Published in final edited form as:
Otolaryngol Head Neck Surg. 2011 October ; 145(4): 572–580. doi:10.1177/0194599811416063.

The Otology Data Collection Project: Report from the CHEER Network

David L. Witsell, MD, MHS[1], **Steven Rauch, MD**[2], **Debara L. Tucci, MD, MS**[1], **Steven Telian, MD**[3], **Peter Roland, MD**[4], **Anh Nguyen-Huynh, MD, PhD**[5], and **Kristine Schulz, MPH**[1]

[1]Duke University Medical Center, Durham, NC

[2]Department of Otology and Laryngology, Massachusetts Eye and Ear Infirmary, Boston, MA

[3]Department of Otolaryngology, University of Michigan, Ann Arbor, MI

[4]Department of Otolaryngology, University of Texas-Southwestern, Dallas, TX

[5]Department of Otolaryngology/Head and Neck Surgery, Oregon Health & Science University, Portland, OR

Abstract

Objective—To describe and communicate data collected in the CHEER Infrastructure proof of concept study to facilitate understanding of the potential capabilities of practice-based research networks, and to present pilot data for development of future research initiatives.

Study Design—Prospective observational study of CHEER infrastructure operational capacity using a convenience sample of all patients presenting to the practices with tinnitus, dizziness, or a combination of these symptoms.

Setting—The CHEER Network of community and academic practice sites.

Subjects and Methods—The data collection exercise collected demographic, clinical, treatment, and health-related quality of life surveys on tinnitus, dizziness, and migraine disorders. Descriptive analysis of the data is presented.

Results—Of the sites in the CHEER network, 73% (16/22) successfully enrolled subjects; a total of 1532 patients were enrolled in 8 months. Tinnitus alone, dizziness alone, and both occurred in 28%, 34%, and 29%, respectively. Patients complaining of tinnitus and dizziness had lower quality of life than those sufferers with one disorder. Migraine was associated with 27% of patients. The most frequent diagnoses for patients with tinnitus and dizziness were Ménière's disease (34%), vertiginous migraine (18%), and benign paroxysmal positional vertigo (16%).

Conclusion—Descriptive data on patients with common disorders can be rapidly collected within the framework of a practice-based research network. Our data provide valuable pilot information on the targeted disorders, providing a baseline for development of future epidemiological data and clinical trials.

Keywords

practice-based research network; tinnitus; dizziness

Corresponding author: David L. Witsell, MD, MHS, Duke University Medical Center, Box 3805, Durham, NC 27710. Phone: (919) 668-6065; Fax: (919) 668-6036. david.witsell@duke.edu.

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

Introduction

CHEER (Creating Healthcare Excellence through Education and Research), a practice-based research network focused on hearing and communication disorders, is based on a collaborative model of academic and community partnerships in otolaryngology. The research backbone of the network is tripartite. The Duke Clinical Research Institute (DCRI) provides clinical research infrastructure including network development and education, data management, and regulatory support. CHEER accesses thought leadership and ties to regional community sites through established collaborations with four academic medical center co-principal investigators. The third component is the American Academy of Otolaryngology, Head and Neck Surgery Foundation (AAO-HNSF) that provides physicians and ancillary health care providers a contextual reference for network involvement within the specialty.

Evaluation of the functionality and efficiency of the CHEER network infrastructure was accomplished through the Otology Data Collection (ODC) project through which we collected data on patients presenting with tinnitus and/or dizziness. The project was designed to evaluate *processes* essential to data collection in a multicenter study as many of the participating sites are community sites and new to research. These common otologic complaints were selected for the study since they fall within the mission of the National Institute on Deafness and Other Communication Disorders, have disease-specific measures, and evidence-based treatment literature is limited. A second goal of the project was to develop databases to further characterize the symptoms of patients presenting with tinnitus and dizziness in order to inform future research in these areas.

Disease-specific measures: Tinnitus and Dizziness

Evaluation and treatment of tinnitus and dizziness contribute significant costs to the health care system and are inadequately understood due to the heterogeneity of causes and clinical presentations. According to the American Tinnitus Association, 50 million Americans experience tinnitus and 12 million experience symptoms that are severe enough to seek medical attention. Two million patients are so seriously debilitated that they cannot function on a normal day-to-day basis. The financial impact of tinnitus is significant. Disability awards were received by 289,159 veterans for their tinnitus totaling $345,495,552 in annual compensation (2004).[1] This is just one example of the cost to society, and does not reflect other quality of life impacts. Dizziness and vertigo are frequent complaints of patients seen in otolaryngology offices, and tools for evaluation and treatment are often inadequate. In studies by Neuhauser et al, dizziness and vertigo present a 1-year prevalence of 20% and a 1-year incidence of 3% in a general population.[2,3] The impact of dizziness on cost and quality of life is considerable.[4] One-fourth of patients with chronic dizziness reduce work hours, change occupations, or stop working as a result of their dizziness, and half indicate a substantial reduction in their efficiency at work.[4]

Two prior reports on the CHEER network discuss in more detail its development, structure, and progress.[5,6] This third report on the CHEER network summarizes the data collected through the ODC Project. Methodologically, the structure of the study was driven by the project's primary intent of testing the network's ability to deploy a project. In this report, we describe the data that were the byproduct of the research methodology, providing an innovative and potentially compelling picture of the future of comparative effectiveness research, particularly where precise disease definitions are still under debate.

Methods

In January 2010, two CHEER multidisciplinary expert panels were convened to identify evidence gaps and research priorities within tinnitus and dizziness. The ODC Project was proposed by the CHEER Hub PIs and was vetted further at these meetings, accessing multidisciplinary input for consensus on the final set of study questionnaires and surveys. The resulting survey set included patient surveys including, the Tinnitus Handicap Inventory (THI),[7] the Dizziness Handicap Inventory (DHI),[8] and the Migraine Assessment Tool,[9] and background questions and demographics. The physician portion included associated clinical information and diagnosis.

To protect patient privacy, study surveys were given a unique identifier number and stripped of patient identifiers. All research data were stored in a central database, accessible to all participating sites for online entry in REDCap, a secure research data system. The Duke University institutional review board (IRB) was approved for exemption and extended to CHEER community sites. CHEER sites participating in the study requiring an independent IRB review (n=5) were provided administrative support.

A convenience sample of patients presenting for visits for either tinnitus and/or dizziness participated in the project. No compensation was provided to the patient or the participating CHEER sites. Eligible patients had to be ≥18 years of age; literate and able to read and speak English, or able to participate with the aid of a medical interpreter; possess sufficient mental capacity to comply with study requirements; and present to clinic with symptoms of tinnitus/dizziness.

The project was launched in February 2010 with rolling activation of sites (timing based on their readiness given IRB needs and/or internal process setup) beginning in March 2010 and continued through November 2010. Data were extracted from the REDCap database and analyzed using summary SAS reports (SAS Institute, Inc., Cary, NC).

Results

Description of Participating Sites and Enrolled Patients

Of the active trained sites in the CHEER network, 16 of 22 or 73%, across 13 states participated in the ODC project (see Acknowledgments). Nine sites (56%) were private practices and 7 were academic. A total of 1532 patients were enrolled with average and median enrollment of 95.8 and 64.5 patients per site, respectively.

Patient demographics are provided in Table 1; 16% of the patients indicated a race other than Caucasian.

Thirty-four percent of patients indicated their main concern was dizziness, 28% indicated tinnitus, 29% indicated both tinnitus & dizziness, and the remaining 9% provided no response to this question but completed other sections of the survey packet. This is important to note as patient surveys were not removed from the analysis if they skipped questions. Appropriate denominators for the various subsections of the report are noted in corresponding tables.

Data are stratified by the patient-reported main concern to highlight different patient profiles. Patients with primarily tinnitus or dizziness alone may look very different from patients with both tinnitus & dizziness, and their underlying demographics and/or contributing factors may vary as well as their responsiveness to particular treatments (Table 1).

Tinnitus—Table 2a details the profile of tinnitus patient respondents. The majority of tinnitus & dizziness (76%, n=336) and tinnitus (68%, n=287) patients responded that their tinnitus began more than 6 months ago. Approximately one-third of patients indicated extreme bother from tinnitus, but could carry out activities of daily living while another one-third indicated that their tinnitus is only a problem on certain days. Of tinnitus and dizziness patients, 15% indicated that their tinnitus was so extreme that it affected their life greatly as compared with 7% of tinnitus patients.

Data collected on strategies tried by the patients could help future subtyping therapeutic studies. For example, for tinnitus & dizziness patients, the top three strategies that patients indicated worked ‘sometimes’ or ‘always’ (and had denominators of patients greater than 20) were background sound (56/63 or 89%), anti-anxiety medicine (45/52 or 87%), and other medications (65/74 or 87%). Using the same criteria, the top three strategies for tinnitus patients are background sound (57/67 or 85%), amplification (15/24 or 63%), and anti-anxiety medicine (20/37 or 54%). On average, patients indicated they had tried 2.25 strategies with a maximum of 10 and a median of two strategies tried.

The average THI (high score worse, 0–100) score for tinnitus & dizziness patients was 36.5 as compared with 28.6 for tinnitus patients, both a grade of 2 (mild severity). For tinnitus & dizziness patients, 22% fell into grades 4 (severe) and 5 (catastrophic) as compared with 12% of tinnitus patients. The most frequently reported problem/item on the THI for both tinnitus & dizziness and tinnitus patients was “I feel I have no control over my tinnitus” while the least frequently reported problem/item was “I feel desperate because of my tinnitus.”

Provider data (Table 2b) collected on tinnitus patients included the provider’s determination of whether the tinnitus was subjective or objective and audiogram information. For the tinnitus and dizziness patients in the study, tinnitus was determined to be objective in 3% of the patients versus 6% of the tinnitus patients. When the audiogram was performed, it showed normal hearing in both ears one-fifth of the time.

Dizziness—Table 3a provides the results of the survey detailing the profile of dizziness patient respondents. The majority of tinnitus & dizziness (85%, n=351) and dizziness (82%, n=407) patients responded that their dizziness was severe enough to warrant further investigation of their experience. The specific screening question was worded as follows:

> I have experienced a feeling of severe spinning (either myself or the room spinning, may be associated with nausea and vomiting). Defined as vertigo, this sensation is severe enough that I have to stop what I am doing. [If NO, stop this questionnaire]

Patients responding to the dizziness portions of the questionnaire reported that dizziness had an impact on their quality of life and daily living. Thirty-nine percent of dizziness and 26% of tinnitus and dizziness patients had more than 10 vertigo episodes in the last month, and 23% of tinnitus and dizziness and 24% of dizziness patients missed more than 10 days of work in that same timeframe. Tinnitus and dizziness patients had associated symptoms more often than dizziness patients; however, the top associated symptoms differed by group. The top two associated symptoms for tinnitus & dizziness were tinnitus in predominantly one ear (54%, n=207) and fullness or pressure in one ear only (47%), whereas the top two associated symptoms for dizziness patients were headache or head pain (32%) and light sensitivity (25%). Neck pain, headaches previously diagnosed as migraines, and family history of migraine was present a third of the time or more in both groups.

The average DHI[8] (higher scores worse, 0–100) score for tinnitus & dizziness patients was 41.7 compared with 40.0 for dizziness patients, both a grade of 2 (moderate severity). For

tinnitus and dizziness patients, 24% were grade 3 (severe) compared with 18% of dizziness patients. The most frequently reported problem/item on the DHI for both tinnitus & dizziness and dizziness patients was “quick head movements increase problem” while the least frequently reported problem/item was “afraid to stay home alone.” For the subgroup of dizzy patient respondents that filled out the MAT,[9] 27% of both groups scored as having a diagnosis of migraine.

Physician data (Table 3b) collected on dizziness patients included the provider’s determination of ‘most likely diagnosis’ and audiogram and electronystagmography (ENG) information. The top three ‘most likely diagnoses’ for the tinnitus & dizziness patients were definite Ménière’s disease (38%, n=103), vertiginous migraine (18%), and benign paroxysmal positional vertigo (BPPV) (16%), whereas for dizziness patients, the top three were BPPV (35%), vertiginous migraine (24%), and vestibular neuronitis (24%). When the audiogram was performed, it was reported as “normal hearing” in both ears 20% of the time in tinnitus & dizziness patients and 30% in dizziness patients. When performed, the ENG showed normal caloric function in both ears most of the time and at least a 25% weakness in the clinically affected ear 35% of the time in tinnitus & dizziness patients and 25% in dizziness patients.

DISCUSSION

Summary

The primary objective of the ODC project was to test the research infrastructure through deployment of a descriptive, epidemiologic study on tinnitus and dizziness. The project, now successfully executed and completed, provides the needed proof of concept of the functionality and processes initially adopted in the CHEER community-based research network. The data described here are an important *byproduct* of testing the operational metrics of CHEER. Notwithstanding that the study was not structured for the purpose of reaching a target enrollment or hypothesis testing, the success of this project and the resulting data further advance CHEER’s mission of becoming the national resource for practice-based research in hearing and communicative sciences.

Context in the Literature

Additional credibility for the data itself is apparent when comparing results with those seen in the literature. In a review of epidemiologic studies published on tinnitus from 1993–2003,[10] findings across the literature include: age and sex were not consistently associated with prevalence of tinnitus; hearing loss was consistently associated with tinnitus; bilateral tinnitus was more common than unilateral with left-sided tinnitus typically reported more than right; and clinical risk factors associated with tinnitus included depression. In our data, there was a close to equal split in sex for tinnitus patients and the average age was 54. Our data indicate that normal hearing in both ears only was noted one-fifth of the time, in concert with the findings in the review. Similarly, we also found that bilateral tinnitus was more common (44%) than unilateral and that left-sided tinnitus was reported more often than right-sided (22% vs. 20%). Thirty-eight patients (9%) indicated using antidepressants as a treatment strategy, potentially lending to an association between tinnitus and depression. The review also pointed out the need for larger studies and the need for a more diverse patient population in terms of race and ethnicity. Our patient demographics show some diversity, with 14% of tinnitus patients indicating a race other than Caucasian. The patient demographics for the diseases in this study are consistent with the overall patient demographics at the participating sites. However, for future studies, the incorporation of a more diverse patient population through focused site recruitment is in progress for the CHEER network.

Neuhauser et al[2,3] reported dizziness and vertigo prevalence higher in women than men in the general population. Our study supports this statistic; 71% of our dizziness patients were female, compared with the overall pool of respondents where 61% were female. Bronstein et al[4] reported the considerable impact of dizziness on social and work life. We found this to be true as 39% of dizziness patients reported having more than 10 episodes of vertigo, and 24% had missed more than 10 days of work in the past month. Bronstein found that half of the patients affected by dizziness feel a substantial drop in their efficiency at work, so much so that 25% may give up or change their work as a result. A 2010 report by Hegemann and Palla[11] reviewed recent advances in the field of neurotology, focusing on vestibular tests. They found that while there have been improvements, treatment options are still limited. The ability of the CHEER network to recruit large volumes of patients in a timely fashion across multiple sites could provide the necessary resource to explore treatment options further.

Limitations—Given that the primary goal of the ODC project was to implement and test the processes adopted by the CHEER infrastructure, the data presented here are both limited and robust. Conceptually, we can begin to see and describe disease patterns of tinnitus and dizziness that should be considered in the design of future research efforts. Since this data collection exercise was admittedly not hypothesis-driven by the diseases, we have intentionally avoided database mining and statistical manipulations for correlations or conclusions that might be over interpreted. We only describe the data in this report and propose interesting observations that might lead curious clinician-scientists to collaboratively explore practice-based research networks like CHEER.

Future Work—The power and expediency of the CHEER network in recruiting ample patient sizes across a diverse set of practices and geographic locations is real. In the ODC study, we enrolled 1532 (427 tinnitus; 527 dizziness; 443 both tinnitus & dizziness) patients in 8 months across 16 sites. In contrast to this metric, the development of the THI was based on recruitment of 84 patients in the item development phase and 66 patients in the validation phase across 2 sites.[7] Similarly, in the development of the DHI,[8] the final version of the tool was administered to 106 consecutive patients at one site to demonstrate internal consistency reliability. In a review of randomized controlled trials in tinnitus and dizziness, the vast majority included less than 100 patients and, regardless of sample size, most are single site studies. For comparative effectiveness research, studies aimed at subtyping, profiling, and stratifying patients are a necessary precursor. Additionally, research translation and generalizability is facilitated by involving community sites and diverse populations in research.

The data are also valuable in serving as the foundation for developing research questions and protocols. Questions and future research opportunities could include:

1. What is the inter-association between disability, audiometric information, patient reported-quality of life, and symptoms?
2. How often are first line treatments tried before seeking specialist consultation with hearing examination and evaluation?
3. What are the relevant patient characteristics and exam findings that are most important in subtyping dizziness and/or tinnitus suffers and how might this provide information on fundamental pathophysiology of their disease and effective treatment options?

Further work in patient profiling and subcategorization needs to be a priority to guide development and conduct of future rigorous treatment trials. This is particularly true in the setting of high public health impact disease or disease symptoms that still have unclear etiologies and likely represent a collection of disorders. We must explore the texture of

disease and disease presentations so that treatments are effective and acceptable to health care providers and patients.

The data here are robust in their descriptive and exploratory value, and what they predict can be accomplished in the future with adequate resources and through collaboration of academic medical centers with community partnerships. We believe that engagement and success on this grassroots level are essential to future research efforts and key steps to translating research into practice.

Acknowledgments

We acknowledge all of the CHEER sites and especially the initiative and motivation of the 16 CHEER sites that participated in this study for no compensation but the greater good: Duke University Medical Center (NC); Charlotte Eye, Ear, Nose, & Throat Associates (NC); Low Country ENT (SC); Medical University of South Carolina (SC); Philadelphia Ear, Nose and Throat Associates (PA); Coastal Ear, Nose & Throat (NJ); Ear, Nose & Throat Surgeons of Western New England (MA); University of Michigan (MI); Ear, Nose & Throat Associates, PC (IN); New York Ear and Eye Infirmary (NY); Ear Institute of Chicago (IL); Puget Sound Hearing & Balance (WA); University of Texas Southwestern Medical Center (TX); University of Texas Medical Branch (TX); Oregon Health & Science University (OR); Commonwealth Ear, Nose & Throat (KY).

We also would like to offer a special acknowledgement to Maureen Hannley, PhD. Dr Hannley's intellectual and creative contributions to the development of CHEER have directly contributed to the success of this network.

Funding: Grant number: 5R33DC008632-04; NIDCD R21/R33 Phased Infrastructure Grant for Patient-Oriented Research

References

1. Henry JA, Dennis KC, Schechter MA. General review of tinnitus: prevalence, mechanisms, effects, and management. J Speech Lang Hear Res. 2005; 48:1204–1235. [PubMed: 16411806]
2. Neuhauser HK, Lempert T. Vertigo: epidemiologic aspects. Semin Neurol. 2009; 29:473–481. [PubMed: 19834858]
3. Neuhauser HK, Radtke A, von Brevern M, Lezius F, Feldmann M, Lempert T. Burden of dizziness and vertigo in the community. Arch Intern Med. 2008; 168:2118–2124. [PubMed: 18955641]
4. Bronstein AM, Golding JF, Gresty MA, et al. The social impact of dizziness in London and Siena. J Neurol. 2010; 257:183–190. [PubMed: 19701661]
5. Tucci D, Schulz K, Witsell D. Building a national research network for clinical investigations in otology and neurology. Otol Neuro. 2010; 31:190–195.
6. Witsell D, Schulz K, Moore K, Tucci D. Implementation and testing of research infrastructure for practice-based research in hearing and communication disorders. Otolaryngol Head Neck Surg. In press.
7. Newman CW, Jacobson GP, Spitzer JP. Development of the Tinnitus Handicap Inventory. Arch Otolaryngol Head Neck Surg. 1996; 122:143–148. [PubMed: 8630207]
8. Jacobson GP, Newman CW. The development of the Dizziness Handicap Inventory. Arch Otolaryngol Head Neck Surg. 1990; 116:424–427. [PubMed: 2317323]
9. Marcus DA, Kapelweski C, Jacob RG, Rudy TE, Furman JM. Validation of a brief nurse-administered migraine assessment. Headache. 2004; 44:328–332. [PubMed: 15109357]
10. Sanchez L. The epidemiology of tinnitus. Audiol Med. 2004; 2:8–17.
11. Hegemann SC, Palla A. New methods for diagnosis and treatment of vestibular diseases. F1000 Med Rep. 2010; 2:60. [PubMed: 21173877]

Table 1

Site and patient characteristics

	[Patient Reported] What is the *main* concern today? Evaluation/treatment of:				
	Both Tinnitus and Dizziness	**Tinnitus**	**Dizziness**	**No Response**	**Grand Total**
Patients enrolled, no.	443	427	527	135	1532
CHEER sites enrolling, no.	16	16	15	11	16
CHEER sites enrolling (no. enrolling/no. of active trained sites or 22 sites), %	73	73	68	50	73
States represented, no.	13	13	12	11	13
Average patients enrolled per site, no.	27.7	26.7	35.1	12.3	95.8
Min. patients per site, no.	1	1	2	1	1
Max. patients per site, no.	80	87	100	31	264
Median patients per site, no.	17	14.5	26	4	64.5
Demographics—characteristics (patient reported)					
Main concern for visit (respondents), %	29	28	34	9	100
Female, %	60	51	71	58	61
Average age, yrs	54.6	54.3	53.9	55.8	54.6
Race/Ethnicity, %					
Caucasian	86	86	84	76	84
African American	6	6	7	4	7
Asian	2	3	4	4	3
American Indian or Alaskan Native	1	4	1	0	1
Other	4	4	2	4	3
Hispanic	6	5	4	75	5
Married, %	64	65	65	66	65
Living with spouse or partner, %	70	70	69	70	69
Employed full-time, %	46	56	45	47	49
On disability, %	10	5	8	4	8
Prior neck injury, %	8.8	2.3	4.0	4.2	4.9
Prior brain injury, %	6.3	1.6	2.9	4.2	3.6
Prior motor vehicle accident, %	9.7	1.9	4.6	5.0	5.4

Otolaryngol Head Neck Surg. Author manuscript; available in PMC 2013 April 30.

	[Patient Reported] What is the *main* concern today? Evaluation/treatment of:				
	Both Tinnitus and Dizziness	**Tinnitus**	**Dizziness**	**No Response**	**Grand Total**
Current treatment, %					
Dialysis	0.9	0.2	0.0	0.0	0.3
Chemotherapy	1.8	0.7	1.0	0.8	1.2
Alternative or herbal medications	5.9	3.3	4.6	0.8	4.2

Table 2

a. Tinnitus profile*

Tinnitus related questions (patient reported)	[Patiet Reported] What is the *main* concern today?	
	Both Tinnitus and Dizziness	**Tinnitus**
Tinnitus began >6 mos ago, no./total no. (%)	336/440 (76)	287/420 (68)
Tinnitus affects, no. (%)		
Left ear	94 (22)	92 (22)
Right ear	102 (23)	85 (20)
Both	161 (37)	186 (44)
Unsure/varies	63 (14)	46 (11)
Did not respond	18 (4)	12 (4)
Uses hearing aid, no. (%)	44 (10)	29 (7)
Tinnitus bother, no. (%)		
Not much of a problem	83 (20)	104 (25)
Is a problem only on certain days	144 (34)	139 (34)
Extremely bothered, but can carry out normal activities of daily living	131 (31)	142 (34)
Extremely bothered to the extent that symptoms affect life greatly	63 (15)	29 (7)
Patient has tried the following strategies and found them helpful (always or sometimes), helpful n/tried strategy n (%)		
Antidepressants	33/52 (63)	19/38 (50)
Anti-anxiety	45/52 (87)	20/37 (54)
Other medications	65/74 (87)	21/54 (39)
Acupuncture	7/20 (35)	7/23 (30)
Amplication (HA)	20/25 (80)	15/24 (63)
Background sound	56/63 (89)	57/67 (85)
Caffeine avoidance	45/71 (63)	16/41 (39)
Neuromonics	1/1 (100)	3/3 (100)
TRT	3/3 (100)	5/5 (100)
Biofeedback	0/5 (0)	0/2 (0)
Yoga	33/47 (70)	17/36 (47)
TMJ treatment	6/8 (75)	1/5 (20)
Tinnitus Handicap Inventory (THI)		
THI score respondents, no. (%)	437 (99)	424 (99)
Average of THI score, no. ±SD	36.5±26.0	28.6±22.7
Average of THI grade	2 (mild)	2 (mild)
Grade 1 (0–16 or slight), %	29	39
Grade 2 (18–36 or mild), %	29	31
Grade 3 (38–56 or moderate), %	19	18
Grade 4 (58–76 or severe), %	13	7
Grade 5 (78–100 or catastrophic), %	9	5
THI top 5 most frequently reported problems/questions (ranked by score—yes/sometimes total)		

a. Tinnitus profile*

Tinnitus related questions (patient reported)	[Patiet Reported] What is the *main* concern today?	
	Both Tinnitus and Dizziness	Tinnitus
Feel no control over tinnitus	1	1
Loudness makes it difficult to hear others	2	4
Cannot escape tinnitus	3	2
Feel frustrated because of tinnitus	4	3
Tinnitus worsens when under stress		5
Difficulty concentrating because of tinnitus	5	
THI top 3 least frequently reported problems/questions		
Desperate because of your tinnitus	1	1
Feel like you can no longer cope with your tinnitus	2	
Tinnitus makes you confused		3
Tinnitus makes you feel insecure	3	2

b. Provider data—tinnitus

	[Patient Reported] What is the *main* concern today?	
	Both Tinnitus and Dizziness	Tinnitus
Provider determined tinnitus to be		
Subjective, no./total no. (% of evaluated patients)	297/305 (97)	373/398 (94)
Objective, no./total no. (% of evaluated patients)	8/305 (3)	25/398 (6)
Provider reported data: For patients primarily being seen for tinnitus		
Audiogram information provided, no.	324	410
Audiogram not done, %	7	8
Audiogram done—showed normal hearing in both ears, %	21	19
Audiogram done and showed, no.	234	300

* Patients were allowed to skip questions which results in changing denominators by question and throughout the survey.

Table 3

a. Dizziness profile*

Dizziness related questions	[Patient Reported] What is the *main* concern today?	
	Both Tinnitus and Dizziness	Dizziness
Severe spinning/vertigo (if NO, stop questionnaire), no. (%)	351 (85)	407 (82)
Most vertigo symptoms when move head/body a certain way	201 (59)	276 (67)
Most vertigo symptoms occur spontaneously	272 (77)	252 (62)
Have had more than 1 episode of severe spinning	330 (92)	374 (90)
Dizziness symptoms last		
<5 minutes	105 (30)	157 (38)
20 minutes to 2–3 hours	124 (35)	99 (24)
Hours to days	122 (35)	157 (38)
Number of vertigo episodes in last year		
1	28 (10)	31 (11)
2	26 (10)	32 (12)
3–10	80 (29)	92 (34)
>10	138 (51)	117 (43)
Number of vertigo episodes in past 6 months		
1	19 (9)	31 (14)
2	28 (13)	33 (14)
3–10	82 (37)	60 (26)
>10	94 (42)	105 (46)
Number of vertigo episodes in past month		
1	41 (20)	50 (20)
2	33 (16)	33 (13)
3–10	80 (38)	69 (28)
>10	54 (26)	98 (39)
Number of days missed work in last year		
1	29 (15)	33 (19)
2	26 (13)	25 (14)
3–10	70 (36)	63 (36)
>10	70 (36)	56 (32)
Number of days missed work in past 6 months		
1	23 (16)	31 (20)
2	29 (20)	24 (16)
3–10	52 (35)	53 (35)
>10	44 (30)	44 (29)
Number of days missed work in past month		
1	38 (29)	44 (27)
2	27 (20)	26 (16)

a. Dizziness profile*

Dizziness related questions	[Patient Reported] What is the *main* concern today?	
	Both Tinnitus and Dizziness	Dizziness
3–10	36 (27)	54 (33)
>10	31 (23)	39 (24)
Symptoms of vertigo typically associated with (all that apply)		
Hearing loss in 1 ear only	157 (35)	69 (13)
Fullness or pressure in 1 ear only	207 (47)	102 (19)
Tinnitus or ringing in 1 ear/predominately	241 (54)	75 (14)
Headache or head pain	178 (40)	169 (32)
Light sensitivity	145 (33)	131 (25)
None of the above	32 (7)	105 (20)
Neck pain or recent neck injury?	142 (40)	126 (31)
Currently have or previously had headaches diagnosed as migraine?	147 (41)	133 (31)
Anyone in immediate family with diagnosis of migraine?	136 (38)	155 (37)
Dizziness Handicap Inventory (DHI)		
DHI score respondents, no. (%)	420 (95)	514 (98)
Average of DHI score ±SD	41.7±26.1	40.0±21.6
Average of DHI score (Grade/Whitney)	2 (moderate)	2 (moderate)
Grade 1 (0–30 or mild), %	40	38
Grade 2 (31–60 or moderate), %	35	43
Grade 3 (61–100 or severe), %	24	18
DHI top 3 most frequently reported problems/questions (ranked by score: yes/sometimes total)		
Quick head movements increase problem	1	1
Feel frustrated because of problem	2	2
Performing more ambitious activities (e.g., sports, household chores, etc.) increases problem		3
Bending over increases problem	3	
DHI top 3 least frequently reported problems/questions		
Afraid to stay home alone	1	1
Afraid people will think you are intoxicated		2
Afraid to leave home unaccompanied	2	3
Difficult to go to work by oneself	3	
Migraine Assessment Tool (MAT)—Diagnosis of migraine (based on tool)		
Patients with migraine, no. migraine diagnoses/no. filled out MAT (%)	33/124 (27)	35/132 (27)

b. Provider data—dizziness (remove PTA SRT no. data)

Provider reported data: For patients primarily being seen for dizziness	[Patient Reported] What is the *main* concern today?	
	Both Tinnitus and Dizziness	Dizziness
Audiogram information provided (categories below), no.	373	510
Audiogram not done, %	9	22

b. Provider data—dizziness (remove PTA SRT no. data)

Provider reported data: For patients primarily being seen for dizziness	**[Patient Reported] What is the *main* concern today?**	
	Both Tinnitus and Dizziness	**Dizziness**
Audiogram done—showed normal hearing in both ears, %	20	30
Audiogram done and showed, no.	265	244
PTA right ear, no.	260	244
SRT right ear, no.	258	243
PTA left ear, no.	260	244
SRT left ear, no.	258	241
ENG data, no. (%)		
Was not done	192 (54)	275 (56)
Was done and showed normal cal fx in both ears	107 (30)	162 (33)
Was done and showed at least 25% weakness in clinically affected ear	58 (16)	55 (11)
Most likely diagnosis, no. (%)		
BPPV	44 (16)	128 (35)
Vestibular neuronitis	34 (12)	90 (24)
Definite Ménière‘s disease	103 (38)	34 (9)
Probable Ménière‘s disease	40 (15)	25 (7)
Otosyphillis, Cogan‘s syndrome, or AHL	3 (1)	3 (0.8)
Vertiginious migraine	50 (18)	89 (24)

* Patients were allowed to skip questions which results in changing denominators by question and throughout the survey.