Clinical Policy Title: Tilt table testing

Clinical Policy Number: 09.01.13

Effective Date: October 1, 2016
Initial Review Date: July 20, 2016
Most Recent Review Date: August 17, 2017
Next Review Date: August 2018

Related policies:
CP# 09.01.01  Autonomic nervous system testing for neuropathy
CP# 10.02.03  Non-pharmaceutical treatments for chronic vertigo

ABOUT THIS POLICY: Keystone First VIP Choice has developed clinical policies to assist with making coverage determinations. Keystone First VIP Choice’s clinical policies are based on guidelines from established industry sources, such as the Centers for Medicare & Medicaid Services (CMS), state regulatory agencies, the American Medical Association (AMA), medical specialty professional societies, and peer-reviewed professional literature. These clinical policies along with other sources, such as plan benefits and state and federal laws and regulatory requirements, including any state- or plan-specific definition of “medically necessary,” and the specific facts of the particular situation are considered by Keystone First VIP Choice when making coverage determinations. In the event of conflict between this clinical policy and plan benefits and/or state or federal laws and/or regulatory requirements, the plan benefits and/or state and federal laws and/or regulatory requirements shall control. Keystone First VIP Choice’s clinical policies are for informational purposes only and not intended as medical advice or to direct treatment. Physicians and other health care providers are solely responsible for the treatment decisions for their patients. Keystone First VIP Choice’s clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, Keystone First VIP Choice will update its clinical policies as necessary. Keystone First VIP Choice’s clinical policies are not guarantees of payment.

Coverage policy

Keystone First VIP Choice considers the use of tilt table testing to be clinically proven and, therefore, medically necessary as a diagnostic test for:

• Members with recurrent and not fully explained syncope, or an unexplained single syncopal episode in high-risk settings (e.g., risk of injury).
• Members with postural orthostatic tachycardia syndrome (POTS), whose cause is not well understood after prior diagnostic efforts.

Limitations:

All other uses of tilt table testing as a diagnostic tool are investigational and, therefore, not medically necessary, due to a lack of evidence in the peer-reviewed medical literature supporting efficacy of this test.
All uses of the test to evaluate effectiveness of treatments or to guide treatment selection are also considered investigational, and not medically necessary.

Contraindications to the administration of isoproterenol include ischemic heart disease, uncontrolled hypertension, left ventricular outflow tract obstruction, and significant aortic stenosis. Caution should be used in patients with known arrhythmias.

**Alternative covered services:**

- History, physical examination, including orthostatic BP measurements. Non-invasive and invasive electrocardiographic monitoring.
- Electrophysiological testing.
- Adenosine triphosphate testing.
- Diagnostic imaging.
- Exercise stress testing.
- Cardiac catheterization.
- Behavioral health assessment.
- Neurological testing.

**Background**

Syncope is a common symptom that affects three to six of every thousand persons in a given year. Incidence is highest in the elderly and in females (Peeters, 2014). Syncope, which is characterized by a brief loss of consciousness and muscle strength due to reduced blood flow from the brain, typically masks a specific diagnosis. Many of these conditions are treatable, but some can be serious and require immediate medical care.

One type of syncope is vasovagal syncope, also known as neurocardiogenic syncope. It is marked by a sudden loss of consciousness from cerebral ischemia secondary to a decrease in cardiac output, peripheral vasodilation, and bradycardia, which occurs when part of the nervous system that controls blood pressure and heart rate suddenly lowers them for a short time, reducing blood flow to the brain, causing faintness.

POTS is a condition of orthostatic intolerance characterized by a rapid increase in heart rate upon standing (Dysautonomia International, 2012). The cause of POTS is poorly understood, but an estimated 1,000,000 to 3,000,000 Americans are impacted by this condition, mostly women between the age of 15 and 50.

A medical history, physical examination, and electrocardiogram can uncover the cause of syncope, which typically is heart-related or hypotension (both naturally mediated and orthostatic). Further testing may be indicated to improve diagnostic accuracy.

Tilt table testing is designed to reproduce the same symptoms while monitoring blood pressure and heart rate in a clinical setting. It may eliminate the need to conduct more advanced and complex tests, if
performed relatively early in the workup. During the test, the patient lying flat and supine is slowly lifted upwards, so that the patient’s head is first elevated 30 degrees, then (after several minutes) to 60 degrees. When a tilt table test changes the patient from a supine to an upright position, a large increase in heart rate results, and symptoms may be triggered. Any excessive drop in blood pressure will result in the test being stopped.

The patient may be given an intravenous (IV) administration of isoproterenol, which will increase the average heart rate to trigger abnormal responses in susceptible patients (Protheroe, 2013). In addition to isoproterenol, patients may be given isosorbide dinitrate (Macedo, 2012) or sublingual nitroglycerine (Uhm, 2012). The test typically takes between 20 to 60 minutes to complete.

Searches

Keystone First VIP Choice searched PubMed and the databases of:

- UK National Health Services Centre for Reviews and Dissemination.
- Agency for Healthcare Research and Quality’s National Guideline Clearinghouse and other evidence-based practice centers.
- The Centers for Medicare & Medicaid Services (CMS).

We conducted searches on July 21, 2017. Search terms were: “Tilt-Table Test (Mesh),” “Orthostatic Intolerance (Mesh),” and free text terms “tilt table test,” “syncope” and “postural orthostatic tachycardia syndrome.”

We included:

- **Systematic reviews**, which pool results from multiple studies to achieve larger sample sizes and greater precision of effect estimation than in smaller primary studies. Systematic reviews use predetermined transparent methods to minimize bias, effectively treating the review as a scientific endeavor, and are thus rated highest in evidence-grading hierarchies.
- **Guidelines based on systematic reviews**.
- **Economic analyses**, such as cost-effectiveness, and benefit or utility studies (but not simple cost studies), reporting both costs and outcomes — sometimes referred to as efficiency studies — which also rank near the top of evidence hierarchies.

Findings

One recent meta-analysis shows that head-up tilt testing is highly effective for diagnosing vasovagal syncope. This publication included 55 studies, comparing 4,361 subjects with syncope of unknown origin to 1,791 controls with no prior history of syncope. (Forleo, 2013). Tilt testing had a strong ability to discriminate between symptomatic patients and asymptomatic controls. Test specificity was highest for patients who were elderly and those positioned at a 60-degree angle, and test sensitivity increased when nitroglycerine was used instead of isoproterenol to increase heart rate.
There have been numerous studies assessing efficacy of diagnosing vasovagal syncope through use of tilt table tests. One showed that a “front loaded” test (patient given 20 minutes of glyceryl trinitrate) showed a higher diagnostic rate for vasovagal syncope than traditional tilt table testing (Parry, 2008). Another showed that a shortened tilt test (13 minutes vs. the conventional 30 minutes, due to the administration of sublingual isosorbide dinitrate at the start of the test instead of after a passive period) was better tolerated by patients and resulted in a faster diagnosis (Macedo, 2012).

Tilt table testing was a prognostic factor in neurocardiogenic syncope (another term for vasovagal syncope), according to a study of 665 males (Uhm, 2012). Another report found that high-dose isoproterenol in 300 syncope patients (who had tested negative without the drug) reproduced neurocardiogenic syncope during tilt table testing (Vlay, 2000).

Multiple studies found tilt table testing effective in the diagnosis of POTS (Freeman, 2006; Novak, 1998; Lamarre-Cliché, 2001). Carew (2009) found that a 10-minute tilt table test is enough to diagnose POTS in most patients, but that a longer time is needed to diagnose vasovagal syncope. One review concluded that new criteria were needed for diagnosing POTS in children and adolescents (Singer, 2012); another group concluded a tilt angle of 60 degrees and test time of 45 minutes was most suitable for diagnosing children with orthostatic intolerance (Lin, 2015). Tilt table testing demonstrated high rate of abnormal findings in persons with persistent post-concussion symptoms, warranting further study of autonomic dysfunction in these patients (Heyer, 2016).

Attempts have been made to use tilt table testing to aid in diagnosing various conditions with little success. Some patients with Chronic Fatigue Syndrome had abnormal responses to tilt table tests and showed improvement in symptoms after taking anti-hypotensive medications; but no additional value in predicting response to medication from the tilt table test was demonstrated (Rowe, 1995; Klonoff, 1996).

One study found the test had only a 40 percent accuracy rate in predicting clinical response to decompression for patients with Chiari, and was not a useful test to guide surgical decision-making (Strauss, 2009). One failed to show that the tilt table test could distinguish Parkinson syndrome patients into groups, by patterns of autonomic abnormalities (Reimann, 2010). Another report found that tilt testing may be useful in diagnosing patients with obstructive sleep apnea syndrome (Uno, 2009).

Policy updates:

In 2017, we added one evidence-based guideline from the European Society of Cardiology (Moya, 2009). They included an additional indication for tilt table testing: diagnosing an unexplained single syncopal episode in high-risk settings (e.g., risk of injury). The policy was amended with this addition.

Summary of clinical evidence:

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forleo (2013)</td>
<td>Key points:</td>
</tr>
<tr>
<td>Citation</td>
<td>Content, Methods, Recommendations</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Meta-analysis of studies on effectiveness of tilt table testing          | • 55 trials, 4,361 subjects with syncope/unknown origin, 1,791 controls (no syncope).  
• Head-up tilt testing highly effective for diagnosing vasovagal syncope.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Macedo (2012)                                                           | Key points:  
• 120 subjects with history of vasovagal syndrome, divided into longer and shorter tests (patient given isosorbide dinitrate immediately vs. after a latency).  
• Shorter test had similar percentage of positive results, was equally accurate, and had fewer false positives than the longer test.  
• Concluded diagnosis was faster and test better tolerated in the shorter test group.                                                                                                                                                                                                                                                                                                                                                     |
| Comparison of specificity, sensitivity, accuracy of tilt table testing   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Uhm (2012)                                                              | Key points:  
• 665 males age 17 to 27 were given tilt tests and followed for 12 months.  
• Those with negative results after 30 minutes were administered sublingual nitroglycerin.  
• Neurocardiogenic syncope was greater in those with positive results in passive phase of tests and those with previous syncopal episodes.                                                                                                                                                                                                                                                                                      |
| Study of prognostic factors for neurocardiogenic syncope                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Moya (2009) for the ESC                                                 | Key points:  
• Recommended for unexplained single syncopal episode in high risk settings, recurrent episodes in the absence of organic heart disease, or recurrent episodes in the presence of organic heart disease after cardiac causes of syncope have been excluded.  
• Recommended when it is of clinical value to demonstrate susceptibility to reflex syncope.  
• Not recommended for assessment of treatment.  
• Other indications have conflicting or insufficient evidence of efficacy.                                                                                                                                                                                                                                                                                                                       |
| Guidelines for the diagnosis and management of syncope                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Vlay (2000)                                                             | Key points:  
• 300 persons given test, heart rate and blood pressure monitored continually.  
• High dose isoproterenol tolerated in 62% of patients, lowered in 33%, stopped in 4%.  
• Concluded isoproterenol reproduced neurocardiogenic syncope in symptomatic patients who tested negative without the drug, and was safe, tolerated, and expeditious.                                                                                                                                                                                                                                                                                                                        |
| Study of safety and tolerability of isoproterenol administered during tilt table testing |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

**References**

**Professional society guidelines/other:**


**Peer-reviewed references:**


**CMS National Coverage Determinations (NCDs):**

No NCDs identified as of the writing of this policy.

**Local Coverage Determinations (LCDs):**


**Commonly submitted codes**

Below are the most commonly submitted codes for the service(s)/item(s) subject to this policy. This is not an exhaustive list of codes. Providers are expected to consult the appropriate coding manuals and bill accordingly.

<table>
<thead>
<tr>
<th>CPT Code</th>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>93660</td>
<td>Evaluation of cardiovascular function with tilt table evaluation, with continuous ECG monitoring and blood pressure monitoring, with or without pharmacological intervention</td>
<td></td>
</tr>
<tr>
<td>ICD-10 Code</td>
<td>Description</td>
<td>Comments</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>R55</td>
<td>Syncope include vasovagal syncope</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HCPCS Level II Code</th>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>