pISSN 2394-6032 | eISSN 2394-6040

## **Review Article**

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20214298

# **Urgent considerations and assessment of acute dizziness**

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**Received:** 14 October 2021 **Accepted:** 21 October 2021

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## **ABSTRACT**

The quality of symptoms assessment of patients with acute dizziness adds much to the diagnostic value in the affected patients within the emergency department. Many previous review articles have concentrated on addressing and assessing these approaches in the emergency department, however, there is increasing evidence regarding these concerns that are not adequately reviewed and comprehended. Emergency physicians should be aware of the recent advances in the field because of the critical role they represent in these settings. In the present literature review, we aim to formulate evidence regarding the urgent considerations that should be considered when assessing acute dizziness. The initial step would be to conduct a differential diagnosis to adequately evaluate the underlying etiology and help plan for adequate interventions. Caring for the serious causes is also critical to reduce the potential harm that might result from a misdiagnosis of these conditions and enhance patient outcomes. Our cumulative evidence also shows that conducting a thorough adequate examination is the ideal approach to a proper diagnosis, as reports indicate that imaging modalities and other neurological tests are not favorable in these situations. Providing adequate training episodes about the neurological and physical examination should be a priority to the emergency physicians as they are located within the first line to which patients with acute dizziness is present.

Keywords: Acute dizziness, Physical examination, Neurology, Emergency, Diagnosis, Evaluation

## INTRODUCTION

In 3.5% of the cases that are admitted to the emergency department, patients are submitted due to developing acute dizziness.<sup>1,2</sup> The condition can be attributed to different diseases and conditions that can either be self-limited or persist and cause serious complications. Based on the presentation of patients with this phenomenon,

evidence shows that presenting patients can be classified into broad categories of diseases.

A successful differential diagnosis can be conducted and the underlying condition can either be managed if being serious as in cases of limb-threatening, life-threatening or brain-threatening situations. It has been demonstrated that fewer resources are usually utilized within the emergency department to achieve an adequate diagnosis of these

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patients. In this context, estimates show that in the United States, the estimated care costs within the emergency department for the affected patients with acute dizziness have been estimated to be \$4 billion.<sup>3</sup>

Additional costs could also aid to the burden of care of the affected patients due to the required care for the potential complications that might result secondary to dizziness. Increased rates of hospital admissions, increased length of stay within the emergency department, and increased frequency of performing more frequent diagnostic modalities were also reported to be more frequent for patients with dizziness than others that are not within the emergency department. For conducting brain imaging, evidence shows that Computed tomography (CT) is the most commonly used modality in this context. However, they are not widely used in the settings of diagnosing acute dizziness. In this context, estimates show that 12% of the total costs for the imaging frequencies (\$4 billion) are attributed to brain imaging, and around 75% are owing to conducting CT.<sup>3</sup>

The quality of symptoms assessment of patients with acute dizziness adds much to the diagnostic value in the affected patients within the emergency department. Many previous review articles have concentrated on addressing and assessing these approaches in the emergency department. However, there is increasing evidence regarding these concerns that are not adequately reviewed and comprehended. Emergency physicians should be aware of the recent advances in the field because of the critical role they represent in these settings. The aim of the study was to formulate evidence regarding the urgent considerations that should be noted when assessing acute dizziness.

#### **METHODS**

This literature review was based on an extensive literature search in Medline, Cochrane, and Embase databases which was performed on 27<sup>th</sup> September 2021 using the Medical subject headings (MeSH) or a combination of all possible related terms, accprding to the database. To avoid missing poetential studies, a further manual search for papers was done through Google Scholar, while the reference lists of the initially included papers. Studies discussing the assessment of acute dizziness were screened for useful information, with no limitations placed on date, language, age of participants, or publication type.

## **DISCUSSION**

Adequate history taking from patients presenting at the emergency department and suffering from acute dizziness is the first critical step to adequately diagnose the underlying conditions. This step should not be different from other evaluation approaches that are used to assess other conditions. Assessment of the triggers, timing, progression and/or deterioration, associated symptoms

and other morbidities, and establishing a differential diagnosis should be adequately conducted by the attending physician. Bedside examination can also add to the diagnostic value of the different evaluation approaches that are conducted in this setting. Specialty consultation might also be required in some situations when the vestibular nerve has been examined, which might also indicate the need for hospitalization and imaging.

Early evaluation is also essential in certain situations that might indicate the presence of severe underlying diseases and conditions. For instance, in cases of patients presenting with dizziness and associated stroke, applying early adequate interventions can significantly add to the diagnostic value of the condition and enhance the prognosis of these patients.8 Misdiagnosis of the condition can cost a lot in these situations, especially when it occurs in the emergency department where efforts are usually directed to lessen these issues that might be life-threatening. For instance, establishing a mistaken diagnosis for patients with a cerebellar stroke can have a devastating prognosis and can even lead to death. Diagnosing patients with acute dizziness might be difficult because the condition might be attributed to several etiologies, and therefore, physicians should be adequately aware of these conditions to assess these cases properly.

Different investigations have reported variable frequencies of the different etiologies that can lead to the development of dizziness and patient presentation to the emergency department. Neurological (like stroke), otovestibular, and general medical disorders (like noncardiovascular stroke) have been reported to attribute to the development of acute dizziness in 11%, 33%, and 55% of the presenting patients at the emergency department, according to the National Hospital Ambulatory Medical Care Survey study that included 9472 patients and was conducted over 13 years.<sup>2,6</sup> The authors of this survey also demonstrated that some patients (22%) presenting with acute dizziness were assessed based on their symptoms and related clinical manifestations only. A symptom-only diagnosis for patients with acute dizziness in the emergency department has been reported to be common in these settings, and evidence shows that these patients are usually diagnosed by this approach more frequently than other patients within the same settings. Furthermore, the evidence does not support the continued use of imaging modalities and different medications, in cases when a specific vestibular condition has been adequately diagnosed by this approach as in cases of acute peripheral vestibulopathy and paroxysmal positional vertigo (BPPV).<sup>2,9</sup>

In 15% of the patients presenting with acute dizziness at the emergency department, estimates show that a serious diagnosis of cardiovascular, cerebrovascular, metabolic, toxic, and infections are usually reported in these patients, which might predispose to a serious condition and poor prognosis in cases when adequate treatment modalities were not adequately applied. It has been furtherly demonstrated that the frequency of these situations increases with age. For instance, the rate for patients ≤50 years old was found to be 9.35%, while in older patients (>50 years old), the rate was found to be as high as 22%.<sup>7</sup> Fluid and electrolyte imbalance, cerebrovascular diseases, cardiac arrhythmia, acute coronary syndrome, anemia, and hypoglycemia were the most commonly reported causes for the presence of a serious diagnosis, with estimated rates of 5.6%, 4%, 3.2%, 1.7%, 1.6%, and 1.4%, respectively.<sup>9</sup>

Many other causes were also reported among the different investigations in the literature as potential etiologies for the development of acute dizziness. Nevertheless, these etiologies were estimated to be rare and are significantly less frequent than the aforementioned etiologies. Some of these causes might include aortic dissection, adrenal insufficiency, thiamine deficiency, pulmonary embolism, and carbon monoxide poisoning. 10-14 This has been furtherly indicated in a previous prospective investigation that analyzed the findings of 125 patients presenting to the emergency department because of acute dizziness over 16 months. The authors of this investigation reported that 30% of these cases had a serious underlying diagnosis, and 43% had a diagnosis of a peripheral condition.15 vestibular-related Another Chinese investigation, which included a huge set of patients that presented at the emergency department with acute dizziness, reported that 6% of the patients developed dizziness secondary to a central nervous system cause.1

Similar findings were also reported in other investigations. For instance, a German investigation analyzed the causes of dizziness in 475 patients at the emergency department and reported that serious causes (mostly owing to central nervous system diseases) were found in 27% of the cases, while the rest of the included patients had benign etiologies. The authors demonstrated that BPPV and stroke were the most common serious causes for patients presenting with acute dizziness at the emergency department. Furthermore, during follow-up, the study demonstrated that around half of the initial diagnosis was changed to another diagnosis when the case was blindly evaluated by a neurologist rather than an emergency physician. Most of the changed causes were serious to benign etiologies. Dangerous misdiagnosis was also reported in 1 patient for every seven patients. For instance, stroke was the diagnosed cause in seven patients that were initially diagnosed with vestibular neuritis (N=5) and vestibular migraine (N=2).<sup>16</sup>

Caring for the potential presence of acute vestibular syndrome in these settings is also important and can be the definitive diagnosis in many patients. It can be defined as the persistent presence of dizziness that is associated with other manifestations, including headmotion intolerance, nystagmus, gait instability, nausea,

and vomiting. The condition usually lasts for days to weeks.<sup>6,17,18</sup>

Physical examination is critical in these cases, and evidence shows that most patients are usually asymptomatic when presenting at the emergency department. Acute peripheral vestibulopathy has been reported to be the commonest cause, including whether vestibular labyrinthitis or neuritis only. 18 Posterior circulation ischemic stroke has also been reported to be the most common serious cause, especially when it affects the cerebellum and/or lateral brain stem. 18 Multiple sclerosis was also reported to be a common cause in these situations. 19,20 Conducting provoking tests and head movement has been reported to worsen the clinical manifestations of the affected patients significantly. Therefore, these characteristics should be considered for the condition and evidence indicates that a misdiagnosis can be established between this case and other cases of BPPV.6,9,21 It should be noted that establishing a differential diagnosis is important in these situations and can also be life-saving by considering other manifestations that can be triggered by additional unnecessary tests that are usually used to adequately diagnose these cases.

To enhance the quality of diagnosis, a physical examination has been reported to be efficacious in these situations and reports even indicate that it is more diagnostic than conducting an early Magnetic-resonance imaging (MRI) study.<sup>22,23</sup> These investigations described a 3-component examination that was composed of Head impulse, nystagmus, and test of skew (HINTS) test, which was used to assess skew deviation and nystagmus, in addition to the Head impulse test (HIT). Although these reports and physical examinations were reported by experienced neuro-otologists, and stroke neurologists, it has been reported that emergency physicians can also apply these modalities in their settings after getting adequate training.<sup>24-26</sup>

Although conducting imaging in these situations might seem reasonable to help with the diagnostic and evaluation process. It has been reported that for patients with the suspected acute vestibular syndrome, imaging is not very useful in these cases. In this context, reports show that in cases with posterior circulation stroke, conducting CT is of limited value.<sup>22,27,28</sup> Within the first 24-48 hours, it has been furtherly demonstrated that conducting MRI might not also be able to detect 10-20% of the underlying cases with acute vestibular syndrome owing to strokes. 18,22,23 A previous investigation furtherly demonstrated that 50% of the cases with small brain stem strokes can also be missed by MRI modalities when conducted within the 1st 48 hours. 23 Accordingly, it can be concluded that conducting a physical examination can adequately establish a proper diagnosis, while on the other hand, imaging modalities might be cost and timeineffective. Therefore, emergency physicians should be adequately aware of the aforementioned diagnostic

physical approaches to enhance the outcomes. This has been indicated in a previous Italian investigation, which demonstrated that reduced hospitalization rates and CT imaging was associated with conducting a physical examination for diagnosing dizziness and acute vestibular syndrome. Furthermore, overusing imaging modalities and HINTS testing is not supported and adequately comprehended by the different American emergency physicians. However, reports still show that American physicians still prefer the use of these modalities over bedside testing, although it underperformed neurological and HINTS testing was reported to be associated with the widely-known vascular risk factors. <sup>29-31</sup>

#### **CONCLUSION**

Caring for the serious causes of acute dizinness is critical to reduce the potential harm that might result from a misdiagnosis of these conditions and enhance patient outcomes. Our cumulative evidence also shows that conducting a thorough adequate examination is the ideal approach to a proper diagnosis, as reports indicate that imaging modalities and other neurological tests are not favorable in these situations. Providing adequate training episodes about the neurological and physical examination should be a priority to the emergency physicians as they are located within the first line to which patients with acute dizziness is present.

Funding: No funding sources Conflict of interest: None declared Ethical approval: Not required

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Cite this article as: Aldarwish TM, Aljuaid MI, Gabbani HH, Basalamah AY, Twayrqi AAA, Aljuhani BG, et al. Urgent considerations and assessment of acute dizziness. Int J Community Med Public Health 2021;8: 5573-7.