Objective: To determine the cost effectiveness of imaging in evaluating patients with dizziness in the emergency department.

Methods: Charts of patients presenting to metropolitan emergency departments (EDs) with diagnoses of vertigo between January 2008 and January 2011 were reviewed. Patient demographics, signs/symptoms and imaging studies were assessed for correlations and stepwise logistic regressions.

Results: 1681 patients presented to the EDs, 810 (48%) received a CT brain/head scan. $988,200 was spent on CT brain imaging where only 0.74% yielded clinically significant pathology requiring intervention. While 8.84% of MRI's yielded discovery of significant abnormalities. Logistic regression analysis reveals that older patients (p-value 0.001) and those of lower income (p-value 0.047) were more likely to receive a CT scan.

Conclusions: Many physicians, including otolaryngologists, use imaging as a first line modality to quickly rule out more serious causes. However, a look at CT scans ordered on patients with dizziness and vertigo in the emergency room yields a low predictive value for significant pathology. This reveals a great potential for cost savings by simply implementing stricter guidelines for ordering in-ED CTs for these patients. It is our hope that our investigation into our own practices will shed light on avenues to run leaner practices within our institution as well as serve as a model for other health care systems.

Introduction

The health care sector in 2009 accounted for 17.3% of the entire US economy [1]. If the US health sector was thought of as the equivalent of a national economy it would be the sixth largest in the world, making it comparable to the entire economy of France and larger than Britain’s. In healthcare there is increased emphasis on cost-effective care. As the health care debate points towards wider coverage and increasing benefits to the underinsured, there must be higher standards and increased financial efficiency.

The chief complaint of dizziness accounts for 5.6 million clinic visits in the US [2]. Remarkably, 40% of all Americans will seek medical attention for dizziness at some point in their lives. Thus, the evaluation of dizziness contributes significantly to the cost of health care. However, dizziness is often an enigma as patients have difficulty articulating the symptoms [3] and the etiologies are numerous. Furthermore, there is diminished physician time, limited knowledge and the pressure to “not miss” a life threatening disorder.

Dizziness is the chief complaint in about 4% of patients presenting to the Emergency department. It represents one of the top 10 complaints in an ambulatory center [4]. In the Emergency room the challenge lies in quickly identifying the cases requiring emergent care (MI, Stroke, Intracranial bleed), identify the location of the lesion or the operative pathology causing the symptoms and hopefully to control the symptoms or triage to a specialist. In order fit within the confines of the many constraints, these patients get extensive evaluation including blood tests and almost “routine” imaging such as CT and/or MRI of the Head/Brain.

Our objective was to analyze hospital expenditure and imaging results to determine if CT scans and MRI imaging is necessary or helpful in evaluating patients presenting to the Emergency Department with the chief complaint of dizziness or vertigo. This is the first study evaluating the benefits and cost effectiveness of imaging in evaluation of dizziness in the Emergency department by actually reviewing patient’s charts.

Materials & Methods

This was a retrospective chart review. IRB approval was obtained for the Henry Ford Research Committee. Charts of patients presenting to the HF system EDs with the diagnosis code of dizziness and vertigo between January 2008 and January 2011 were reviewed. Only patients under the HAP/HMO were evaluated because of the readily available database. Charts were reviewed in depth for all patients who received a CT scan or MRI of the brain/head related to their presenting complaint. Patient demographics were obtained and stepwise logistic regression analysis was performed to determine whether patient age, socioeconomic factors, signs/symptoms, sex and ethnicity correlated with obtaining CT scans.

<table>
<thead>
<tr>
<th>Imaging</th>
<th># of Patients</th>
<th>Sig.</th>
<th>% Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>1028</td>
<td>6</td>
<td>0.74%</td>
</tr>
<tr>
<td>MRI</td>
<td>113</td>
<td>10</td>
<td>8.94%</td>
</tr>
</tbody>
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Table 1. Positive Yield for Imaging

<table>
<thead>
<tr>
<th>CT Finding</th>
<th>Presenting Symptoms</th>
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<tbody>
<tr>
<td>1</td>
<td>Subarachnoid hemorrhage</td>
</tr>
<tr>
<td>2</td>
<td>FN enhancement from IAC to mastoid</td>
</tr>
<tr>
<td>3</td>
<td>Possible blocked basilar artery</td>
</tr>
<tr>
<td>4</td>
<td>Abnormal ICA (+MRI optic aneurysm)</td>
</tr>
<tr>
<td>5</td>
<td>Isolated anterior vertebrae, possible ICA</td>
</tr>
<tr>
<td>6</td>
<td>Right frontal lobe lesion</td>
</tr>
</tbody>
</table>

Table 2. Significant Abnormal Findings.

Discussion

For any clinician, the challenge of evaluating a dizzy or vertiginous patient lies in correctly identifying the etiology of their complaint. As the differential diagnosis for dizziness is vast, many physicians as well as Otolaryngologists, use imaging as a first-line modality to quickly rule-out more serious causes. Yet the question that arises is how efficacious is the use of a CT scans?

Our literature review found that bedside physical examination and history is considered the best method to identify the cause and to determine who will benefit from additional testing. Kerber et al. in 2010, reviewed the data from the NHAMCS database assessing the benefits of CT scan in evaluating dizzy patients in the ER [5]. While the summative conclusion deemed the clinical value of CT scan, the ER as very low in the setting of acute dizziness, the data was limited due to the nature of the data collection and the results were inferred. Moreover CNS causes of dizziness are uncommon as in a population-based study, about 3% of patients with dizziness had a stroke etiology, but less than 1% of patients with isolated dizziness had stroke as the etiology [6,7].

Furthermore, several guidelines and studies make specific recommendations against radiographic testing stating that the use of a CT to rule-out serious conditions such as acute stroke is largely insensitive [8, 9,10]. These studies focus on the constellation of symptoms (vertigo, instability, other neurological signs, pattern of nystagmus) once again, reinforcing the importance of the history and physical examination on evaluation of vertigo patients.

Conclusions

- With the rising costs of healthcare and the recent movement for change to the infrastructure of HMO’s, it is imperative for physicians to learn the business of medicine.

- Our initial step began with a look at CT scans ordered on patient with dizziness and vertigo in the emergency room and our preliminary results show a 2-year cost of $988,200 where only 0.74% of scans were pathologic.

- Further work involves cost-benefit analysis of MRI as well as investigation into correlations of both CT and MRI with presenting symptoms.

References