

Which Primary Care Patients With Dizziness Will Develop Persistent Impairment?

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Objective: To determine which factors identifiable during an office visit for dizziness predict chronic impairment from dizziness 3 months later.

Design: A prospective cohort study with 3-month telephone follow-up.

Setting: Nine primary care office practices in North Carolina.

Subjects: 117 adults who presented to primary care practices because of dizziness.

Outcome Measures: Our outcome of interest, restriction of daily activities due to dizziness 3 months after the enrollment visit, was characterized using three different but correlated self-reported measures. Independent analytic models tested the relationship between demographic variables, health status, psychological state, and dizziness characteristics at baseline and our three measures of activity restriction due to dizziness.

Results: A two-stage logistic regression analysis identified the following baseline characteristics to be independent predictors in one or more models of activity-limiting dizziness at 3 months: dependency in instrumental activities of daily living (odds ratio [OR]=11.1, $P=.002$); a high anxiety score (OR=5.7, $P=.003$); self-rating of health as fair or poor (OR=3.2, $P=.042$); the presence of three or more chronic conditions (OR=1.9, $P=.022$); interference from chronic conditions (OR=1.7, $P=.012$); dizziness duration of greater than 1 year (OR=20.9, $P<.001$); frequent dizziness (OR=4.3, $P=.016$); subjective imbalance (OR=4.7, $P=.012$); and activity limitation due to dizziness (OR=11.7, $P<.001$).

Conclusion: To estimate the prognosis and clinical significance of dizziness complaints, primary care physicians should take into account not only the characteristics of the patient's dizziness but also the patient's baseline health status and psychological state.

(*Arch Fam Med.* 1993;2:847-852)

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DIZZINESS, a common complaint among patients seen in primary care,¹ is one of the most "subjective, nonspecific, challenging, and frustrating symptoms."² Because dizziness cannot be measured, the physician must rely on patient self-report, and such subjective descriptions are of limited diagnostic value.³⁻⁷ In part, this is because dizziness often involves several different and overlapping sensations and may be caused by any of a wide spectrum of diseases, ranging from benign, self-limited conditions to potentially serious conditions.⁸ Given the vague nature of the symptoms and the many possible diagnoses, dizziness presents a significant challenge to physicians. Between 9% and 37% of patients go undiag-

nosed.⁸⁻¹¹ Furthermore, identifying a diagnosis does not guarantee that a treatment or cure exists; it simply means that the underlying problem has been labeled and that, in some cases, palliative measures can be identified.

Considerable literature exists on making a diagnosis in patients with dizziness; however, few reports address the impact of dizziness on the patient's everyday life. In one study, many patients with syncope and dizziness reported avoiding moving rap-

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MATERIALS AND METHODS

STUDY DESIGN

The Primary Care Dizziness Study was designed to study the epidemiology and natural history of dizziness in primary care. Nine medical practices in North Carolina participated in data collection: two family practice groups, a university family practice center, and one internal medicine group practice in an urban county and two family practices, one internal medicine group practice, a county hospital emergency department (only three patients were referred from this site), and one solo internist in a rural county. The study had two data-collection periods, corresponding to funding from two different sources. During both data-collection periods, cooperating physicians were instructed to enroll all eligible patients seen for dizziness. The first data-collection period enrolled patients aged 60 years and older; the second data-collection effort enrolled all eligible adult patients. As a result, the study oversampled the geriatric population, in which chronic disability from dizziness was anticipated to be especially problematic.

To qualify for the study, patients had to present with dizziness either (1) as the chief complaint or (2) as part of a symptom complex that was the principal reason for the visit. Patients who had previously consulted a physician for dizziness were eligible as long as they had not already enrolled in the study. Dizziness was defined as a subjective complaint including at least one of the following: a sensation of motion, a feeling of imbalance, a sensation of impending faint, and lightheadedness.

Participating primary care physicians obtained verbal consent from eligible patients, and members of the nursing

staff recorded the name and phone number of each patient who agreed to be contacted about the Primary Care Dizziness Study. Research staff collected the referrals from each study site twice per week and sent each subject a consent form and a 20-page Dizziness Questionnaire to complete and mail back. Each patient's physician completed a 1-page form at the end of the enrollment visit. Subjects were contacted 3 months after the office visit and interviewed by telephone to determine outcomes.

VARIABLES

Two outcome variables were used to examine the effect of dizziness on everyday activities. The first variable, effect on life in general from dizziness, was measured by the question: "In the past 2 weeks, has your dizziness affected your daily life?" Response categories were "No, not at all"; "Yes, some"; or "Yes, a lot." The second variable measured the overall effect of dizziness on four specific daily activities: standing, reading, moving quickly, and socializing. This measure was assessed by the question, "In the past 2 weeks, have you avoided [activity] because of dizziness?" To each of the four questions, respondents could answer either "No, not at all"; "Yes, some"; or "Yes, a lot," and these responses were assigned numerical scores of 0, 1, and 2, respectively. To obtain the outcome measure used in our analyses, the four responses were summed, resulting in a score that ranged from 0 to 8.

Independent variables included demographic, health status, and psychological status measures as well as characteristics of the patient's dizziness complaint. Demographic variables included age, sex, race, marital status, living situation, and education. Health status measures included self-rating of health; instrumental activities of daily living¹⁸; number of chronic conditions; the presence of rheumatism, diabetes, high

idly, driving, walking, and standing because of dizziness.¹² In another report, approximately one third of elderly persons with postural disturbances experienced dizziness as an "obstacle for their activity."¹³ Assessing and estimating the impact of dizziness on the patient is important because, in cases where a definitive cure is absent, interventions to reduce disability offer the only treatment option. Furthermore, determining which patients are at risk for chronic disability would help identify a subgroup of dizziness patients in whom management should be intensive. Risk factors for chronicity are largely unknown, however, and the scant literature we were able to identify on prognosis, all from referral populations, focuses on specific medical risk factors.^{14,15}

Dizziness may limit daily activities and functioning in a number of ways. First, dizziness tends to be associated with other symptoms, such as impaired balance function, fatigue, and nausea. Second, frequency and unpredictability appear to be additional factors affecting function.^{11,13,16,17} Third, dizziness can be a marker for underlying medical problems, such as severe heart disease,

which may independently affect everyday functioning. Finally, psychological factors may, by influencing the individual's responses to dizziness, affect the prognosis.

This study sought to determine which factors predict disability due to dizziness 3 months after a visit for dizziness to a primary care physician. Specifically, the study sought to determine the relative contribution of baseline health status measures (ie, instrumental activities of daily living status, self-report of health, medical history, education, and psychological state) and dizziness characteristics (ie, duration of dizziness, frequency of episodes, and dizziness sensations) to reported disability from dizziness 3 months after a primary care encounter.

RESULTS

The mean age of the 117 subjects was 61.3 years, with a range from 20 to 90 years old. Two thirds of the subjects were aged 60 years and older. The majority of study subjects (72.6%) were women, white (82.9%), and married (62.4%). The educational level of subjects varied widely,

blood pressure, and/or heart trouble; individual measures of interference from rheumatism, diabetes, high blood pressure, and/or heart trouble; a summary score of interference from chronic conditions; and self-rating of hearing and vision. Psychological variables measured anxiety, depression, and phobic anxiety using subscales from the Symptom Checklist-90.¹⁹ Dizziness characteristics included the duration of the dizziness problem, frequency of dizziness, temporality of dizziness (dizziness attacks or continuous dizziness), length of attacks, onset of dizziness (sudden or gradual), baseline effect of dizziness on daily life in general, baseline effect of dizziness on specific daily activities (standing, reading, moving quickly, and socializing), and the physician's primary diagnosis for the patient. Other characteristics of dizziness studied were descriptions of the sensation itself, categorized as follows: a sensation of rotation or motion (vertigo), a feeling of imbalance, a sensation of impending faint, and a swimming sensation or lightheadedness.

SUBJECT ENROLLMENT

During data collection, 45 physicians referred 144 patients to the study. Of the 144 referrals, 117 (81.2%) were successfully enrolled in the study. Of the 27 patients not included in the study, 13 (48%) agreed to participate but never returned their questionnaires, seven (26%) refused to participate, five (19%) could not be reached, one had incomplete data, and one was outside the geographical boundaries for the study. A comparison of those enrolled with those not enrolled reveals no significant difference in sex or race. There was however, a statistically significant difference in age ($P < .001$), with patients not successfully enrolled in the study more likely to be younger than those who were enrolled.

with 15.4% completing 8 or fewer years of school, 40.2% completing some or all of high school, 28.2% completing up to 4 years beyond high school, and 16.2% completing more than 4 years of college.

A relatively high proportion of subjects reported health problems. Nearly half (41.4%) rated their health as fair or poor. Almost one third (32.5%) reported being dependent in one or more instrumental activities of daily living. One third (33.4%) reported three or more chronic conditions, of which the most common were rheumatism (66.7% of subjects), high blood pressure (39.7%), heart trouble (32.0%), and diabetes (11.1%).

Table 1 displays characteristics of the dizziness symptoms reported by these subjects. A high proportion reported more than one type of dizziness symptom, with lightheadedness and imbalance reported by over two thirds of subjects. Many of the dizziness problems were chronic; 39.3% of subjects reported dizziness lasting at least 1 year. Dizziness symptoms were frequent, generally occurred in attacks, and represented a range of diagnoses. The most common diagnostic category was otologic.

Of the 117 patients who completed the study questionnaire, 108 (92.3%) attended 3-month follow-up. Of the nine subjects unavailable for follow-up, three failed to respond following a number of telephone calls, one was too ill to be interviewed, and the first five subjects did not attend follow-up until 6 months after their initial physician visit. Those unavailable for follow-up were not significantly different from the rest of the cohort by age, sex, or race.

ANALYSIS

The reported effect of dizziness on daily life was dichotomized; patients were considered to be either not affected by dizziness at all or affected by dizziness some or a lot. The overall effect of dizziness on four specific daily activities was dichotomized in two ways: no effect (score of 0) vs low or high effect (scores of 1 to 8), and little or no effect (scores of 0 to 2) vs high effect (scores of 3 to 8).

Analyses were performed using the Statistical Analysis System for personal computers (PC SAS). After descriptive statistics, including odds ratios, were calculated and examined, a parsimonious logistic regression model was developed for each outcome measure. To effectively consider each of 36 independent variables as a potential predictor for a given dichotomy, logistic regression was implemented in two stages. In the first stage, a logistic regression model was obtained for each of the four groups of independent variables (demographic, health status, psychological status, and characteristics of dizziness) using backward and forward selection procedures. Independent variables from each group that were statistically significant below the $\alpha = .15$ level were then entered as a single group into a stage 2 logistic regression procedure, with $P < .05$ required for a variable to remain in the final model.

Table 2 reports baseline and follow-up responses to questions about the impact of dizziness on daily life. At the time of their physician visit, 63.2% of the 117 subjects with dizziness responded yes to the question "Has your dizziness affected your daily life?" Of those subjects with 3-month follow-up ($n = 108$), 27.8% reported some effect on their daily life due to dizziness. At baseline, subjects frequently reported avoiding moving quickly (81.0%), standing (46.2%), reading (35.0%), and socializing (25.6%) due to dizziness. The percentage of subjects avoiding these specific activities declined at 3-month follow-up, with the activities most often avoided continuing to be moving quickly (41.1% of subjects) and standing (18.7%).

Three models that predict persistent impairment from dizziness were obtained through implementation of two-stage logistic regression analysis (**Table 3**). Characteristics measured at baseline that predicted continued effects of dizziness on the subject's "daily life" 3 months after the initial physician visit were (1) dependency in any of five instrumental activities of daily living (travel, shopping, meals, housework, or money), (2) interference from chronic

Table 1. Characteristics of the Dizziness Symptoms in the Study Sample

Dizziness Characteristic	% of Subjects (N=117)
Dizziness sensation reported*	
Vertigo	55.6
Impending faint	45.7
Lightheadedness	78.6
Imbalance	77.7
Other	52.6
Duration of dizziness	
<1 mo	35.0
1 to 12 mo	25.6
1 to 5 y	26.5
>5 y	12.8
Frequency of dizziness	
≥2 d/wk	63.2
≤1 d/wk	36.8
Onset of symptoms	
Gradual	35.0
Sudden	65.0
Temporality of symptoms	
Occurred on one or more attacks	81.2
A continuous sensation	18.8
Duration of attacks†	
<1 min	76.3
1 min to 2 d	15.1
2 d to 2 wk	8.6
Physician diagnostic impression after the visit during which the patient was enrolled in the study	
Otologic	44.3
Cardiovascular	18.3
Psychiatric/neurologic	13.0
Respiratory	7.8
Other	16.5

*Many patients reported multiple sensations. As these variables were categorical, an attempt was made during analysis to identify the predominant sensation, but this was not always possible.

†Includes only the 95 subjects who reported dizziness attacks.

conditions (rheumatism, diabetes, high blood pressure, or heart trouble), (3) chronicity of the dizziness itself, and (4) the reported effect of dizziness on daily life (Table 3).

For the outcome variable measuring the effect of dizziness on specific activities, two models were elaborated. Where the predictors of any effect were modeled, the following variables remained in the final model: (1) frequency of dizziness, (2) chronicity of dizziness, (3) self-rating of health (dichotomized as excellent/good or fair/poor), and (4) anxiety score (Table 3). When predictors of a high level of effect were modeled, the variables remaining in the model were (1) the sensation of imbalance, (2) reported interference from coexisting conditions at baseline, and (3) the patient's anxiety score (Table 3).

From these models, it is clear that having chronic dizziness is the strongest predictor of some continued disability after 3 months. Surprisingly, however, duration of diz-

ziness was not related to major effects of dizziness at 3 months; this suggests that equal proportions of chronic and acute dizziness problems are likely to be severe at 3 months. In patients with recent-onset dizziness, the major factors related to chronicity include measures of overall health status, certain features of the dizziness (severity and possibly imbalance), and the patient's anxiety profile.

COMMENT

These data indicate that a high proportion of primary care patients with dizziness have no residual disability 3 months later and that certain characteristics present on the initial office visit can be used to identify those who are at high risk for persistent impairment. The study's conclusions were developed using a sample that contained a high proportion of elderly; so, while the prevalence of dizziness increases with age,¹ these results should be applied with caution to practice settings that do not include a significant geriatric population. The two outcome measures studied in this research are related to each other with a Pearson correlation coefficient of .65. Since these outcome variables are correlated to a moderately high degree, the variables from our three final models will be considered together.

The predictor variables from the final models can be conceptualized in three separate groups: (1) baseline health status measures, which include instrumental activities of daily living status, self-rating of health, the presence of chronic conditions, and interference in activities from chronic conditions; (2) dizziness characteristics, including the baseline effect of dizziness on daily life, duration of the dizziness problem, frequency of dizziness episodes, and sensation of imbalance; and (3) psychological state, represented by scores on the Anxiety Scale.

Health status measures have previously been associated with survival, changes in functional status, and the presence of dizziness.^{15,20-22} The strong relationships we observed between baseline health status measures and persistence of dizziness effects verify that these measures fore-

Table 2. Reported Effects of the Dizziness Problem on Daily Life at Enrollment and 3 Months Later

	% of Subjects Reporting Impairment	
	At Baseline (N=117)	At Follow-up (N=108)
Impact of dizziness on daily life		
Any reported effect	63.2	27.8
Life affected "a lot"	17.9	6.5
Activities avoided because of dizziness		
Moving quickly	81.0	41.1
Standing	46.2	18.7
Reading	35.0	11.2
Socializing	25.6	11.2

Table 3. Predictors of Impairment due to Dizziness 3 Months After a Primary Care Office Visit: Results of Logistic Regression Analysis

Variable	P	Odds Ratio	(95% Confidence Interval)
Outcome Variable: Effect of Dizziness Problem on Daily Life			
Dependent IADL status*	.002	11.1	(2.42-51.30)
No. of chronic conditions	.02	1.9	(1.10-3.42)
Chronic dizziness (≥ 1 y)	.0003	32.2	(4.91-211.39)
Effect of dizziness on daily life at baseline	.0004	11.7	(3.02-44.95)
Outcome Variable: Any Effect of Dizziness on Daily Activity Summary Score			
Dizziness occurs "often"	.02	4.3	(1.31-13.88)
Chronic dizziness (≥ 1 y)	.0001	20.9	(6.28-69.82)
Self-rating of health	.04	3.2	(1.04-9.67)
Anxiety score	.05	3.2	(1.01-10.11)
Outcome Variable: Major Effect of Dizziness on Daily Activity Summary Score			
Dizziness sensation of imbalance	.01	4.7	(1.41-15.87)
Interference from chronic conditions	.01	1.7	(1.13-2.65)
Anxiety score	.003	5.7	(1.79-17.83)

*IADL indicates *Instrumental Activities of Daily Living*.

cast chronic disability from this common condition as well. The relationship between dizziness and chronic disease is complex. Thus, while dizziness in the elderly is not an independent risk factor for death, institutionalization, or functional decline, it is a marker for other conditions that increase a patient's risk of becoming disabled.^{14,15} Some common risk factors associated with dizziness and subsequent disability are advanced age, nonwhite race, vascular disease, sensory impairment, and level of morbidity from arthritis, hypertension, and diabetes.¹⁴ In addition, dizziness can combine with other medical problems, resulting in greater levels of impact than would be expected from dizziness alone.^{23,24}

It is not surprising that the level of effect from dizziness at baseline is a strong predictor of future levels of effect and that chronic dizziness at baseline is independently associated with persistence of symptoms at 3 months. Similarly, the association between frequency of dizziness and future disability supports the hypothesis that frequent or continuous symptoms are more likely to lead to persistent disability, a finding reported by Jacobson and Newman.¹⁶ Given the strong relationship between duration of dizziness and age,¹⁵ chronic dizziness may be a sign of underlying medical problems associated with aging that lead to activity restriction.^{23,24} The association of imbalance with a major effect of dizziness at 3 months may be a reflection of the fact that older persons with multiple chronic problems are more likely to report this symptom when dizzy.^{11,15,25}

Dizziness often places great stress on the patient because of its unpredictable nature, unknown cause, and uncertain future course.²⁶ An individual's psychological state often affects how one perceives and copes with the stress of illness, which in turn may significantly affect how dysfunctional (physically and psychologically) a patient becomes. In a community elderly population, significant associations were observed between dizziness within the past year and (1) perception of self as a nervous person and (2) a depressive symptom index.¹⁵ This relationship between psychological state and dizziness may develop in two ways. A patient can begin with anxiety, depression, or some other psychological state and experience increased stimulation of the sympathetic nervous system, which results in hyperventilation and psychogenic symptoms described as dizziness or vertigo.²⁷ Alternatively, psychological states may not cause dizziness but may affect how patients with dizziness perceive and cope with their symptoms. Thus, a person who is extremely anxious may interpret dizziness in a different way than a person with identical symptoms who is not anxious. This observation helps to explain why dizziness often alters a patient's daily activities even when in remission.¹³

Models such as ours, which focus on functional health as an outcome, place less emphasis on diagnosis than do many traditional approaches to the dizzy patient. This functional approach is supported by the work of Jacobson and Newman,¹⁶ who suggest that the success of treatment procedures should be measured

In . . . recent-onset dizziness, the major factors related to chronicity include . . . health status, . . . dizziness severity, . . . and the . . . anxiety profile

not by physiologic improvement but by functional improvement over time. In this approach, making a specific diagnosis may be of relatively little importance for many patients, since diagnosis does not appear to predict chronic disability. Instead, health care providers should use the dizziness history, baseline health status, and underlying psychological state to identify and manage intensively those patients at greatest risk for chronic impairment.

Accepted for publication March 16, 1993.

This study was supported by grants 1-K08-AG00341 and AG09648 from the National Institute on Aging and by grant A074 from the American Academy of Family Physicians Foundation.

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