

# Profiling the Pathway of the Dizzy Patient in the Emergency Department from the Triage and Onwards

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## Abstract

**Background:** Dizziness is a common complaint among patients seeking medical assistance in the Emergency Departments (EDs). Although its aetiology is usually benign, patients often follow a complex pathway with health service and resource overuse. Aims of this study were to describe the symptoms and characteristics of such subjects and gain an overall impression of their management by ED physicians.

**Methods:** Our study was performed in the University Hospital of Heraklion, Crete, Greece. We retrospectively collected demographic, clinical and co-morbidity data of patients visiting the ED complaining of dizziness during a 3-month period. These were evaluated initially by general practitioners (GPs) in the triage and then referred to other specialists, if needed.

**Results:** In total, 408 self-referred patients visited the triage of the ED complaining of dizziness. The most common accompanying symptoms of dizziness were vertigo, headache, fatigue, nausea and imbalance. Relevant concomitant chronic diseases included hypertension, coronary artery disease and diabetes mellitus. After the initial triage, most patients were referred to an internist or an otorhinolaryngologist, or remained in the triage for further work up.

**Conclusion:** Our study underlines the difficulty to diagnose and refer cases with dizziness faced by triage GPs in the ED. There is a great variability of symptoms accompanying dizziness and GPs face the challenge to discharge or refer to specialists for further examination. An educational need for GPs and the devise of simple but efficient diagnostic algorithms have emerged as unmet needse.

**Keywords:** Dizziness • General practitioner • Primary health care • Emergency department

## Introduction

Dizziness is a common complaint among the consultations referred from primary to secondary or tertiary health care EDs [1]. It is estimated that dizziness is involved in 5% of primary health care visits and it is the commonest reason for GP appointments for patients over 75 years old [2–5]. Among all the main symptoms, dizziness is considered to be the third most common in general medical practice with 30% lifetime prevalence [6,7].

Regarding its aetiology, dizziness is usually of benign origin, and only occasionally it may present as a symptom of a more serious disease [4]. The most common causes of dizziness include benign paroxysmal positional vertigo (BPPV) or labyrinthitis, as well as infections, myocardial infarction, alcohol intoxication and hypothyroidism [4,8,9]. Furthermore, a multitude of symptoms like vertigo, floating sensation, light-headedness, fainting, disequilibrium or even anxiety or general malaise may be described as “dizziness” [10,11]. Thus, medical evaluation and differential diagnosis of the acute-phase dizziness remains a challenge, despite the plethora of available diagnostic modalities at the physicians' disposal [2,3,12]. Notably, it has been

estimated that 20% of patients with dizziness are discharged from the EDs without a final diagnosis [13].

While the need for a sound diagnosis presents every time a patient complains of dizziness, especially for ruling-out the most serious or even lethal underlying causes, “first-line” physicians are often challenged by the appropriate use of resources or existing diagnostic algorithms. Indicative of this burden is that the ED visit costs due to dizziness exceed 4 billion dollars per annum in the USA [14]. This problem may be aggravated in health care settings where patients may visit a secondary or tertiary hospital without consulting with their primary care physician.

The aim of this study is to describe the characteristics of such patients, in terms of symptoms and co-morbidities, who visit the ED triage of a tertiary hospital in Greece. Additional goals are to describe their route from the triage to other specialties, up to either hospitalization or discharge, and identify interventions that may increase the efficiency of managing the “dizzy” patient.

## Materials and Methods

The study was conducted in the University Hospital of Heraklion, which provides secondary and tertiary health care services for the island of Crete, Greece (population: approximately 600,000) and the majority of the Aegean Sea islands. It should be noted that this hospital receives a large number of ambulatory patients who are addressed in the ED without a referral from a primary care physician, due to the lack of adequate primary health care facilities. Such patients are always evaluated by specialists or trainees (GPs, internists, surgeons, pulmonologists) at the triage office and subsequently are referred to various specialties in the ED.

Retrospective data collection was held over a 3-month period (August 15,

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2015 - November 14, 2015). The study data was retrieved from the electronic and hard-copy records of the University Hospital of Heraklion, Crete, Greece. Demographic (such as gender, age) and clinical data (such as vital status, coexisting symptoms accompanying dizziness, co-morbidities), referral to other specialties and final diagnosis (if present) at discharge or on admission were available in these records.

Inclusion Criteria were patients aged >16 years of Greek residency who visited the ED of the hospital using the term "dizziness" to describe their main symptom. Subjects with obvious severe life-threatening conditions (e.g. brain trauma) were not included in our study; they are neither assessed nor did worked-up in the ED triage office but are immediately refer to the appropriate ED subspecialty (e.g. neurosurgeon). Also, patients who had previously been diagnosed with brain neoplastic disorders or vertigo (either of central or peripheral aetiology) were excluded from the study.

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS Version 25). Descriptive statistics were used to present frequencies (%), as well as means and medians with standard deviations (SD). For the data collection, permission was given by the Bioethics Committee of the University Hospital of Heraklion, Crete, Greece (Protocol Number: 13457).

## Results

### Characteristics of patients with dizziness visiting the ED

In total, four hundred and eight patients (n=408) visited the ED complaining of dizziness. This corresponds to 1.88% of the total number of patients who visited the ED in the 3-month period (n=21,671), whereas 41.70% of them (n=9,037) were assessed in the triage office. The rest of the patients either were younger than 16 years old and were assessed immediately in the pediatrics department, or the symptoms they referred did not need assessment from triage (e.g. car accidents).

### Patients with dizziness discharged from the ED without admission vs. hospitalizations

Most of the patients who presented with dizziness were not hospitalized (84.56%, n=345). They were discharged from the ED on the same or rarely on the next day. The most common accompanying symptoms in this group were vertigo, headache, fatigue, nausea, imbalance, palpitations, chest pain and vomiting (Table 1). Additionally, the most prevalent concomitant chronic diseases in this group of patients were hypertension, coronary artery disease and diabetes mellitus (Table 2). Only 15.44% (n=63) of the "dizzy" patients were hospitalized. Admission rates to the ENT and Neurology Departments were 4.17% (n=17) and 11.27% (n=46), respectively.

The following results refer to the patients who visited the ED complaining of dizziness and were assessed in the triage without admission (n=345), unless otherwise specified. Median age was 51.08 years (SD:  $\pm$  20.43 years). A female predominance (approximately 3:2) of the patients presenting with dizziness was identified (females: 59.71%, n=206 vs. males: 40.29%, n=139).

### The pathway from the triage to the specialist

After the initial triage performed by the GPs, the majority of the patients were referred to the Internal Medicine (65.22%, n=225) and the ENT (17.97%, n=62) ED offices or remained in the triage (7.83%, n=27) for further work-up. Referrals to subspecialty EDs are summarized in Tables 3 and 4.

### The referral pathway of patients in the ED

In Figure 1, the route of patients who visit the ED complaining of dizziness is depicted. The main "pathway" they follow in the subspecialty EDs is from triage to Internal Medicine, ENT or Neurology (or Neurology and ENT).

In particular, after the initial triage, 92.72% (n=318) of the patients were further referred to ED subspecialties. Approximately half of the "dizzy" patients (51.01%, n=176) were discharged after evaluation by one ED subspecialty, 29.28% (n=101) by two and only 11.88% (n=41) by three.

**Table 1.** Accompanying symptoms of dizziness (not hospitalized patients, n=345).

Symptom	Frequency % (n)
Vertigo	29.28 (101)
Headache	20.00 (69)
Fatigue	19.71 (68)
Nausea	17.10 (59)
Imbalance	15.65 (54)
Palpitations/chest pain	11.59 (40)
Vomiting	7.25 (25)
Numbness	4.93 (17)
Abdominal pain	2.90 (10)
Blurred vision	2.61 (9)
Recent drops	2.03 (7)
Sweating	1.74 (6)
Tremors	1.74 (6)
Hearing loss	1.45 (5)
Dyspnea	1.16 (4)
Dysphonia	1.16 (4)
Diarrhea	1.16 (4)
Other symptoms	4.06 (14)

**Table 2.** Co-morbidities in patients with dizziness (not hospitalized patients, n=345).

Chronic Disease	Frequency % (n)
Hypertension	22.03 (76)
Coronary Artery Disease	13.04 (45)
Diabetes Mellitus	10.14 (35)
Hormonal Disorders	5.80 (20)
Neoplastic Disorders	5.51 (19)
BPPV	5.22 (18)
Atrial Fibrillation	4.35 (15)
Psychiatric Disorders	4.06 (14)
Hematologic Disorders	3.48 (12)
Respiratory Diseases	3.48 (12)
Neurological Diseases	2.61 (9)
Kidney Diseases	1.45 (5)
Other	7.83 (27)

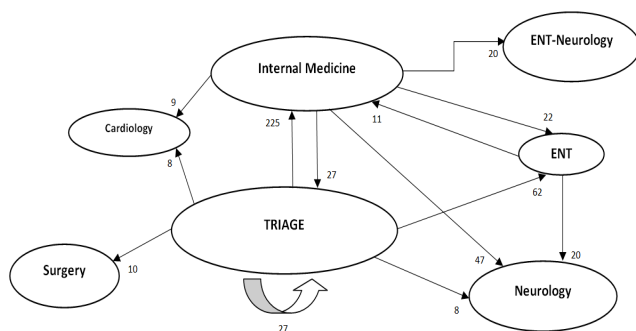
**Table 3.** Referrals of patients with dizziness to specialists in the ED after the initial triage (not hospitalized patients, n=345).

ED Subspecialty	Frequency % (n)
Internal Medicine	65.22 (225)
ENT	17.97 (62)
Remain to ED triage	7.83 (27)
Surgery	2.90 (10)
Cardiology	2.32 (8)
Neurology	2.32 (8)
Obstetrics & Gynecology	0.29 (1)
Endocrinology	0.29 (1)
Orthopedics	0.29 (1)
Pulmonology	0.29 (1)
Psychiatry	0.29 (1)

About one-fifth of the patients (22.32%, n=77) were discharged after the completion of work-up in the ED without a final diagnosis. The most frequent diagnoses on discharge were upper respiratory tract infections (18.26%, n=63), lower respiratory tract infections (9.57%, n=33), BPPV (7.83%, n=27) and migraine (3.19%, n=11). Almost all patients discharged with a diagnosis were given a scheduled appointment with the appropriate specialty over the next few days, in case the symptoms persisted Table 5 summarizes these findings.

**Table 4.** Most frequent combinations of multiple referrals to ED subspecialties (not hospitalized patients, n=345).

ED subspecialty combinations	Frequency % (n)
Internal Medicine-Neurology	13.62 (47)
Internal Medicine-ENT	6.38 (22)
Internal Medicine-ENT-Neurology	5.80 (20)
ENT-Internal Medicine	3.19 (11)
Internal Medicine-Cardiology	2.61 (9)
Internal Medicine-Neurology-ENT	1.45 (5)
ENT-Internal Medicine-Neurology	1.161 (4)
Internal Medicine-Orthopedics	0.58 (2)
Internal Medicine-Ophthalmology	0.58 (2)
Referral to a single ED subspecialty	51.01 (176)



**Figure 1.** Referral pathway in the ED (not hospitalized patients, n=345).

**Table 5.** Final diagnosis on discharge from the ED (not hospitalized patients, n=345).

Diagnosis on discharge	Frequency % (n)
Undiagnosed	22.32 (77)
Upper Respiratory Tract Infection	18.26 (63)
Lower Respiratory Tract Infection	9.57 (33)
Benign Paroxysmal Positional Vertigo	7.83 (27)
Migraine	3.19 (11)
Atrial Fibrillation	2.61 (9)
Urinary Tract Infection	1.45 (5)
Anaemia	1.45 (5)
Pregnancy	1.16 (4)
Stroke	1.16 (4)
Heart Attack	1.16 (4)
Dehydration	0.58 (2)
Other	29.28 (101)

## Discussion

Our study endeavors to identify the characteristics of the patient group visiting the ED of a tertiary hospital, dizziness being their main complaint/symptom (1.88% of total triage visits). Mostly these were women in their fifties. We present the often complex route from the GPs in the triage office to other specialties, up to the final decision of admission or discharge. An interesting finding was that more than half of these patients were first referred to an internist and almost 85% of them were discharged from the hospital the same or on the next day. The most frequently involved specialties were internists, GPs and ENTs. Patients only needed simple laboratory test exams or imaging in their work up.

### Characteristics of patients with dizziness visiting the ED

The frequency of dizziness in our study (1.88%) is lower compared to previous ones, which report percentages 3.5-4.0% [3,15–17]. The majority of the “dizzy” patients were women (59.71%), which is in agreement with other works. On

the other hand, the calculated age median (51.08 years, SD: ± 20.43 years) is lower than reported by previous studies [9,10,18,19].

### Patients with dizziness discharged from the ED

Our study found that the majority of patients who visited the ED with dizziness were not hospitalized. As most of these patients were self-referred, in many cases the reason for visiting the ED could not be considered an actual emergency. We believe that this phenomenon is explained exactly by the fact of self-referral, although this is not an uncommon problem in other settings as well. A study from the USA showed that 13.7% to 27.1% of all patients who visit the ED could be treated on a non-emergency basis [20].

A surprising finding of our study is that more than 90% of the patients were referred from the triage to a specialist for further work-up. This may be attributed to the fact that accompanying symptoms and co-morbidities, especially chest pain or cardiovascular disease, influence GP decisions to refer the majority of patients to other specialists, in order to ensure that a serious underlying cause is not missed. This finding underlines the need for a better assessment tool for the triage or other community health care settings, in order to reduce the number of referrals to a single or multiple subspecialties.

### Co-morbidities, co-existing symptoms and final diagnoses

Our study also identified the co-morbidities and symptoms which usually accompany dizziness. The most prevalent co-morbidities were hypertension, coronary artery disease, diabetes mellitus, hormonal and neoplastic disorders. Furthermore, concomitant symptoms included vertigo, headache, fatigue, nausea and imbalance. Previous studies have also described causes of dizziness which are not limited to otologic/vestibular dysfunction, but may be of cardiovascular, respiratory, neurologic, genitourinary, digestive, psychiatric or infectious aetiology [21]. Interestingly, a recent study, which focused on grouping the finer characteristics of patients with dizziness, proposed that the “type of dizziness” (vertigo, floating sensation, light-headedness, fainting, disequilibrium) may be of limited diagnostic value [22].

In our study, the five most common “final” diagnoses in patients with dizziness were upper or lower respiratory tract infections, newly diagnosed BPPV, migraine and atrial fibrillation, therefore none urgent enough to justify an ED visit in a tertiary hospital.

### The pathway from the triage to ED specialists

In our study, we tried to delineate the referral pathway of a patient who is visiting the ED complaining of dizziness. We found that the majority of patients are referred to internists, ENTs and neurologists, and not infrequently to more than one of them.

To this end, a number of studies have focused on practices and diagnostic algorithms followed by ED physicians, relying on physical examination, history-taking and diagnostic tests to evaluate the dizzy patient [16,18]. Unfortunately, the traditional approach is not always sufficient [15,17]. An interesting study recently conducted in the Netherlands suggests that the diagnosis-oriented approach is not suitable for all patients, especially the elderly, and underlines the need for a patient-oriented approach [7]. Misdiagnoses are not uncommon, due to the limited time dedicated to each patient, lack of adequate infrastructures and shortness of resources for expensive diagnostic tests which are occasionally needed [23].

ED physicians should maintain a high index of suspicion and be able to differentially diagnose serious from benign self-limiting conditions. A number of studies report that the incidence of serious cerebrovascular events is 3-5% and that many of their causes present with benign characteristics or remain undiagnosed [9,19]. These findings underline the need of a triage assessment tool which can help in identifying a high probability of stroke in cases with dizziness [3]. Other studies tried to evaluate whether tele-medical applications, like transmission of smart phone recorded videos of eye movements, could allow a remotely stationed ENT specialist to accurately screen non-acutely dizzy patients in the ED for BPPV [24].

## The ENT perspective

While a greatly specialized field, otorhinolaryngology deals with many primary health care conditions that are also faced by GPs. Thus, ENTs should be able to assess the dizzy patient and differentially diagnose benign from serious causes of dizziness, especially in the multiple-referral Greek ED setting. Efficient history taking is unequivocal. In many cases, the "qualities" or "traits" of dizziness like time course, precise symptom definition and circumstances may lead to a sound diagnosis [25]. A brief neurological examination, targeting cranial nerve function, may quickly rule-in or rule-out peripheral vestibular pathology [26]. For any physician, a brief examination for nystagmus, knowledge of its basic types (spontaneous, gaze-evoked, positional etc.) and of a few fundamental "laws" (Ewald's, Alexander's) can greatly help in distinguishing its origins [27,28]. No specialized equipment is required for bedside assessment of the dizzy patient: a spot light, a tuning fork and a white sheet of paper (or Frenzel goggles) will more than suffice for the initial examination in the ED setting. GPs can easily perform all of these examinations with no special training in balance disorders, and then refer the dizzy patient appropriately.

Dealing with peripheral vestibular disorders requires more training and experience [29,30], and may pose diagnostic [31,32] and therapeutic [33] challenges, even for experienced physicians. Obviously, extensive posterior labyrinth testing with specialized equipment in dedicated Audiology and Neurotology laboratories is beyond the purpose and the capabilities of an ED.

## Strengths and Limitations

In our opinion, strong points of our study are that it was conducted in real-life settings, identifies the characteristics of the dizzy patient in Greece, and depicts the not infrequently "chaotic" referral route in the ED. In our city, there are two public hospitals which function in an alternating 24-hour service, so we do believe our sample is representative of the patients who search medical assistance in the ED complaining of dizziness. The period of conducting the research was not during the flu season, which could have biased our results due to the higher incidence of respiratory tract infections. Our study, instead of focusing on a stroke-dizziness correlation which is the usual literature approach, it aimed to record accompanying symptoms and chronic diseases of the dizzy patient and explore the referral route of such patients.

Our study has also a number of limitations. One major limitation is the relatively short sampling period (3 months). Also, our analysis is based on a retrospective chart review and only covers a single institution's experience.

## Conclusion

Dizziness is a common presenting symptom in the ED. The vast majority of patients who complain of dizziness are diagnosed with a benign condition. This study underlines the great need for a valid tool to assess the dizzy patient at the "first meeting point" with the health care system, while avoiding needless time expenditure and costs.

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