

Importance of an Interprofessional Team Approach in Achieving Improved Management of the Dizzy Patient

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Abstract

Background: Because of its multifaceted nature, dizziness is difficult for clinicians to diagnose and manage independently. Current treatment trends suggest that patients are often referred to the otolaryngologist for intervention despite having a nonotologic disorder. Additionally, many individuals with atypical presentations are often misdiagnosed and spend a significant amount of time waiting for consultation by the otolaryngologist. Few studies have alluded that implementation of an interprofessional team approach in the diagnosis and management of the dizzy patient can improve clinical decision-making. However, to the authors' knowledge, there is no information specifically quantifying the outcomes and potential benefits of using an interprofessional balance care team approach.

Purpose: To compare dizziness diagnoses trends and referral practices with and without the use of an interprofessional management approach within a university healthcare system.

Research Design: Over the course of a 3-yr period, a retrospective review of the diagnosis and management of dizziness was performed with and without implementation of an interprofessional team. To observe potential differences, year 3 incorporated the interprofessional management approach while years 1–2 did not. The two periods were then compared to each other.

Study Sample: A total of 134 patients referred to a university hearing clinic for a vestibular and balance function evaluation.

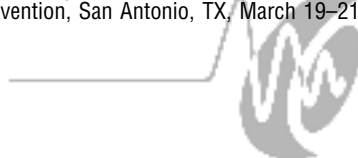
Data Collection and Analysis: Diagnoses and management trends were examined with descriptive statistics (percentages and frequencies). Fisher's exact tests, analysis of contingency tables, were conducted to evaluate the influence of interprofessional management on dizziness diagnoses and treatment patterns.

Results: Results demonstrated that before implementation of an interprofessional team approach, (1) referring clinicians used unspecific dizziness diagnosis codes (e.g., dizziness and giddiness), (2) a low number of patients with dizziness were referred for balance function testing, (3) diagnoses remained unspecific following the balance function assessment, and (4) the most frequently occurring vestibular diagnoses were unilateral vestibular hypofunction and benign paroxysmal positional vertigo. Following the use of an interprofessional management approach, it was determined that (1) disease-specific diagnoses increased, (2) patients with dizziness were referred for balance function testing mainly by otolaryngologists, (3) dizziness was considered to be multifaceted for a greater number of patients, (4) a larger percentage of patients were referred to a specialist other than the otolaryngologist as a result of their diagnosis, and (5) patients reported reduction or resolution of their symptoms.

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Conclusions: An interprofessional management approach for the dizzy patient can lead to more specific diagnoses and provide alternative referral pathways to other health-care professionals (e.g., audiologists, physical therapists, and pharmacists) in an effort to reduce over-referral to one specialist. Future studies should address the utility of an interprofessional team approach in the overall management of patients with dizziness.

Key Words: benign paroxysmal positional vertigo, dizziness, interprofessional relations, patient care team, vertigo

Abbreviations: BPPV = benign paroxysmal positional vertigo; ICD-9 = *International Classification of Diseases*, 9th Edition; PCP = primary care physician; TTUHSC = Texas Tech University Health Sciences Center; UVH = unilateral vestibular hypofunction

INTRODUCTION

Patients may describe their dizziness as true vertigo, subjective vertigo, general imbalance, presyncope, and/or lightheadedness (Maarsingh et al, 2010; Post and Dickerson, 2010). Given its all-encompassing definition, the nature of dizziness is often multifaceted and can result from impairments of otologic, neurologic, vascular, polypharmacy, and/or anxiety-related origins (Dros et al, 2010; 2012). The complex pathophysiology of dizziness makes it difficult for clinicians, such as the primary care physician (PCP), to independently assess and manage patients (Bird et al, 1998). Often, a PCP does not have access to the necessary testing equipment specific for dizziness (e.g., electro/videonystagmography) and is limited to bedside neurologic and balance screenings (Johnson et al, 2008; Maarsingh et al, 2010; Zhao et al, 2011).

PCPs also report that while they believe assessing balance concerns in adults is important, they do not have time to perform screenings on their patients (Johnson et al, 2008). Thus, many clinicians may also rely on using the patient's chief complaint as a diagnostic approach to determine cause and management. While using the chief complaint as a screening guideline is useful for predicting differential diagnoses or streamlining care (Guardabascio et al, 2006), a final diagnosis cannot be made in 20% of patients based on symptoms alone (Post and Dickerson, 2010) and 30% of patients' symptoms cannot be explained by initial diagnoses (Staab, 2012). Relying on patient history and bedside assessments to diagnose dizziness is especially cumbersome in patients with atypical or multifaceted symptom presentations (Zhao et al, 2011). Outcomes for individuals with uncommon symptoms can be poor, and they may undergo numerous unnecessary consultations and/or unsuccessful interventions (Honaker et al, 2009).

When a patient with dizziness is referred to a specialist for further assessment, the referral is often made to an otolaryngologist for diagnosis and management (Johnson et al, 2008). However, practice management studies performed in the United Kingdom suggested that specialty clinics like the otolaryngology office experience substantial over-referrals and extended wait

times for patients. This is in part due to the increasing number of inappropriate referrals. In a recent study, nearly 30% of audiovestibular referrals made to the otolaryngologist were deemed unnecessary by ear, nose, and throat physicians. Authors concluded that referrals to the otolaryngologist for cerumen removal, nonpulsatile tinnitus, and nonotologic dizziness congested clinic productivity and time (Mahalingam et al, 2014). The long wait times and inconclusive findings delay management, which places the patient at increased risk of falling. Thus, it is plausible that allied health professionals such as audiologists, physical therapists, and pharmacists can serve as an important referral source within the balance care team and alleviate the overflow in specialty physician clinics. While there is great variability in diagnosing dizziness, more efficient diagnostic and management practices are needed. The concept of interprofessional dizziness management is aimed at improving dizziness diagnostic triage decisions, improving patient prognosis, and assisting in fall prevention. Researchers have suggested that a multidisciplinary approach should incorporate the patient's PCP and referrals should be made to the otolaryngologist, audiologist, neurologist, cardiologist, and/or psychiatrist, depending on the patient's symptoms and organ systems involved (Weinstein and Devons, 1995).

While the concept of interprofessional care is not necessarily novel, there is minimal published data that quantifies the outcomes of interprofessional management involving physician and allied health professionals (e.g., audiologists, physical therapy, and pharmacy) for the dizzy patient. Therefore, the purpose of the present study was to determine dizziness diagnosis and treatment trends in a university health-care system and examine the differences with and without the use of an interprofessional approach for dizziness management.

METHODOLOGY

For a few well-established hospitals in the United States, an interprofessional management approach for dizziness is in place (e.g., the Mayo Clinic's Integrated Balance Team) and has set the standard for interprofessional care in current practice (Burkard and



Trembath, 2015). Texas Tech University Health Sciences Center (TTUHSC) Speech, Language, and Hearing Clinic created an interprofessional team to manage patients with diagnosed dizziness. The team was composed of an otolaryngologist, neurologist, the patient's existing PCP, audiologist, physical therapist, and pharmacist to manage patients' dizziness. All team members were affiliated with the TTUHSC with the exception of the physical therapist. The patient signed a medical release of records form for the physical therapist to view his/her records. The interprofessional team determined that all patients who were referred to otolaryngology for dizziness would be triaged to audiology for a vestibular and balance function test before seeing all other specialists. The full vestibular balance function assessment included, but was not limited to, ocular motility testing, rotational chair (sinusoidal and step test), vestibular evoked myogenic potentials, videonystagmography (positional and bithermal water or air calorics), rapid positioning (Dix–Hallpike and Roll tests), and computerized Clinical Test of Sensory Organization of Balance. In the instance in which benign positional paroxysmal vertigo (BPPV) was suspected based either on physician referral, patient interview, and/or on questionnaire (e.g., Dizziness Handicap Inventory), rapid positioning testing was initially performed. The patient only followed up with the clinic for further testing if BPPV had resolved but subjective symptoms of dizziness persisted. Additionally, specialty tests were performed when appropriate (pressure fistula test, orthostatic hypotension screen, vertebral basilar insufficiency test, etc.).

Following the balance assessment, the lead audiologist made a vestibular diagnosis (if any) and discussed via e-mail or phone correspondence with the interprofessional team for verification of diagnosis, additional medical diagnoses, intervention, and which specialist would be deemed most appropriate for treatment. Using current standard practices and published evidence-based research, the interprofessional team created and agreed on following a triage model (see Table 1) to determine which specialists would be the most appropriate clinician given the patient's intervention plan. For example, a pharmacist performed a pharmacological consultation for patients with a normal balance function assessment but positive screening for orthostatic hypotension.

Retrospective Review

The researchers performed a 3-yr retrospective review on patients who received a dizziness diagnosis and were referred for balance function testing at TTUHSC Speech, Language and Hearing Clinic in Lubbock, TX. Investigators of the study reviewed all charts from vestibular patients seen from January 2012 to December 2014. Only those patient charts that were complete (e.g., audiogram, results from vestibular assessments, conclusive di-

Table 1. Outline of Type of Clinician and Reason for Management

Clinician	Referral Reason for Intervention
Otolaryngology	Suspicion of third-window effect Suspicion of endolymphatic hydrops Labyrinthitis (onset <72 hr) Asymmetrical hearing loss Conductive hearing loss/abnormal middle ear status Severe otalgia Active drainage Pulsatile tinnitus
Physical therapy	UVH Bilateral vestibular hypofunction Positive cervicogenic screening
Audiology	Positive BPPV
Pharmacy	Suspicion of polypharmacy Positive orthostatic hypotension screening
Primary care	Positive vertebral basilar insufficiency screening Polypharmacy (following consult from pharmacy) Positive orthostatic hypotension (following consult from pharmacy)
Psychiatry	Anxiety-related dizziness
Neurology	Central vestibular involvement Migraine-related dizziness

agnosis, and patient intake) were included in this study. During year 1 (Y1) and year 2 (Y2), the interprofessional team was not in place; however, it was established in year 3 (Y3). A staff audiologist (4 yr of experience) was responsible for performing all of the vestibular and balance assessments during this time frame. The lead audiologist (10 yr of experience) was consistent all 3 yr and served as the main interpreter of the results. For each year, the investigators of the study obtained general nonidentifying demographic information and determined the number of dizziness diagnosis codes (e.g., 780.4—dizziness and giddiness) made at TTUHSC outpatient clinics in Lubbock from Y1 to Y3. Additionally, each chart was reviewed for the following outcomes: (a) initial referring clinician for vestibular and balance testing; (b) initial referring diagnosis made by the referring clinician compared to final impressions/diagnosis made following vestibular and balance function assessment; (c) vestibular diagnosis determined, if any; (d) multifaceted dizziness (defined as more than one diagnosis to explain symptomology); (e) specialist(s), the patient was referred to for intervention, if any (i.e., otolaryngology, primary care, neurology, psychiatry, and physical therapy); and (f) patient subjective report of symptom improvement obtained via informal phone correspondence ~6 weeks after vestibular testing was performed. The phone call was made by the clinician who performed the testing and documented in the patient's chart whether symptoms had resolved or reduced since intervention. Finally, the researchers compared

outcomes illustrated above from Y1 to Y2 versus Y3 to examine differences between pre- and postimplementation of the interprofessional team management. Before the review process, the Institutional Review Board of TTUHSC approved the proposed study.

Data Analysis

The researchers calculated frequencies and percentages of the review findings. χ^2 and Fisher’s exact test statistical analysis using a two-tailed definition was performed to determine if there was a difference in team approach versus no team approach on the outcomes addressed in the methodology. A significance level of 0.05 was set for all measures. All analyses were completed using Prism Statistical Software (version 5.0; GraphPad, San Francisco, CA).

RESULTS

Results from the retrospective review revealed that referrals for vestibular and balance assessments came from otolaryngology clinics, internal medicine, neurology, primary care, physical therapy, and private practice audiologists. The investigators reviewed a total of 134 patient charts (mean age = 63.3 yr; 55 males and 79 females) for the outcomes previously addressed in the methodology. The yearly distribution of patient charts reviewed was 27 in Y1, 40 in Y2, and 67 in Y3.

Number of Patients Referred for Vestibular and Balance Testing

A total of 3,785 patients within TTUHSC outpatient clinics were coded with a 9th Edition of the *International Classification of Diseases* (ICD-9) code for dizziness or imbalance (see Table 2) throughout Y1–Y3. Figure 1 indicates the percentage of patients referred to TTUHSC Speech, Language and Hearing Clinic for

Table 2. Percentage of Dizziness-Related Diagnosis Codes Determined per Year by TTUHSC Outpatient Clinics

Dizziness Diagnosis	Y1 (%)	Y2 (%)	Y3 (%)
780.4 (dizziness and giddiness)	75.6	68.5	69.2
781.2 (abnormality of gait)	9	9.9	8.7
386.00 (Ménière’s disease, unspecified)	2	2	1.3
386.11 (BPPV)	5.7	8.5	6.5
V15.88 (history of fall)	1.7	8.5	9.5
386.19 (unspecified peripheral vertigo)	4.2	1.6	1.3
386.53 (hypoactive labyrinth, unilateral)	2.1	1.2	3.6
Total codes per year	1,358	1,418	1,009

vestibular and balance testing each year per referring clinician from Y1 to Y3. Throughout Y1–Y3, otolaryngologists made the majority of referrals for vestibular and balance testing (84%). In comparison, primary care/internal medicine physicians referred a smaller percentage of patients (42% in total) for vestibular and balance testing.

Initial Diagnosis Compared to Diagnosis Made following Balance Assessment and Team Approach

The investigators compared the initial ICD-9 diagnosis made by the referring clinician to the diagnosis/impression following the vestibular and balance assessment. This outcome was evaluated to investigate the value of interprofessional management in terms of obtaining a more specific diagnosis and potentially improving management. Results obtained from Y1 and Y2 revealed that there were more similar final diagnoses that “matched” the initial diagnosis given by the original clinician; 55.5% matched diagnoses in Y1, 30% matched diagnoses in Y2, and a decline to 22.4% in Y3. A significant difference was noted in the number of matched diagnoses between Y1–Y2 (pre team approach) and Y3 (post team approach) (Fisher’s exact test, $p = 0.02$), suggesting higher variability in the number of diagnoses obtained postevaluation.

Most Common Vestibular Diagnoses Determined following Balance Assessment

The most frequent vestibular diagnoses made following the vestibular and balance assessment included unilateral vestibular hypofunction (UVH) and BPPV. While UVH and BPPV were the most prevalent disorders in Y3, a greater diversity of diagnoses were seen in Y3 compared to Y1 and Y2, including an increase in nonotologic disorders (e.g., vestibular migraine, anxiety, polypharmacy). A significant difference in the number of nonotologic diagnoses was found between Y1–Y2 and Y3 (Fisher’s exact test, $p < 0.0001$). Results suggest that the team approach may have contributed to a greater diversity of diagnoses.

Frequency of Patients Who Had Multifaceted Dizziness (More than One Dizziness-Related Diagnosis)

A higher number of patients were diagnosed with multifaceted dizziness in Y3 (53.7%) compared to Y1 (3.7%) and Y2 (8%). A significant difference in the number of patients identified with multifaceted dizziness between Y1–Y2 and Y3 (Fisher’s exact test, $p < 0.0001$). Results illustrate that using a team approach may have contributed to an increase in detection of patients with multifaceted symptoms.

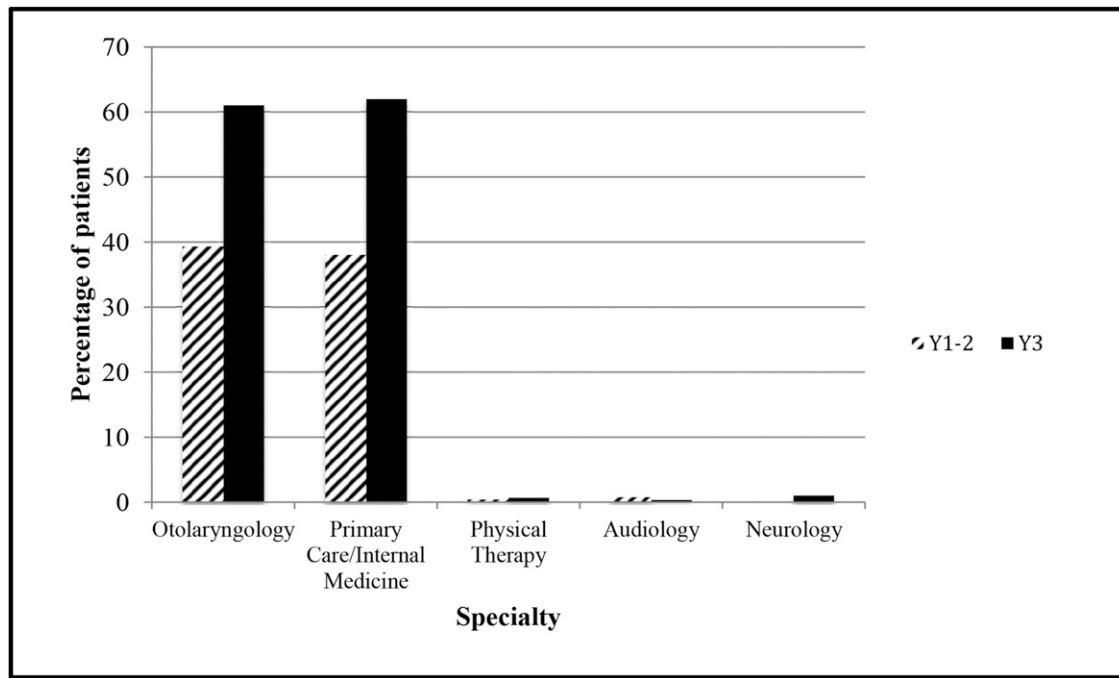


Figure 1. Percentage of referrals for vestibular and balance function testing from each health care professional from Y1 to Y3. Majority of referrals for vestibular and balance function tests were made from otolaryngologists throughout Y1–3.

Frequency of Patients Recommended to Each Specialty for Intervention (i.e., Otolaryngology, Primary Care, Neurology, Psychiatry, and Physical Therapy)

Figure 2 demonstrates that secondary referrals to otolaryngology decreased in Y3 (13.4%) compared to Y1 (66.7%) and Y2 (50%). Because of the high occurrence of referrals made to the otolaryngologist in Y1 and Y2, the researchers performed a Fisher's exact test to determine difference between using a team approach and decreased referrals to the otolaryngologist. Results revealed a significant influence between using a team approach and having fewer patients referred back to the otolaryngologist ($p < 0.0001$) for management.

Patient Subjective Report of Symptom Improvement

Descriptive data throughout Y1–Y3 revealed that there was a higher percentage of patients who reported a reduction in their symptoms postvestibular assessment and intervention in the years where a team approach was used compared to the years without a team approach. This was noticeably observed in peripheral pathologies: 63% of patients diagnosed with UVH and 100% diagnosed with BPPV saw improvement, in contrast to 40% of patients diagnosed with UVH and 86% diagnosed with BPPV reported resolution or reduction in symptoms in Y1–Y2. Fisher's exact test was performed and indicated a statistically significant difference

between number of patients who reported symptom improvement during Y3 as compared to Y1–Y2 ($p = 0.024$). Results illustrate that using a team approach may have contributed to reported patient improvement following their vestibular assessment and respective treatment. Table 3 depicts the percentage of patients who reported resolution or reduced dizziness symptoms at ~6 weeks following the patient's vestibular and balance test specifically in Y3 and the recommended secondary referral source.

DISCUSSION

Dizziness Diagnosis Trends

The quantity of dizziness diagnoses observed was comparable to other studies investigating the prevalence of dizziness and imbalance diagnoses in a major medical center (Jayarajan and Rajenderkumar, 2003; Royle et al, 2011; Dros et al, 2012). It should also be noted that these studies did not encompass the number of dizziness diagnoses being made in the emergency department. There is a reported higher population of individuals with symptoms of dizziness and imbalance who visit the emergency department compared to their PCP (Cappello et al, 1995; Saber Tehrani et al, 2013), suggesting that occurrence of dizziness is considerable and a relevant medical issue. There was a notable difference between the overall number of patients diagnosed with dizziness or imbalance in Y3 compared to Y1–Y2. Reasoning for the variance in Y1–Y3 may be because there were a smaller number of patients seen at the TTUHSC outpatient clinics in Y3 compared to Y1 and Y2.

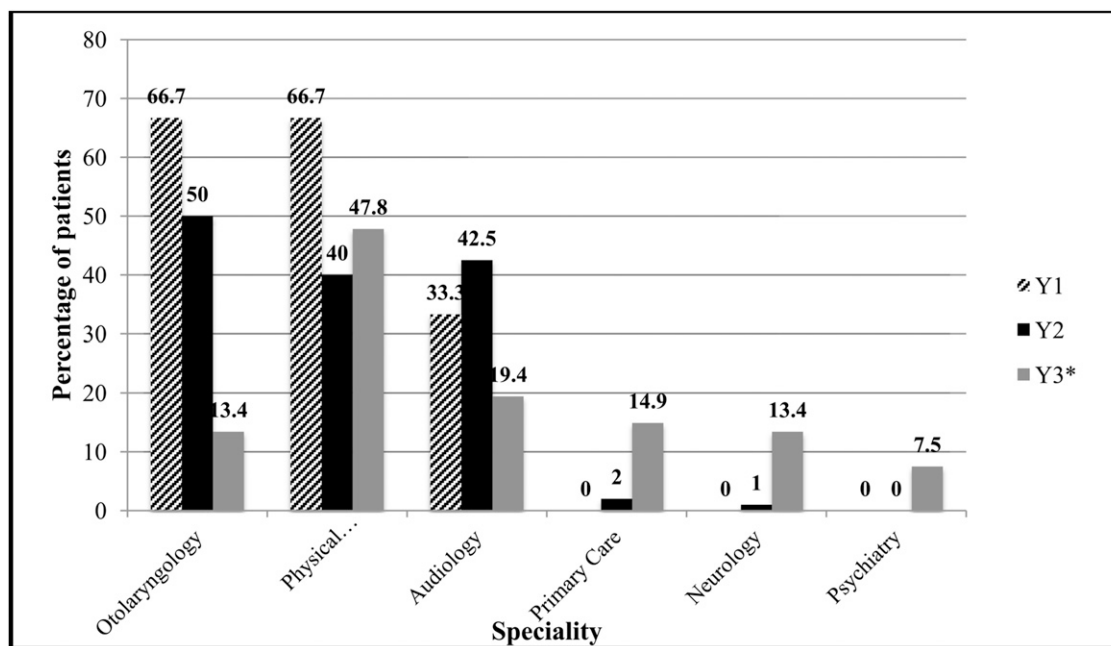


Figure 2. Percentage of patients recommended to each specialist for intervention per year. Increase in patients referred to health-care professionals other than otolaryngologists. *Interprofessional team implemented.

Data also revealed that there was a greater amount of unspecific dizziness diagnoses codes used in comparison to more disease-specific codes, with “dizziness and giddiness” (ICD-9: 780.4) being the most prevalent throughout Y1–Y3. This suggests that health-care clinicians may not have enough initial diagnostic information to definitely diagnose a patient’s dizziness, and those patients will most likely need further assessments or expertise from other specialists. While some studies have stated that formal vestibular diagnostic work-ups

(e.g., videonystagmography) are not necessary to determine cause of a patient’s dizziness (Colledge et al, 1996), other investigators argue that the information from traditional laboratory studies (e.g., blood analysis) and imaging are not cost-effective and are unspecific when attempting to diagnose a peripheral vestibular loss (Stewart et al, 1999; Wasay et al, 2005; Post and Dickerson, 2010; Saber-Tehrani et al, 2013). Use of videonystagmography has a reported sensitivity of 74% and specificity of 83% for peripheral vestibular disorders. For central vestibular disorders, sensitivity has been reported as high as 81% and specificity as high as 93% in patients with dizziness complaints (Hoffman et al, 1999). Thus, the importance of educating other health-care clinicians about the diagnostic evaluations and alternative referrals sources available for dizzy patients is warranted. Additionally, with the shift toward the 10th Edition of the *International Classification of Diseases* coding, there will be a greater emphasis on increasing the specificity of what clinicians diagnose and code in efforts to improve reimbursement, compliance in documentation, and consistency with advances in medicine (Bowman, 2008). Based on the large number of dizziness diagnoses made per year, referral for balance function assessment may provide the additional diagnostic information to stratify a patient’s diagnosis.

Table 3. Percentage of Patient Improvement at Six Weeks following Initial Diagnosis and Team Recommendations Made during Y3

Impression/Diagnosis	Symptom Resolution or Reduction (%)	Recommended Management
UVH	63	Physical therapy
Bilateral vestibular hypofunction	40	Physical therapy
BPPV	100	Audiology
Central vestibular involvement	0	Neurology
Migraine-related dizziness	42	PCP/neurology
Anxiety-related dizziness	12	PCP/psychiatry
Superior semicircular canal dehiscence/perilymph fistula	66	Otolaryngology
Orthostatic hypotension and polypharmacy	40	PCP

Number of Patients Referred for Vestibular and Balance Function Testing and Initial Referring Clinician

Otolaryngologists made the most referrals for vestibular and balance function testing in comparison to

primary care/internal medicine clinicians. Reasons for these findings are not surprising as otolaryngologists are more aware of the utility of objective vestibular testing (aside from traditional laboratory, imaging, and bedside studies) and the role of allied health professionals in the balance care team. While results revealed a significant difference between the percentage of patients referred for testing in Y3 (team approach) in comparison to Y1–Y2 (no team approach), it is plausible that this is influenced by the otolaryngology triage method of referring all patients to audiology for testing. However, it should be noted that overall referrals for vestibular and balance testing remains relatively low. The expected referral percentage for dizziness codes has been minimally documented; a few studies have revealed that 54% of physicians agreed that they do not do routine hearing and balance screenings, and only 12% refer for further objective balance testing (Johnson et al, 2008). This, in part, may be due to decreased non-otolaryngology physician awareness of the role of allied health professionals who can assist in the evaluation (Johnson et al, 2008) and/or overall high rates of misdiagnosis made at the primary care level (Royle et al, 2011). These data also suggest that nonotolaryngology physicians may be most likely triaging all dizzy patients to the ear–nose–throat clinic versus considering other potential causes for the patient's dizziness and the more appropriate referral source. It is plausible that there may be an overreliance on the otolaryngologist to refer for vestibular and balance testing. While educational lectures that were provided to the university were made available to all physicians in this study to promote our team, these data warrant further investigations on attempts to improve clinician awareness of current dizziness diagnoses and management, specifically alternative referral avenues that can improve patient care.

Initial Diagnosis Compared to Impression/ Diagnosis Made following Balance Assessment and Team Approach

There was a decrease in matched diagnoses observed in Y3 as compared to Y1–Y2. This may be related to the implementation of the interprofessional approach to help achieve more specific diagnoses as compared to the general dizziness and imbalance diagnoses the patient was initially referred with and as previously illustrated in Table 2. The expertise of each specialist on the interprofessional team improved the ability to assess the multiple causes of dizziness and avoid broad impressions/diagnoses (e.g., ICD-9 code, 780.4—dizziness and giddiness). Ultimately, the interprofessional approach assisted in making appropriate secondary referrals for intervention, and potentially improves patient's management (e.g., fewer visits with various specialists, reduced clinic overflow, reduced wait time).

Most Common Vestibular Diagnoses Determined following Balance Assessment

UVH and BPPV were the most prevalent disorders throughout Y1–Y3 (see Table 4) and coincided with previous studies suggesting that the most common vestibular diagnoses in medical facilities were of peripheral origin and typically benign (Herr et al, 1989; Jayarajan and Rajenderkumar, 2003; Dros et al, 2012). While otologic diagnoses were most common throughout Y1–Y3 (BPPV and UVH), there was an increase in various nonotologic disorders in Y3. The significant difference between the implementation of the team approach and increase in nonotologic disorders suggests that interprofessional dizziness management can assist in improving more appropriate management for the patient and potentially assist in reducing reoccurring symptoms.

Frequency of Patients Who Had Multifaceted Dizziness (More than One Dizziness- Related Diagnosis)

A higher incidence of patients diagnosed with multifaceted dizziness was found with the implementation of the team approach. For example, the interprofessional team diagnosed a larger number of patients with BPPV combined with anxiety-related dizziness in Y3 compared to Y1–Y2, when patients were diagnosed with BPPV alone. Reasons for this outcome are likely due to increased clinician awareness of the various causes of dizziness aside from traditional inner ear dysfunction. Additionally, it is plausible that in using an interprofessional team, members were able to contribute their expertise to rationalize the various causes of the patient's symptoms. Difficulty in managing chronic dizziness is the inability to resolve patients' symptoms after management has been performed (Honaker et al, 2009). Often symptoms of chronic dizziness are related to overlapping nonotologic disorders that either mimic

Table 4. Final Impressions/Diagnoses following Vestibular and Balance Assessment per Year

Diagnosis	Y1 (%)	Y2 (%)	Y3* (%)
UVH	59.3	55	40.3
Bilateral vestibular hypofunction	7.4	2.5	7.5
BPPV	33.3	42.5	19.4
Central vestibular involvement	0	0	3
Migraine-related dizziness	0	0	10.4
Anxiety-related dizziness	0	0	16.4
Superior semicircular canal	0	0	4.5
dehiscence/perilymph fistula	0	0	14.9
Positive orthostatic hypotension	0	0	7.5
Polypharmacy	0	0	67
Total referrals	27	40	

Note: *Interprofessional team implemented.

vestibular dysfunction or prevent functional compensation as seen in anxiety-related dizziness following a peripheral vestibular insult (Staab, 2012). Without a team approach clinicians may misdiagnose or overlook a contributing disorder. For example, neurologic conditions such as multisensory dizziness and vestibular migraine are underdiagnosed by referring physicians because of their complex presentation (Geser and Straumann, 2012). However, using an interprofessional team and having greater awareness of the causes of a patient's symptoms can facilitate a holistic diagnostic approach. Clinicians can then better triage treatment, decrease unnecessary costs, and aim to improve that patient's quality of care.

Frequency of Patients Recommended to Each Specialty for Intervention (i.e., Otolaryngology, Primary Care, Neurology, Psychiatry, and Physical Therapy)

Because of a higher incidence of nonotologic diagnoses (e.g., polypharmacy) made in Y3, the interprofessional team recommended that a larger percentage of patients return to their existing PCP versus to the otolaryngologist for management when compared to Y1–Y2 (refer to Table 1 for triage model for intervention). Referral rates to the otolaryngologist also decreased in Y3 because an allied health-care member (e.g., audiologist, physical therapist) managed the patient, as seen in cases of UVH and BPPV. It is well documented that vestibular rehabilitation can be an effective management tool for patients with a unilateral or bilateral peripheral vestibular loss, especially in its chronic state (Macias et al, 2005; Han et al, 2011). Vestibular rehabilitation is within the scope of practice for physical therapy and audiology clinicians (AAA, 2004; Herdman and Whitney, 2007). While physician-driven vestibular rehabilitation is used in the primary care setting, it may not always be the most effective method for all dizzy patients who have multifaceted disorders or decreased agility and motivation (Yardley et al, 2004). Additionally, targeted treatment based on the individual complaints is recommended rather than a general rehabilitation regimen (Agrawal et al, 2013). Therefore, the interprofessional team referred patients diagnosed with a UVH to a neuro-physical therapist for vestibular rehabilitation.

An experienced audiologist also treated in-office patients diagnosed with BPPV. In a retrospective study investigating treatment trends of BPPV, researchers found that the average time from the first referral to treatment was 93 weeks (Fife and FitzGerald, 2005) for most affected patients. Authors added that 85% of the cases they observed in their review represented classic canalithiasis BPPV of the posterior canal and could have been treated either by the PCP or referred directly to audiology for intervention to avoid extended

wait times and unnecessary costs (Fife and FitzGerald, 2005). In the present study, the interprofessional team referred patients with unremarkable vestibular and balance assessments to the most appropriate specialist for their diagnosis instead of to the otolaryngologist, to limit inappropriate referrals.

According to researchers who have performed otolaryngology clinic audits, inappropriate referrals are associated with longer waiting times for patients and overflow. With an increase in excess wait time in these clinics, dizzy patients are at a higher risk of falling and developing chronic symptoms that can be cumbersome to diagnose and treat. Recent investigations in the United Kingdom suggest that improved means of triaging dizzy patients and incorporating substitute referral pathways for efficiency are necessary for adequate patient satisfaction and safety (Mahalingam et al, 2014). With the implementation of an interprofessional team, we observed a greater diversity of nonotologic diagnoses that may not necessarily require intervention by the otolaryngologist. Assistance from other medical and allied health professionals can serve as alternative referral sources for benign vestibular disorders or nonotologic dizziness and reduce waiting periods for patients seeking relief of their symptoms.

Patient Subjective Report of Symptom Improvement

A significant difference in symptom reduction was noted between implementation of a team approach for management versus no team approach. Improvement was mostly observed in patients with peripheral vestibular involvement (e.g., BPPV and UVH), which is expected given the physiological nature of the etiologies. No report of symptoms resolution was observed in patients diagnosed with central vestibular involvement throughout Y1–Y3; however, it is plausible that medical intervention had not yet occurred at post six weeks. It is also expected that patients with multifaceted dizziness may have not seen symptom reduction as early as six weeks due to more complex intervention. The difference between symptom improvements in Y1–Y2 compared to Y3 could also be attributed to the high incidence of patients with multifaceted dizziness that may have been misdiagnosed or overlooked in years before the team approach was used. These data suggest that using a team approach for dizziness management allows team members to identify more specific causes of the patient's symptoms, improve the team's ability to triage those individuals to the most appropriate clinician for treatment, and potentially reduce symptoms in a reasonable time frame.

Limitations

There were some limitations found in this study. The study team made attempts to control for extraneous

variability, which included analyzing the selected time frame in which staff and protocols were consistent. However, the shorter time frame (3 yr of retrospective review) may have resulted in a smaller selected sample size than desired. Yet we believe that the data presented in the study provide valuable information regarding dizziness management trends that have not otherwise been discussed in the literature. Another limitation in the presented investigation is the fact that all the charts reviewed in our data originated from the same institution. Our ability to generalize the results to other medical centers was considered; however, information from this study is also intended to advocate to the practicing clinicians about current treatment patterns and potential changes that can be made for patients with dizziness. Finally, we were able to describe outcome measures that suggested whether a patient's symptoms were improved after the team impressions/diagnoses were made. We were able to observe patient responses only at a six-week postaudiology visit. It is plausible that the patient's symptoms may have improved at a later time, fluctuated, or returned. Future prospective studies would be ideal to determine patient outcomes at varied time frames.

CONCLUSION

Interprofessional management for the dizzy patient can assist in identifying specific and multifaceted dizziness diagnoses, enhance the ability to detect non-otologic disorders that contribute to dizziness symptoms, and thereby reduce the amount of secondary referrals to the otolaryngologist by incorporating other health-care professionals, including those in allied health, into the balance care team. With the assistance of other clinicians, there is potential to reduce overflow in a particular clinic, decrease unnecessary physician visits and patient wait time, assist in cost savings for the patient and clinic, and promote advocacy for a team approach in patient management.

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REFERENCES

- Agrawal Y, Ward BK, Minor LB. (2013) Vestibular dysfunction: prevalence, impact and need for targeted treatment. *J Vestib Res* 23(3):113–117.
- American Academy of Audiology (AAA). (2004) Scope of practice. <http://www.audiology.org/publications-resources/document-library/scope-practice>. Accessed 10 August 2015.
- Bird JC, Beynon GJ, Prevost AT, Baguley DM. (1998) An analysis of referral patterns for dizziness in the primary care setting. *Br J Gen Pract* 48(437):1828–1832.
- Bowman S. (2008) Why ICD-10 is worth the trouble. *J AHIMA* 79(3):24–29, quiz 41–42.
- Burkard R, Trembath S. (2015) Practicing at the top of the audiology license. *ASHA Access Audiology*, 20. <http://www.asha.org/aud/Articles/practicing-at-the-top-of-the-audiology-license/>. Accessed 15 August 2015.
- Cappello M, di Blasi U, di Piazza L, Ducato G, Ferrara A, Franco S, Fornaciari M, Sciortino A, Tarantino AM, di Blasi S. (1995) Dizziness and vertigo in a department of emergency medicine. *Eur J Emerg Med* 2(4):201–211.
- Colledge NR, Barr-Hamilton RM, Lewis SJ, Sellar RJ, Wilson JA. (1996) Evaluation of investigations to diagnose the cause of dizziness in elderly people: a community based controlled study. *BMJ* 313(7060):788–792.
- Dros J, Maarsingh OR, Beem L, van der Horst H, ter Riet G, Schellevis F, van Weert H. (2012) Functional prognosis of dizziness in older adults in primary care: a prospective cohort study. *J Am Geriatr Soc* 60(12):2263–2269.
- Dros J, Maarsingh OR, van der Horst HE, Bindels PJ, Ter Riet G, van Weert HC. (2010) Tests used to evaluate dizziness in primary care. *CMAJ* 182(13):E621–E631.
- Fife D, FitzGerald JE. (2005) Do patients with benign paroxysmal positional vertigo receive prompt treatment? Analysis of waiting times and human and financial costs associated with current practice. *Int J Audiol* 44(1):50–57.
- Geser R, Straumann D. (2012) Referral and final diagnoses of patients assessed in an academic vertigo center. *Front Neurol* 3:169.
- Guardabascio LM, Rothman RE, Zee DS, Newman-Toker DE. (2006) “Chief complaint screening”—a new method for symptom-oriented research in the emergency department. *Acad Emerg Med* 13:S146.
- Han BI, Song HS, Kim JS. (2011) Vestibular rehabilitation therapy: review of indications, mechanisms, and key exercises. *J Clin Neurol* 7(4):184–196.
- Herdman SJ, Whitney SL. (2007) Interventions for the patient with vestibular hypofunction. In: Herdman SJ, ed. *Vestibular Rehabilitation*. San Francisco, CA: Davis Company, 309–337.
- Herr RD, Zun L, Mathews JJ. (1989) A directed approach to the dizzy patient. *Ann Emerg Med* 18(6):664–672.
- Hoffman RM, Einstadter D, Kroenke K. (1999) Evaluating dizziness. *Am J Med* 107(5):468–478.
- Honaker JA, Gilbert JM, Stabb JP. (2009) Chronic subjective dizziness (CSD) vs. conversion disorder: discussion of clinical findings and rehabilitation. *Am J Audiol* 19:3–8.
- Jayarajan V, Rajenderkumar D. (2003) A survey of dizziness management in General Practice. *J Laryngol Otol* 117(8):599–604.
- Johnson CE, Danhauer JL, Koch LL, Celani KE, Lopez IP, Williams VA. (2008) Hearing and balance screening and referrals for Medicare patients: a national survey of primary care physicians. *J Am Acad Audiol* 19(2):171–190.
- Maarsingh OR, Dros J, Schellevis FG, van Weert HC, van der Windt DA, ter Riet G, van der Horst HE. (2010) Causes of persistent dizziness in elderly patients in primary care. *Ann Fam Med* 8(3):196–205.

Macias JD, Massingale S, Gerkin RD. (2005) Efficacy of vestibular rehabilitation therapy in reducing falls. *Otolaryngol Head Neck Surg* 133(3):323–325.

Mahalingam S, Seymour N, Pepper C, Tostevin P, Oakeshott P. (2014) Reducing inappropriate referrals to secondary care: our experiences with the ENT Emergency clinic. *Qual Prim Care* 22(5): 251–255.

Post RE, Dickerson LM. (2010) Dizziness: a diagnostic approach. *Am Fam Physician* 82(4):361–368, 369.

Royl G, Ploner CJ, Leithner C. (2011) Dizziness in the emergency room: diagnoses and misdiagnoses. *Eur Neurol* 66(5):256–263.

Saber Tehrani AS, Coughlan D, Hsieh YH, Mantokoudis G, Korley FK, Kerber KA, Frick KD, Newman-Toker DE. (2013) Rising annual costs of dizziness presentations to U.S. emergency departments. *Acad Emerg Med* 20(7):689–696.

Staab JP. (2012) Chronic subjective dizziness. *Continuum (Minneapolis Minn)* 18(5 Neuro-otology):1118–1141.

Stewart MG, Chen AY, Wyatt JR, Favrot S, Beinart S, Coker NJ, Jenkins HA. (1999) Cost-effectiveness of the diagnostic evaluation of vertigo. *Laryngoscope* 109(4):600–605.

Wasay M, Dubey N, Bakshi R. (2005) Dizziness and yield of emergency head CT scan: is it cost effective? [Letter] *Emerg Med J* 22(4):312.

Weinstein BE, Devons CA. (1995) The dizzy patient: stepwise workup of a common complaint. *Geriatrics* 50(6):42–46, 49, quiz 50–51.

Yardley L, Donovan-Hall M, Smith HE, Walsh BM, Mullee M, Bronstein AM. (2004) Effectiveness of primary care-based vestibular rehabilitation for chronic dizziness. *Ann Intern Med* 141(8): 598–605.

Zhao JG, Piccirillo JF, Spitznagel EL Jr, Kallogjeri D, Goebel JA. (2011) Predictive capability of historical data for diagnosis of dizziness. *Otol Neurotol* 32(2):284–290.

