Management Of Dizziness In Primary Care

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Background: **We sought to determine the types of dizziness problems that are commonly seen in primary care practices, and to bring to light clinical and demographic factors that predict management decisions.**

Methods: **We undertook a prospective cohort study with a 6-month follow-up using data gathered in nine primary care practices in two North Carolina counties. Subjects were 144 dizziness patients examined by primary care physicians. Data collected included demographic characteristics, a standardized dizziness history, physician estimation of symptom severity and diagnostic certainty, and physician "worry" about arrhythmia, transient ischemic attack, and brain tumor. Physicians reported their management decisions and diagnosis (or differential diagnosis) by responding to a questionnaire after completing the patient encounter. A 6-month follow-up chart review and physician interview were completed on 140 patients (97.2 percent); information obtained included changes in diagnosis and patient mortality.**

Results: **The most common diagnoses were labyrinthitis, otitis media, benign positional vertigo, unspecified presyncope, sinusitis, and transient ischemic attack. The initial diagnosis changed during the 6-month follow-up period in 34 (24.3 percent) of patients. The overall course of these patients was benign, however, with only one death occurring during the 6-month follow-up period.**

Patients' dizziness tended to be managed using a combination of strategies, including office laboratory testing (33.6 percent), advanced testing (11.4 percent), referral to a specialist (9.3 percent), medication (61.3 percent), observation (71.8 percent), reassurance (41.6 percent), and behavioral recommendations (15.0 percent). Office laboratory testing was associated with younger patient age, a suspected metabolic or endocrine disorder, and physician worry about a cardiac arrhythmia; advanced laboratory testing was associated with suspected cardiovascular or neurologic disorders. Medication tended to be prescribed for vertigo and severe symptoms and avoided when physicians were worried about a cardiac arrhythmia. Referral to a specialist was associated with suspected neurologic disease. Observation, behavior change, and reassurance were avoided in patients with poorly defined dizziness and tended to be used in older patients. The management approaches employed by the 4 physicians who referred the most subjects to the study varied considerably.

Conclusions: **Dizziness in primary care represents an extremely broad spectrum of diagnoses. The generally conservative management approach of primary care physicians in this study is consistent with basic clinical and epidemiologic principles, and patient mortality with this approach is low. (J Am Board Fam Pract 1994; 7:1-8.)**

Dizziness is a common problem in primary care, accounting for 2 percent of all office visits.[1-5] A symptom that often represents a self-limited or benign condition, dizziness is also considered a marker for worrisome underlying problems. It could represent disease of many different organ systems, and its cause can be quite difficult to diagnose.[6] Optimal care for such patients is made particularly difficult because of a lack of epidemiologic data from primary care settings on the number and type of dizziness problems seen, their prognoses, the sensitivity and specificity of common tests, and the risk-benefit ratio of specific management strategies.[2,5,7] Balancing the need for making a specific diagnosis with the risks of overtesting and overtreatment constitutes a major challenge for the primary care physician.

Although most patients with dizziness are seen in primary care settings,[1] the current medical lit-

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erature on dizziness is composed largely of reports and recommendations from subspecialty clinics, whose experiences might not be applicable in primary care.[5,8-11] By examining the management of dizziness in patients in primary care settings, we can improve our understanding of how dizziness is managed, including the factors influencing decision making and the validity of decisions rendered. Epidemiologic techniques provide a useful tool for building such empiric models of dizziness management in primary care. Patient and physician demographics, the type of dizziness complaint (i.e., vertigo), symptom severity, suspected underlying cause, and diagnostic certainty might all be important factors in the decision to observe, test, give medication, or refer. Such information can provide a valuable supplement to theoretical models of decision making in primary care.[12-14]

In this study we describe the management decisions observed in a cohort of 144 patients with dizziness in nine primary care practices. We report those patient-specific factors that are associated with each of five patient management strategies (basic laboratory testing, advanced testing, prescribing of medication, referral, and other), using univariable and multivariable analytic techniques and controlling for unmeasured physician factors. In addition, we describe the epidemiologic characteristics of our cohort members, including the number and type of dizziness problems seen and their prognoses after 6 months of follow-up care.

Methods

The Primary Care Dizziness (PCD) Study is a study of the epidemiology and natural history of dizziness in primary care. Data collection occurred in two phases. The first phase, funded by a pilot grant from the National Institute on Aging, recruited 36 subjects aged 60 years and older. The second data collection phase, funded by the American Academy of Physicians Foundation, enrolled an additional 108 adults aged 18 years and older. Thus, the total study sample of 144 individuals oversampled the elderly population. Subjects were enrolled by office practices in two North Carolina counties. One county had a relatively high proportion of upper middle-class, educated persons; the other was predominantly rural and less affluent. Within these counties, nine primary care practices referred consecutive eligible consenting patients to the study. Referral sites included four family medicine group practices, one internal medicine group practice, one university family practice center, one solo general internist, one solo family physician, and one county hospital emergency department.

Dizziness was defined as a subjective complaint including at least one of the following: a sensation of motion (vertigo), a feeling of imbalance, a sensation of impending faint, and vague lightheadedness and related sensations ("other" dizziness).[9,15,16] Subjects were enrolled who sought care during January–June or August–October 1991 with dizziness as either the chief complaint or part of a symptom complex that represented the principal reason for the visit. Subjects could be enrolled who had been previously seen for the same dizziness problem as long as they had not previously been enrolled.

Data were gathered using a subject questionnaire, a physician questionnaire, and a 6-month follow-up chart review and physician interview. The subject questionnaire included a history of the dizziness complaint, background medical and functional status data, and a psychological profile. The standardized dizziness history included questions about the character of the symptoms (e.g., spinning, a feeling of being about to faint, imbalance, or other), symptom severity, the episodic or continuous nature of the complaint, and symptom duration.

The single-page physician questionnaire was completed by the examining physician at the end of the enrollment visit. It included the physician's primary diagnosis; diagnostic certainty (on a scale from 0 to 100); assessment of the severity of symptoms; how worried the physician was about a brain tumor, a cardiac arrhythmia, and a transient ischemic attack; and a checklist of management strategies. Among the management strategies included in the checklist were tests ordered, medications prescribed, referrals made, observation, behavioral change, and reassurance. The physician's primary diagnosis was assigned an ICD-9 code[17] and placed in one of the following categories: otologic, cardiovascular, psychiatric, neurologic, infectious, metabolic or endocrine, and other.

The 6-month chart review and physician interviews were conducted by a research assistant who sought to verify or amend the initial diagnosis and

to assess whether any relevant interval events had occurred. Subsequently, the primary physician was asked to assign a final diagnosis based on available interval information.

Data were double entered, verified, and cleaned using a standard microcomputer data entry package.[18] Next, an empiric decision-making model for each of the four management strategies was developed as follows[19]: (1) The univariable or unadjusted odds ratio (OR) between each patient characteristic or predictor variable (e.g., dizziness severity) and the decision of interest or outcome (e.g., giving medication) was determined. (2) The association between each predictor and the outcome was then stratified by all other strong predictors ($OR > 2$) to look for effect modification and confounding. (3) Using this information as a guide, a "full" predictive logistic regression model of the outcome variable was developed by including all factors that had large (> 2.0 or < 0.5) or statistically significant ($P < 0.1$) odds ratios. (4) A succinct logistic regression model was built to include only those factors that were statistically significant ($P < 0.05$) after adjusting for age and sex. Throughout the process, the size and direction of important odds ratios were examined for consistency and stability.

Physician-specific predictors (e.g., specialty, practice style) were not included in any of the models, largely because most participating physicians referred only a few patients to the study. These effects, however, might be important confounders of some observed associations, as might happen, for example, if one physician frequently gave medication to all patients with dizziness, regardless of the type of dizziness or severity of symptoms. Consequently, our final models were corrected for unmeasured physician effects using dummy variables for each of the four physicians who referred more than 10 patients to the study. All other physicians were grouped together as the reference category.

Results

Subject Enrollment

During the data collection period, 144 patients were considered to be eligible for the study. Information on age, sex, and race and the physician's initial diagnosis were obtained for 142 patients (98.6 percent). Completed physician questionnaires were obtained for 137 patients (96.5 percent), and 117 subjects (82.4 percent) filled out and returned the patient questionnaire. Of the 27 subjects with uncompleted patient questionnaires, 14 failed to return a questionnaire, 7 refused to participate in this portion of the study, and 6 were lost to follow-up. Nonrespondents did not differ significantly from respondents by sex or race; however, they were more likely (76.0 percent versus 33.0 percent) to be less than 60 years old ($P < 0.01$). Six-month follow-up chart review and final diagnosis were obtained for 140 subjects (97.2 percent).

Although 45 physicians referred patients to the study, 54 (38 percent) subjects were referred by 4 physicians. These 54 patients did not differ significantly from the remainder of the study population by either age, sex, or race.

Subject Characteristics and Diagnoses

The characteristics of study subjects are summarized in Table 1. The mean age was 58.6 years (range 17–90 years). The majority were white women. Most subjects described more than one specific type of dizziness sensation (e.g., spinning, feeling about to faint, or imbalance) when characterizing their symptoms. More than 80 percent of the patients reported that their dizziness occurred in discrete attacks.

Sensations described as other and chronic dizziness symptoms were more common among the elderly than among the young. Atypical or diffi-

Table 1. Characteristics of the 142 Study Subjects.

Characteristic	Percent of Study Subjects
Age (years)	
> 60	59.2
< 60	40.8
Sex	
Women	71.8
Men	28.2
Race	
White	82.3
Nonwhite	17.7
Dizziness sensations	
Spinning (vertigo)	56.4
Near-syncope	45.7
Imbalance	77.8
Swimmy or vague lightheadedness	78.6
Other	35.0
Dizziness in distinct attacks	81.2
Continuous dizziness	18.8
Symptom duration > 3 months	51.3
Symptom duration < 3 months	48.7

cult-to-describe symptoms, such as pressure in the head, "muddled brain," or "giddy-headed" feelings, were much more common in the older patients than in the younger patients (46.2 percent versus 12.8 percent, $P < 0.001$). Less than one-third (30.8 percent) of young subjects reported dizziness problems of more than 3 months' duration; more than one-half (51.3 percent) had experienced dizziness for less than 1 month. By contrast, the elderly tended to have more chronic dizziness, with 47.6 percent reporting dizziness persisting 1 year or more ($P = 0.002$). Twelve elderly subjects (15.4 percent) reported dizziness problems lasting more than 10 years.

Initial and final diagnoses, by diagnostic category, are presented in Table 2. The most common final diagnoses (Table 3) were labyrinthitis (32 patients), acute or chronic (including serous) otitis media (7 patients), benign positional vertigo (10 patients), unspecified presyncope (7 patients), sinusitis (7 patients), and transient ischemic attack (7 patients). There were 48 different final diagnoses listed by the referring physicians. Although more than 50 percent of the patients reported symptoms of vertigo, physicians cited otologic problems as the principal diagnosis in only one-third of the subjects. Suspected cardiovascular and neurologic causes of dizziness were significantly more common among patients more than 60 years old, whereas psychiatric and infectious causes were more common in the younger patients ($P = 0.02$, chi-square test).

At the 6-month follow-up chart review, only 1 of the 140 patients had died; that patient was an elderly man with various chronic conditions.

Table 2. Most Common Initial and Final Diagnoses by Category.

Diagnostic Category	Number of Patients	
	With Initial Diagnosis (n = 142)	With Final Diagnosis (n = 140)
Otologic	47	45
Cardiovascular	26	21
Psychiatric	16	19
Neurologic	14	16
Infectious	25	21
Metabolic or endocrine	7	9
Other	7	9

Table 3. Most Common Final Diagnoses within Diagnostic Categories.

Diagnostic Category	Most Common Final Diagnoses	No. of Cases
Otologic	Labyrinthitis	32
	Benign positional vertigo	10
Cardiovascular	Presyncope	7
	Hypertension	3
Psychiatric	Anxiety	8
	Hyperventilation	3
Neurologic	Transient ischemic attack	7
Infectious	Otitis media	7
	Sinusitis	7
Metabolic or endocrine	Anemia	3
	Dehydration	2
Other	Drug toxicity	6

Thirty-four (24.3 percent) of the patients, however, were assigned new diagnoses, and 29 (85.5 percent) of these were in a different diagnostic category than was the initial diagnosis. The initially assigned categories with the highest percentage of new diagnoses were otologic (21.3 percent), cardiovascular (42.3 percent), and infectious (32.0 percent), whereas the category with the lowest percentage was psychiatric (6.3 percent); these differences were not statistically significant ($P = 0.14$, chi-square test for all categories). The 34 cases with a new diagnosis included many treatable but not life-threatening diagnoses, such as peripheral vestibular problems (n = 8), anxiety or depression (n = 4), sinusitis or otitis media (n = 3), hypertension (n = 1), and diabetes mellitus (n = 1). These 34 subjects did not differ by age, sex, race, symptom severity, or physician worry scores when compared with the rest of the cohort. For patients with a new diagnosis at follow-up, however, physicians had lower diagnostic certainty scores (66.3 versus 74.3) on initial evaluation than they did for the other subjects ($P = 0.05$, Wilcoxon rank-sum test).

Despite the lack of dizziness-related mortality during the follow-up period, 6 patients with new diagnoses had a potentially serious underlying cause of their dizziness symptoms. Five of these 6 subjects had cardiovascular disorders, (3 had transient ischemic attacks, 1 had a stroke, and 1 had congestive heart failure). The 6th subject, who subsequently had an acoustic neuroma diagnosed, was initially considered to have a psychiatric cause of dizziness. These 6 subjects did not

differ by sex, race, symptom severity, or physician worry scores from the rest of the cohort. As did the entire group of subjects with new diagnoses, these 6 subjects tended to have lower physician diagnostic certainty scores (62.5 versus 72.8, $P = 0.09$, Wilcoxon rank-sum test) than other subjects in the study. In addition, all five new cardiovascular diagnoses occurred in patients older than 60 years ($P = 0.08$, Fisher exact test).

Physician Diagnostic Certainty and Worry

The mean physician diagnostic certainty score (on a scale from 0 to 100 percent certain) was 72.3 (standard deviation 19.2). The mean physician estimate of the severity of patient dizziness, rated on a scale of 1 (not at all severe) to 5 (very severe) was 2.76 (standard deviation 1.02). Physician worry scores were all skewed toward the low end of the distribution; the mean, reported on a scale ranging from 1 (not at all) to 5 (very worried) was 1.65 for arrhythmia, 1.38 for brain tumor, 1.65 for transient ischemic attack, and 3.10 for an inner ear disorder. Notably, no physician reported a score greater than 3 for worry about brain tumor (although 1 patient subsequently had a brain tumor diagnosed).

Physician diagnostic certainty after the initial visit varied significantly by patient race and by worry variables; higher diagnostic certainty was seen in whites and in patients for whom worry about arrhythmia, brain tumor, and transient ischemic attack was low (Table 4). There was no difference when certainty was stratified by age, sex, or symptom subtype. Physician worry about arrhythmias ($P = 0.002$) and transient ischemic attacks ($P < 0.001$) was significantly greater for patients aged 60 years and older; worry about a brain tumor was similar in both age groups. Additionally, worry about brain tumor also was associated with a higher symptom severity score ($P = 0.04$).

Table 4. Factors Significantly Associated with Physician Diagnostic Uncertainty.

Factor	Reported Physician Diagnostic Certainty Percent ± SD	P*
Patient race		
White	74.1±18.4	0.015
Nonwhite	63.6±20.4	
Physician worry about arrhythmia		
Score ≥ 2	67.3±18.8	0.002
Score < 2	76.4±18.7	
Physician worry about brain tumor		
Score ≥ 2	66.7±18.4	0.003
Score < 2	75.3±19.1	
Physician worry about transient ischemic attack		
Score ≥ 2	67.5±18.8	0.003
Score < 2	75.4±19.0	

*Wilcoxon rank-sum test.

Four physicians entered more than 10 patients into the study; there were significant differences in the symptom severity scores among the 4 physicians, and the mean diagnostic certainty scores had considerable, although nonsignificant, variation. The differences in physician worry scores were of borderline statistical significance, with the mean scores varying by 0.5 to 0.7 points. The patients seen by these 4 physicians were similar with respect to age, race, sex, duration and type of symptoms, and whether the dizziness occurred in discrete attacks; however, the distribution of patients by diagnostic subgroup differed significantly among the physicians ($P = 0.03$, chi-square test). One physician referred mostly patients with suspected cardiovascular disorders, whereas the other 3 tended to refer patients with otologic and infectious problems.

Management Decisions

Most referring physicians used a combination of management strategies. A total of 76.8 percent of patients received office laboratory testing (33.6 percent), advanced testing (11.4 percent), a medication prescription (61.3 percent), or referral to a specialist (9.3 percent). Physicians reported the intent to order 21 advanced tests (7 computerized tomographic or magnetic resonance imaging studies of the head, 7 cardiac monitoring studies, 2 echocardiograms, 1 vertebral Doppler study, 1 electronystagmogram, 1 venous Doppler study, and 2 formal audiometric tests) on 16 (11.4 percent) patients. Only 23.2 percent of the patients were cared for without laboratory testing, medication, or referral (i.e., "other" strategies only), but physicians reported relying on observation in a total of 71.8 percent of patients, reassurance in 41.6 percent, and recommending a behavioral change in 15.0 percent.

The regression models for the five different management strategies (ordering basic laboratory tests, ordering advanced tests, giving a medication, referral to a specialist, and other) are presented in Table 5. Patient age was a strong predic-

tor for performing office laboratory tests; however, it was the younger patients who were more likely to undergo testing. A suspected primary diagnosis of a metabolic or endocrine problem and worry about a cardiac arrhythmia were also associated with office laboratory testing. Advanced testing was significantly related to a suspected cardiovascular or neurologic cause of the dizziness. Prescription of a medication for dizziness was associated with symptoms of vertigo and with discrete attacks of dizziness; meclizine was the most common drug prescribed. Physicians were less likely to prescribe a medication when they were worried about a cardiac arrhythmia as the cause of the patient's dizziness. Referral was associated with a suspected neurologic cause of dizziness. Other strategies (observation, behavioral change, and reassurance) were least likely to be used for patients who had poorly defined dizziness.

The regression model also suggested, after correcting for age, sex, and other predictors, that each of the 4 physicians who entered the most subjects to the study had management approaches that differed from the reference group. Three physicians prescribed medications significantly more often (for 2 physicians, OR = 21.5, 95 percent CI 2.47–186.7; for the other, OR = 14.7, 95 percent CI 1.36–161.3). The fourth prescribed medication significantly less frequently (OR = 0.20, 95 percent CI 0.04–0.95). There were no significant differences among the 4 physicians with regard to ordering office laboratory tests, and the small number of referrals (n = 13) prevented meaningful separation of physician-specific effects.

Discussion

This study demonstrates the broad spectrum of problems that can present with dizziness in primary care offices: 144 patients represented 46 different diagnoses. It also confirms what other studies[20-22] have reported and what most primary care clinicians already know: most patients with dizziness will not die within the immediate follow-up period, even if the correct diagnosis is not determined at the time of initial presentation. Thus, because dizziness in primary care very rarely represents a life-threatening problem, conservative management strategies including observation are probably often appropriate, as they will protect the patient from the detrimental effects of unnecessary medical services.[23] The concern, of course, is knowing which patient will be the rare one suffering from dizziness caused by a serious underlying disorder; in such a patient, diagnostic delay might be life-threatening or lead to avoidable morbidity.

The primary care physicians in this study appeared to individualize their diagnostic and management approaches based primarily on the suspected diagnosis, worry about certain life-threatening diseases, the character of the patient's dizziness, and the patient's age. They also demonstrated a very active process of revising their diagnoses without deleterious effects on patient mortality. While appropriately concerned about potentially life-threatening problems (as seen in the worry scores), these clinicians tended to rely on observation and medication prescription as primary management strategies, reflecting the

Table 5. Factors Predicting Physician Management Strategies: Results of Multivariable Logistic Regression.

Management Strategy	Significant Predictors	Odds Ratio* (95% Confidence Interval)
Office laboratory testing	Age > 60 years	0.39 (0.16–0.94)
	Suspected metabolic or endocrine cause	18.42 (1.82–185.9)
	Worry about arrhythmia	2.64 (1.08–6.45)
Advanced testing†	Suspected cardiovascular cause	10.38 (2.47–43.7)
	Suspected neurologic cause	10.33 (2.13–50.1)
Medication prescription	Patient describes rotatory dizziness (dizziness type = vertigo)	3.24 (1.21–8.73)
	Worry about arrhythmia	0.24 (0.08–0.70)
	Dizziness occurs in discrete attacks	4.16 (1.04–16.6)
Referral to a specialist	Suspected neurologic cause	5.12 (1.27–20.6)
Other‡	Patient describes lightheadedness (dizziness type = other)	0.26 (0.08–0.87)

*All odds ratios adjusted for age, sex, and other variables in the final model and for "unmeasured" physician variation.

†Defined as intent to order tests that are not routinely available in most primary care offices, such as ambultory heart monitoring and computerized tomographic studies of the head.

‡Other management strategies included observation, recommendations for behavioral change, and reassurance.

overall good prognosis of patients with dizziness. Both advanced tests and referrals to specialists, however, were ordered for approximately 10 percent of patients. Given the large number of primary care patients with dizziness,[1] the annual cost of such evaluations is sizable. Studies of other symptoms have indicated that physicians overestimate the probability of serious diagnoses[24-26]; thus, it is possible that advanced testing and referral are overutilized.

Is the management style displayed by the clinicians in this study safe and appropriate? Certainly, no management style, no matter how aggressive, will pick up all cases of "bad" dizziness at the time of initial patient contact. Our data, however, support the notion that there is essentially no mortality from delayed diagnoses in the primary care setting in spite of an active process of revision of diagnoses during the first 6 months of care. Unfortunately, this study did not gather systematic data about interval morbidity resulting from delayed diagnosis; in all likelihood, there was some. Furthermore, we did not attempt to validate the primary physician's diagnoses through use of an external reference standard, as did Kroenke, et al.[27] in their study of chronic dizziness in ambulatory care. To do so would have lowered subject recruitment rates (reducing study generalizability), interfered considerably with the care rendered by the participating practices, and possibly introduced investigator bias, issues that we sought to avoid in this preliminary, largely descriptive study.[28]

The assessment and management displayed by these primary care physicians are consistent with basic clinical and epidemiologic principles. For example, physicians tended to have low worry scores about relatively rare causes of dizziness, such as brain tumors, and to demonstrate increased worry with increasing patient age about conditions that are known to become more common with age (e.g., transient ischemic attacks). Likewise, the clinicians reported more worry about serious underlying causes of dizziness when their diagnostic certainty was lower. Physicians tended to treat conservatively the more classic symptoms of vertigo, which often have self-limited causes, and to conduct more investigations when a neurologic or cardiologic diagnosis was suspected.

Of note is that our empiric models failed to detect a symptom subtype as the principal determinant of decision making. Traditionally, the description of dizziness as vertigo, presyncopal lightheadedness, imbalance, or other is believed to be the cornerstone of decision making for this symptom, providing the major key to placing patients into groups for diagnosis and management.[8,16,29] In our empiric models, however, subjective physician factors, such as worry and diagnostic uncertainty, were stronger predictors of decision making than the patient's description of symptoms, perhaps in part because classical descriptions of dizziness symptoms are rare, particularly in the elderly.[30]

The level of diagnostic certainty might have a role in the risk assessment of patients with dizziness. Classically, age is the only risk factor associated with subsequent cardiovascular events.[2,8,20-22] In our data physicians had significantly lower initial diagnostic certainty scores for all patients who had revised diagnoses at follow-up — including the 6 with cardiovascular causes of dizziness — than the other members of the cohort. Low diagnostic certainty could represent a warning for clinicians evaluating dizziness in patients in this setting.

Finally, we noted a great amount of physician-specific variation in patient assessment and symptom management among the 4 physicians who referred 10 or more patients. Estimates of dizziness severity were significantly different, and the 4 high-referral physicians showed strong individual variation in prescribing medications for dizziness. Despite the lack of statistical significance for some other physician-specific characteristics, the wide variability seen among so few patients (n = 54) suggests that the problem might simply be a lack of statistical power. The reason for some of these physician-specific differences cannot be assessed from our data; one can only speculate as to their cause and clinical importance.

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