# Evaluation and Outcome of the Dizzy Patient

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One hundred twenty-one patients were identified who presented to an emergency room with the complaint of dizziness. Peripheral vestibular disease (24 percent of patients) was the most common cause of dizziness, but the cause remained unknown at follow-up after six months in 37 percent of the patients. The history and physicial examination were sufficient for diagnosis in 83 percent of patients in whom a diagnosis could be made. Diagnostic tests, such as complete blood counts (four patients) and chest roentgenograms (four patients), provided crucial information in some cases. At the time of follow-up, 7 percent of patients had suffered either major morbidity or had died as a result of the cause of the index episode of dizziness. Patients with an initial diagnosis of anemia, stroke, or diabetes represented a high-risk (50 percent) group for a poor outcome. However, patients who were aged under 50 years or whose dizziness was due to peripheral vestibular disease, vasovagal or psychogenic cause, drugs, or infection formed a low-risk (2 percent) group.

Dizziness is a common complaint that is often confusing and discouraging for the physician. Because dizziness is such a vague symptom, its differential diagnosis includes the entire spectrum of diseases, from benign and self-limited diseases to potentially fatal ones. The physician must, therefore, decide whether a potentially costly evaluation or simple reassurance is appropriate.

The purpose of this study was to describe the patients who present to an emergency room complaining of dizziness, the ways in which they were evaluated, and their prognosis. The emergency room evaluation was analyzed to determine its most useful aspects. An attempt was made to divide the patients into groups with different risks of having subsequent major morbidity or mortality related to the cause of the dizziness. The results were used to suggest a rational approach to the evaluation of the dizzy patient.

## Methods

The Letterman Army Medical Center Emergency Room log book from September 1, 1983, to December 31, 1983, was reviewed to

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identify all patients seen for the complaint of dizziness. Of the 125 patients with this complaint, 121 (97 percent) charts were available for review.

Each chart was reviewed for details of the patient's past medical history, particularly any prior history of dizziness, cardiac disease, or neurologic disease. Abnormal findings on the emergency room physical examination were also noted, including the vital signs, postural changes in pulse or blood pressure, and abnormal findings on the cardiac or neurologic examination. The results of all laboratory tests were also reviewed.

When possible, follow-up data were obtained by chart review. Further diagnostic tests, episodes of recurrent dizziness, hospitalizations, and mortality occurring after the emergency room visit were noted. Follow-up information was available for 99 patients (82 percent). The mean duration of follow-up was six months.

The cause of dizziness was recorded at two points. First was the emergency room diagnosis as recorded by the emergency room physician. The second and final diagnosis was the best possible explanation for the dizziness based on all available information.

Both the emergency room diagnosis and the final diagnosis were placed into one of the following eight mutually exclusive categories:

1. Peripheral vestibular dizziness included cases that were attributed to labyrinthitis, vestibular neuronitis (acute or recurrent peripheral vestibulopathy[1]), benign positional vertigo, and otitis media. These patients described an abnormal sensation of movement, or vertigo. Nausea, vomiting, and diaphoresis accompanied many cases. Nystagmus was frequently found on examination or could be induced by provocative maneuvers. These patients had no other neurologic dysfunction.

2. Central neurologic dizziness was caused by strokes or transient ischemic attacks. Abnormalities of strength, sensation, or cranial nerve examination were present.

3. Cardiac dizziness included cases that were secondary to arrhythmias, ischemic chest pain, heart failure, and endocarditis.

4. Vasovagal or psychogenic dizziness included cases that were attributed to vasovagal causes, psychogenic causes, or episodes that occurred after voiding. Vasovagal dizziness was considered as a final diagnosis only in patients who had symptoms in the appropriate emotional setting, while standing or sitting, who were younger than 60 years of age, and who had no antecedent cardiovascular or neurologic disease.[2] None of the seven patients with an emergency room diagnosis of vasovagal dizziness satisfied these criteria.

5. Metabolic or drug-induced dizziness included cases attributed to a markedly abnormal serum glucose or to drug or alcohol ingestion. Drug or alcohol ingestion had to be documented by serum levels or by a characteristic clinical course.

6. Dizziness was attributed to anemia in men with a hematocrit less than 35 percent and in women with a hematocrit below 30 percent or in patients with acute gastrointestinal bleeding.

7. Dizziness was attributed to infections in patients with typical clinical or laboratory findings of pneumonia, a urinary tract infection, or viral syndrome.

8. Dizziness of unknown cause included any episodes that could not be placed into the seven preceding categories.

## Results

Of the 121 patients with dizziness, 57 (47 percent) were male and 64 (53 percent) were female. The mean age was 57 years.

A history of cardiac disease was present in 21 patients (17 percent) and a history of neurologic disease was present in 14 patients (12 percent). Six patients (5 percent) had a history of psychiatric illness, and five (4 percent) had cancer. Twenty-three patients (19 percent) had a prior history of dizziness. The cause of these prior episodes was unknown in 17, was thought to be related to peripheral vestibular dysfunction in 3, and was ascribed to miscellaneous causes in 3 patients.

Twenty (17 percent) of the 121 patients were admitted to the hospital. Admitted patients were significantly older than patients who were not admitted (66 ± 14 years vs 55 ± 19 years, $P < .01$). Admitted patients were more likely to have an abnormal cardiac examination (7 or 16 such patients

were admitted) and to have a significant postural change in blood pressure indicated by a decrease in systolic blood pressure of more than 20 mmHg (5 of 6 of these patients were admitted). Also, patients with an emergency room diagnosis of neurologic or cardiovascular disease or anemia were more likely to be admitted (15 of 24 patients with one of these problems were admitted). Younger patients and patients with an emergency room diagnosis of peripheral vestibular disease, vasovagal or psychogenic dizziness, or an unknown cause of the dizziness, however, were usually not admitted. The admission decision was not significantly influenced by a past history of cardiac or neurologic disease or by a prior history of dizzy episodes.

Peripheral vestibular disease and various infections were the most common causes of dizziness. However, the cause of the dizziness remained unknown in 45 patients (37 percent) (Table 1). There was no difference in the sex ratio by diagnosis, but patients with dizziness due to infections were younger and patients with cardiac dizziness were older than the mean age.

Of the 76 patients in whom a final diagnosis could be made, the history and physical examination were sufficient for diagnosis in 63 (83 percent). Especially helpful on physical examination was the orthostatic blood pressure. Six patients had a significant postural change in blood pressure, five of whom were admitted. Three of these patients had gastrointestinal hemorrhage.

Diagnostic tests were frequently ordered but were helpful in only a few cases (Table 2). Of the 61 complete blood counts, significant occult anemia was revealed in four patients. Of the 60 serum electrolyte studies, one proved helpful for one patient who, with no prior history of diabetes, was found to have a glucose level of 1,258 mg/dL. Electrocardiograms in the emergency room revealed an unexpected abnormality in one of the 53 patients in whom they were performed. This patient had ischemic changes with atypical symptoms and subsequently was found to have three-vessel disease on cardiac catheterization.

Four of the 26 chest roentgenograms performed revealed unexpected findings. Three of these patients had pneumonia, and one had heart failure. History and physical examination were not classical in these patients, who were elderly and, in two cases, not fluent in English. One of 17 stool guaiac tests was positive for blood in a patient who gave no history to suggest a gastrointestinal hemorrhage. One of the 15 urinalyses revealed pyuria in one patient whose symptoms were atypical. Results of the one alcohol level determination ordered was abnormal, establishing the diagnosis in a patient who had a history of alcoholism but otherwise did not appear intoxicated. None of the other numerous tests ordered established the cause of dizziness of any patient.

By the time of follow-up three (2 percent) of the 121 patients had died (Table 3). Two of the three

**Table 1. Breakdown of Final Diagnoses**

| Diagnosis | Number of Patients |
|---|---|
| Peripheral vestibular (n=29) | |
| Acute peripheral vestibulopathy | 13 |
| Acute and recurrent peripheral vestibulopathy | 5 |
| Benign positional vertigo | 8 |
| Otitis media | 3 |
| Central neurologic | 2 |
| Cardiac (n=7) | |
| Arrhythmia | 1 |
| Ischemic heart disease | 5 |
| Valvular heart disease | 1 |
| Vasovagal or psychogenic (n=6) | |
| Psychogenic | 5 |
| Micturition | 1 |
| Drug or metabolic (n=7) | |
| Alcohol | 2 |
| Secobarbital | 1 |
| Amitriptyline | 1 |
| Prazosin | 1 |
| Diabetes | 2 |
| Anemia (n=9) | |
| Gastrointestinal hemorrhage | 6 |
| Other etiologies | 3 |
| Infection (n=16) | |
| Viral syndrome | 11 |
| Pneumonia | 3 |
| Prostatitis | 1 |
| Urinary tract infection | 1 |
| Unknown | 45 |

**Table 2. Diagnostic Evaluation of Dizziness**

| Test | Number of Tests | Number Abnormal | Established Cause |
|---|---|---|---|
| Complete blood count | 61 | 19 | 4 |
| Serum electrolytes | 60 | 15 | 1 |
| Electrocardiogram | 53 | 25 | 1 |
| Chest roentgenogram | 26 | 11 | 4 |
| Stool guaiac | 17 | 4 | 1 |
| Urinalysis | 15 | 5 | 1 |
| Arterial blood gas | 10 | 2 | 0 |
| Prothrombin time/partial thromboplastin time | 9 | 1 | 0 |
| Other roentgenograms | 7 | 0 | 0 |
| Alcohol level | 1 | 1 | 1 |
| Theophylline level | 1 | 1 | 0 |
| Digoxin level | 1 | 0 | 0 |

deaths occurred in patients whose serious underlying diseases were appropriately identified and treated. The third death was from an acute gastrointestinal hemorrhage. Six other patients were alive but had significant moribidity requiring hospitalization related to the cause of the index episode of dizziness. These included two recurrent hemorrhages, one subdural hematoma, and one recurrent stroke.

The nine patients who died or had major morbidity were compared with the 90 patients who survived without major morbidity for an average of six months after the emergency room visit. Based on the emergency room diagnosis and the patient's age, patients were placed into groups of low, medium, and high risks of poor outcome (death or major morbidity related to the cause of the dizziness). Patients who were under the age of 50 years or had an emergency room diagnosis of dizziness due to peripheral vestibular disease, vasovagal or psychogenic cause, drugs or infection made up the low-risk group (2 percent, one poor outcome in 62 patients). The one poor outcome was the death of a patient who was aged under 50 years, but who had many serious chronic medical problems. Patients who were aged over 50 years and had an unknown cause of the dizziness or had an emergency room diagnosis of a cardiac cause of dizziness constituted the medium-risk group (10 percent, 3 poor outcomes in 30 patients). The high-risk group included all patients with an emergency room diagnosis of anemia, stroke, or diabetes (50 percent, 6 poor outcomes in 12 patients).

## Discussion

This study of 121 patients confirms that dizziness is associated with a broad range of disease. Peripheral vestibular dysfunction accounted for the largest number of cases, 24 percent. Infections, anemia, cardiac, and other causes accounted for smaller percentages. Thirty-seven percent of patients had an unknown cause of their symptoms even six months after the emergency room visit.

It is difficult to compare the causes of dizziness in this series of patients with those reported elsewhere in the literature. Most reports deal with a limited segment of the dizzy population rather than an unselected series. Moreover, criteria for causative diagnoses are often arbitrary and less stringent than those used in this study.

One comprehensive study reported the experience of a university "dizziness clinic," where 104 patients underwent a battery of neuro-ophthalmologic and neuro-otological tests.[3] This clinic also had the luxury of accepting only patients who spoke English fluently. (Such was not

the case at the Letterman Emergency Room, which served patients of many different ethnic backgrounds and varying degrees of fluency of English.) Peripheral vestibular disorders accounted for the largest number of cases in this series also, at 38 percent, but 32 percent of their cases were felt to be psychogenic. After extensive testing, 9 percent of their patients still had an uncertain cause of their dizziness.

An emergency room study of 106 weak and dizzy patients attributed the largest number of cases, 22 percent, to vasovagal or psychogenic causes, with infections and medication reactions being other frequent causes.[4] Four percent of their patients had an unknown cause of dizziness. However, 9 percent of patients who complained of weakness alone were included in this report, and no information was available about the subsequent clinical course. Therefore, the accuracy of the emergency room diagnoses cannot be determined.

History and physical examination provided the most important diagnostic information in 83 percent of patients in whom a diagnosis could be established. The complete blood count and chest roentgenograms were the most helpful of the routine diagnostic tests. Other tests were mainly useful for confirming data obtained by history and physical examination.

Of the 99 patients in whom follow-up was available, there were three deaths and six episodes of major morbidity related to the index episode of dizziness. In most cases, these poor outcomes were related to a serious underlying disease that was appropriately identified in the emergency room and treated. Based on the patient's age and emergency room diagnosis, the patients could be placed into groups with low (2 percent), medium (10 percent) and high (50 percent) risks of death or major morbidity during a mean follow-up period of six months.

It is not known whether further episodes of major morbidity occurred in those patients for whom no follow-up was available. Such patients, however, tended to be young, to have no significant medical problems, and to be seen for dizziness attributed to peripheral vestibular dysfunction or to an unknown cause. Most of these patients would therefore fall into the low-risk group, few of whom should have a poor outcome.

A rational approach to the evaluation of the dizzy patient can be developed from this information. The history and physical examination alone will make the diagnosis in most patients. Postural blood pressure determinations and maneuvers to test vestibular function (Nylen-Barany or Dix-Hallpike[3]) are particularly useful. The neurologic examination is crucial in patients with evidence of vestibular disease to determine whether the cause is peripheral or central.

Diagnostic tests can occasionally be helpful when the history and physical examination are unrevealing. A hematocrit and a chest roentgenogram may reveal an occult anemia or pneumonia, particularly in an elderly patient. Other laboratory tests are rarely helpful. Because patients aged under 50 years are at low risk for subsequent morbidity and mortality related to their dizziness, it may be justified to perform no diagnostic tests in this group. An important diagnosis should rarely be missed with this approach.

**Table 3. Follow-Up Status of 121 Patients After Six Months**

| | Patients No. (%) |
|---|---|
| No follow-up available | 22 (18) |
| Alive without subsequent dizziness | 67 (55) |
| Alive with minor morbidity from the cause of dizziness | 23 (19) |
| Alive but with major morbidity from the cause of dizziness | 6 (5) |
| Died from causes related to index episode of dizziness | 3 (2) |

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