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Clinical Focus

A Benign Paroxysmal Positional Vertigo Triage Clinic

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Purpose: The purpose of this study was to evaluate the effectiveness of triaging patients with motion-provoked dizziness into a benign paroxysmal positional vertigo (BPPV) clinic.
Method: A retrospective chart review was performed of veterans who were tested and treated for BPPV in a triaged BPPV clinic and veterans who were tested and treated for BPPV in a traditional vestibular clinic.
Results: The BPPV triage clinic had a hit rate of 39%. On average, the triaged BPPV clinic reduced patient wait times by 23 days relative to the wait times for the traditional vestibular clinic while also reducing patient costs.
Conclusion: Triaging patients with BPPV is one method to improve access to evaluation and treatment and a mechanism for the effective use of clinic time and resources.

Benign paroxysmal positional vertigo (BPPV) is a prevalent peripheral vestibular disorder that negatively affects quality of life (Neuhauser et al., 2005; von Brevern et al., 2007). Studies have shown that patients with BPPV experience an increase in fall risk, a reduction in exercise intensity, greater postural instability, and reduced gait speed (Çelebisoy, Bayam, Güleç, Köse, & Akyürekli, 2009; Chang, Hsu, Yang, & Wang, 2006; Kollén, Hörder, Möller, & Frändin, 2017; Lopez-Escamez, Gamiz, Fernandez-Perez, Gomez-Fiñana, & Sanchez-Canet, 2003). In addition to physical consequences, patients with BPPV may experience increased social isolation, emotional and psychological distress, and a limitation in activities that they would otherwise perform (Çelebisoy et al., 2009; Chang et al., 2006; Kollén et al., 2017; Lopez-Escamez et al., 2003). Last, occupational disability and time off work can be common in patients suffering from BPPV (Benecke, Agus, Kuessner, Goodall, & Strupp, 2013; Skøien, Wilhemsen, & Gjesdal, 2008).

It is fortunate that the diagnosis of BPPV is well-established and the treatment is quick, safe, and highly effective (Bhattacharyya et al., 2017; Cohen & Kimball, 2005; Froehling et al., 2000; Lynn, Pool, Rose, Brey, & Suman, 1995; von Brevern, Schmidt, Schönfeld, Lempert, & Clarke, 2006). The American Academy of Otolaryngology—Head and Neck Surgery developed clinical practice guidelines for the diagnosis and management of BPPV, which include: (a) diagnose posterior semicircular canal BPPV when vertigo associated with nystagmus is provoked by the Dix–Hallpike maneuver, (b) perform the roll test if a patient's history is compatible with BPPV, but Dix–Hallpike is negative, (c) treat patients with posterior canal BPPV with canalith repositioning treatment (CRT), and (d) reassess within 1 month to confirm symptom resolution (Bhattacharyya et al., 2017). The panel recommended against radiographic imaging and vestibular testing in patients diagnosed with BPPV and made no recommendation for audiometric testing in these patients. In a similar manner, the Quality Standards Subcommittee of the American Academy of Neurology provided practice parameters on the treatment of BPPV and the use of CRT as an effective treatment strategy for posterior canal BPPV (Fife et al., 2008).

Despite evidence-based guidelines and practice parameters, many patients with BPPV do not have access to timely assessment and treatment. Von Brevern et al. (2007) reported that 86% of individuals with BPPV sought medical care, but only 8% received effective treatment, and BPPV is often unrecognized in the elderly (Oghalai, Manolidis,

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Barth, Steward, & Jenkins, 2000). Patients with BPPV frequently undergo unnecessary and costly diagnostic tests of no yield (e.g., brain magnetic resonance image, head computerized tomography scan, electroencephalogram), whereas they are not evaluated with a Dix–Hallpike maneuver, which is the gold standard test for diagnosis of BPPV (Polensek, Sterk, & Tusa, 2008). In one study of patients seeking treatment for dizziness, only 11% of providers evaluated patients for BPPV by performing the Dix–Hallpike maneuver, despite the fact that the test can be readily performed by nonspecialists at the bedside without need for specialized equipment (Polensek et al., 2008). A subsequent qualitative study found that physicians felt that a major barrier to providing care for patients with vestibular disorders (including BPPV) was their perception of not having sufficient training and expertise in the area of vestibular assessment and management (Polensek & Tusa, 2009). Additional barriers perceived by clinicians included problems with dizzy patients complaining of vague symptoms, not having enough time to evaluate a dizzy patient in clinic, and the perceived vast differential diagnosis for dizziness.

The audiology service at Mountain Home Veterans Affairs Medical Center (VAMC) has long provided comprehensive vestibular evaluations for veterans with dizziness, including assessment and treatment of patients with BPPV. In March of 2010, a BPPV clinic was established utilizing the American Academy of Otolaryngology—Head and Neck Surgery guidelines (n.d.) with the goal of improving access to care for patients and to use clinical time more efficiently. The purpose of this study was to evaluate the effectiveness of triaging patients with motion-provoked dizziness to the BPPV clinic.

Method

A retrospective chart review was performed on two cohorts of veterans evaluated for dizziness in the vestibular clinic at the Mountain Home VAMC: (a) patients enrolled in the vestibular clinic from March 2005 to August 2006 (no triage group) and (b) patients enrolled in the BPPV clinic from March 2010 to August 2011 (triage group). This study was approved by the East Tennessee State University/Veterans Affairs Institutional Review Board.

Prior to establishment of the BPPV clinic (March 2010), all patients referred for dizziness, vertigo, and/or imbalance were scheduled for a comprehensive assessment in the vestibular clinic. The test battery often included case history, assessment for spontaneous nystagmus, ocular motor assessment, Dix–Hallpike and roll tests, caloric irrigations, rotational testing (sinusoidal harmonic acceleration, assessment of fixation suppression, and velocity step), cervical vestibular-evoked myogenic potentials, and posturography.

In March 2010, the BPPV clinic was established within the audiology service as a triage service and included six 30-min appointments per week designated for diagnosis, treatment, and follow-up of BPPV. Patients seen in the BPPV clinic included those who had been (a) treated previously for BPPV and were returning for the Dix–Hallpike and roll tests to determine treatment outcome and any need for retreatment if necessary (follow-ups), (b) diagnosed and treated previously for BPPV and report that symptoms have recurred (recurrences), or (c) referred to audiology for assessment of dizziness and who were triaged into the BPPV clinic (new referrals). Criteria for new referrals to be triaged into the BPPV clinic included: (a) a report of brief motion-provoked vertigo (< 1 min) and (b) residence within a 30-mile radius of the Mountain Home VAMC (Johnson City, TN). Prior to scheduling a new referral in the BPPV clinic, an audiologist reviewed the referring providers' clinic notes in the computerized patient record system to determine if the patient reported brief motion-provoked vertigo. In the cases where documentation of symptoms was unclear, patients were scheduled in the full clinic rather than the BPPV clinic.

BPPV appointments included a brief vestibular case history, which included information about quality, duration, and frequency of symptoms, exacerbating or provoking factors, concomitant symptoms, and general medical history. The Dix–Hallpike test and the roll tests were performed using video goggles (RealEyes xDVR Monocular Video Goggles, Micromedical Technologies, Chatham, IL) to visualize and record nystagmus. Patients who reported neck or back problems were assessed with a side-lying test instead of the Dix–Hallpike. Diagnostic criteria for BPPV included presence of brief nystagmus and vertigo. Patients who were positive for BPPV were treated with CRT, counseled about their BPPV, provided an educational brochure, and scheduled for a BPPV follow-up appointment in 1 to 2 weeks. Patients who continued to report symptoms following resolution of BPPV were referred for additional vestibular testing at the BPPV follow-up appointment. Patients who were negative for BPPV (no vertigo or nystagmus during Dix–Hallpike or roll tests) during the initial assessment were also scheduled for a full vestibular assessment.

To determine the effectiveness of triaging patients with motion-provoked vertigo into the BPPV clinic, we examined the positive BPPV hit rate, clinic wait times, and the cost to evaluate, treat, and provide follow-up for patients with BPPV. The positive BPPV hit rate was calculated from new referrals who were triaged into the BPPV clinic for motion-provoked vertigo from March 2010 to August 2011. Clinic wait times were compared for patients who were newly diagnosed with BPPV in the BPPV triage clinic (triage group) to patients who were newly diagnosed for BPPV in the vestibular clinic (no triage group). To determine clinic wait times, the following data were recorded from appointment dates and progress notes in the computerized patient record system for both groups: (a) the date of the initial referral to the vestibular clinic for dizziness symptoms and (b) the date of the initial appointment that the patient was scheduled in the vestibular clinic (no triage group) or BPPV clinic (triage group). The clinic wait time was defined as the number of days between the referral date to the vestibular or BPPV clinic for dizziness and the first date a patient was scheduled to be assessed. During

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the time period from March 2005 to August 2006, approximately four full vestibular evaluations were scheduled each week. During the time period from March 2010 to August 2011 approximately six full vestibular evaluations were scheduled each week.

To evaluate the cost effectiveness of the BPPV clinic, we compared the cost per encounter between the BPPV and vestibular clinics for new referrals. Cost estimation per encounter was based on clinic type and was provided by the local decision support service, which serves as a cost accounting system for the Veterans Health Administration. Cost was calculated by examining the actual cost to provide a specified patient care service and included the following factors: (a) the labor needed to carry out the specified patient care service, (b) relative value units (RVUs) for services rendered, (c) the supplies and equipment needed, and (d) overhead (e.g., square footage of clinic space) associated with that particular service. Some of the cost factors are site-specific, whereas RVU values for clinic types are based on guidance from the National Audiology and Speech Pathology Program Office using standardized Veterans Affairs–wide procedure times or professional work values (RVUs). For the BPPV clinic, the RVU value was 30 min and the vestibular clinic was set to 180 min. These values include the test battery described above and also include the interpretation and documentation of the test results.

Results

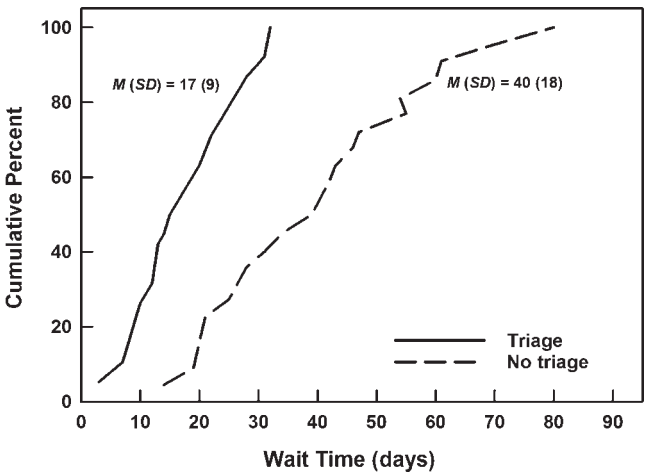
BPPV Triage Clinic Hit Rate

The chart review revealed that 187 unique patients were seen in the BPPV triage clinic from March 2010 to August 2011. Of the 187 patients seen, 105 were new referrals into the BPPV clinic (triage group) and the other 82 were either recurrences or follow-up visits from the vestibular clinic. An examination of the 105 new referrals that were triaged into the BPPV clinic revealed that 41 patients were positive for BPPV (hit rate of 39%).

Clinic Wait Times

To determine if the BPPV clinic improved access to care for patients with BPPV, the clinic wait times were calculated for new referrals that were positive for BPPV in both the triage and the no triage groups. In the triage group, 41 new referrals were positive for BPPV, and 23 new referrals in the no triage group were positive for BPPV. One patient was excluded from both the triage and the no triage groups' wait time analyses as those patients requested appointments to be bundled with future appointments either in audiology or another clinical service. Figure 1 shows the mean clinic wait times were 17 days (SD = 9) for the triage group and 40 days (SD = 18) for the no triage group. A one-way between subjects analysis of variance (ANOVA) was conducted to compare the wait times of the triage and no triage groups. There was a significant improvement in the wait times for patients triaged with BPPV compared with those in the no triage group, $F(1, 60) = 39.96$, $p = .000$. Forty-five percent of patients positive for BPPV in the triage group were seen in less than 2 weeks compared with < 1% of patients in the no triage group. Triaging patients with motion-provoked dizziness into the BPPV clinic allowed patients to be evaluated and treated for BPPV on average 23 days earlier than patients who were not triaged.

Figure 1. Comparison of wait times for the triage and no triage groups. All patients in the triage group were seen in less than 35 days. The mean wait time was 17 days for the triage group and 40 days for the no triage group.



BPPV Triage Cost Effectiveness

To examine the cost effectiveness of identifying and treating patients in the BPPV clinic, the cost was estimated per encounter on the basis of clinic type (i.e., BPPV versus vestibular). At the Mountain Home VAMC, the BPPV clinic cost is approximately $94 per encounter, whereas the vestibular clinic cost is approximately $442 per encounter. Table 1 shows the cost to diagnose and treat patients with BPPV on the basis of the number of clinical visits. The number of clinical visits was calculated as the initial evaluation with treatment plus a follow-up visit or visits. For example, if a patient returned for two follow-up visits, then the number of clinical visits was three (one evaluation and treatment appointment and two follow-up appointments). All follow-up appointments were equal to a 30-min RVU regardless of clinic type. The majority of patients (63%) were treated successfully with one treatment (two clinical visits = 1 initial evaluation and 1 follow-up) (Akin et al., 2017), and the cost was $188 for patients who were triaged to the BPPV clinic and $536 for patients initially seen in the vestibular clinic and not triaged.

BPPV Triage Follow-Up

In the triage group, 41 patients were positive for BPPV and four were lost to follow-up. Of the 37 patients

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Table 1. Number of clinical visits and the cost of evaluation and treatment.

	Cost ($)	
No. of clinic visits	**BPPV clinic (triage clinic)**	**Vestibular clinic (no triage clinic)**
2	188.00	536.00
3	282.00	630.00
4	376.00	724.00
5	470.00	818.00

Note. Clinic cost includes the initial evaluation with treatment plus follow-up visit(s); BPPV = Benign Paroxsymal Positional Vertigo.

who were seen for follow-up, 33 had a negative Dix–Hallpike and roll test during their follow-up visit(s), and four patients continued to demonstrate abnormal responses (i.e., a positive Dix–Hallpike and/or roll test). Three of these four were referred for further vestibular testing.

Discussion

The primary aim of the current study was to determine effectiveness of triaging patients with short duration motion-provoked dizziness into a BPPV clinic. Our hit rate was 39% for the BPPV clinic. This suggests that approximately 40% of BPPV patients avoided unnecessary testing, resulting in substantial savings to the health care system. It is not surprising that using motion-provoked vertigo as a screening criterion for triage would result in inclusion of patients without BPPV. Although motion-provoked vertigo is the most common symptom reported by patients with BPPV (Akin et al., 2017), it can occur with other (non-BPPV) causes of vestibular dysfunction. That is, motion-provoked vertigo suggests a breakdown of the vestibulo-ocular reflex that keeps gaze steady when the head is in motion and is a clinical sign for vestibular loss. Unlike non-BPPV vestibular vertigo, BPPV symptoms are provoked by specific positions (e.g., looking up or turning in bed) rather than generalized to all head movement. Several opportunities to refine and improve the precision of our current triage process could be considered. First, using specific provoking positions (e.g., turning over in bed or looking up) as a triage criterion may improve the hit rate. Second, educating referring health care providers may improve documentation of BPPV-like symptoms compared with abstracting motion-provoked vertigo from clinic notes of untrained providers. In a similar manner, the use of telephone or mail-in case history forms to the patient may provide a mechanism to improve upon the triage process and hit rate.

In patients who were positive for BPPV, we were able to evaluate and treat them sooner than patients who were not triaged. The mean wait time for new referrals was 17 days for the triage group and 40 days for the no triage group. The BPPV clinic allowed patients with motion-provoked dizziness to be identified and treated for BPPV on average 23 days earlier than patients who were not triaged. It is important to note that using this model, the audiologist performed both the evaluation and treatment of BPPV on the same day and in doing so, this contributed to improving access to care and reducing wait times for treatment. Our data show an improvement in wait times compared with some research that has shown wait times on average of 18 weeks with an additional 5 weeks for follow-up treatment (Leong, Barker, & Bleach, 2008).

The current study demonstrates a model to reduce the health care cost of BPPV by eliminating unnecessary testing. Among patients with BPPV, Fife and FitzGerald (2005) demonstrated that many patients undergo extensive testing (averaging $2,000 per patient) that does not lead to the diagnosis. In this group of patients, the average health care savings in the audiology service alone was $348 per triaged patient. Although the cost saving may not be generalizable to other clinics (i.e., clinics that utilize different test batteries), our findings demonstrate that a triage process can lower health care costs for patients with BPPV.

Although treatment of BPPV is described within the scope of practice for audiology, Medicare and third-party reimbursement is limited to diagnostic testing for audiologists. The lack of reimbursement for treatment of BPPV presents an obstacle in implementing a BPPV triage clinic in non-Veterans Affairs clinics. That is, a second appointment (and delay in access to treatment of BPPV) may be required in some clinic settings. Another option is a multidisciplinary service delivery model in which treatment is performed by health care providers who are reimbursed for CRT (e.g., physical therapist, occupational therapist, or physician) on the same day that BPPV is diagnosed. Beckerman (2016) described a triage model in which patients who report brief vertigo (< 1 min) that is triggered by position changes are referred to physical therapy as the initial appointment and treatment for BPPV. This model overcomes the lack of reimbursement to audiology for treatment of BPPV, and, similar to our model, reduces the number of unnecessary tests that a patient would undergo for diagnosis of BPPV.

Last, a limitation of this study includes the retrospective design and small sample size. A prospective design would provide stronger evidence of the effectiveness of a BPPV triage clinic. In the current study there was a small difference in the clinic resources available (i.e., in the 2005–2006 time period an average four appointments per week and in 2010–2011 an average of six appointments

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per week). Due to the retrospective nature of the study and the data available, it was difficult to ascertain how clinical needs may have changed during those periods of time and therefore difficult to completely understand the extent to which the triage clinic improved wait times. A prospective study may provide a mechanism to further understand the wait times and clinical resources saved when triaging patients.

Conclusions

The use of triaging patients with symptoms of motion-provoked vertigo to a BPPV clinic yielded a 39% hit rate and improved access to care by decreasing clinic wait times by an average of 23 days for veterans with BPPV. In addition, the BPPV clinic provided cost savings by reducing the amount of unnecessary testing for identifying BPPV.

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