

Running Head: CLINICAL DECISION MAKING REGARDING VITAL SIGNS

A QUALITATIVE STUDY ON CLINICAL DECISION MAKING REGARDING THE
USE OF VITAL SIGNS IN PHYSICAL THERAPY

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Clinical Decision Making Regarding Vital Signs

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Abstract

Introduction Clinical decision making is an integral component of patient care. Vital signs are a component of the clinical decision making process each visit. These include body temperature, blood pressure, heart rate, respiratory rate, and pulse oximetry. Measuring vital signs allows physical therapists to screen for red flags, monitor a patient's cardiovascular response to exercise, and incorporate relevant information into the plan of care. Previous studies have shown that physical therapists do not always objectively measure vital signs each visit. With physical therapists emerging as autonomous practitioners, it is important to understand which factors strongly influence the clinical decision making of physical therapists to take vital signs.

Methods Seventeen practicing physical therapists were given a questionnaire by phone, email, or in person. The questionnaire contained three sections including demographic data, clinical decision making questions, and two risk-based scenarios in which participants were asked to indicate whether or not they would assess vital signs.

Results The primary factors cited in response to source of reference of assessing vital signs included clinical experience, education, and patient presentation. The primary factors included by physical therapists in response to the decision to treat or refer based on abnormal vital signs included patient history, clinical experience, various parameters, and contacting the physician. Several different themes emerged with respect to clinical decision making that included utilizing ACSM guidelines, clinical experience, physician's protocol, education, patient presentation, criteria proposed by the cardiopulmonary section of the APTA, and facility policies and procedures. In addition,

there did not appear to be an agreement by participants on the definition of abnormal vital signs seen clinically.

Conclusion The variation of factors that influenced the decision making process by the participants may be reflective of the lack of guidelines and the broad understanding of the need and benefit of objectively assessing vital signs.

Introduction

Physical Therapists (PT) can practice as autonomous practitioners (Domholdt & Durchholz, 1992). Measuring vital signs including temperature, blood pressure (BP), heart rate (HR), respiratory rate, and pulse oximetry (SpO₂) allows physical therapists to screen for red flags, monitor a patient's cardiovascular response to exercise, incorporate relevant information into the plan of care and use the information gained for making clinical predictions. Physical therapists do not always measure vital signs every visit (Peters, 2014). Whether PTs should be measuring vital signs every visit can be controversial, as patients' status can undergo changes from day to day that are not visible or easily communicated. Evaluation and treatment of many dysfunctions can commonly involve physical exertion which can increase stress on the patient's different body systems. Clinicians have stated that they use clinical decision making in determining which vital signs they measure based on observations or patient information provided through risk assessment. The decision to take vital signs is a component of clinical decision making for PTs, which is multi-factorial in nature. Evidence on clinical decision making in relation to vital signs is not widely available in the existing literature. It is therefore important to know which factors influence the decision to take vital signs.

Purpose

The purpose of the study was to examine the clinical decision making process involved in the measurement of vital signs by physical therapists including body temperature, blood pressure, heart rate, respiratory rate, and pulse oximetry.

Research Question

This study sought to answer the question, “What factors most strongly influence the decision of physical therapists to take vital signs?”

Literature Review**Clinical Decision Making**

Clinical decision making is a strategy employed by clinicians which is highly variable and often difficult to quantify. Smith, Higgs, and Ellis (2007) examined the factors that influenced the clinical decision making process in the acute care setting using observation and semi-structured interviews. Because environment can impact clinical decision making, the authors sought to examine the influence of a “complex, busy organizational context” in an urgent environment in which adverse effects are highly possible (2007). Smith et al. (2007) described clinical reasoning as a complex and multiphasic phenomenon wherein physical therapists develop an understanding of the problems of their patients as the basis for action. Through data analysis, the researchers found the most influential factors for cardiorespiratory decision making included the physical therapists themselves, the nature of the decision, and context in which the decision occurred. In addition, the researchers reported that the more complex the decision, the more in-depth the reasoning process was reported to be. This study illustrates the role of subjective factors in the variable clinical decision making process.

Vital Signs as a Measurement Tool

Vital signs can provide information that elucidates the immediate conditions of patients in the clinic. Moreover, monitoring vital signs continuously can help to indicate systemic changes and assess progress. In a retrospective study which looked at 1.15

million individual vital signs from a level 1 trauma hospital, Bleyer et. al (2011) sought to examine the association of critical vital signs during hospitalization and mortality. The researchers defined a critical vital sign as the level at which a patient had a 5% or greater chance of mortality. The measures included in the study comprise systolic and diastolic blood pressure, temperature, heart rate, respiratory rate, pulse oximetry reading, level of consciousness, and Glasgow coma score if applicable. Of the measurements taken, the researchers reported that the most commonly missing vital signs included temperature and pulse oximetry. The results of the study indicate that the presence of one critically abnormal vital sign was associated with a mortality of .92% whereas three simultaneous critical vital signs were associated with a mortality of 23.6%. It is interesting to note that of those individuals who experienced three simultaneous critical vital signs, only 25% did so within the first 24 hours of admission. The implications of this study therefore highlight the need for early recognition as well as continuous monitoring and attention paid to abnormal vital signs.

Stanforth et. al (2000) examined the reproducibility of resting systolic and diastolic blood pressure, mean arterial pressure, and heart rate measurements from a prior research study. Researchers found that day-to-day variations within subjects were small as compared to between subject variance for the measurements. Moreover, they found factors that impacted reproducibility to include technical error and coefficient of variation within subjects. The researchers reported that the blood pressure measurements, computed across four clinical settings reported technical errors less than 5.1 mm Hg with coefficients of variation less than 7% and interclass correlations of 0.75. They also noted that heart rates were slightly less reproducible.

In their research, Edmonds et. al (2001) measured vital signs, including heart rate, respiratory rate, and blood pressure on 140 patients in an emergency room clinical setting using auscultation and the calculation of mean values to configure reliability. They found substantial interrater agreement in assessing tachycardia, bradycardia, and diastolic hypertension; moderate agreement in detecting systolic hypertension; and little agreement assessing systolic hypotension and tachypnea. Overall, the results of the study indicated significant interobserver variability in the vital sign measurements. In particular, the researchers designated that values approaching the line between normal and abnormal may be particularly implicated by variability. Therefore, they indicate that caution should be taken with respect to interpretation of vital signs, particularly respiratory rate which is an inherently unreliable measurement of respiratory status. It is important to note that in their efforts to assess reliability, the researchers deliberately devoted attention to detailed measurements of vital signs. This effort may not be the standard of care across settings and practitioners which can further impact reliability of measurement.

Mower et. al (1996) sought to examine the correlation between respiratory rate and arterial oxygen saturation as measured by pulse oximetry. Their aim in this research was to determine whether respiratory rate measurements were reliable in detecting oxygen desaturation. To begin, they contrasted the inaccuracy of respiratory rate measurement with the efficiency of pulse oximetry which they note can provide non-invasive, accurate measurements of arterial oxygen saturation. For this undertaking, the researchers conducted a prospective study on a total of 17,383 patients who presented to the emergency department. Results of the study indicated correlation coefficients which ranged from 0.379 to -0.465 with only 33% of subjects with an oxygen saturation value

of 90% exhibiting an increased respiratory rate. The authors subsequently concluded that respiratory rate measurements have a poor correlation with oxygen desaturation and that this measurement should not be used to screen reliably for desaturation.

Clinical Use of Vital Signs

In the emergency room setting, the measurement of standard vital signs includes heart rate, blood pressure, respiratory rate, and temperature (Edmonds et. al, 2001). The assessment of these four vital signs is consistent with the findings of Evans, Hodgkinson, and Berry (2001) who conducted a systematic review of evidence related to the use of vital signs by nurses. They note that these measures could be supplemented by other measurements such as nutritional status or pulse oximetry. In particular, they found that pulse oximetry is the most commonly suggested addition to traditional vital signs and is recommended for use in pulmonary outpatient departments, for patients on oxygen therapy, and for those with pulmonary disease. The researchers also point out minimal findings with respect to optimal frequency of vital sign measurement with existing decisions commonly made on the basis of opinion or tradition, rather than evidence. With respect to variability in practice, Smith, Bland, and Mullett (2005) indicate that unlike other physiological parameters which are carefully monitored for changes, core body temperature is not always well monitored (Harries, Zacharia, Kapur, Jahn, & Enarson, 2009). Moreover, pain, level of consciousness, and urine output may also be assessed in certain clinical settings (Elliot & Coventry, 2012).

In a prospective, observational cohort study with United States Veterans, Lighthall, Markar, and Hsiung (2009) sought to examine the association of critical events including mortality, cardiac arrests, and unplanned intensive care unit transfers with

abnormal vital signs in patients. They found that abnormal vital signs were present in approximately 16% of the population with the most common abnormalities including decreased blood pressure, abnormal heart rates, abnormal respiratory rates, and decreased oxyhemoglobin saturation. Of the patients with abnormal vital signs, 35% experienced one of three critical events whereas only 2.5% of patients with normal vital signs experienced a critical event. The authors found, however, that the sensitivity of vital signs in predicting clinical events was 64% with a false positive rate of 65% allowing them to conclude that vital signs failed as a screening tool for clinical deterioration. This study therefore shows the importance of incorporating vital signs into a summative risk evaluation for patients in which multiple considerations and clinical decision making are incorporated to assess the risk of morbidity and mortality.

According to the American Physical Therapy Association's Guide to Practice (American Physical Therapy Association, 2014), measurement of blood pressure, heart rate, respiratory rate, and pulse oximetry are appropriate to characterize or quantify cardiovascular and pulmonary signs and symptoms as part of an assessment of aerobic capacity and endurance. Peters (2014) sampled 45 physical therapists in the outpatient clinical setting from the state of Florida on their beliefs and practice of taking vitals. Peters found that the most of the participants reported measurement of vital signs between 0 to 20 percent of the time during initial evaluations and subsequent visits (Peters, 2014). The majority of participants believed that it was important to measure vitals for patients whose primary condition was cardiovascular while few believed it was important to measure vitals for each patient every visit.

Scherer, Noteboom, and Flynn (2005) reported that an “estimated 62% of patients seen in the orthopedic setting have cardiovascular disease, as indicated in the initial medical profile.” Therefore, concerns of a cardiovascular nature extend beyond the cardiopulmonary rehabilitation setting and should be considered in all patients. The implications from Peters’ study can provide a better understanding for the discrepancy between beliefs and practice of assessment of vital signs in the clinical setting.

Cardiovascular Disease in Athletes

Cardiovascular disease is widespread in its effects with around 56 million deaths attributed to the disease annually (Turnbull, Kengne, & MacMahon, 2010).

Cardiovascular disease can impact individuals of all ages and is often undiagnosed.

Though infrequent, reports of young and presumably healthy athletes who suffer sudden death serve to highlight the impact of undiagnosed underlying conditions. For athletes below the age of 35, the majority of sudden deaths are caused by severe congenital cardiac malformations with hypertrophic cardiomyopathy presenting as the predominant abnormality (Maron et. al, 1996). In athletes over the age of 35, the majority of deaths occur from atherosclerotic coronary artery disease (1996). In examining the pre-participation screening of competitive athletes, Maron et. al (1996) found that the incidence of cardiovascular screening among professional sports teams was low. The authors offered the idea that practical limitations, economic considerations, and acceptance of implied risk by athletes were underlying factors that contributed to this phenomenon. In addition, they found that personal history information had a low specificity for detection of abnormalities leading to sudden death in young athletes; however, in older athletes, a history of coronary risk factors and family history of

premature ischemic heart disease could be useful for identifying individuals at risk. Though the authors explicitly addressed cardiovascular disease in athletes, the findings can have important implications for the general population. For instance, a thorough history, though not in place of vital signs, can be highly important in calculating the risk of an individual for a cardiovascular adverse event. In addition, it is important for physical therapists to consider that there may be underlying conditions in those individuals who appear healthy.

Hemodynamic Response to Exercise

Because different modes of exercise can impact blood pressure variably, it is important to consider vital signs in relation to exercise prescription. Exercise can elicit cardiovascular abnormalities which are not normally present and therefore can help to determine cardiac function (Fletcher et. al, 2001). Three types of exercise can impact the cardiovascular system including isometric exercises, isotonic exercises, and a combination of isometric and isotonic exercises, called resistive exercises. It is also important to consider the population involved in exercise in determining appropriate vital signs. For instance, a lower heart rate response and higher systolic blood pressure response may be considered appropriate for older individuals (2001).

One study by Laird, Fixler, and Huffines, (1979) examined the cardiovascular response of normotensive adolescents to isometric exercises. During sustained isometric muscle contractions, an increase in cardiac output and blood pressure can occur with little change in total peripheral resistance. The researchers used an echocardiograph to determine left ventricular function and systolic time intervals. In addition, sphygmomanometry was used to find blood pressure at rest and during 25% maximal

contraction using a handgrip dynamometer. The results showed that there was a significant elevation in mean heart rate, systolic, diastolic, and mean blood pressures during the maximum voluntary contraction. In addition, they found that stroke volume remained constant and left ventricle diastolic and systolic dimensions remained unchanged which allowed them to attribute the increase in cardiac index to heart rate. The researchers chose to include adolescents in the study due to the deficiency of literature on this population and speculated that a 25% voluntary contraction would be sufficient to produce effects on blood pressure as a 20% maximum voluntary contraction is sufficient in normal adults. In consideration of the 26% increase in heart rate and 22% increase in cardiac index, researchers concluded that sustained isometric exercise is a safe technique for healthy adolescents. This study indicates that a hemodynamic response often occurs with isometric exercises. For healthy adults and adolescents, this response may be appropriate; however, in individuals that have underlying cardiovascular pathologies, this increase may be sufficient to cause complications. It is therefore important to consider not only the influence of exercise on vital signs, but also the nature of exercise.

Risk Stratification

Risk stratification in relation to cardiovascular disease can be defined as classifying a patient according to low, moderate, or high risk of an event occurring. Currently, risk stratification guidelines are available through the American College of Sports Medicine (ACSM). With these guidelines, a classification of low risk requires no known cardiovascular, pulmonary, or metabolic disease, no major signs or symptoms suggestive of these diseases, and less than two risk factors (ACSM, 2014). Moderate risk

is indicated similarly and includes greater than or equal to two risk factors. A high risk classification, on the other hand is determined as a result of known cardiovascular, pulmonary, or metabolic disease or major signs and symptoms of these diseases (2014). According to the ACSM, current risks for stratification can include age, family history, cigarette smoking, sedentary lifestyle, obesity, hypertension, dyslipidemia, and prediabetes (2014). Though a physical therapist may inquire about these risk factors during an evaluation, a set of risk stratification guidelines does not currently exist specific to the profession of physical therapy.

Scherer, Noteboom, and Flynn (2005) surveyed physical therapists who were members of the Orthopedic Section of the American Physical Therapy Association in order to examine current practice patterns for assessing cardiovascular status in patients. This study was justified through the need for physical therapists to adopt best practice patterns, in particular with the increasing number of individuals seeing physical therapists through direct access. With their survey, the authors designed questions to ascertain whether physical therapists could correctly identify cardiovascular risk based on ACSM guidelines. Participants were also asked to identify which individuals were appropriate for screening and which individuals did not need to be screened. Results revealed that 64% of participants correctly determined the risk in the first patient scenario and 78% for the second patient scenario. The authors speculated the error rate was more closely attributed to unfamiliarity with ACSM guidelines than ability to assess cardiovascular risk. The absence of risk assessment standards for physical therapists may therefore play a significant role in the variability of risk assessment seen in the study. It is therefore

important to identify the factors used by physical therapists to identify risk as part of the clinical decision making process.

Conclusion

Physical therapists screen for red flags to determine a patient's cardiovascular response to exercise, incorporate relevant information into the plan of care and can use the information gained for making clinical predications. Moreover, regardless of what the patient is being seen for, adverse events can occur and should be considered in relation to the interventions physical therapists prescribe. Understanding the clinical decision process involving vital sign assessment may help promote improved patient outcomes.

Methods

Research Design and Instrumentation

A questionnaire was created and peer reviewed by two faculty members of the College of Health Professions and Social Work at Florida Gulf Coast University (FGCU) and feedback was incorporated. Multiple edits were made to improve the content, readability, and efficacy of the final instrument. The questionnaire included a consent form and statement of confidentiality in accordance with the model provided by the Office of Research and Sponsored Programs at FGCU. Information regarding the confidentiality and security of participant's personal information was provided. All data, including data analysis performed on SPSS software, were stored on a flash drive and kept in a secure location in the committee chair's office. The flash drive will remain in the secure location for three years after which it will be destroyed.

Sampling Strategy

IRB approval was obtained before participant recruitment and data collection. The study was a phenomenological design with snowball sampling to include 10 to 20 physical therapists. Recruitment was achieved through multiple sources including through DPT faculty at FGCU as well as through participants themselves. Each participant was given full disclosure of the study including the purpose and nature of the project, and participation was voluntary. Results were kept confidential and completion of the survey implied informed consent. Each participant was required to be a licensed and currently practicing physical therapist in the State of Florida, and only participants meeting these eligibility requirements were asked to participate. Participants were instructed not to proceed with the interview if they were not currently practicing or had been practicing for less than six months.

Data Collection

Data collection consisted of an interview that was recorded, coded, and transcribed. The first part of the interview featured demographic questions. The second part featured a questionnaire related to clinical decision making. The third part included two clinical scenarios in which participants explained the reasoning behind their decisions whether or not to take vitals.

Data Analysis

Answers to open ended questions were grouped into themes based on common responses and similar characteristics noted. Pearson correlation and Cohen's Kappa were used to associate demographic information regarding APTA membership, years of

practice, and highest level of education with response to clinical scenarios and reference for cardiovascular risk.

Results

A total of 17 physical therapists were interviewed for this study including five through email and 12 either by phone or in person. No statistically significant correlations were found between level of practice, APTA membership, education, and use of vital signs. No statistically significant correlation was found between variables and reference for cardiovascular risk.

Range of Years	Number (%) of Respondents
<5 years	3 (17.6%)
5-10 years	4 (23.5%)
11-20 years	4 (23.5%)
21-30 years	5 (29.4%)
>30 years	1 (5.9%)

Degree in Physical Therapy	Number (%) of Respondents
Doctoral	9 (52.9%)
Masters	6 (35.3%)
Bachelors	2 (11.8%)

Setting	Number (%) of Respondents
Outpatient	15 (88.2%)
Pediatrics	1 (5.9%)
Home health	1 (5.9%)

Setting	Number (%) of Respondents
Members	9 (60.0%)
Non-members	8 (47.1%)

Decision to Take Vital Signs on the First Scenario Patient

The following is the first scenario that was given to the participants:

“Patient is a 65 year old female who is referred to you for balance retraining following a fall. She was seen by her primary care physician two days ago. Patient has a history of hypertension and gastroesophageal reflux disease (GERD). Medications include propranolol (Inderal) and omeprazole (Prilosec), patient states that she is compliant with her medications.”

The respondents were then asked, “Would you take vital signs on this patient, if so which ones? Why or why not?”

Seven participants (41.2%) stated that they would take blood pressure, six participants (35.3%) stated that they would take heart rate, three participants (17.6%) stated that they would take respiratory rate, five participants (29.4%) stated that they would take pulse oximetry, and one participant (5.8%) that they would take temperature. Dependent upon on certain additional stipulations suggested by participants which were not specified in the scenario, seven participants (41.2%) stated that they would take blood pressure, six participants (35.3%) stated that they would take heart rate, two participants (11.8%) stated that they would take respiratory rate, and four participants (23.5%) stated that they would take pulse oximetry.

- “Yes, blood pressure, oxygen saturation, heart rate, and respiratory rate. I would take blood pressure because she has a history of hypertension and I am not sure how compliant she is with her medication. Blood pressure is important in regard to falls, possibly due to orthostatic hypotension. Oxygen saturation to ensure that the patient is not having episodes of syncope or shortness of breath. Heart rate and respiratory rate I take for patients perceived level of exertion.”
- “I would take blood pressure if primary care physician visit two days prior showed high blood pressure and it is something that needs monitoring.”
- “No, I probably would not. I would want to find out why she fell, if it’s because she passed out, and if so I would want to do blood pressure...If the patient is sitting here looking in distress, I would certainly take heart rate and grab the blood pressure cuff. I would

not take temperature. Respiratory rate and pulse oximetry I would take if she seemed like she was in distress.”

- “I probably would not take vital signs. Sounds like she’s seeing a physician regularly for her issue and recently so unless she states that she’s having lightheadedness after standing (I ask my patients frequently) or some other adverse reaction like not feeling well that day I probably wouldn’t take vitals.”
- “I probably would not right off the bat because there’s a lot of time pressure unfortunately and so taking vital signs is quick but in a patient like her if she’s feeling fine and has blood pressure normally under control, compliant with medications, hasn’t done anything out of the ordinary, that’s not a big red flag. So because of time pressure there wasn’t anything that led me to it right off the bat.”

Decision to Take Vital Signs on the Second Scenario Patient

The following is the second scenario that was given to the participants:

“Patient is a 16 year old male who is in the last stages of rehab following an ACL reconstruction. He is seeing you today to prepare for his return to football next week, so you plan to do advanced plyometric training.”

The respondents were then asked, “Would you take vital signs on this patient, if so which ones? Why or why not?”

Two participants (11.8%) stated that they would take heart rate and one participant (5.9%) stated an intention to take respiratory rate. With additional stimulations not provided in the scenario, two participants (11.8%) cited that they would take blood pressure, heart rate, and respiratory rate. None of the participants stated an intention to assess pulse oximetry on the patient.

- “I would not take vital signs unless the patient is symptomatic for chest pain, shortness of breath, or dizziness/lightheadedness. Patient is a 16 year old male playing a highly intensive cardio sport program. Although he has been rehabbing his ACL for the past 2-3 months (more sedentary lifestyle) in preparation for return to sports, a 16 year old male has to be medically cleared to play football and have his physical in the first place. That would mean his primary care physician did not notice any concerns in regards to his cardiovascular system. Unless I’ve noticed any new symptoms

while rehabbing this patient prior to the plyometric program, I don't see it as a priority at this time for any vital signs.”

- “That’s a good question because often times in the outpatient clinic, typically a lot of therapists don’t take vitals but I would because if we’re going to be doing advanced exercises, plyometrics are going to have an increased demand on the heart and so I would take pre and post vitals to assess the patient’s tolerance. I would probably just take the heart rate and if there was any reason why I was worried I would assess their blood pressure. Since they’re 16 years old I have to be honest we’re not as cautious but maybe we should be.”
- “No. I don’t think that it is necessary to take vitals as long as the patient is under the care of a primary care physician.”
- “No. The patient is not at risk for a cardiovascular incident unless the pre-operative screening showed something.”
- “Possibly respiratory rate/heart rate depending on response to exercise or as a way to teach him to work in a submax zone safely.”
- “No, unless something indicates it in the past medical history. Given age, I would not. Perhaps based on anecdotal evidence, for instance if 6 ft. 9 and playing basketball, perhaps there may be more evidence to suggest valve issues.”
- “No I wouldn’t do any of the vitals. Things that I considered: it might make sense to do some for baseline but typically not seeing them long enough and you’re not their strength and conditioning coach so as long as they’re young and healthy and you don’t see anything in their medical history indicating he would have a problem, I would not take them. There has been discussion that you should take it on everyone for a baseline but I don’t for a couple of reasons—I never did before so it’s a hard pattern to get into, time is limited, and if someone comes in and looks different—pale or complains that they don’t feel well I check it. Pulse oximetry if feeling lightheaded and going to do gait training or have a positional issue.”
- “I would not take vital signs on this patient—the textbook answer is that I should but honestly I probably wouldn’t. I would not take it for reasons of time, equipment, and the athlete is young and otherwise presumed healthy.”

- “No because of 16 years old, last stage. Nothing jumps out and says really unstable. Also return to football indicates he’s not out of shape. If he never did football maybe I would. If patients have a lot of medical issues like they feel sick, possible fever, and don’t feel comfortable doing any of the exercises, I would want to know why. If they say “I don’t feel right, I feel dizzy, or I feel lightheaded,” that is not an ACL problem and then that would tell me oh you need to go back to the doctor and I need to take your vitals.”
- “No I would not take vital signs, I figure if he’s out playing football he has to be healthy.”

Source of Reference for Cardiovascular Risk

Participants were asked the question, “What is your source of reference when assessing cardiovascular risk?” Several themes emerged with regards to source of reference including ACSM guidelines, clinical experience, physician’s protocol, education, patient presentation, criteria proposed by the cardiopulmonary section of the APTA, and facility policies and procedures.

Clinical Experience.

Clinical experience was cited by five (29.4%) participants as a source of reference for cardiovascular risk.

- “Clinical presentation—the entire clinical picture. This comes from experience; I don’t go back and check the numbers. Patients that vitals were taken on displayed dizziness, and one had pacemaker issues.”
- “Clinical experience and we have policies and procedures that are too high or too low. If I’m not sure, I rely on clinical judgement and check the internet. It’s not a big thing that was taught or emphasized in school.”
- “My source of reference is based on clinical experience, physician protocols, and also my education—I do have some resources in the clinic I may go to placed around the wall for exercise parameters and for vital signs. Around 170/100 I would call the doctor and not perform physical therapy exercises. Depends on the patient too though; if someone has chronic high blood pressure and we’re there

to ambulate, gait train, or do transfer training then I would monitor to make sure it doesn't go any higher. If a person came in with 130/80 blood pressure and their blood pressure went up 20 points then I would stop, but I've never really had that problem. There are physician protocols for cardiac patients, COPD, or CHF patients; there may be certain parameters that we have to follow and those parameters might be 150/90 so those are a little bit more strict."

Education.

Education was cited by three (17.6%) participants as a source of reference for cardiovascular risk.

- "Always ask about cardiac history—heart attacks, blood pressure issues, is blood pressure controlled by medication, and are they working with a doctor. Always ask if they have a pacemaker. I learned to take history with education in school."
- "I treat vestibular patents sometimes so I frequently take vitals with any patient that has orthostatic hypotension to determine if their blood pressure is appropriate. I will take vitals if the patient is having any adverse reaction in the clinic like hypoglycemia, shortness of breath, not feeling well, or needing to sit and rest more than they usually would. Based on my education background—learned a lot of that in school—and learned more about what's appropriate since I graduated."

Patient Presentation.

Patient presentation was cited by 12 (70.6%) participants as a source of reference for cardiovascular risk.

- "Based on past medical history or symptoms seen. The hospital has specific cutoffs where if they're over this amount you're not allowed to treat them. Past medical history can include cardiovascular history or complex medical history. Tend to do on patients maybe 60 and up 100% of the time."
- "History form they fill out and based on talking and listening if there are things that don't sound right that dictates what direction I go—shortness of breath, fatigue more than what would be expected, pacemaker, or defibrillator."

- “Based largely on patient history. Also if I check the vitals they are out of the customary range always I’m assessing to see if they are within a safe range to exercise or if I need a referral. Safe ranges are criteria proposed by the cardiopulmonary section of the APTA. I use my card from the section.”

Factors Influencing Decision to Treat or Refer

Participants were asked the question, “With a result of abnormal vital signs, what influences your decision to either treat or refer?” A variety of factors appeared to influence the decision to treat or refer a patient, including patient history and presentation, ACSM guidelines, clinical experience, and parameters set forth by various sources. Most respondents agreed that there is no definitive protocol in place when determining whether to treat or refer the patient.

Patient History.

Patient history and presentation was cited by six (35.3%) participants as a factor influencing their decision to treat or refer the patient.

- “If the patient’s vital signs—specifically blood pressure—are higher than the patient’s reported normal or the most recent vital signs taken in the chart, I will follow the patient’s symptoms and the ACSM guidelines at this point. If the patient’s blood pressure is higher than normal but is asymptomatic and it is below ACSM contraindications then I will treat but monitor. However, if a patient is symptomatic or is above ACSM cutoff points, I will hold off on treatment and call the patient’s physician, and in extreme cases I have called EMS to send the patient to the hospital.”
- “Based on symptoms—if uncomfortable in other ways, tired, feeling lightheaded, if they’re sweating or have a headache, based on history of blood pressure issues, or recent change in medication that could be causing it. Or if I know they have a medical history that’s a little bit tenuous. No company standard but I sort of have my own from class notes—kind of limitations—not using cut and dry method but based on individual decision.”

Clinical Experience.

Eight participants (47.1%) cited clinical experience as an influential factor for their clinical decision to treat or refer the patient with abnormal vital signs.

- “What would influence my decision is I would first take a minute and assess the situation, see if they’ve taken their blood pressure medication, see if there’s an underlying situation that maybe would make it risky for the day and decide at that point if I would continue. I would more frequently check vitals and would ask the patient subjectively how they’re feeling.”
- “Clinical decision making—someone may have very low blood pressure but if on medication and if they’re having active symptoms, for example sweating profusely, I may be more apt to do it. If they’re acting fine, I may not be as likely. The whole clinical picture is what is relied on.”
- “How significant they are—slightly elevated would either have them rest or ask if blood pressure is normally high. If significantly high, I would discharge treatment and go to or call the physician’s office. No company policy—usually if blood pressure is over 150/100 that would be the red line to stop treatment.”

Parameters.

Various parameters were cited as influential by five (29.4%) participants.

- “If mildly to moderately elevated, I will repeat after rest, watch them during exercise and take vitals to see their response. If above our cutoffs we’re required to send them to the emergency room or call emergency services. Cutoffs I think are only for blood pressure and there is one for pulse but I don’t know the numbers—it’s posted on the wall and I don’t have to deal with it much.”
- “If it falls outside of established parameters or is a contraindication then I would contact the physician. If higher up in the range, I may proceed and re-assess, and if it changes but is in the “safe” range, proceed with caution. Ask if there is a change in medication. If there was a specific concern—for example a stent put in last month—I might check for a few sessions, but if not I probably would not.”

Contact the Physician.

With a result of abnormal vital signs, five (29.4%) participants explicitly mentioned the referring physician as a source of influence with regards to decision making.

- “Some of it has to do with if it’s expected or not—if I know you have a history of stroke or history of uncontrolled hypertension and it seems like it’s off, judge based on what I want to do next. Reference to primary care physician or specialist information. No clinic policy—up to clinician discretion.”
- “Knowing the patient—if you have a good feel for that and if it doesn’t feel right recommend they see family doctor. Lot of times I will give the family doctor a heads up and see which way they want to go. Textbook is 120/80 but everyone is a little different—if I know from history that something is going on and they’re not acting right then I recommend strongly seeing the physician and if significant enough I call the doctor too.”

Discussion

With direct access, patients can see a physical therapist for a specific amount of time depending on state legislation, without a referral for physical therapy. This autonomy warrants further evidence to guide the clinical decision making process by physical therapists with regard to assessment of vital signs. With the prevalence of undiagnosed cardiovascular disease and the impact of exercise on the cardiovascular system, physical therapists must understand the important implications of taking vital signs for purposes of safety and best practice decision making.

One instance that may jeopardize patient safety is by challenging the cardiovascular system without assessment of vital signs in an individual who is non-compliant with blood pressure medications. For instance, if the physical therapist is aware that the patient is on medication for high blood pressure and discovers normal vital

signs on the initial evaluation, the physical therapist may assume that the patient's blood pressure is stable and defer regular assessment of vital signs during subsequent sessions. The underlying assumption in this situation, however, is that the patient will be compliant with the correct dosage of medication between sessions. If this is not the case and subsequent measurement is not taken, the stress to the patient's cardiovascular system may result in a cardiovascular incident.

Another potential compromise to patient safety is to falsely assume that a patient who is young is necessarily healthy. For instance, an athlete who is receiving pressure from outside sources to accelerate his rehabilitation and return to sport more rapidly may utilize performance enhancing substances. Furthermore, even if the physical therapist screens for the use of these substances, it may be difficult to confirm usage by the patient. These medications can have effects on the cardiovascular system and therefore may alter patient response to exercise and potentially increase the risk of an adverse event.

Limitations

The findings represent a small sample of physical therapists from Florida and it cannot be assumed that they represent the entire practice of physical therapy. With the question, "How often do you take vital signs?" some participants gave percentages while others gave specific numbers which may have impacted the data. Follow up questions were not asked to participants who provided answers through email. The question "What is your source of reference when assessing cardiovascular risk" required elucidation for certain individuals which may have affected bias in the answers provided.

Conclusion

Many factors were cited by participants regarding clinical decision making as well as the decision to treat or refer patients with abnormal vital signs. In addition, there did not appear to be an agreement by participants on the definition of abnormal vital signs seen clinically. The variation of factors that influenced the decision making process by the participants may be reflective of the lack of guidelines for physical therapy practice with regard to risk stratification.

An individual's blood pressure may change rapidly if compliance is not achieved through regular administration of medication for hypertension. Therefore, in order to minimize the risk of adverse events, regular assessment of vital signs, particularly in individuals with hypertension or conditions that increase cardiovascular risk is necessary. On the other hand, utilization of prohibited substances may occur and can have detrimental effects on the cardiovascular system in conjunction with high intensity exercise. In summary, it is important to remember that physical therapists should not assume that a patient is safe without performing risk stratification and undertaking measures to minimize incident occurrence.

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Appendix A: Informed Consent Form



College of Health Professions
Department of Physical Therapy
& Human Performance

Consent Form

Study Title: Qualitative Study on Clinical Decision Making Regarding the Use of Vital Signs in Physical Therapy

Principal Researcher: Virginia Thistle, Allison Basskin

Faculty Sponsor: Eric Shamus, Renee Jeffreys

You are being invited to participate in a research study conducted through Florida Gulf Coast University. Your participation in this study is voluntary. In order for you to participate in this study, the University requires that we obtain your signed consent in order for you to participate in this project.

A short description of the study follows. Please read it and ask the researcher any questions you have to help you understand the study. If you choose to join the study, please sign the last page of this form in front of the person who told you about the study. You will get a copy of this form to keep. If you choose to join the study, you can leave it at any time with no penalty.

Refusal to join the study will not affect any future services you may be eligible to receive from the University. Anyone who chooses to participate in this study is free to withdraw at any time with no penalty or loss of benefits they are entitled to.

The purpose of the study is to better understand the clinical decision making process by physical therapists in relation to measurement of vital signs. We are asking you to take part in the study because you are a licensed and currently practicing physical therapist in the state of Florida. If you join the study, you will be asked to participate in an interview either through phone, email, or in person which will last approximately 15 to 20 minutes. Your response will be audio recorded and written during the interview, and later transcribed.

The potential risks associated with the study include probing for personal or sensitive information in surveys or interviews as well as potential release of information to employers. These risks are minimal and will be minimized by allowing participants to choose the location of the interview and by following a questionnaire. Though we do not expect this to benefit you, we hope that the information we get from this study will help to clarify the clinical decision making process and contribute to a better standard of care.

If you join the study, we will take the following steps to keep your information confidential and secure including destroying this original document after scanning and saving it to a flash drive which will be kept along with research data in a secure location accessible only to the researchers and faculty sponsors. We will not release information about you unless you authorize us to do so or unless we are required to do so by law. If the results of this study are published or presented, no information will be included that would make it possible to identify you as a study participant. You will not be paid to take part in this study.

We do not foresee any medical problems from participating in this study. However, if you experience any research related injury, please contact Dr. Eric Shamus at 239-590-1418. If you have any questions about this study, you may contact Dr. Eric Shamus at 239-590-1418. If you have any questions about your

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Appendix A Continued: Informed Consent Form

rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board through Sandra Terranova, Office of Research and Sponsored Programs, at 239-590-7522.

I have read this form and I understand it. The researcher answered my questions about the project. My signature indicates that I volunteer to participate in the project. I understand that if I become uncomfortable with the project I am free to stop my participation. I also understand that it is not possible to identify all potential risks in an experimental procedure and I believe that reasonable steps have been taken to minimize both the known and potential but unknown risks.

Signature of Study Participant

Date

Signature of Witness

Date

The dated approval stamp on this consent form indicates that this project has been reviewed and approved by the Florida Gulf Coast University Institutional Review Board for the Protection of Human Subjects



Appendix B: Recruitment Script

Hello/Dear Physical Therapist,

Allison Basskin and I, Virginia Thistle, are Doctor of Physical Therapy Students at Florida Gulf Coast University. We are conducting an independent research study entitled *A Qualitative Study on Clinical Decision Making Regarding the Use of Vital Signs in Physical Therapy*. The questionnaire includes questions on demographic information, clinical decision making, and scenario based risk assessment. The interview will take approximately 15-20 minutes of your time if you are interested in participating. Results will be kept confidential and this information will be helpful to determine the decision making process of taking vital signs in our profession, as it is evolving toward independent practice and direct access.

Participants who work in a setting with scheduled monitoring of vitals are ineligible for this research. If you are interested in participating, please respond and let us know when you are available to meet in person or talk over the phone, or we can administer the questionnaire over email if this is more convenient for you.

Thank you for your time,

Virginia Thistle, SPT, vgthistle5960@eagle.fgcu.edu

Allison Basskin, SPT, abasskin2204@eagle.fgcu.edu

Participants will also be excluded if they work in a setting that constantly monitors vitals or in an environment that takes vitals measurements at scheduled intervals.

Appendix C: Questionnaire

Clinical Decision Making Regarding the Use of Vital Signs in Physical Therapy

Demographic

1. How many years have you been a practicing physical therapist?
2. What is your highest level of education related to physical therapy?
3. Are you an APTA member?
4. What type of setting do you practice in?

Clinical Decision Making

5. How many initial patient evaluations did you perform last week? How many times did you take blood pressure _____, heart rate _____, respiratory rate _____, pulse oximetry _____, and temperature _____?
6. How many patient follow-up visits did you perform last week? How many times did you take blood pressure _____, heart rate _____, respiratory rate _____, pulse oximetry _____, and temperature _____?
7. What is your source of reference when assessing cardiovascular risk?
8. With a result of abnormal vital signs what influences your decision to either treat or refer?
9. How often do you ask each patient if they exercise regularly?
10. If the answer is that the patient does not regularly exercise, what is your next step.

Clinical Scenario & Risk Assessment

Scenario 1: Patient is a 65 year old female who is referred to you for balance retraining following a fall. She was seen by her primary care physician two days ago. Patient has a history of hypertension and gastroesophageal reflux disease (GERD). Medications include propranolol (Inderal) and omeprazole (Prilosec), patient states that she is compliant with her medications.

11. Would you take vital signs on this patient, if so which ones?
12. If you would take all vital signs, please explain why for each one.
13. If you would not take all or any vital signs, please explain why for each one.

Scenario 2: Patient is a 16 year old male who is in the last stages of rehab following an ACL reconstruction. He is seeing you today to prepare for his return to football next week, so you plan to do advanced plyometric training.

Appendix C Continued: Questionnaire

14. Would you take vital signs on this patient, if so which ones?
15. If you would take all vital signs, please explain why for each one.
16. If you would not take all or any vital signs, please explain why for each one.

Appendix D: All Participant Responses Including Those Not Directly Referenced**What is your source of reference when assessing cardiovascular risk?**

“ACSM guidelines with exercise.”

“ACSM guidelines.”

“My source of reference is based on clinical experience, physician protocols, and also my education—I do have some resources in the clinic I may go to placed around the wall for exercise parameters and for vital signs. Around 170/100 I would call the doctor and not perform physical therapy exercises. Depends on the patient too though; if someone has chronic high blood pressure and we’re there to ambulate, gait train, or do transfer training then I would monitor to make sure it doesn’t go any higher. If a person came in with 130/80 blood pressure and their blood pressure went up 20 points then I would stop, but I’ve never really had that problem. There are physician protocols for cardiac patients, COPD, or CHF patients; there may be certain parameters that we have to follow and those parameters might be 150/90 so those are a little bit more strict.”

“Past medical history”

“Medical history review and physical signs and symptoms. Will check BP, pulse, and pulse ox if patient presentation is someone who gets short of breath easily, has history of uncontrolled blood pressure, and/or is very deconditioned.”

“Based largely on patient history. Also if I check the vitals they are out of the customary range always I’m assessing to see if they are within a safe range to exercise or if I need a referral. Safe ranges are criteria proposed by the cardiopulmonary section of the APTA. I use my card from the section.”

“Clinical experience and we have policies and procedures that are too high or too low. If I’m not sure, I rely on clinical judgement and check the internet. It’s not a big thing that was taught or emphasized in school.”

“Based on past medical history or symptoms seen. The hospital has specific cutoffs where if they’re over this amount you’re not allowed to treat them. Past medical history can include cardiovascular history or complex medical history. Tend to do on patients maybe 60 and up 100% of the time.”

“Always ask about cardiac history—heart attacks, blood pressure issues, is blood pressure controlled by medication, and are they working with a doctor. Always ask if they have a pacemaker. I learned to take history with education in school.”

Appendix D Continued: All Participant Responses Including Those Not Directly Referenced

“Clinical presentation—the entire clinical picture. This comes from experience; I don’t go back and check the numbers. Patients that vitals were taken on displayed dizziness, and one had pacemaker issues.”

“History of myocardial infarction, coronary artery bypass graft. If they say uncontrolled hypertension or atrial fibrillation—no. With surgery or infarction, can’t participate if blood pressure is over 180/100. Cannot participate if heart rate is greater than 100 unless MD authorizes it.”

“Their history—if they have a history of anything that is cardiovascular or cardiopulmonary or any signs and symptoms of cardiovascular or cardiopulmonary issues. Clinical experience influences decision to take vitals.”

“I treat vestibular patents sometimes so I frequently take vitals with any patient that has orthostatic hypotension to determine if their blood pressure is appropriate. I will take vitals if the patient is having any adverse reaction in the clinic like hypoglycemia, shortness of breath, not feeling well, or needing to sit and rest more than they usually would. Based on my education background—learned a lot of that in school—and learned more about what’s appropriate since I graduated.”

“Would probably take vital signs if they’re cardiac patients, don’t really have any on my caseload right now. I look for blue lips. I see a lot of torticollis and developmental delay.”

“If they tell me that they’re had a previous cardiac history—something significant like a coronary artery bypass graft or myocardial infarction recently, severe cardiac disease, a pacemaker, or if they just say they have unsteady or unstable blood pressure. Or if they’re feeling faint or not so great, fatigued.”

“History form they fill out and based on talking and listening if there are things that don’t sound right that dictates what direction I go—shortness of breath, fatigue more than what would be expected, pacemaker, or defibrillator.”

With a result of abnormal vital signs what influences your decision to either treat or refer?

“Patient presentation, history, medical diagnosis, ACSM guidelines, and “gut feeling.”

“If the patient’s vital signs—specifically blood pressure—are higher than the patient’s reported normal or the most recent vital signs taken in the chart, I will

Appendix D Continued: All Participant Responses Including Those Not Directly Referenced

follow the patient's symptoms and the ACSM guidelines at this point. If the patient's blood pressure is higher than normal but is asymptomatic and it is below ACSM contraindications then I will treat but monitor. However, if a patient is symptomatic or is above ACSM cutoff points, I will hold off on treatment and call the patient's physician, and in extreme cases I have called EMS to send the patient to the hospital."

"What would influence my decision is I would first take a minute and assess the situation, see if they've taken their blood pressure medication, see if there's an underlying situation that maybe would make it risky for the day and decide at that point if I would continue. I would more frequently check vitals and would ask the patient subjectively how they're feeling."

"Patient complaints"

"If patient is outside of accepted parameters for exercise and general presentation"

"Degree of readings outside of patient norm and signs and symptoms displayed"

"If it falls outside of established parameters or is a contraindication then I would contact the physician. If higher up in the range, I may proceed and re-assess, and if it changes but is in the "safe" range, proceed with caution. Ask if there is a change in medication. If there was a specific concern—for example a stent put in last month—I might check for a few sessions, but if not I probably would not."

"Clinical decision making—someone may have very low blood pressure but if on medication and if they're having active symptoms, for example sweating profusely, I may be more apt to do it. If they're acting fine, I may not be as likely. The whole clinical picture is what is relied on."

"If mildly to moderately elevated, I will repeat after rest, watch them during exercise and take vitals to see their response. If above our cutoffs we're required to send them to the emergency room or call emergency services. Cutoffs I think are only for blood pressure and there is one for pulse but I don't know the numbers—it's posted on the wall and I don't have to deal with it much."

"Patient symptoms—what they're currently presenting as. Some may have high blood pressure but not sweaty, clammy, or looking like they're in distress; that may just be their baseline."

Appendix D Continued: All Participant Responses Including Those Not Directly Referenced

“Clinical presentation and stability of the patient—look for dizziness, balance, and steadiness in gait. If dizziness is the only problem, for example if the patient has a hip replacement and dizziness and can’t walk but not because of hip, may call the referring physician. If the clinical picture is not that of a typical hip replacement and more medical instability. If dizziness is what they’re here to treat, like vertigo, I may not take vitals.”

“If over the established limits, call referring doctor.”

“Some of it has to do with if it’s expected or not—if I know you have a history of stroke or history of uncontrolled hypertension and it seems like it’s off, I judge based on what I want to do next. Reference to primary care physician or specialist information. No clinic policy—up to clinician discretion.”

“How significant they are—slightly elevated would either have them rest or ask if blood pressure is normally high. If significantly high, I would discharge treatment and go to or call the physician’s office. No company policy—usually if blood pressure is over 150/100 that would be the red line to stop treatment.”

“Would refer them if there was any abnormal vital signs. No normed references—I don’t do blood pressure. Closest thing we have is a pulse oximetry. Sometimes I will do pulse oximetry if it’s a cardiac patient.”

“Based on symptoms—if uncomfortable in other ways, tired, feeling lightheaded, if they’re sweating or have a headache, based on history of blood pressure issues, or recent change in medication that could be causing it. Or if I know they have a medical history that’s a little bit tenuous. No company standard but I sort of have my own from class notes—kind of limitations—not using cut and dry method but based on individual decision.”

“Knowing the patient—if you have a good feel for that and if it doesn’t feel right recommend they see family doctor. Lot of times I will give the family doctor a heads up and see which way they want to go. Textbook is 120/80 but everyone is a little different—if I know from history that something is going on and they’re not acting right then I recommend strongly seeing the physician and if significant enough I call the doctor too.”

Appendix D Continued: All Participant Responses Including Those Not Directly Referenced

Scenario 1: Would you take vital signs on this patient, if so which ones? Why or why not?

“I would ask if they checked today and if not I would check blood pressure and heart rate. Pulse oximetry and respiratory rate—not unless there were complaints of shortness of breath, dizziness, or determined to not be vestibular or central.”

“Yes, blood pressure, oxygen saturation, heart rate, and respiratory rate. I would take blood pressure because she has a history of hypertension and I am not sure how compliant she is with her medication. Blood pressure is important in regard to falls, possibly due to orthostatic hypotension. Oxygen saturation to ensure that the patient is not having episodes of syncope or shortness of breath. Heart rate and respiratory rate I take for patients perceived level of exertion.”

“I would absolutely take vital signs and would assess for everything—I would take blood pressure, heart rate, respiratory rate, and oxygen saturation. For one, the person has a history of falling so blood pressure is very important to monitor. They’re on medications that can alter their heart rate and blood pressure so that’s another reason. And thinking back at your scenario those are probably the two main reasons—the history of falling and their history of blood pressure obviously. So all three of those reasons, you should take vitals under those conditions.”

“No. I would go off patient complaint; I would take blood pressure if the patient had complaints of dizziness or shortness of breath.”

“I would take blood pressure if the primary care physician visit two days prior showed high blood pressure and it is something that needs monitoring.”

“All. Standard operating procedure in our office.”

“Yes because of the history of hypertension. GERD does not tip me off to do anything but hypertension is the risk plus the history of propranolol. Blood pressure, pulse rate, and pulse oximetry. Not temperature—only if I suspect infection and no access to thermometer in clinic. Not respiratory rate, if pulse oximetry was abnormal then I would take it.”

“No I would not realistically take any vitals. I would be most likely to take blood pressure. I don’t take respiratory rate a lot unless I feel and can tell they’re labored. Only take pulse if I feel they’re having issues like feeling lightheaded or struggling, same with pulse oximetry if they feel lightheaded. I never take temperature and I don’t think we own a thermometer.”

Appendix D Continued: All Participant Responses Including Those Not Directly Referenced

“I would take blood pressure and heart rate. I would take blood pressure given past medical history of hypertension, the recent fall, and cardiovascular causes of dizziness. Heart rate for the same reasons—would want to have a baseline of response to exercise and postural changes. I would not take respiratory rate because I’m bad about it; hypertension stands out a little bit more. I would not take pulse oximetry because it’s not readily available so unless the patient has a history of respiratory disorders not likely to go try to find the pulse oximeter which is usually missing. I would not take temperature because I don’t even think we have the equipment.”

“No, I probably would not. I would want to find out why she fell, if it’s because she passed out, and if so I would want to do blood pressure...If the patient is sitting here looking in distress, I would certainly take heart rate and grab the blood pressure cuff. I would not take temperature. Respiratory rate and pulse oximetry I would take if she seemed like she was in distress.”

“I would take blood pressure and heart rate. I would take blood pressure and pulse to know if they’re high for their normal range. When I was doing home health I did more pulse oximetry and respiratory rate because there were a lot of acute symptoms. Same with temperature.”

“Yes because of fall and age. I would take blood pressure if related to the fall, heart rate, respiratory rate if someone is short of breath, pulse oximetry I normally do anyways because it’s part of the protocol, and temperature—will refer.”

“Depending on the fall—if she fell because she lost consciousness I would probably take vitals. I would get a history of why—if it seems like it is cardiovascular in nature I would definitely take vitals and if she just tripped and fell probably not without indication. If a cardiovascular reason I would take heart rate, blood pressure, and pulse oximetry. If she fell because of loss of consciousness or because of cerebral vascular accident or something like that and her blood pressure bottoms out, is not regulated, or she overshoots the medication. If she experienced syncope would want to know that and heart rate to get a feel for if bradycardic or tachycardic. Pulse oximetry would want to know if getting good blood perfusion to tissues and if oxygen levels are causing her to lose consciousness. Not sure if we have a thermometer, someone can pass out from fever or cold but would more take if looks like they are febrile or have cold clammy skin. Respiratory rate, I would take if it looks like she has rapid or shallow breathing.”

“I probably would not take vital signs. Sounds like she’s seeing a physician regularly for her issue and recently so unless she states that she’s having lightheadedness after

Appendix D Continued: All Participant Responses Including Those Not Directly Referenced

standing (I ask my patients frequently) or some other adverse reaction like not feeling well that day I probably wouldn't take vitals."

"No I would not take vital signs on this patient. If showing no signs of distress I would not take vital signs."

"I probably would not right off the bat because there's a lot of time pressure unfortunately and so taking vital signs is quick but in a patient like her if she's feeling fine and has blood pressure normally under control, compliant with medications, hasn't done anything out of the ordinary, that's not a big red flag. So because of time pressure there wasn't anything that led me to it right off the bat."

"During the course of the evaluation if noticing distress I would check heart rate and blood pressure given the cardiac history. Temperature—don't even necessarily have a good thermometer, haven't in 24 years had an incident that jumps out. Pulse oximetry if more labored in breathing from the lobby to evaluation. Respiratory rate—same reason. If seeing distress would count that, if looking normal, conversing, not winded I would not take."

Scenario 2: Would you take vital signs on this patient, if so which ones? Why or why not?

"Possibly respiratory rate/heart rate depending on response to exercise or as a way to teach him to work in a submax zone safely."

"I would not take vital signs unless the patient is symptomatic for chest pain, shortness of breath, or dizziness/lightheadedness. Patient is a 16 year old male playing a highly intensive cardio sport program. Although he has been rehabbing his ACL for the past 2-3 months (more sedentary lifestyle) in preparation for return to sports, a 16 year old male has to be medically cleared to play football and have his physical in the first place. That would mean his primary care physician did not notice any concerns in regards to his cardiovascular system. Unless I've noticed any new symptoms while rehabbing this patient prior to the plyometric program, I don't see it as a priority at this time for any vital signs."

"That's a good question because often times in the outpatient clinic, typically a lot of therapists don't take vitals but I would because if we're going to be doing advanced exercises, plyometrics are going to have an increased demand on the heart and so I would take pre and post vitals to assess the patient's tolerance. I would probably just take the heart rate and if there was any reason why I was worried I would assess their

Appendix D Continued: All Participant Responses Including Those Not Directly Referenced

blood pressure. Since they're 16 years old I have to be honest we're not as cautious but maybe we should be."

"No. I don't think that it is necessary to take vitals as long as the patient is under the care of a primary care physician."

"No. The patient is not at risk for a cardiovascular incident unless the pre-operative screening showed something."

"Resting heart rate and respiratory rate."

"No unless something indicates it in the past medical history. Given age, I would not. Perhaps based on anecdotal evidence, for instance if 6 ft. 9 and playing basketball, perhaps there may be more evidence to suggest valve issues."

"No I wouldn't do any of the vitals. Things that I considered: it might make sense to do some for baseline but typically not seeing them long enough and you're not their strength and conditioning coach so as long as they're young and healthy and you don't see anything in their medical history indicating he would have a problem, I would not take them. There has been discussion that you should take it on everyone for a baseline but I don't for a couple of reasons—I never did before so it's a hard pattern to get into, time is limited, and if someone comes in and looks different—pale or complains that they don't feel well I check it. Pulse oximetry if feeling lightheaded and going to do gait training or have a positional issue."

"I would not take vital signs on this patient—the textbook answer is that I should but honestly I probably wouldn't. I would not take it for reasons of time, equipment, and the athlete is young and otherwise presumed healthy."

"No, I would not take any. Decision process is that he is a 16 year old male, assuming no cardiovascular history (I would have asked), and if no history I would not have taken vitals."

"No because of 16 years old, last stage. Nothing jumps out and says really unstable. Also return to football indicates he's not out of shape. If he never did football maybe I would. If patients have a lot of medical issues like they feel sick, possible fever, and don't feel comfortable doing any of the exercises, I would want to know why. If they say "I don't feel right, I feel dizzy, or I feel lightheaded," that is not an ACL problem and then that would tell me oh you need to go back to the doctor and I need to take your vitals."

Appendix D Continued: All Participant Responses Including Those Not Directly Referenced

“No for the reasons of 16 years old, no known history, and therefore I’m not concerned.”

“No, I would not take any vitals, not unless I see in his history that he had a history of asthma, uncontrolled asthma, or hypertension which is an issue at 16.”

“No I probably wouldn’t take vital signs because he’s young and healthy and based on descriptions doesn’t sound like any indications that are out of the ordinary. Usually wait until I pick up on an issue before I take vitals.”

“No I would not take vital signs, I figure if he’s out playing football he has to be healthy.”

“Probably would not. Unless he has a cardiac history that was alarming to me I would probably assume that he’s pretty much a healthy young male if he’s an athlete but that could be inaccurate. I don’t work with a lot of athletes, I more work with geriatrics and right off the bat I don’t think so but the more I think about it...”

“Typical history and if no cardiac history I would probably not do that. If doing stuff and noticing things don’t seem right, I would check respiratory rate, pulse oximetry would be interesting, and standard blood pressure and heart rate. Having done a lot more sports medicine when up north, I would not necessarily do unless there is a trigger. A trigger could be shortness of breath that you wouldn’t expect to see in 16 year old and if you’ve been with a patient a while should expect to read them a bit, look for something out of the ordinary in an otherwise healthy 16 year old with normal medical history.”