase in blood flow from an increase in cardiac output requires the heart to elevate the heartrate, strengthen myocardial contractility and raise the ventricular workload (Duncker & Bache, 2008). This is why screening for blood pressure and pulse was very important to this DNP project.

Physical Therapists and Vital Signs

Peters (2014) found that physical therapists in Florida are only assessing vital signs on 0-20% of their patients during physical therapy session. This was because many physical therapists did not think routinely screening vital signs was important (Peters, 2014). Kasinskas, Wood and, Koch (2011) discovered that many physical therapists are not assessing vital signs when their physical therapy students were doing clinical rotations. There is one study that shows the importance of screening for cardiovascular status. It was identified that 54 out of 87 patients at various physical therapy clinics were classified as pre-hypertensive or hypertensive (Kasinskas et al., 2011). That study was done prior to the new recommendations of hypertension being a blood pressure greater than 130/80. Screening for cardiovascular health is important for the patient and to relay information back to the interdisciplinary team that provides care for patients.

Significance of Clinical Problem

This problem is significant because many physical therapists use exercise as an intervention for treatment and this can increase stress in the body (Thistle, Basskin, Shamus,

Jeffreys-Heil, 2016). Exercise can cause cardiac abnormalities and changes that are absent at rest (Fletcher et al., 2001).

This DNP project took place at a military treatment facility in the rehabilitation services department where only active duty servicemembers were treated. In the past year, one military base in Eastern North Carolina has seen a 25% increase of hypertension in their active duty service members (The Globe, 2019). Assessing cardiovascular health of our servicemembers increased medical readiness. A servicemember was not considered medically ready if they had a blood pressure or pulse out of range of normal. This project alerted the medical readiness officer to ensure that they were healthy enough to be deployable and remain active duty.

Question Guiding Inquiry (PICO)

A rehabilitation physical therapy clinic at a military treatment facility serviced active duty service members does not take blood pressure or pulse on patients prior to initiating physical therapy sessions. This clinic was interested in increasing patient safety by checking the cardiovascular status of patients prior to initiating therapy.

Population. The proposed population for the intervention was the physical therapists. By teaching them about appropriate screening, then the active duty servicemembers received the appropriate screenings and treatment.

Intervention. The intervention was to assess vital signs upon initiation of physical therapy sessions. Vital signs were taken at all initial evaluation sessions. The APTA standard was that all patients will have their vital signs taken prior to initiation of physical therapy sessions.

Comparison. The physical therapists performed a cardiovascular screening before and after the DNP project was the comparison for the DNP project. They were screening no patients

for cardiovascular health prior to starting the DNP project. The goal was to screen 75% of patients on initial appointment with physical therapist.

Outcome(s). The outcome was to identify any patients with an unstable cardiovascular status. They were referred back to their primary care provider or to the emergency department for further evaluation of their cardiovascular status by use of a standardized protocol.

Summary

In summary, vital signs were important to assess before physical therapy. Since patients were able to self-refer to physical therapists, their cardiovascular status needs to be assessed. Physical therapists were taught how to take vital signs during their formal training. It is recommended by the *Guide to Physical Therapy Practice* that physical therapists should do a review of systems and included in that is pulse and blood pressure to assess cardiovascular status.

This project took place at a military treatment facility at a physical therapy clinic providing care to active duty servicemembers. The physical therapists initiated vital signs at all evaluation and follow up appointment types. If abnormal vital signs were found, the session will be terminated, and the patient will be referred back to their primary care provider who developed an interprofessional plan of care.

Chapter Two: Review of the Literature

An extensive literature search was conducted on outpatient physical therapy, direct access, cardiovascular assessment, appropriate referrals, and interprofessional/interdisciplinary care. This chapter describes the specifics of the searches performed and their results that were obtained. Literature on these particular topics was limited.

Literature Appraisal Methodology

Sampling strategies. The search terms included physical therapist, physical therapy, vital signs, blood pressure, heart rate, pulse, cardiovascular assessment, referral, outpatient, interdisciplinary, interprofessional, servicemember, and advanced practice nursing. Databases that were used were PubMed, The Cumulative Index to Nursing and Allied Health Literature (CINAHL), Google Scholar and the East Carolina University Laupus Library database.

In total, 70 articles matched the key words in the search criteria, however only 13 research articles were found in relation to this project (See Appendix A). Ongoing search strategies included having NCBI send email updates with new publications related to the search and staying current with American Physical Therapy Association publications.

Evaluation criteria. The search was limited to those words found in the title or abstract, English language, and the last 15 years of research. Other exclusions were studies unrelated to this project, textbooks, commentary, or letters to the editor. Studies that were included were surveys, meta-analysis, systematic reviews, original research, and randomized and non-randomized control studies (See Appendix B). Literature was analyzed using the Melnyk and Fineout-Overholt (2011) rating system for interpreting levels of evidence.

Literature Review Findings

The current recommendation from the American Physical Therapy Association is that all physical therapists perform a cardiovascular assessment on all patients, which includes heart rate, blood pressure and respiratory rate (APTA, 2014). Based on the literature review, many physical therapists do not assess vital signs.

Physical Therapists Not Assessing Vital Signs. Albarrati (2018) conducted a survey of 285 physical therapists to determine whether or not they were taking heart rate or blood pressure on their patients. His 12-item survey concluded that 24% of physical therapists were taking blood pressures and, of that group, only 41% use manual sphygmomanometers. Many responded that it was not their job to take these assessments and it would not “add value to their treatment plan” (Albarrati, 2018). This study presents the discrepancy between physical therapist attitudes and what is evidence-based practice.

Allen and Mulderick (2014) also conducted a survey in the US assessing factors that influence vital sign assessments. Sixty-one physical therapists completed the 27-item survey. The results showed that 41% of the respondents “rarely or never” assessed a pulse, 36% obtained blood pressure, 64% obtained respiratory rate (Allen, & Mulderick 2014). Although, 8% of respondents “always” took a pulse, 6% took a blood pressure, and 1% took respiratory rate (Allen & Mulderick, 2014). The most common reason cited (69%) for not assessing cardiovascular status was that they did not have a cardiorespiratory pathology (Allen & Mulderick, 2014). Despite this study having a small sample size, this research demonstrates that physical therapists are not following the recommendation that all patients have a cardiovascular assessment.

Arena, Reyes, Rolf, Schlagel, and Peterson (2018) conducted a survey of 313 outpatient orthopedic physical therapists on their attitudes and beliefs regarding assessing blood pressure and heart rate. They also assessed their ability to determine what constitutes a blood pressure in the range of prehypertension and hypertension. Fifty-one percent of respondents felt it was “important to take a BP reading on every patient during an evaluation or re-evaluation” (Arena et al., 2018). Consequently, 62% of physical therapists disagreed and 67% strongly disagreed that it is important to take a BP reading on all patients prior to or after a treatment respectively (Arena et al., 2018). This study demonstrates that there is a gap in attitudes of physical therapists compared to what has been put forward as best practice by American Physical Therapy Association.

Van Zant, Cape, Roach, and Sweeney (2013) discovered through a survey of 516 physical therapists that many physical therapists feel comfortable in their role of preventing cardiovascular disease prevention, but many do not engage in the clinical detection of identifying any risk factors for cardiovascular disease. Eighty five percent of respondents agreed that physical therapists should be performing a cardiovascular review (Van Zant et al., 2013). This study showed that despite the eagerness of physical therapists to engage their patients in education about cardiovascular disease, they are not screening for it.

Miller et al. (2016) performed an observational study where they observed 74 patient sessions, of which 15 were initial encounters, 54 were follow-ups and 5 were discharges. Despite 26% of the patients having hypertension as a comorbidity, initial heart rate and blood pressure were taken twice prior to treatment and only once after an exercise treatment (Miller et al., 2016). The physical therapists consented to having their sessions observed and did not engage in

cardiovascular systems review. This study demonstrates that physical therapists are not performing cardiovascular assessments.

Scherer et al. (2011) discovered a lack of consistent vital sign assessment in acute care settings. In an acute care setting, 323 patients were studied to determine how frequently vital signs were used in clinical decision making by the physical therapists before engaging in gait training. An average of 56.3% of patients had their vital signs recorded (Scherer et al., 2011). On day one, 24.9% of the patients had an abnormal vital sign response and 29% had an abnormal vital sign response on day four (Scherer et al., 2011). This study demonstrates that vital signs are not being considered by physical therapists when making clinical decision making and developing plans of care.

One study done by Peters (2014) sent a survey to 45 physical therapists to ascertain frequency of performing vital signs. Most physical therapists who responded said it was extremely important for BP to be taken 44.4% of the time and heart rate should be taken 46.6% of the time (Peters, 2014). Very few (0.8%) of respondents said that vital signs should be taken at every patient encounter (Peters, 2014). Most work places (28.9%) did not have a policy in place to support a cardiovascular assessment (Peters, 2014). This study confirms that many physical therapists are not taking vital signs at the recommended frequency.

Harrison (2017) surveyed 286 physical therapists from 24 states, of which 60% came from direct access states and 32.5% came from restricted direct access states. Most respondents did not routinely assess heart rate (39%), blood pressure (37%) and SpO₂ (30%) of the time on initial assessments (Harrison, 2017). This author looked to see if there was a statistical significance between states with direct access and restricted access to determine if those PTs from direct access states were more likely to perform cardiovascular assessments. There was no

statistical significance found (Harrison, 2017). This study proves that physical therapists who practice in direct access states are not more likely to perform cardiovascular assessments.

Kasinskas, Wood, & Koch (2011) discovered that their physical therapy students at Quinnipiac University were reporting that they were not observing vital signs being taken during clinical rotations. The students initiated a process improvement project to start cardiovascular assessments and they discovered that 23.6% of 114 patients were prehypertensive and 23.6% were hypertensive (Kasinskas et al., 2011). This research shows the importance of assessing cardiovascular status prior to initiating therapy.

Severin, Want, Wielechowski and Philips (2019) discovered that there is an improvement with physical therapists assessing vital signs, but it is still not routinely being performed. A survey was sent to 1812 physical therapists with 931 responses. Of the responses, 14.8% measured blood pressure and pulse on initial encounter. The most commonly cited barriers were lack of time (37.44%) and lack of perceived importance (35.62%).

Most of the literature described above includes self-reported surveys asking physical therapists to reflect upon their own practice and clinical decision-making skills. No literature was found to show a successful vital sign implantation program and positive changes in a physical therapy practice that would promote cardiovascular assessment. No studies were found reflecting improved patient outcomes after an implementation of vital signs at an outpatient physical therapy clinic.

The site of the proposed DNP project does not perform cardiovascular assessments on their patients, on initial evaluations or at treatments. Vital sign machines are present in the clinic for episodic events with patients. This aligns with much of the research in this literature review,

that many physical therapists do not routinely perform a cardiovascular assessment, including heart rate and blood pressure.

Physical Therapist Initiating Referrals to Practitioners. In many states, current practice says that patients do not need a referral to a physical therapist from their primary care provider to seek therapy. Due to these new standards, physical therapists need to hone their assessment skills and understand when to refer back to primary care when therapy is not safe based on clinical decision making. There is limited data that reflects literature on physical therapists writing referrals.

In a study performed by Jette, Ardleigh, Chandler & McShea (2006), 399 physical therapists responded to a survey with specific scenarios regarding when a physical referral is appropriate. A correct referral was written 87.3% of the time for musculoskeletal complaints and conditions that should be further evaluated by a physician (Jette et al., 2006). For a noncritical medical condition, a correct referral was written 87.3% of the time for those patients (Jette et al., 2006). Most alarmingly, 21% of physical therapists did not referred to a physician for a critical medical condition (Jette et al., 2006). This study reveals that physical therapists might be able to recognize certain red flag conditions and might require more training.

Mount, Graham, Clark, Morris, and Foley (2016) piloted a study of 391 physical therapists who answered questions regarding care and referrals in a set of vignettes. The respondents answered the questions correctly 90.5% of the time (Mount et al., 2016). This study shows the importance of physical therapists being able to correctly identify and provide referrals to physicians.

Another study was performed by Thistle et al. (2016) in which 17 physical therapists responded to a survey about their clinical decision-making with patient vital signs. Factors that

were listed as important when making clinical decisions about when it is appropriate to refer to primary care included patient history, clinical experience, and vital sign parameters (Thistle et al., 2016).

There are very few studies to demonstrate physical therapists making appropriate referrals to providers. One of the studies found demonstrated that physical therapists need increased knowledge on when is appropriate to refer a patient to a medical provider based on critical medical diagnosis (Jette et al., 2006).

Servicemembers and Hypertension. There is a paucity of literature regarding servicemembers and hypertension risk. Howard et al. (2018) performed a study of 3846 patients of PTSD servicemembers. The rate of PTSD and hypertension has an incidence rate of 46.4 compared to hypertension diagnosis without PTSD which was a rate of 25.3 (Howard et al., 2018). This study demonstrates that servicemembers who also have PTSD have an increased risk for developing hypertension compared to civilians in the same age group.

Interprofessional Care. No literature was found to show interdisciplinary care between advanced practice nurses and physical therapists. Kilpatrick, Lavoie-Tremblay, Ritchie and Lamonthe (2014) studied advance practice nurses and their role within the interdisciplinary care team. Their research showed that healthcare teams are dynamic, and that team effectiveness should be looked at within the context of the situation (Kilpatrick et al., 2014). With the advent of the DNP degree, advanced practice nursing is propelling itself forward on interprofessional teams.

Limitations of Literature Review Process

Some of the limitations found during the literature review process is there is a scarcity of recent studies to pull data from. The literature search had to extend beyond the typical 5-year

timeframe to find enough studies to include in the literature review process. Most of the literature found was from a physical therapy field and not from the nursing field. No studies were found to elaborate on the importance of a physical therapist and advance practice nursing on an interdisciplinary team.

Discussion

Conclusion of findings. The American Association of Physical Therapy has recommended a cardiovascular assessment on all patients and part of that assessment includes blood pressure, pulse and respirations (APTA, 2014). Throughout the literature review, many articles cited above have shown that, despite the current practice recommendations, physical therapists are not performing a cardiovascular assessment. The knowledge is limited on whether physical therapists can correctly assess a patient and provide the appropriate practitioner referral for medical conditions.

The proposed DNP project will provide a policy change at a military treatment facility in their outpatient adult physical therapy clinic to initiate taking vital signs upon every initial patient encounter, regardless of history of cardiovascular disease. Currently, no vital signs have been taken in the last three months by physical therapists or technicians in this clinic. This is a clinic that only provides care to active duty servicemembers. In the new policy, specific parameters for normal vital signs will be given. The new guidelines will be developed to include interview questions to assess a patient's status if found to have abnormal vital signs. Based on patients' vital signs and clinical status, a clinical decision will be made to continue therapy, continue therapy and refer, decline therapy and refer, or initiate emergency protocols. This new protocol will incorporate a team-based model of care between physical therapists, and practitioners at this facility.

Advantages and disadvantages of findings. Advantages of this proposed DNP project include improving patient safety. Based on the cardiovascular effects of exercise, a patient with abnormal vital signs are at an increased risk of having adverse reactions and potentially falling or injuring themselves. The physical therapists will be performing the best evidence-based care, which matches the current standards. An additional advantage is that physical therapists will be able to engage in interprofessional care teams with other providers.

Some of the disadvantages of this study is that this population is active-duty service members, which means they are generally young adults and regularly engage in physical fitness. Routine blood pressure screens are part of their ability to be medically ready to deploy. Most patients probably have normal vital signs. Because of this heightened state of readiness for this patient population, vigilant vital sign screening is still warranted. A disadvantage is that this clinic is very large with many active duty physical therapists rotating to branch health clinics. Their investment in this proposed project may be lessened due to their rotating work stations. Also, due to the military lifestyle and constant turnover, some physical therapist and technicians may rotate in and out during the course of this project. They might not be as invested in this outcome as a result of not being integrated into the planning stages. A disadvantage was the lack of any literature supporting a practice change that involved implementing a vital sign policy at an outpatient physical therapy clinic.

Utilization of findings in practice change. The proposed practice change will be implemented at a military treatment facility outpatient adult physical therapy clinic. The *Guide to Physical Therapy Practice* (2014) recommends that physical therapists perform a cardiovascular assessment on every patient. The proposed DNP project will implement the addition of taking pulse and blood pressure on all initial patient encounters and what to do with any abnormal vital

signs, which is supported by the practice guidelines. The literature showed that many physical therapists who responded to various surveys were not performing cardiovascular assessments to include pulse and vital signs.

No literature was found to identify an intervention performed to demonstrate the importance of implementing this change. However, the literature that was found shows that many physical therapists are not assessing blood pressure and heart rate. This implementation will attempt to be implemented to reflect the current practice guidelines set forth by the American Physical Therapy Guidelines.

Summary

In summary, the literature review has demonstrated that cardiovascular assessments are not performed by many physical therapists, despite a cardiovascular assessment being the current standard. The proposed project will implement a new procedure where blood pressure and pulse assessments will become standardized.

This project is targeted to assist in early detection of heart disease and stroke risk factors. One of the Healthy People 2020 goals is to improve cardiovascular health by preventing, detecting and treating risk factors that can lead to heart attack or stroke (Healthy People 2020, 2019). Since heart disease is currently the leading cause of death in the US, controlling modifiable risk factors, such as hypertension, is essential to preventing these deaths (Health People 2020).

This project also targets all the components of the Triple Aim, which are “improving the patient experience of care, improving the health of populations, and reducing the per capita cost of health care” (Institute for Healthcare Improvement [IHI], 2019). This project is improving the patient experience by allowing physical therapists to practice at the top of their scope. In

addition, they are practicing to the current specialty guidelines set forth by the American Physical Therapy Association. By nature of this change, this will improve the patient experience. This project will improve the health of the active duty servicemembers who receive care at this physical therapy clinic. This will enhance their medical readiness to be able to deploy. And lastly, heart disease approximately costs \$320 billion annually (Healthy People 2020, 2019). Screening and treating early cardiovascular health risk factors will help reduce that cost.

In conclusion, this project is supported in evidence found in the literature review. This will improve the health of those individuals receiving care at this physical therapy clinic.

Chapter Three: Theory and Concept Model for Evidence-based Practice

During this chapter, concepts used in this DNP project are identified and defined. These concepts are defined in context of what it means to this project. Additionally, the theoretical framework used to ground this project is explored. The theories identified shed light on the application of practice change.

Concept Analysis

In analyzing the concepts apart of this DNP project, a concept map was developed (Appendix C). One of the fundamental concepts through this DNP project is the concept of interprofessional care. This concept is one that integral to this DNP project. This is the concept where the different healthcare disciplines work in cohesion to provide patient-centered and evidence-based care to those within their care. Interprofessional care is a concept that involves coordinating between different professions. In this project, it is considered health care professionals between physical therapists and primary care providers.

Physical therapy is a health care discipline that treats injury using modalities such as heat or ice, massage, exercises and stretching. The providers that develop a plan of care following these modalities are physical therapists. Physical therapy assistants follow the developed plan of care prescribed by physical therapists. Patients go to a prescribed number of sessions over a few weeks to improve their injuries and start moving with better mobility and less pain.

Cardiovascular assessment is determining a patient's heart health through a set of questions, called a review of systems, and through physical assessment. For this DNP project, the cardiovascular assessment will include blood pressure and pulse.

Primary care provider is the healthcare professional who is a physician, nurse practitioner or physician assistant who is the main healthcare provider and acts as the gateway for the

patients' healthcare. They often write referrals to specialists and receive feedback from other healthcare professionals to make sure that the patient is receiving care and allowing for all professionals to work together.

Referral is the concept of one healthcare professional requesting another healthcare professional's service to treat a patient. The DNP project will use referrals if patient's primary care provider feels they need to see physical therapy and if a physical therapist needs to see their primary care provider or emergency room for an abnormal cardiovascular assessment.

This project outcome concept is safe patient care. This concept is the foundation of many healthcare disciplines. Healthcare providers caring for this patient will communicate about what is best for their patient. Cardiovascular assessments will be performed on patients to promote patient safety.

Theoretical Framework

Naming the Theory. The nursing theory that closest aligns with the proposed DNP project is Barbara Carper's Fundamental Patterns of Knowing in Nursing. The fundamentals of this theory include empirics, esthetics, knowledge and ethics (Carper, 1978). As a nurse progresses through their career, their views about each of these fundamentals will change.

Empirics is considered the science of knowledge or "nursing science," (Carper, 1978). The knowledge of empirics was developed through testing theories and researching things that can be measured (Vaughan, 2014). Nurses can draw their knowledge from their nursing science or from other sciences, as well.

Esthetics is considering the art of nursing, or the skills involved in nursing practice (Carper, 1978). This phenomenon describes what nurses sometimes refer to as "trusting their

gut.” Nurses might recognize something that does not fit the empirical knowledge base and they will use their critical thinking skills to individualize their care for their specific patient.

Personal knowledge is the understanding of the self and continuing to strive to understand one’s self. (Carper, 1978). As nurses start to understand their own self, they can understand the interpersonal relationships better and there is a relationship between the nurse and those that are being cared for (Carper, 1978). This knowledge of oneself allows practitioners to react to different situations that they are put in; these situations could pertain to loss or death (Vaughn, 2014). This is the foundation of self-awareness in nursing and knowing your reactions in certain situations have meaning.

The last foundation that is part of this nursing theory is ethics. This is the moral component of nursing (Carper, 1978). Nurses today are involved in many morally complex decisions regarding caring for the ill and health promotion. At a basic level, practitioners use our ethics every day in ensuring our patients are seen on time and how we respect our patients (Vaughn, 2014). Every decision we make has a moral component to it (Vaughn, 2014).

This theory can be applied when looking at new evidence-based practice. New evidence changes the empirical knowledge, which causes a shift in all the fundamentals (Porter, 2010). Holtslander (2008) used this theory to study bereaved palliative caregivers and she discovered that these fundamentals can be used to develop nursing research and interventions.

To summarize this theory, a nurse uses their learned knowledge to provide compassionate care to those around them, known as the “art of nursing”. They will understand their own sense of self to give empathy to those who need it and monitoring their reaction to their environment. They will use their moral compass to guide their care. The physical therapy profession borrows theories from other professions to define its theoretical framework. There are limited physical

therapy theories, especially compared to the nursing profession. Despite this theory described above being a nursing-based theory, this is the best theory used to describe this project.

Application to practice change. Carper's Fundamental of Patterns of Knowing in nursing can be applied to other disciplines. Although, this theory is primarily rooted in nursing, it can be applied to other healthcare disciplines as well. For the purpose of this DNP project, this nursing theory will be applied to the physical therapy discipline.

Empirics exists in the physical therapy discipline as well as nursing. For this DNP project, the physical therapists will be educated about the importance of performing cardiovascular assessments, including pulse and blood pressure. This will broaden their empirical knowledge base. Many were also taught about the importance of this assessment during their education, so this could highlight the need to perform that assessment, again.

The fundamental of esthetics can also apply to physical therapy. They practice an art that is different than nursing. However physical therapists perform assessment and develop plans of care for their patients as well. They are striving to perfect their art, as well.

For this DNP project the next two fundamentals are very important. Personal knowledge is understanding their self. Some of the physical therapists may have been practicing without taking a pulse or blood pressure for many years. Through this DNP project, hopefully they accept this change and understand it is to improve patient care.

The last fundamental from this theory is ethics. The physical therapists will be educated about the prevalence of hypertension in an active duty population and educated about the standard of care in their profession regarding cardiovascular assessments. It will be their ethical choice to implement it in their care.

In summary, Carper's Fundamentals of Patterns of Knowing can be applied to other healthcare professionals in applying evidence-based practice changes.

EBP Change Theory

Naming the Change Model. This DNP project will use Lewin's Planned Change Theory as the theory behind motivating the practice change. This theory is founded on Lewin's force field analysis (FFA) which identifies and examines the factors affecting a situation (Shirley, 2014). The factors that the FFA identifies can be both helping or hindering factors.

Unfreezing is the first stage in Lewin's theory. This stage is setting up for the change (Shirley, 2014). A problem is identified that needs to be changed. Part of this stage is generating a sense of urgency. Also, the driving factors need to be strengthened and the hindering factors need to be weakened (Shirley, 2014).

The second stage is the moving or transitioning stage. The process requires a detailed plan for change to engage people (Shirley, 2014). People generally oppose change so making sure they understand why the process needs to change and generating a willingness to change is important. This is the stage where the process actually changes.

The last stage is the refreezing stage. This is the stabilizing piece that makes the process change permanent (Shirley, 2014). This is what will allow sustainability for the institution to maintain the change and not revert to the old process.

A practice change model is identified and described in detail. A reader must be able to clearly understand the model after they read this section of your paper. Be sure to describe the model as if someone would be reading it for the first time. Use appropriate sources to cite content about the model.

In summary, this model has 3 steps to development and implementation. The most important stage is the refreezing stage. Forethought in the moving stage will help maintain the practice change.

Application to practice change. Lewin's model for change supports the change needed in the physical therapy clinic to implement vital signs. Described below will be how the process improvement project will go through all of Lewin's stages of change. In the proposed DNP project, the first stage is unfreezing. This process was started by talking with the physical therapists. They are being educated about the standard of practice involving a cardiovascular assessment to include pulse and blood pressure. The factors that are helping include the standard of practice, the prevalence of hypertension in young active duty servicemembers and willingness from leadership. The hindering factors include the time that obtaining the blood pressure and pulse will take. Another hindering factor is that only one vital sign machines are present in the physical therapy clinic.

The next stage is the moving stage. In this stage, the physical therapists will start taking blood pressure and pulse as part of their routine cardiovascular assessments. This stage will be the project implementation.

The last stage will be to sustain the implementation after completion of the DNP project. This will only happen if the physical therapists believe the intervention is a valuable one. Hopefully, the clinic can justify obtaining more vital sign machines in order to sustain this project. The fall is often time to obtain more equipment which lines up with the timeframe of this process improvement project. Hopefully, this project can be implemented at the branch health clinics upon completion of the DNP project and the value demonstrated.

Summary

In conclusion, nursing theory has helped mold the nursing profession into what it is today. Carper's Fundamentals of Knowledge of Nursing theory can explain many important themes in nursing today and ties them together. Nursing will continue to evolve to meet the cultural needs in society, but the core of nursing will remain constant. Carper describes those fundamentals as empirical knowledge, esthetics of nursing, personal knowledge and ethics. Those fundamentals can be used in other disciplines but molded to fit them specifically. This DNP project will mold those fundamentals to physical therapy.

Lewin's model for change has been used by many disciplines, including nursing, to implement a change in processes. There are three steps in this practice model, and they include unfreezing, moving and refreezing. This proposed DNP project will unfreeze the current practice of not taking blood pressure and pulse on patients. The project will move the physical therapists to taking blood pressure and pulse. Then the process will refreeze, and the implementation will be maintained.

Chapter Four: Pre-implementation Plan

This chapter discusses the specifics leading up to the implementation of the project. Here the reader learns how the project was approved at the site, information about the Internal Review Board, data management, and the data collection tools that were used.

Project Purpose

The purpose of the proposed DNP project was to ensure that patients who received physical therapy had cardiovascular stability before initiating therapy. The project tracked the interprofessional collaboration of patients who had abnormal blood pressure or pulse.

Project Management

Organizational readiness for change. This organization was ready for change. Overall, there was enthusiasm about the project within the department. Not all physical therapists were excited about the project, however, they were willing to participate in the project. Since many patient's that were treated at this facility are between 18-45 years old, the physical therapists felt that many patients had normal blood pressures and pulses which did not need to be screened. Citing the frequency of hypertension in active duty servicemembers helped convince the physical therapists that this process improvement project was necessary.

Interprofessional collaboration. The project champion was the assistant department head, a physical therapist. The first site champion was the other assistant department head, but he deployed before the project was implemented. The department head, who is an occupational therapist, was also very involved and supportive of the DNP student's project. One physical therapist implemented this process improvement project, after many collaborative meetings with the site champion and the DNP student. The physical therapist also collaborated with the primary care providers. The staff members of Staff Education and Training assisted in routing the project

for approval and writing the memorandum of understanding between the site and East Carolina University.

Risk management assessment. A SWOT analysis was performed prior to the implementation of the project. The strength of this project was achievability. This project was able to be implemented in the allotted timeframe. It was able to be sustained beyond the completion of this DNP project, by continuing to take vital signs after the data collection phase. This DNP project improved patient care by providing safe and efficient care.

One weakness in this project was that there was only one vital sign machine in the department. Taking blood pressure and pulse took time out of the review of systems and assessment for the physical therapist. Additional weaknesses of this project were that there were no previous interventions found in the literature review. The literature search identified many studies that demonstrated that there is a need to perform thorough cardiovascular assessments before physical therapy but that they are not done.

This project had not been previously implemented at any other military physical therapy clinic which allowed for the ability to replicate it. This opportunity allowed providers to provide safer patient care and opened the doors to effective interprofessional care in a variety of settings across military medicine. This could further communication between physical therapists and nurse practitioners.

Some threats leading up to the project was getting the contract completed and the lengthy time it takes to route approval at the site. Another threat was the project's original site champion deployed in the weeks leading up to the project implementation. Due to his deployment, the new site champion did not know the plan in detail. The DNP student had to develop the plan again with the new site champion, with very few changes to the original process improvement project.

Organizational approval process. The first step to getting site approval was to discuss the proposed DNP project with the department head of Rehabilitation Services. The department head was very supportive of the proposed project. Next, the DNP student spoke with Staff Education and Training to ensure DNP projects were approved for implementation at that institution. A form and detailed summary of the proposed DNP project was submitted to the Director of Clinical Support Services for approval. Then the project approval was approved by the Director of Professional Education. The Director of Clinical Support Services was ultimately responsible for the approval of the project (Appendix D). The DNP student spoke to the entire department to gain buy-in for the proposed process improvement project.

Information technology. The data for this process improvement project was collected on vital sign machines. The vital sign machines are maintained by the biomedical department at the health center. The data collected was input into SPSS™ and Excel to create graphs to display the data after of the project.

Cost Analysis of Materials Needed for Project

This project accrued minimal costs. A pack of six clipboards was purchased for \$9.95. A ream of paper was purchased to collect the data at the cost of \$8.99. A pack of pens was purchased for \$12.99. One physical therapist needed an additional minute in their review of systems during an initial evaluation.

Plans for Institutional Review Board Approval

The medical center where the project is being implemented did have an internal review board (IRB) process. The Director of Professional Education approved the project and determined that it did not meet requirements to be presented to the medical center's IRB. The DNP Student submitted a self-assessment of the proposed DNP project to determine if an IRB

was required from the university. This project is a process improvement project and thus a full IRB review was not necessary (Appendix G).

Plan for Project Evaluation

Demographics. Four active duty physical therapists were the participants. Their gender and education level were gathered.

Outcome measurement. The outcome of the DNP project was to ensure that patients with abnormal blood pressures and pulses had interprofessional collaboration with their primary care provider (PCM). Some patients still followed through with their physical therapy sessions, but some were unable to follow through based on their cardiovascular status. The outcome was considered a performance measure. The total number of patients and the total number of patients who had their blood pressure collected for participating physical therapists were tallied to calculate compliance with the practice change, that was the physical therapists collecting vital signs.

Evaluation tool. This tool was generated by the DNP student. Refer to Appendix E to view the data collection tool. The tool was used to gather the tally of the patients who had a blood pressure and pulse screen prior to therapy. The data collection tool gathered the tally of patients who had a blood pressure higher than 140/90 or their pulse rate was higher than 100 beats per minute and were referred back to their primary care provider. The tool gathered the tally of patients who had blood pressure greater than 180/100 or a pulse greater than 120 beats per minute and had their therapy session halted. The tool gathered the total of patients who had a blood pressure greater than 200/120 or a pulse > 140 beats per minute or were symptomatic and were escorted to the emergency department.

Data analysis. The data was evaluated using Excel. This data reflected the interprofessional collaboration between physical therapists and primary care providers. There is no comparative benchmark however, taking vital signs is the recommendation of the American Physical Therapy Association.

Data management. No protected personal information was collected on this DNP project. The data was always kept in a double locked location. The data was uploaded into the Excel spreadsheet which was stored on the departmental drive through ECU. The paper was shredded upon completion of the data collection timeframe, and the data has been input into Excel. The DNP student was the only one who had access to the project data.

Summary

This chapter summarized the thought process leading up to implementing this DNP project. The organization was ready for change, except for a few physical therapists who do not see the necessity of the project. There was much benefit to be gained from implementing this process improvement project and the risk was minimal.

This project was thoroughly vetted through all the appropriate leaders at the medical center. The directors determined that this DNP project did not meet requirements to go through the medical institution's IRB. This project had limited expenses and technology needed to implement this project.

A detailed Data Collection Tool was developed by the DNP student to collect information gathered at the medical center. The DNP student developed a safe and smart way to manage the data that was gathered. This data was used to demonstrate the ability of the physical therapists and the provider's ability to collaborate to provide safe and efficient patient care.

Chapter Five: Implementation Process

This chapter discusses the process used to implement this DNP project. The reader can recreate this process improvement in any setting based on the information provided in this chapter. In the pages that follow, the reader learns about the project setting, its participants, and how they were recruited. Next, the chapter presents how the process improvement was implemented and any variations from the original plan and then during actual implementation.

Setting

The setting was at a physical therapy clinic in an eastern North Carolina military treatment facility. Adjoining the physical therapy clinic was a family medicine clinic, orthopedics clinic, inpatient units, emergency department, radiology services, laboratory services, and other healthcare resources. All departments in military treatment facilities across the world use the same electronic medical record with the ability for the primary care provider to review all vital signs. The referring provider and physical therapists easily share encrypted patient information through e-mail to relay critical information regarding the patient's care. The patient was notified that the physical therapist would share the information with their referring provider.

This was a Department of Defense agency that transitioned over to the Defense Health Agency. The physical therapy clinic only treated active duty service members. This facility was funded by the Department of Defense. No insurance was billed for services rendered.

Participants

Project participants were the physical therapist employees. Inclusion criteria was active duty physical therapists working at this facility. No inclusion criteria existed because this DNP project followed an already existing best practice guideline from APTA.

Recruitment

The physical therapist was initially recruited 7 months prior to the project implementation when the DNP student presented the proposed DNP project to the entire department. The DNP student informed them about current guidelines, recent research, and hypertension prevalence among active duty servicemembers. The project champion and department head decided to have an active-duty physical therapist implement the project. The reason for this decision was that process improvement participation benefitted an active duty physical therapist's annual evaluation. This was a convenience sample because the physical therapist was a project site employee.

Implementation Process

Once it was discovered that patients' blood pressure and pulse were not evaluated before physical therapy sessions, the process improvement project was planned. This was discovered when the DNP student asked about potential process improvement projects at this site. A group presentation with education regarding guidelines and prevalence was provided to the physical therapists. The physical therapists were notified of the process improvement project at that presentation. One vital sign machine was available that was stored in the treatment space of one of the physical therapists. The physical therapist obtained the patient's blood pressure and pulse before their PT session. The BP cuff was attached to the patient's arm and the machine started as the PT initiated the verbal interview and systems review. If an abnormal blood pressure or pulse was found, it was performed again after five minutes.

Some of the physical therapists were enthusiastic for the process improvement project. Others were not. The DNP student presented the proposed project to the entire staff of the Rehabilitation Department. Then, the project was discussed with the active duty physical

therapists. Most physical therapists were concerned that they would have less time to conduct a patient intake if they obtained vital signs. These concerns were taken into consideration when developing the process improvement project to facilitate buy-in from the physical therapists.

Next, the DNP student devised an algorithm for the physical therapists on what to do in response to blood pressure readings (see Appendix F). If a blood pressure was under 140/80 and a pulse was less than 110, the physical therapist continued prescribed therapy.

For blood pressures between 141-159/91-104 or a pulse between 111-129, the physical therapist notified the patient's primary care provider via encrypted email that day. It could be relayed at any point in the day since it was not critical information to relay. The physical therapist asked the patient if they had a headache, chest pain, shortness of breath, or palpitations. If the patient reported one or more of these symptoms, they were transported in a wheelchair by any available staff member with CPR certification to the emergency department.

For blood pressure between 160-170/105-114 or a pulse between 130-139, physical therapy was halted, and the patient urgently referred back to their primary care provider. A phone call to the provider's nurse was made to determine the provider dictated plan of care. If the patient had associated symptoms, they were transported in a wheelchair by any available staff member with CPR certification to the emergency department.

If the blood pressure is greater than 180/115 or the pulse is greater than 140, the patient was to be taken in wheelchair by any available staff member with CPR certification to the emergency department for immediate treatment and evaluation. The physical therapist sent an encrypted email to the primary care provider that day to ensure that patient receive appropriate follow up after discharge from the emergency department.

After assessing patient blood pressure and pulse, the physical therapist logged the results in the EMR and on a clipboard attached to the vital sign machine (see Appendix E). Weekly, the DNP student collected these sheets and logged the data. Successful project implementation meant that physical therapists obtained patient blood pressures and pulses and referred patients to the appropriate resource. Successful outcome was defined as interprofessional communication via encrypted email when an abnormal blood pressure or pulse was discovered.

Plan Variation

One plan change in this project was the amount of vital sign machines. During the original concept design, two vital sign machines were available and two physical therapists were going to do the intervention. They were unwilling to take manual blood pressures and pulse and there was no manual sphygmomanometer available. The project was simplified to one physical therapist taking vital signs on all her patients during the day. Patients who were receiving treatments by technicians, and not physical therapists, did not have vital signs taken prior to therapy. They had already been evaluated by the physical therapist and given a treatment plan to do by them and the technician was following the treatment plan.

Another large change was the site champion and other active duty physical therapy staff changes. Due to the nature of implementation in a military treatment facility, staffing changes due to unexpected deployments occurred. One of the expected participants was not present for the entire implementation phase. Another therapist was due to participate but was unable to due to timing.

One large variable was a hurricane. Due to the hurricane as well as a national holiday, no data was collected for week 2 of implementation. However, to account for this an extra week of data was obtained at the end of implementation.

Summary

In conclusion, this chapter summarized implementation of a process improvement project. This project took place at an eastern NC military treatment facility in their physical therapy division. Study participants were active-duty physical therapists who were employed there. Daily, one physical therapist was responsible for blood pressure screenings. The project goal was to add more vital sign machines post project completion to increase the number of physical therapists screening BP.

Project implementation specifics were described in this chapter. Physical therapists were responsible for assessing the blood pressure and pulse of their patients before starting therapy. If abnormal finding was discovered, PT initiated communication with the patient's primary care provider.

Chapter Six: Evaluation of the Practice Change Initiative

In chapter six, the reader can expect a thorough description of the demographic data obtained for the DNP Project. Then the results of the DNP Project Data Collection Tool are described.

Participant Demographics

The DNP Project participant was an active duty physical therapist at the project site. Initially the project was designed to include all active duty physical therapists (PT). However, due to deployment cycles, three of the PTs were not able to participate. Therefore, only one PT was involved in the implementation process. The participant was female, active duty and had her Doctor of Physical Therapy degree. She saw an average of four patients a day. The individuals who had their vital signs recorded were all active duty servicemembers between the age of 18-45. No additional demographic data was obtained from the patients.

The other physical therapists who were originally participating were 2 men and 1 woman. All were active duty in the military with their Doctor of Physical Therapy.

Intended Outcome(s)

The intended short-term outcomes for this project were that physical therapists would screen patients for vital signs prior to starting therapy. If there were any abnormal results, the physical therapist would let the primary care manager (PCM) know so the PCM could correctly manage the patient.

The goal for the intermediate outcome was the willingness for the physical therapists to continue to screen vital signs. Many in the profession do not believe that this assessment is necessary. The hope was that the physical therapists would recognize the importance of screening for blood pressure and pulse and feel compelled to continue to this screening.

The long-term outcome would be the interprofessional management of patients as the two disciplines manage patients together. As the scope of nurse practitioners continue to change in NC, it is important that all professions work together for the safety of the patients. The long-term goal would be the natural relationship between providers and physical therapists to carry out evidence-based practice in cohesion.

Findings. No patients were screened for pulse or blood pressure prior to the start of this project. During initiation, 100% of patients ($n= 143$) were screened for pulse and blood pressure. Six percent of patients ($n=8$) had a blood pressure that met criteria for PCM notification but were able to continue their session. Zero patients met criteria that would warrant ceasing the session and transfer to the emergency department.

Table 1. The results for each week are displayed in a bar graph (Appendix H).

Summary

In conclusion, this project site was not screening any patient prior to the project initiation. During the initiation phase, all patients had their blood pressure and pulse taken. The physical therapist correctly identified all patients who needed interprofessional communication between the physical therapist and the patient's PCM. They initiated that communication between the PCM for management of their blood pressure. No patients had severely elevated blood pressure where therapy needed to be stopped or brought to the emergency room.

Chapter Seven: Implications for Nursing Practice

Although this DNP project is taking place in a physical therapy practice, this project has many implications for advanced practice nursing. It meets all the pillars of the Doctor of Nursing Practice (DNP). These pillars are the foundation of education for all DNP educational programs and the basis for all advanced practice nursing, regardless of discipline (American Association of Colleges of Nursing [AACN], 2006).

Throughout this chapter, the reader can see the specifics about how the project met each of the pillars of the DNP degree and examples of practice implications will be given for each essential.

Practice Implications

Essential I: Scientific underpinnings for practice. This essential is vital for a DNP to translate evidence or research into practice. This essential combines the natural and social sciences with science-based theories and has the APRN deliver and reevaluate care based on nursing and other theories (AACN, 2016). This essential was vital to the development of the proposed DNP project. The area of need for this DNP project was that physical therapists were not performing cardiovascular assessments prior to initiating therapy. Extensive research on physical therapy practice and evidence-based care on cardiovascular assessment was performed. The standard of care published by the American Academy of Physical therapists says that this assessment needs to be performed (APTA, 2014). Also, research was discovered on physical therapists and their ability to refer patient's safely and quickly. This research showed that physical therapists do not always know when to refer safely, which was one of the reasons that led to the DNP project (Jette et al., 2006).

Essential II: Organization and systems leadership for quality improvement and systems thinking. APRNs must provide safe, quality care for their patients and recognize that this is done within organizations and using systems leadership (AACN, 2006). This essential was pivotal in the developing of this DNP project. The guidelines put forward by the American Physical Therapy Association (APTA) are very clear about caring for this patient population and the appropriate assessments needed to be performed. The DNP project improved practice by implementing the latest evidence-based care. This incorporated the entire healthcare system, since the DNP project took place at a military system.

The military system is vast and complicated. It required a collaboration of efforts to get this project approved between the Staff Education and Training Department, Physical Rehabilitation Department and East Carolina University. The approval of the Director of Professional Education, Director for Clinical Surgical Services and the Commanding Officer had to approve this project before it was implemented. The primary care provider and physical therapist could easily communicate regarding the best plan of care for the patient via the EMR.

Costs and benefits were evaluated during the planning and implementation phase of this project. This DNP project will demonstrate to leadership at the military treatment facility the necessity of owning more vital sign machines in the physical therapy spaces. The cost of more vital sign machines outweighs the potential risks associated with not screening for cardiovascular status due to lack of awareness.

Essential III: Clinical scholarship and analytical methods for EBP. A DNP prepared advanced practice nurse needs to be able to evaluate literature and determine if it is valuable enough to implement into practice (AACN, 2006). This essential was the foundation of this DNP project. Translating research into practice and making effective change is vital for the DNP

nurse. This DNP project implemented current guidelines into practice. Much of the evidence that was found discussed the void of physical therapists who were using best practice.

It is important for the APRN to also use this research to implement positive changes, even interprofessional changes, to benefit their patients. The evidence was analyzed via the literature matrix in Appendix B. Many studies were small in sample size. There were no meta synthesis studies performed on this topic. However, since the professional organization for physical therapists recommends this intervention; that was the primary basis for this DNP project.

Essential IV: Information systems/technology and patient care technology for the improvement and transformation of healthcare. Understanding and using technology and information systems are important for DNP nurses. A graduate from a DNP program is able to utilize information technology to provide safe patient care, evaluate outcomes, and initiate quality improvement (AACN, 2006). This DNP project utilized an EMR that communicates well across many specialties and clinics within the same healthcare network. The blood pressure and pulse documented by the physical therapist can easily be viewed by the primary care provider since they use the same EMR. The email system allowed for encrypted emails to be sent with sensitive patient information that did not violate HIPAA laws. The DNP student used technology by utilizing email with the site champion as well as using Excel to track the data for this project.

Essential V: Healthcare policy for advocacy in healthcare. The DNP graduate has the knowledge to be able to get involved in healthcare policy at various levels. They are able to critically analyze policy involved in healthcare, demonstrate leadership, influence policy makers, provide education about policy, and advocate for nursing (American Association of College of

Nursing [AACN], 2006). Much of this proposed DNP project is affected by existing legislation and current proposed legislation.

In all states and the District of Columbia, individuals can self-refer to physical therapy without needing a physician referral in some capacity. North Carolina is one of the states that does not require a referral from a physician to receive physical therapy treatment (Physical Therapy Practice Act: North Carolina, 1985). Many insurance companies will not provide reimbursement if there is no referral but that is insurance dependent. This is a significant piece of legislation because it requires physical therapists to know when to refer back to physicians for consultation and further imaging.

North Carolina currently has proposed legislation to increase autonomy of nurse practitioners (NPs). The current proposed legislation is called the SAVE Act which is designed to eliminate the mandate of physician supervision over NPs (North Carolina General Assembly, 2019). In North Carolina, NPs currently have to practice with physician supervision. SAVE stands for safe, accessible, value-directed and excellent healthcare compelling NPs to have further practice in North Carolina.

Both of these policies affect this DNP project. Physical therapists and NPs provide care to their patients. Interprofessional collaboration needs to occur to make sure that patients are well cared for. Open communication is imperative for safety. Patients who are under the care of the NP can self-refer to physical therapy. NPs need to trust that physical therapists will provide safe care for their patients. This is where accurate and complete cardiac assessment of patients, utilizing vital signs becomes so important.

Essential VI: Interprofessional collaboration for improving patient and population health outcomes. The DNP graduate is able to effectively communicate with other professionals

to change healthcare and improve patient safety (AACN, 2006). This is important for nurses to take on various leadership roles in their institutions. This essential is very important for this project as physical therapists and NPs working together are the essence of this DNP project. The physical therapist and NP are ensuring together that the cardiovascular stability of their patients is being upheld by communicating any abnormal blood pressure or pulse to each other. It is vital for NPs to be able to work with many other professionals to provide the best care for their patients. The providers were able to take the blood pressure and pulse measurements obtained in physical therapy to evaluate their plans for hypertension management. Some patients may now qualify for hypertension medication based on these additional vital signs from physical therapy.

Essential VII: Clinical prevention and population health for improving the nation's health. DNP prepared nurses are able to use their knowledge to increase health for an entire population. The DNP nurse can address health promotion across the life span using delivery care models encompassing many different dimensions of health (AACN, 2006). This DNP project improves the population of the patients who are receiving care from physical therapists by ensuring their blood pressure and pulses meet specific targets.

One of the goals of Healthy People 2020 (2019) is heart disease and stroke. Their aim is to prevent, detect and treatment heart attack and stroke through education and early detection of cardiovascular health risk factors (Health People 2020, 2019). This DNP project helps to meet that goal by screening a targeted population for health disease risk factors.

Essential VIII: Advanced nursing practice. This essential is a complicated one that draws all of the essentials together to come together as advanced nursing practice. The DNP nurse can provide an assessment, develop interventions, sustain therapeutic relationships, make sound clinical judgements for their patients (AACN, 2006). DNP nurses also provide mentorship

to other nurses and provide education and support through transitions while linking all the other essentials listed here together (AACN, 2006). This DNP project met this essential by providing a thorough literature review of the data regarding physical therapists and the need to review cardiovascular assessment. A detailed education plan was laid out to provide education to the physical therapists on appropriate referrals to primary care providers. Together, the NP and physical therapist are using evidence-based medicine to make sound clinical judgements for their patients.

Summary

In conclusion, the DNP project met all the required essentials for a DNP graduate program. Many of these essentials were the foundations of which this project was developed. Scientific underpinnings for practice demonstrated that the evidence was present to implement this quality improvement (QI) project. All nurses have to operate within organizational and systems leadership to develop and implement effective QI projects. Clinical scholarship and the ability to discern good research and implement it into practice is vital for DNP nurses. As technology is continuing to evolve and change, using it to change patient care is transformational. The political landscape is dynamic and DNP nurses can navigate it proficiently while advocating for their profession and the population. DNP nurses can collaborate efficiently with other professions to benefit their patients. Caring for entire patient populations is pivotal for DNP nurses and developing QI projects. The implementation of advanced nursing practice is what separates DNPs from other healthcare professionals. The proposed DNP project met all these essentials and demonstrated why the essentials define the importance of the DNP.

Chapter Eight: Final Conclusions

In this chapter, the reader will understand the significance of this DNP project. The strengths, weaknesses and limitations will be described. The project benefits and recommendations will be discussed during this chapter.

Significance of Findings

The largest outcome of this project was that 100% of the blood pressures were screened during the implementation of this project for the patient population selected. Prior to the DNP project, this site was not screening vital signs. This practice change now aligns with the standard of care of screening for vital signs prior to initiating physical therapy as recommended by the APTA (APTA, 2014).

When presenting for therapy, 94% of patients were not hypertensive. Only 6% of patients had an elevated BP but were able to continue therapy. No patients had to have their therapy halted due to unstable blood pressure. The physical therapist was able to initiate that communication with the patient's PCM to let them know about the abnormal assessment.

One significant outcome of this DNP project was the interprofessional communication that occurred between the providers. This demonstrates the ease in continuing the process improvement project beyond the data collection phase. This could also translate well into a variety of other settings and other physical therapy clinics.

Unfortunately, this site did not continue to screen vital signs beyond the length of this DNP project. They cited reasons such as not enough staff, time, or vital sign machines to effectively continue to assess vital signs. This site does not accept direct access patients who do not have a referral to physical therapy. A physical therapy clinic that accepts direct access patients would likely have more enthusiasm about a process improvement project such as this

one, as patients are coming without a referral. The physical therapy clinic where this process improvement project was implemented required patients to have a referral from a provider. A direct access clinic seeing a patient would not know the last time a patient saw their primary care provider.

Project Strengths and Weaknesses

One of the strengths of this project was the plethora of background data. This is a published guideline by APTA which clearly demonstrated why this process improvement should be accomplished. In addition, research shows that active duty servicemembers are at an increased risk for developing hypertension. Blood pressure rises during exercise which is why it is important to screen vital signs prior to initiating physical therapy.

Another strength of this DNP project was that it improved interprofessional communication. This facility was not having regular conversations between physical therapists and primary care providers. This opened up the avenue for communication. This then facilitated a team approach to patient care for those patients under the care of physical therapy.

Another strength was the buy-in from the department head, an occupational therapist, who was the original person that the DNP student proposed the project to. She was very enthusiastic about supporting the DNP student and making this project happen.

This project had many weaknesses. It took place at a military treatment facility and due to deployment tempo, there were unforeseen staffing changes which left the staff undermanned and unenthusiastic for a process improvement project. Despite the buy in from the department head, not all the physical therapists thought the project was needed, but they did participate.

Also, one of the vital sign machines broke the month prior to project implementation. This site was also not a direct access clinic, so all patients would have been seen recently by a

provider. At that visit with a provider, their vital signs were assessed so the physical therapists did not see the importance of screening again at their appointment.

Project Limitations

The largest limitation of this DNP project was the deployment tempo of the physical therapists at the project site. Half of the active duty physical therapists were deployed during the project implementation. Another limitation was the number of vital sign machines available during the clinic. One vital sign machine broke the month before implementation, which left the clinic with one working vital sign machine. Both of these changes meant that there were less participants in the project, both due to staffing and due to limited machines available. Staff was not interested in taking manual vital signs due to it taking too much time and they did not all own stethoscopes.

Another limitation of this PI project is that new hypertensive guidelines have been published by the American Heart Association with hypertension now being 130/80 (AHA, 2018). There would have been greater numbers of patients who would be considered hypertensive based on those numbers. It was decided not to use the new guidelines since many primary care providers are still not considering 130 systolic hypertension and would likely not treat the patient as hypertensive.

It was a lengthy process getting this project approved. The Memorandum of Understanding was not completed until 3 weeks prior to implementation. This is the contract of agreement between the university and the project site. This was another limitation to the project.

Project Benefits

There are a variety of benefits to the organization from this project. The benefits include creating an avenue for interprofessional communication. This did not regularly occur between

the primary care providers and the physical therapists in the past. Interprofessional communication improves patient outcomes, as different professions understand each other's roles and allows them to function effectively as a team (Jakubowski & Perron, 2018).

Another benefit to this organization is that screening for hypertension could prevent a sentinel event from happening. The physical therapists will not put someone through therapy who is not cardiovascular stable thereby potentially preventing the patient from having an event in the clinic.

The physical therapy clinic can use the data from this project to purchase more vital sign machines to make this project more be widespread throughout the Rehabilitation Department. Other specialties in the Rehabilitation Department include occupational therapy and speech language therapy. They plan to implement this through the different specialties within the rehabilitation clinic, such as the speech language pathologist. With Department of Defense funding very restrictive, each department chooses how to spend their specific allotment of funds. Hopefully, this project showed the Rehabilitation Department that some of these funds need to be used to procure more vital sign machines.

Practice Recommendations

Based on the results of this DNP project, the recommendation is to continue to screen vital signs for patients prior to receiving physical therapy. More vital sign machines should be purchased by the clinic to allow for more vital signs to be screened prior to initiating therapy. Another recommendation is to provide an educational session on obtaining manual vital signs. All of the staff in the physical therapy spaces should be able to obtain a manual blood pressure and count a pulse.

This project could be expanded to include other specialties in the clinic to include speech language pathology or occupational therapy, which are all in the same clinic.

Another algorithm should be developed to reflect the new hypertension guidelines. Based on the current American Heart Association (2017) guidelines, hypertension is considered 130/80. If the project is replicated, a new algorithm should start with the lowest blood pressure at 130/80 and relay that information to the primary care provider. This would have strengthened the project.

Another recommendation would be to talk to all the physical therapists as the project is being implemented, instead of one. The collaboration of ideas and hearing all concerns would have been useful in developing more buy in and sustainability after the data gathering portion of the DNP project.

Final Summary

The findings of this DNP project, along with the APTA (2014) recommend screening vital signs prior to initiating physical therapy. This will hopefully prevent some cardiovascular events from happening while undergoing therapy. There is growth in this project to carry this process improvement project to other areas within the Rehabilitation Department such as occupational therapy, and speech language therapy. This project can be replicated in other physical therapy clinics who are looking to implement this process improvement project.

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Appendix A

Literature Search Log

Database	Key Word Searches	Limits	# of Citations Found / Kept	Rationale for Inclusion / Exclusion (include rationale for excluding articles as well as for inclusion)
ClinicalKey	blood pressure	5 year period, peer reviewed, English	1 used	used articles directly related to clinical question
Clinical Key	pulse	5 year period, peer reviewed, English	1 used	used article directly related to clinical question
Laupus Library	Physical therapist AND vital sign	10 year period, peer reviewed, English	15 found, 1 redundant, 2 used	used article directly related to clinical question
Laupus Library	Physical Therapy AND Vital signs AND outpatient	5 year period, peer reviewed, English	1 found. 1 used	kept article directly related to clinical question
PubMed	Physical Therapist AND referral	5 year period, peer reviewed, English	2 found, 1 used	Not directly related to clinical question
Laupus Library	Physical Therapy or physical therapist AND vital signs or blood pressure or pulse or heart rate or cardiovascular assessment and outpatient or ambulatory	5 year period, peer reviewed, English	4 used	kept article directly related to clinical question

PubMed	Advanced practice nursing and interprofessional health team	5 year period, peer reviewed, English	3 found, 1 used	kept article directly related to clinical question
PubMed	Physical therapist AND blood pressure	5-15 years, peer reviewed, English	31 found, 1 redunant 1 used	kept article directly related to clinical question
PubMed	Physical therapist AND blood pressure	5 year period, peer reviewed, English	34 found, 2 used	kept articles directly related to clinical question
PubMed	Physical therapist OR physical therapy AND cardiovascular assessment	5 year period, peer reviewed, English	1 found. 1 used	kept article directly related to clinical question
CINHAL	Physical therapy AND refer	5-15 year period	5 found 1 used	kept article directly related to clinical question
Google	Servicemember AND Hypertension	Any	1 used	Kept article directly related to clinical question

Appendix B

Literature Review Matrix

Article (APA Citation)	Level of Evidenc e	Data/ Evidence Findings	Conclusion or Summary	Use of Evidence in EBP Project Plan
Albarrati, A. M. (2018). Outpatient physical therapy cardiovascular assessment: Physical therapist perspective and experience. <i>Physiotherapy Theory Practice</i> . Doi:10.1080/09593985.2018	Level III	285 PTs completed survey. 24% measured HR and BP	Majority of physical therapists who responded to survey are not assessing VS prior to performing assessment on PT	Indicated that PTs are not taking vital signs. Do not feel that it is important or part of their jobs.
Allen, A. & Mulderick, B. A. (2014). Vital signs monitoring in outpatient physical therapy practice. <i>Cardiopulmonary Physical Therapy Journal</i> , 25(4), 136-137. Doi:10.1097/01823246-201412000-00058	Level III	41% of physical therapists are not assessing pulse, 36% do not routinely assess BP, 64% do not assess respirations	Majority of physical therapists who responded to survey are not assessing VS prior to performing assessment on PT	Raise awareness that outpatient PTs are not taking VSs on their patients. Small sample size
Arena, S., Reyes, A. Rolf, M., Schlagel, N., & Peterson, E. (2018). Blood pressure attitudes, practice behaviors, and knowledge of outpatient physical therapists. <i>Cardiopulmonary Physical Therapy Journal</i> 29(1), 3-12 doi: 10.1097/CPT.0000000000000068	Level III	313 PTs with >10 years experience responded to survey. 51.8% did not feel BP was important but 94.2% felt confident they could take BP. 1/3 of PTs could correctly identify prehypertensive BP. 2/3 correctly identified	Address attitudes about assessing BP in PTs and addressing gaps in knowledge.	Sample is similar to the setting of DNP project- Outpatient orthopedic PTs with >10 years experience. Limitations include limited geographical region. Only used PTs signed up for APTA. Larger group

		hypertensive BP		of PTs who answered survey. Increase awareness of current APTA standards.
Harrison, C. (2017). Self-Reported Vital Sign Assessment in Physical Therapy. Retrieved from https://search-proquest-com.jproxy.lib.ecu.edu/docview/1899149049?pq-origsite=summon	Level III	286 PTs responded to survey. Respondents only measures HR (39%), BP (37%), and SpO2 (30%) during initial encounters	PTs are not taking VS assessments consistently and regularly	Big sample size from all over the US. Looked at whether PTs were more likely to assess VS if their state allowed direct access and no correlation was found.
Howard, J. T., Sosnov, J. A., Janak. J. C., Gundiapalli, A. V., Pettey, W. B., Walker, L. E., & Stewart, I. J. (2018). Associations of initial injury severity and posttraumatic stress disorder diagnoses with long-term hypertension risk after combat injury. <i>Hypertension</i> , 71(5), 824-832. Retrieved from https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.117.10496	Level III	6011 patients and 3846 were included and it was discovered that 32.6% of those servicemember's were diagnosed with HTN	PTSD diagnosis resulted in at 85% increase in risk of HTN	This study demonstrated that servicemembers with PTSD have an increased risk of HTN.

<p>Jette, D.U., Ardleigh, K., Chandler, K., & McShea, L. (2006). Decision-making ability of physical therapists: Physical therapy intervention or referral. <i>Physical Therapy</i>, 86(12), 1619-1629. Retrieved from https://academic.oup.com/ptj/article/86/12/1619/2805064/Decision-Making-Ability-of-Physical-Therapists</p>	Level III	<p>399 surveys to reflect clinical decision making on when PTs should refer. Musculoskeletal condition-correctly referred 87.3% of the time, noncritical referral correct 87.8 %. For critical medical condition, correct referral 79% of the time.</p>	<p>Study shows that physical therapists might need further training to determine correct refer to physical for medical conditions</p>	<p>Further training on red flag symptoms for PTs. Survey study. Large sample size.</p>
<p>Kasinkas, C., Wood, R. D. & Koch, M. L. (2011). Blood pressure monitoring in outpatient physical therapy clinics: Should it be performed routinely? <i>Cardiopulmonary Physical Therapy Journal</i> 22(4). 29-41. Retrieved from http://eds.b.ebscohost.com/jproxy.lib.ecu.edu/ehost/pdfviewer/pdfviewer?vid=1&sid=1119e2ee-0b86-496d-b73d-632c08fe5d28%40pdc-v-sessmgr06</p>	Level III	<p>114 patients were screened for hypertension by PT students in New England area. 23.6% were hypertensive and 23.6% were prehypertensive.</p>	<p>Screening for hypertension is important as HTN is contraindication for treatment.</p>	<p>Limitations-small sample size. Does not specify what is prehypertension and hypertension. Does not say if BP was too high to complete therapy. Does not specify intervention done once discovered if PT was hypertensive.</p>

<p>Kilpatrick, K., Lavoie-Tremblay, M., Ritchie, J. A., Lamonthe, L. (2014). Advanced practice nursing, health care teams, and perceptions of team effectiveness. <i>Journal of Trauma Nursing 21</i>(6), 291-299. Doi: 10.1097/JTN.0000000000000090</p>	<p>Level IV</p>	<p>Literature review of organization and health care literature regarding APRNs, health care teams, and team effectiveness.</p>	<p>Health care teams are dynamic. Team effectiveness should be looked at in context of team situation</p>	<p>Limitations that is does not address PT specifically. Health care teams are effective.</p>
<p>Miller, A. L., Village, D. King, T., McKenzie, G., Lee, J., & Lopez, C., (2016). Heart rate and blood pressure assessment by physical therapists in the outpatient setting: An observational study. <i>Cardiopulmonary Physical Therapy Journal 27</i>(3), 90-95. Doi:10.1097/CPT.0000000000000033</p>	<p>Level III</p>	<p>Observed 74 observed visits, BP was only taken in 2 sessions and taken 1 time after exercise.</p>	<p>PTs in outpatient settings are not following current HR and BP screening.</p>	<p>This study continues to raise awareness that PTs are not taking vital signs prior to interventions.</p>
<p>Mount, H.E., Graham, C., Clark, D., Morris, D., & Foley, K. (2016). An investigation of screening for medical referral by physical therapists. <i>Internet Journal of Allied Health Sciences and Practices, 14</i>(2). Retrieved from http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=1582&context=ijahsp</p>	<p>Level III</p>	<p>Survey of 391 PTs who responded to certain clinical scenarios to determine if appropriate physician referrals were made. Answered correctly an average of 90.5%</p>	<p>Appropriate decisions were made 90% of the time.</p>	<p>Large sample size. PTs were able to accurately recognize and write appropriate referrals</p>

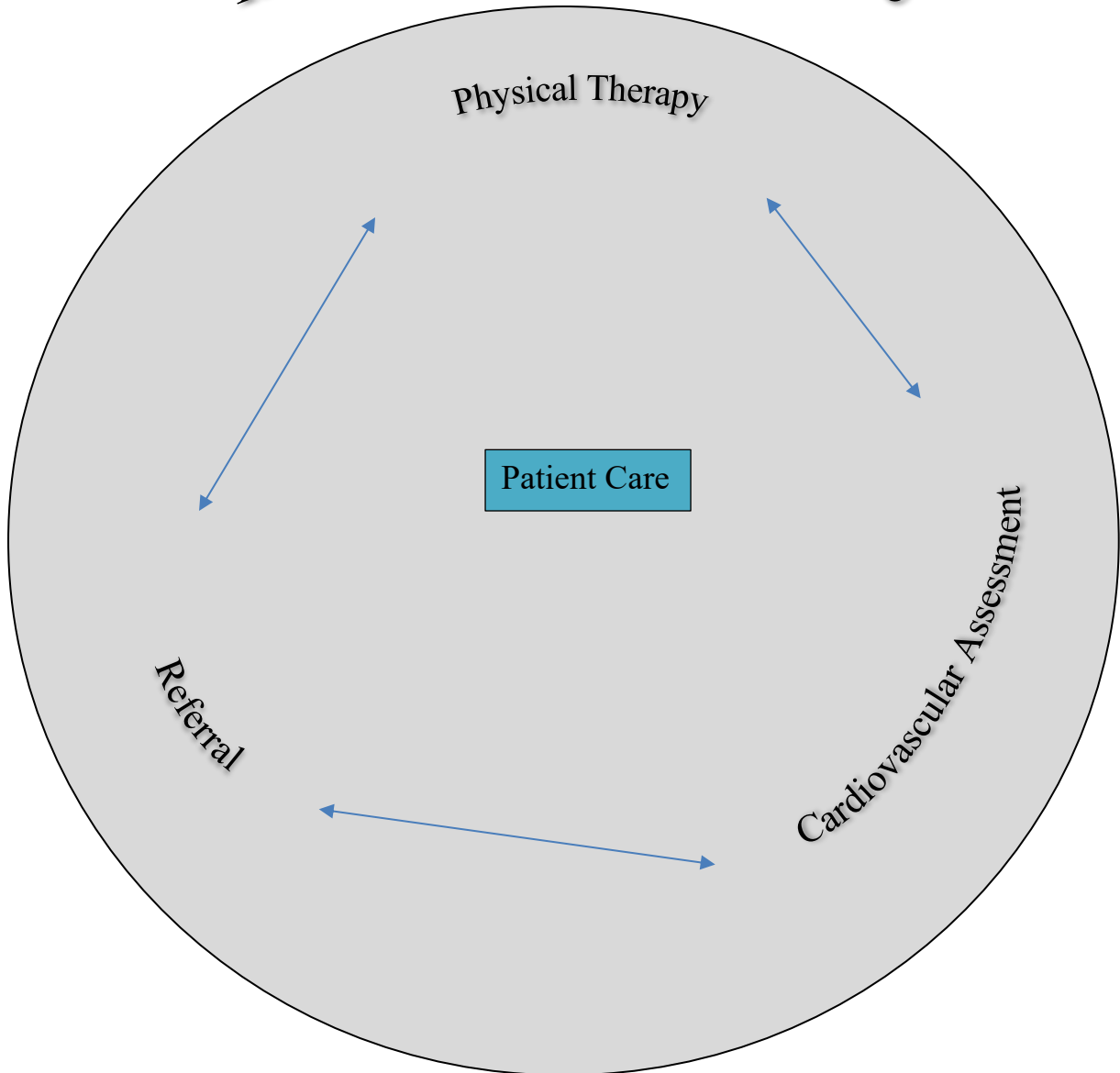
<p>Peters, J.J. (2014). Self-reported use of vital signs in the adult outpatient physical therapy setting. Retrieved from https://fgcu.digital.flvc.org/islandora/object/fgcu%3A27274/datastream/OBJ/view/Self-Reported_Use_of_Vital_Signs_in_the_Adult_Outpatient_Physical_Therapy_Setting_.pdf</p>	Level III	<p>45 PTs were surveyed. 44.4% said important to measure BP and 46.6% said extremely important to measure heart rate. Only 0.8% said it is important to measure it on each PT every visit. Only 28.9% of respondents had a workplace policy</p>	<p>Many PTs think VS are important but not many are actually doing it on every patient at every visit</p>	<p>Small sample size. Not many work policies support performing VS at every visit.</p>
<p>Scherer, S., Anemaet, W.K, Briggs, B., Bulter, C., Foucier, J., Haia, C., Stockham, K., & Weiss, E. (2011). Analysis of practice in acute care physical therapy: Vital signs monitoring. <i>Cardiopulmonary Physical Therapy Journal</i>, 22(4), 26-27. Retrieved from http://journals.lww.com/cptj/Citation/2011/22040/ANALYSIS_OF_PRACTICE_IN_ACUTE_CARE_PHYSICAL.15.aspx</p>	Level III	<p>323 patients in acute care setting were studied using descriptive statistics to determine frequency of VS. 65.8% of patients had no VS taken and were engaging in gait training</p>	<p>large number of patients do not have their vital signs taken</p>	<p>highlights lack of routine VS monitoring and inconsistency in using vital sign monitoring in clinical decision making</p>
<p>Severin, R., Wang, E., Wielechowski, A., Phillips, S. A. (2019). Outpatient physical therapist attitudes toward and behaviors in cardiovascular disease screening: A national survey. <i>Physical</i></p>	Level III	<p>931 PTs responded to a survey regarding whether they assess BP and pulse and perceived</p>	<p>14.8% are taking BP and pulse. Barriers: lack of time (37.44%), lack of perceived importance (35.62%)</p>	<p>Large sample size. Only members of APTA were included.</p>

<p><i>Therapy</i>, 99(7), 833-848. Doi:10.1093/ptj/pzz042</p>		<p>barriers and facilitators</p>		
<p>Thistle, V.G., Basskin, A.L., Shamus, E., & Jeffreys-Heil, R. (2016). Clinical decision making regarding the use of vital signs in physical therapy. <i>Physical Therapy Rehabilitation</i>, 3(7). Doi: 10.7243/2055-2386-3-7</p>	<p>Level III</p>	<p>17 PTs responded to questionnaire regarding clinical decision making and high-risk scenarios</p>	<p>Several themes affected clinical decision making-ACSM guidelines, clinical experience, protocol, education, patient presentation, policies. No agreement between PTs over definition of abnormal VS</p>	<p>Small sample size from FL. PTs have lack of direction and protocols about what to do with abnormal VS</p>
<p>Van Zant, R. S., Cape, K. J., Roach, K., & Sweeney, J. (2013). Physical therapists' perceptions of knowledge and clinical behavior regarding cardiovascular disease prevention. <i>Cardiovascular Physical Therapy Journal</i>, 24(2), 18-26. Retrieved from https://search-proquest-com.jproxy.lib.ecu.edu/docview/1369309739/C10E3AA7324C493EPQ/5?accountid=10639</p>	<p>Level III</p>	<p>516 PTs responded to survey regarding identifying and educating about CVD risk factors. 85% responded that they performed cardiopulmonary system review</p>	<p>PTs are in an ideal position to administer quality care regarding CVD prevention. They feel that they can actively help prevention but they do not engage in clinical practice behavior.</p>	<p>Other factors incorporated into study. Only took out the data about cardiovascular assessment for literature review for this paper.</p>

Appendix C

Concept Map

Interprofessional Care



Appendix D

Organization Site Support Letter

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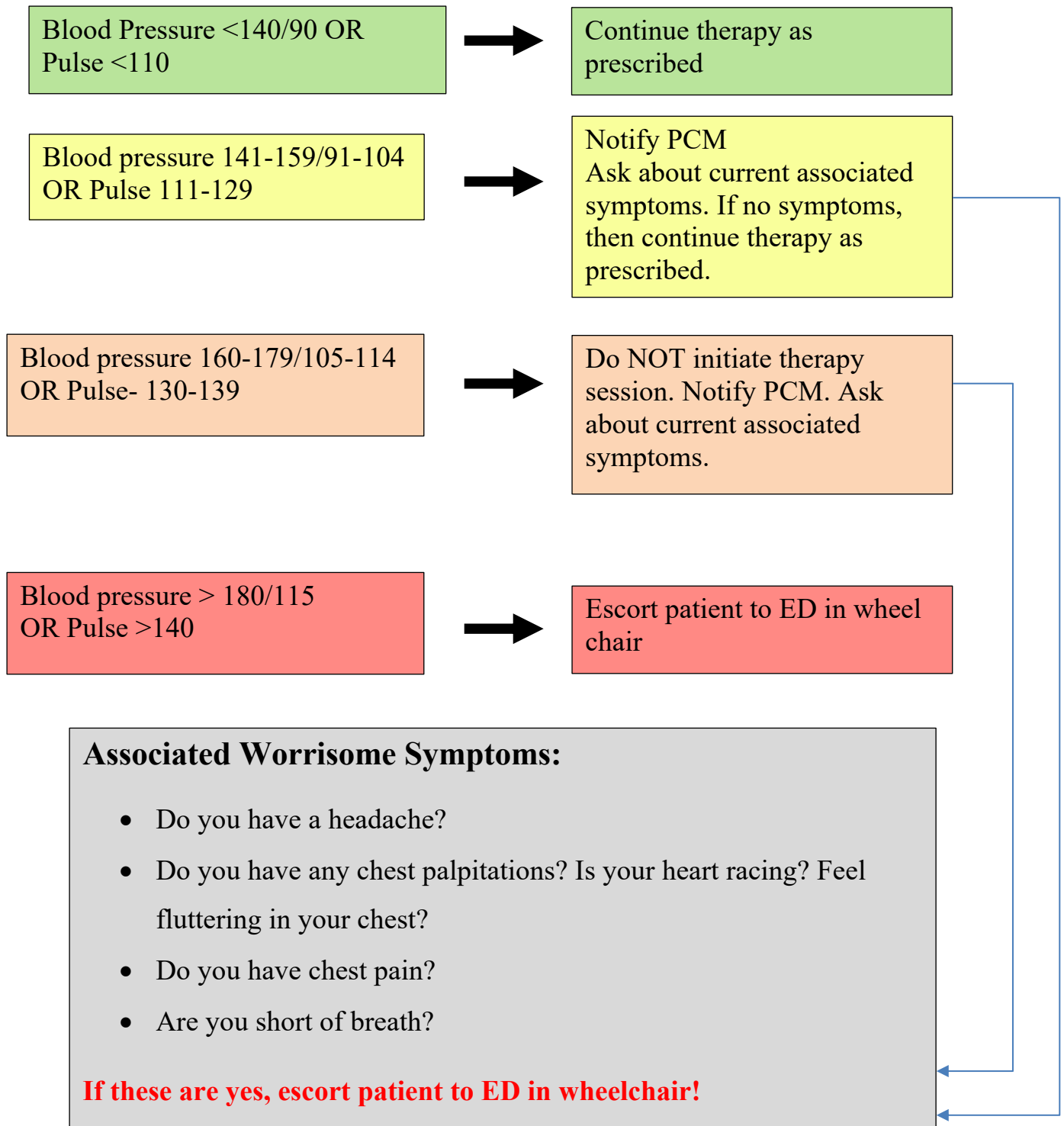
Appendix E

DNP Data Collection Tool

Date	Tally of Blood Pressure Taken	Blood pressure 141-159/91-104 Pulse 111-129 Asymptomatic and continued therapy	Blood pressure 160-179/105-114 Pulse- 130-139 and stopped therapy session	Blood pressure > 180/115 Pulse >140 symptomatic, escort to ED

Appendix F

DNP Project Implementation Algorithm



Appendix G

ECU IRB Review Response Summary

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Appendix H

Table 1

Total Blood Pressure Interventions by Each Week

