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Gait Ataxia and Posterior Circulation Stroke Recognition: Emergency Department Patients with Subjective Dizziness

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DNP Final Project Report

Gait Ataxia and Posterior Circulation Stroke Recognition: Emergency Department Patients with Subjective Dizziness

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Dedication

First and foremost, I thank and praise the Lord for calling me into the wilderness and growing my faith and obedience. I couldn't see it initially, but this journey was always about more than nursing. He was calling me deep into following and trusting in His ways.

Luke, what you do to keep our family thriving is beyond thanks. I cannot tell you how grateful I am to have such a strong and dedicated husband and father for our sons. I always tell you, "You are a better mom than I am." It is so true. You make everything happen for us and you do it with such ease. I love you.

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Abstract

PURPOSE: The purpose of this study was to evaluate and describe any correlations between subjective dizziness, gait ataxia, and posterior circulation stroke in the setting of gait assessment as an evidence-based standard of care in the emergency department.

METHODS: This study was a two-center, descriptive, retrospective and prospective medical record review. The sample consisted of adult patients presenting to the emergency departments at two tertiary facilities within a large metropolitan healthcare system with chief complaints of subjective dizziness. The study period was February 1, 2018 through July 31, 2018. The data set was retrieved via data retrieval specialists.

RESULTS: A total of 1,091 patients meeting inclusion criteria presented to the study sites with subjective dizziness. Gait assessment documentation occurred 29 times (2.7 percent). Ataxia per ICD-10 coding was diagnosed in 10 cases (0.9 percent). Zero posterior circulation stroke diagnoses per ICD-10 coding were found in this sample. No association was found between gait ataxia and posterior circulation stroke in this study.

CONCLUSION: Findings in the sample studied did not support the literature-based assumption that subjectively dizzy patients who undergo gait assessment may be ataxic due to posterior circulation stroke. Current literature continues to recommend gait assessment when appropriate, as well as other more sensitive assessments for management of the dizzy population and diagnosis of posterior circulation stroke. Clinical application of new evidence-based assessments must be implemented and studied to determine efficacy and improve posterior circulation stroke assessment, diagnosis, and treatment.

Key words: subjective dizziness, emergency department, gait assessment, gait ataxia, posterior circulation stroke

Gait Ataxia and Posterior Circulation Stroke Recognition: Emergency Department Patients with Subjective Dizziness

An ischemic stroke is caused when blood flow within the brain becomes occluded. According to the Centers for Disease Control and Prevention (CDC, 2017), strokes occur every 40 seconds, are fatal every four minutes, and cost the United States $33 billion annually for stroke care and disability. Ischemic stroke intervention is time-sensitive. In many cases, medical and/or surgical treatments are essential for the prevention of devastating and costly disability and/or death.

Anterolateral vascular territory stroke presents most frequently with focal, unilateral deficits that are easily recognized when utilizing common scales such as Act FAST (Face, Arms, Speech, Time) and the National Institutes of Health Stroke Scale (NIHSS), and other validated assessment tools (National Stroke Association, 2017). Emergency department (ED) providers, neurologists, and nurses in comprehensive and primary stroke centers readily identify stroke signs and initiate stroke protocols. However, posterior circulation stroke (PCS) accounts for only 20% of all cases and may be unrecognized or misdiagnosed due to multiple differential diagnoses ("Up to Date," 2016). Findings in the literature indicate that PCS patients present 41% of the time with gait instability and 34-70% with dizziness (Arch et al., 2016, Ibrahim et al., 2018).

Background

The head impulse, nystagmus, test of skew (HINTS) exam may be the most effective (100% sensitive, 96% specific) bedside stroke assessment for distinguishing stroke from benign vestibular syndromes (Kattah, Talkad, Wang, Hsieh, & Newman-Toker, 2009; Tarnutzer et al., 2011). However, researchers found providers may lack skill in detailed vestibular assessments

or interpretation maintaining neither the HINTS exam nor specialized training are required for proper diagnosis of a stroke (Chen, Schneider, Llinas, & Marsh, 2016; Jorns-Häderli, Straumann, & Palla, 2007). Previously utilized exams performed to elicit responses of dizziness or nystagmus, like the Dix-Hallpike position test, were questioned by Tarnutzer et al. (2011) due to the inability to decipher central or peripheral origins of causes. A systematic review of the literature revealed that ED providers need practice guidelines, clinical pathways, or other resources to prevent misdiagnosis of PCS, as well as validation of the most effective bedside exams (Chase et al., 2014; Tarnutzer et al., 2011). The gait assessment has been noted in the literature as clinically relevant in the subjectively dizzy and PCS populations. The literature suggests that gait assessment of patients presenting with symptoms of dizziness is frequently an underutilized portion of a thorough neurological assessment, and potentially useful in identifying clinical signs of ataxia with ease of interpretation (Chase et al., 2014). Gait ataxia may indicate central etiology of symptoms like those associated with PCS (Chen et al., 2016).

Not only is a gait assessment cost effective, it may be more reliable than imaging and other bedside assessments (Chen et al., 2016; Kattah et al., 2009). For example, computed tomography (CT) is the most utilized imaging modality in stroke care, but CT is not indicated for dizziness; in addition, it is an ineffective imaging technique for the posterior fossa (Tarnutzer et al., 2011). Tarnutzer and colleagues noted that CT is effective only 16% of the time when compared to diffusion weighted images/magnetic resonance imaging (DWI MRI), which misses one-fifth of posterior stroke. Patients presenting with symptoms of dizziness who have no evidence of acute changes on CT scans may have an undetected stroke in the posterior circulation. Further, the standard assessment, NIHSS, is not a substitute for comprehensive neurological assessment, as it does not assess for gait ataxia; many patients who present with

PCS symptoms may score zero on the NIHSS (Martin-Schild et al., 2010). Given the challenges of PCS diagnosis with imaging and complicated or inadequate bedside assessments, gait assessment may offer reliable, feasible, and relevant means of recognition as it assesses for cerebellar motor function (Schmahmann, Gardener, MacMore, & Vangel, 2009). Research suggests that completion of a thorough history of present illness, vascular risk assessment, and neurological exam (including gait assessment) can properly guide the "rule in-rule out" diagnostic process for PCS via determination of central versus peripheral origin of symptoms (Chen et al., 2016).

While cerebellar infarction is less common than other forms of ischemic stroke, misdiagnosis is associated with increased risk for hydrocephalus requiring hypertonic saline treatment or sub-occipital decompression, or death due to brain herniation (Schulz & Fischer, 2017). A recent large, multi-center study revealed findings supporting greater disability, dependency, and death at three months post-discharge for patients with PCS. Disability at three months odds ratio increased 23% with PCS as compared with anterior circulation stroke (Chen et al., 2018). In order to deliver quality care and optimal outcomes for all stroke patients improved recognition of PCS and timely interventions must occur.

Gait assessment is an evidence-based component of a complete neurological assessment, which is included in the undergraduate nursing health assessment curriculum. This project was established on the literature-based assumption that subjectively dizzy patients may have gait ataxia due to PCS, which was the conceptual framework for the study, derived from the community of scholars referenced in this work. The conceptual framework was utilized in determining the objectives, data collection and measures, and evaluating the study findings. Based on the conceptual framework gait assessment was introduced as a standard of care for

dizzy patients without a definitive diagnosis an evidence-based pilot study. Nursing staff were educated during staff meetings and during shift huddle meetings prior to initiation of the pilot intervention.

Purpose

The purpose of this study was to evaluate and describe correlations between subjective dizziness, gait ataxia, and posterior circulation stroke in the setting of gait assessment as evidence-based standard of care in the ED. The primary objectives of the study were:

- Objective 1: Determine the incidence of patients who presented to the study sites with subjective dizziness within a six-month period.
- Objective 2: Identify the incidence of patients who presented to the study sites with subjective dizziness whose gait assessment was documented within a six-month period.
- Objective 3: Identify the incidence of subjectively dizzy patients who were diagnosed with ataxia and posterior stroke per ICD-10 coding in the sample within a six-month period.
- Objective 4: Identify the total incidence of posterior stroke patients who presented to the study sites within a six-month period.

Study Design

This study was a two-center, descriptive, retrospective and prospective review of the electronic medical record (EMR). The duration of the study period took place over six months. Data were extracted from the EMR between February 1, 2018 and July 31, 2018.

Sample

The sample consisted of medical records of patients who presented to the study sites with complaints of subjective dizziness. Inclusion criteria for the study population were adult patients

18 years of age and older with complaints of subjective dizziness (dizzy, light-headed, almost passed out, passed out, off-balance, spinning) and diagnosis of ataxia and PCS per ICD-10 coding (see Table 1). Those excluded from the study were 17 years of age and younger, anterolateral circulation ischemia, hemorrhagic stroke in any vascular territory, space occupying lesion on head CT, and patients with baseline gait abnormalities.

Setting and Subject Recruitment

The study took place in two emergency departments within a large metropolitan system of tertiary care hospitals. The healthcare system is the largest in its region offering five acute care facilities, a multitude of immediate care centers, and medical offices to meet a range of healthcare needs. The system comprises 1,837 licensed beds, 127 of which are within the primary ED study site. The primary ED site is the only facility with comprehensive stroke center certification in the system, this was the initial setting for the study. Another 605 beds are within the secondary study site, which is a primary stroke center. To ensure a substantial population to sample and generalize conclusions, the secondary study site was included. The study did not involve active recruitment or interaction with any subjects.

Privacy and Informed Consent

Clinical data were delivered de-identified and assigned unique codes for protection of privacy. All data collected are stored separately from any identifying information on a password protected and encrypted drive maintained by the healthcare system. Data will remain secure for six years and destroyed per the healthcare system and University of Kentucky research policies. The electronic spreadsheet containing data is accessed through secure intranet. A waiver of informed consent was granted for this study.

Research Procedures

Institutional Review Board approval was obtained from the University of Kentucky and the Office of Research and Administration prior to the collection of data. Retrospective and prospective review of patient data was conducted. Electronic spreadsheet data reports obtained per data analytic specialists were provided according to the list of inclusion criteria and specified timeframe. Data were transferred from Excel spreadsheet to analytic software. University of Kentucky College of Nursing statistician assisted in preparation and analysis of de-identified data.

Data Collection

Data collected corresponded directly to the objectives of the study. All cases that did not fit inclusion criteria were eliminated from the data set. Chief complaints of subjective dizziness were reported using correlated ICD-10 coding (see Table 1). Gait assessment documentation was filed with each unit's nursing educator and collected with stroke assessment paperwork. Outcome variables were ataxia and PCS as defined by ICD-10 coding (see Table 2). Demographic data requested included age in years, gender (male, female), and race/ethnicity: African American/Black; Asian/Pacific Islander; Caucasian/White; Hispanic/Latino; or other (see Table 2).

Data Analysis

The incidence of patients who presented to the study sites with subjective dizziness, those whose gait assessment was documented, and those diagnosed with ataxia and PCS were described with frequencies and percentages. Demographic data were described with mean (standard deviation) and frequencies and distribution. Study data were analyzed in SPSS 24 software.

Results

Sample Characteristics

A total of 1108 adult patients presented to the study sites with chief complaints of subjective dizziness. The total number meeting inclusion and exclusion criteria from the identified population was 1091 patients. The mean age of the sample for males and females was 55 years old. The majority of the sample were Caucasian (67.1%). Females (61.5%) were the dominant gender in the sample population. A breakdown of demographic characteristics pertaining to the age, sex, ethnicity of the sample is composed in Table 4.

Of the 1,091 patients included in the study, more than half of the patients (55.5%) complained of "almost passing out or passing out," correlated with ICD-10 coding for near/syncope. Nearly half (43.6%) of those complaining of subjective dizziness actually stated that they were "dizzy," correlated with ICD-10 coding for dizziness and giddiness. Patients complaining of being "off-balance," correlated with ICD-10 coding for unsteadiness on feet, made up just 10 (0.9 percent). Zero patients complained of "lightheadedness/spinning," correlated with ICD-10 coding for vertigo (see table 4).

Gait Assessment, Ataxia, and PCS

Of the 1,091 patients who presented to study sites with subjective dizziness only 29 (2.7 percent) had gait assessment documentation per nursing staff. Only 10 patients were diagnosed with ataxia comprising 0.9 percent of the study sample. Zero patients diagnosed with PCS were identified in the sample studied (see table 4).

Discussion

The findings from this study did not validate the research-based conceptual framework that gait assessment of subjectively dizzy patients may reveal gait ataxia caused by PCS. The target population of subjectively dizzy patients was abundant (n = 1,091), which aligns with the literature. However, with a lack of documented gait assessments, success of the program cannot be demonstrated. Independent from the gait assessment, gait ataxia was only diagnosed in a small proportion (0.9 percent) of the sample. We can conclude that gait assessment implementation was not applied, or documentation was omitted, which has clinical implications for recognition of symptoms and diagnosis. However, we cannot conclude that lack of documentation indicates lack of ataxia. There was no relationship between gait ataxia and PCS in this study. No PCS cases were identified in the sample.

During the study period, 44 patients were diagnosed with PCS in the other two adult tertiary facilities of this healthcare system (S. Deetsch, personal communication, October 26, 2018). As subjectively dizzy PCS patients do not experience hallmark stroke symptoms care may not be sought promptly. Further, when seeking care any proximal hospital is reasonable as patients do not perceive symptoms to be stroke-like. Further, emergency medical services (EMS) will likely transport subjectively dizzy patients to the closest facility rather than the comprehensive stroke center as the presentation is atypical for stroke.

Of the 44 PCS cases, three patients were transferred to the comprehensive stroke center for endovascular intervention (L. Siewert, personal communication, October 19, 2018). The standard of care for ischemic stroke is prompt treatment with recombinant tissue plasminogen activator (rtPA), an intravenous thrombolytic (Papakadis & McPhee, 2017). The lack of treatment with rtPA in the 44 patients may be associated with delay in seeking care related to

obscure symptomology, presentation outside of the treatment window, and concerns regarding treating PCS patients without imaging confirmation of stroke. Recent literature confirming the difficult diagnosis of PCS in the ED setting provides data regarding prolonged time to treatment. Ibrahim et al. (2018) state that PCS time to treatment is 65±20 minutes, compared to anterolateral stroke, which is 47±25 minutes. Delayed time to treatment in this study indicates PCS diagnosis is occurring, although time to administration of the medication was prolonged. These researchers continue to stress the importance of early recognition and treatment. The 0/44 patients with PCS who did not receive rtPA validate the continued concern that PCS is difficult to recognize, which delays treatment, and carries implications for patient outcomes.

Limitations

Several limitations were identified pertaining to nursing implementation of gait assessment. Each study site encountered environmental disruption and construction within the unit prior to or during the study period. A flood in the ED at the secondary study site with reconstruction had just been remedied prior to the beginning of the study. Nursing staff may have been adjusting to the challenges of returning to the ED which may have been a distraction in compliance to the gait assessment standard of care. The primary study site was under construction for expansion which may also have created distraction. Construction and environmental challenges may have introduced stressors impacting the implementation of the gait assessment.

Feasibility of the gait assessment in this population is also a limitation of the study. Nurses exercised autonomy in clinical judgment when deciding whether to ambulate patients to assess for gait ataxia. If nurses perceived an increased falls risk, whether at baseline or related to symptoms, the gait assessment could be omitted for safety. Gait assessment ambulation as a falls

risk may have affected nursing staff buy-in to the evidence-based assessment. However, "dangle" positioning for truncal ataxia assessment was an option to alleviate falls risk. Further, some of the subjectively dizzy population may have been unwilling to ambulate once in the ED due to severity of symptoms.

Nursing documentation limited the study due to the lack of evidence of completed gait assessments. The electronic fields for gait assessment in documentation flowsheets are available to the physical therapy department only. Nurses do not have point-and-click gait assessment documentation. For a pilot study, it is inappropriate to make major changes in electronic documentation. Paper documentation is not foreign for stroke patients in the ED, although it is neither preferred nor convenient for nursing staff.

The design of the study limited the results in some capacities. Retrospective and prospective designs rely on the presence and retrieval of documentation. Upon completion of the study, the researcher is dependent on the contents of the medical record and may access only what was recorded. Extending the duration of the study period may have increased capture of a larger PCS population. Further, the inclusion criteria may have been too narrow. Additional subjective complaints such as weakness, fatigue, and confusion were not included in this study. Further, PCS patients present with a myriad of symptoms like nausea and vomiting, which may necessitate combined inclusion criteria with the aforementioned subjective complaints. Finally, chief complaints were correlated with ICD-10 coding, which may have inhibited the scope and capture of the population by altering the subjective quality of the patient experience.

Implications for Practice and Future Research

Given the difficulty and comprehensive approach necessary to diagnose PCS, future studies are necessary to improve care of this population. Immediate research may involve retrospective study of the 44 PCS patients presenting to the other facilities within the healthcare system during this study. Variables of interest may be chief complaints, vascular risk, physical assessments, co-morbidities, imaging studies, diagnosis, treatment, and outcomes. As PCS does not look like a typical stroke, pre/post education of providers regarding PCS presentations in the primary stroke centers may increase knowledge and enhance recognition. Further, retrospective comparison of anterolateral stroke patients and the 44 PCS patients may quantify and describe any gaps in care and outcomes between these populations.

Recent literature refocuses on the utility of the head impulse, nystagmus, test of skew (HINTS) assessment for distinguishing peripheral from central causes of symptoms, as well as superiority to imaging studies (Edlow, Gurley, & Newman-Toker, 2017). Researchers now recommend reserving gait assessment for benign HINTS findings, while maintaining that emergency providers do not profess competency, consistency, or confidence with HINTS. The literature stresses the importance of resource conservation when caring for the dizzy population. These experts also developed guidelines, a flowsheet, and assessment videos in response to this challenging pathology to assist providers in the management of dizziness and the extensive differential diagnoses associated with the population. The HINTS has been described as challenging to use and interpret, suggesting that nursing driven evidence-based practice may not be feasible with this assessment. Care of the subjectively dizzy population costs greater than $10 billion annually (Kattah et al., 2008) thus provider knowledge and utilization of the HINTS exam may offer data associated with cost-benefit, diagnosis, and patient outcomes.

Stroke care nurses certify annually to maintain competency utilizing the National Institutes of Health Stroke Scale (NIHSS), which lacks thorough assessment for cerebellar deficits. However, there is an expanded NIHSS (e-NIHSS), which assesses anterolateral circulation and PCS signs. The e-NIHSS as a PCS-weighted assessment increases feasibility and reproduceable findings among providers (Olivato et al., 2016). The e-NIHSS assesses vertical and horizontal eye movements, cranial nerves nine and twelve, and truncal ataxia (Olivato et al., 2016). Certification, implementation, and prospective study of the e-NIHSS may also provide important presentation, assessment, and sensitivity data for the PCS population.

A portion of nursing staff are not NIHSS certified, but now have an examination with assessment points focused on PCS. The B.E. (Balance and Eyes) F.A.S.T. includes assessments for balance (gait imbalance/leg weakness) and eyes (vision changes) in addition to the well-known FAST examination. The B.E. F.A.S.T. study determined that patients negative for FAST were positive for gait instability or leg weakness (42%) and experienced vision changes (40%) (Aroor, Singh, & Goldstein, 2017). FAST missed 71% of strokes involving the posterior circulation and BE FAST utilization decreased missed PCS to 43% ($p=0.042$). The B.E. F.A.S.T. assessment for stroke is validated and live in this healthcare system. Evaluation of utilization and outcomes related to the B.E. FA.S.T. exam may contribute to assessment and diagnosis data regarding PCS recognition.

Assessment and diagnosis of PCS requires a comprehensive approach implementing the most sensitive assessments, utilizing vascular risk assessment, and imaging. New evidence suggests adaptation of the Posterior Circulation Ischemia Risk Score System. This system was recently studied and found to be superior to other vascular risk assessments with 94% sensitivity for distinguishing dizziness from PCS (Chen et al., 2018). Provider utilization and adherence

regarding vascular risk assessment scales is another area of necessary research contributing to comprehensive care of the PCS population.

Imaging in PCS remains a concern, and new research states that PCS is five times more likely than anterolateral stroke to have negative diffusion weighted MRI findings (Edlow, Hurwitz, & Edlow, 2017). Researchers adamantly stress awareness of the likelihood of negative imaging studies in the PCS population. Further, they maintain that PCS is a clinical diagnosis and providers should not withhold treatment due to negative diffusion weighted MRI studies. However, cost-benefit analysis is necessary to evaluate outcomes of patients receiving rtPA based on clinical diagnoses.

New CT perfusion scanning technology is available and guiding endovascular intervention in this healthcare system. CT perfusion studies offer non-invasive information regarding cerebral blood flow and other measures to evaluate ischemia. Outcome comparison studies involving CT perfusion scanning and standard CT including PCS diagnosis, treatment, and outcomes may describe any increased utility associated with the new imaging modality.

The body of evidence for PCS is limited, but studies are congruent regarding assessment, diagnosis, and treatment of PCS. Outcome comparison of cases of anterolateral and PCS may help to generate evidence and awareness necessary for improved PCS care. Future research may focus on quantifying gaps in treatment and outcome comparison between those with anterolateral circulation stroke versus PCS.

Conclusion

This study aimed to assess correlations between gait ataxia and posterior stroke in the setting of gait assessment as standard of care. The objectives were driven by the research-based

conceptual framework supporting gait assessment of subjectively dizzy patients to determine ataxia related to PCS. Findings from this study did not support this assumption. However, the literature continues to recommend gait assessment based on clinical judgement, as well as other more sensitive assessments for management of the dizzy population and diagnosis of PCS. Providers must be aware and prepared for the clinical challenges accompanying PCS. Clinical application of new evidence-based assessments must be implemented and studied to determine efficacy and improve posterior circulation stroke assessment, diagnosis, and treatment.

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Table 1

Inclusion Criteria: List of Subjective Dizziness ICD-10 Codes	
ICD-10 Code	**Chief Complaint**
H81.49	Vertigo (lightheaded, spinning)
R26.81	Unsteadiness on feet (Off-balance)
R42	Dizziness and giddiness (dizziness)
R55	Near-syncope, syncope, collapse (almost-passed out, passed out)

Table 2

List of Measures and Outcome Variables defined per Category and ICD-10 Code	
Demographics	
Age	Age in years
Sex/Gender	Male, Female, Other
Ethnicity	African American/Black, Asian/Pacific Islander, Caucasian/White, Hispanic/Latino, other
Ataxia	
ICD-10 Code	**Diagnosis**
R26	Abnormalities of gait and mobility
R27	Other lack of coordination
R270	Ataxia, unspecified
I69.393	Ataxia following cerebral infarction
I69.993	Ataxia following unspecified cerebrovascular disease
I69.893	Ataxia following other cerebrovascular disease
Posterior Stroke	
ICD-10 Code	**Diagnosis**
I63011	Cerebral infarction due to thrombosis of right vertebral artery
I63012	Cerebral infarction due to thrombosis of left vertebral artery
I63111	Cerebral infarction due to embolism of right vertebral artery
I63112	Cerebral infarction due to embolism of left vertebral artery
I63119	Cerebral infarction due to embolism of unspecified vertebral artery
I6312	Cerebral infarction due to embolism of basilar artery
I63019	Cerebral infarction due to thrombosis of unspecified vertebral artery
I6302	Cerebral infarction due to thrombosis of basilar artery
I63219	Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral artery
I6322	Cerebral infarction due to unspecified occlusion or stenosis of basilar artery
I63331	Cerebral infarction due to thrombosis of right posterior cerebral artery

I63332	Cerebral infarction due to thrombosis of left posterior cerebral artery
I63339	Cerebral infarction due to thrombosis of unspecified posterior cerebral artery
I63341	Cerebral infarction due to thrombosis of right cerebellar artery
I63342	Cerebral infarction due to thrombosis of left cerebellar artery
I63349	Cerebral infarction due to thrombosis of unspecified cerebellar artery
I63431	Cerebral infarction due to embolism of right posterior cerebral artery
I63432	Cerebral infarction due to embolism of left posterior cerebral artery
I63439	Cerebral infarction due to embolism of unspecified posterior cerebral artery
I63441	Cerebral infarction due to embolism of right cerebellar artery
I63442	Cerebral infarction due to embolism of left cerebellar artery
I63449	Cerebral infarction due to embolism of unspecified cerebellar artery
I63531	Cerebral infarction due to unspecified occlusion or stenosis of right posterior cerebral artery
I63532	Cerebral infarction due to unspecified occlusion or stenosis of left posterior cerebral artery
I63539	Cerebral infarction due to unspecified occlusion or stenosis of unspecified posterior cerebral artery
I63541	Cerebral infarction due to unspecified occlusion or stenosis of right cerebellar artery
I63542	Cerebral infarction due to unspecified occlusion or stenosis of left cerebellar artery
I63549	Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebellar artery
I6621	Occlusion and stenosis of right posterior cerebral artery
I6623	Occlusion and stenosis of bilateral posterior cerebral arteries
I6629	Occlusion and stenosis of unspecified posterior cerebral artery
I663	Occlusion and stenosis of cerebellar arteries

Table 3

Data Collection: List of Outcome Variables by Level of Measure		
Outcome Variable	**Measure**	**Level of Measure**
Chief complaint of subjective dizziness	Dizzy, light-headed, off-balance, syncope/near-syncope, "spinning" (1) or otherwise (0)	Nominal
Gait assessment	Documentation of gait assessment (1) and/or absence of gait assessment (0)	Nominal
Ataxia	ICD – 10 Ataxia normal (0) or ataxic (1)	Nominal
Diagnosis of Posterior Stroke	ICD – 10 posterior circulation stroke diagnosis no (0) or yes (1)	Nominal
Demographics	Age in years Sex/Gender Race	Ratio Nominal Nominal

Table 4

List of Sample Characteristics	*n = 1091*
Variable	**Mean (SD) or *n* (%)**
Age in years	55 (19.7)
Sex	
Female	671 (61.5%)
Male	420 (38.5%)
Race	
Caucasian	732 (67.1%)
African American/Black	300 (27.5%)
Other	31 (2.8%)
Hispanic/Latino	14 (1.3%)
Asian/Pacific Islander	14 (1.3 %)
Chief Complaint	
Dizziness and giddiness	605 (55.5%)
Near-syncope, Syncope	476 (43.6%)
Off-balance/Unsteadiness	10 (0.9%)
Lightheaded, spinning/Vertigo	0
Gait Assessment documented	29 (2.7%)
Ataxia	10 (0.9%)
Posterior Stroke	0

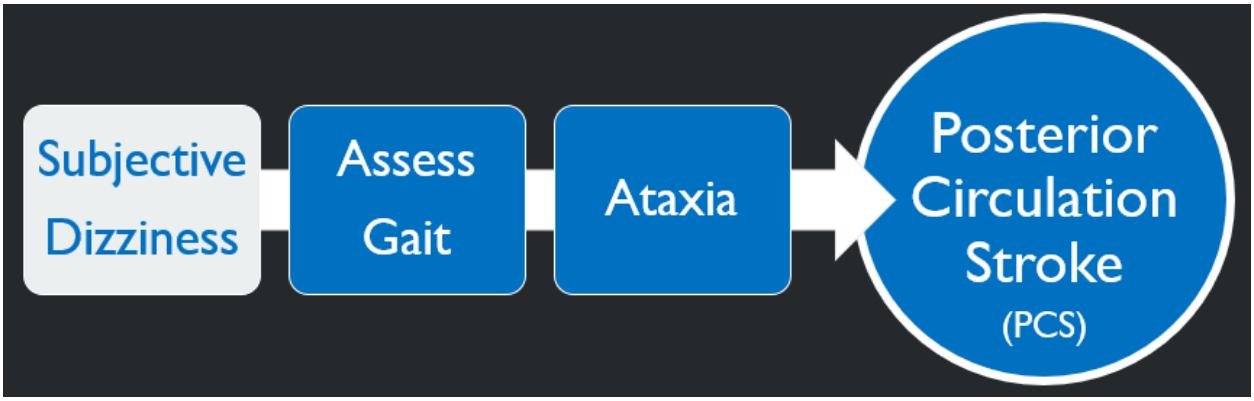

Figure 1. Conceptual Framework derived from evidence-based assumptions found in the literature review.