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, 2016
Next Review Date: August, 2017

About this policy: Select Health of South Carolina has developed clinical policies to assist with making coverage determinations. Select Health of South Carolina’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 Select Health of South Carolina 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. Select Health of South Carolina’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. Select Health of South Carolina’s clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, Select Health of South Carolina will update its clinical policies as necessary. Select Health of South Carolina’s clinical policies are not guarantees of payment.

Coverage policy

Select Health of South Carolina considers the use of tilt table testing to be clinically proven and, therefore medically necessary as a diagnostic test for patients with recurrent and not fully explained syncope, including, but not restricted to, vasovagal syncope. The test is also considered medically necessary for patients with postural orthostatic tachycardia syndrome whose cause is not well understood after prior diagnostic efforts.

Limitations:

All other uses of tilt table testing as a diagnostic tool are considered to be 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.

Alternative covered services:

None.
**Background**

Syncope is a common symptom that affects 3-6 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.

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). However, some cases require further testing, and tilt table testing has demonstrated the ability to improve accuracy of diagnosis in patients presenting with syncope. It can even eliminate the need to conduct more advanced and complex tests, if performed relatively early in the workup.

Another condition for which tilt table testing can be effectively used is postural orthostatic tachycardia syndrome. Estimates of how many Americans have the disease at one time range between 500,000 to 3,000,000, mostly women between the age of 15 and 50.

During a tilt table test, the patient lies on a table and is given an IV administration of isoproterenol, which will increase the average heart rate to trigger abnormal responses in susceptible patients. In addition to isoproterenol, patients can also be given isosorbide dinitrate (Macedo, 2012) or sublingual nitroglycerine (Uhm, 2012). The patient 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. During this process, symptoms can be triggered, and changes in a patient’s blood pressure and pulse are measured. Any excessive drop in blood pressure will result in the test being stopped. The test typically takes between 20 to 60 minutes to complete. Some tests are administered without isoproterenol or other IV drug, and some are given with lower body negative pressure (Protheroe, 2013).

**Searches**

Select Health of South Carolina 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 June 8, 2016. Search terms were: “tilt table test” and “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 4361 subjects with syncope of unknown origin to 1791 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 tradiation 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 also found to be 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 postural orthostatic tachycardia syndrome, or 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 was 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).
More recently, one report documented that tilt table testing was able to show a 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% accuracy rate in predicting clinical response to decompression for patients with Chiari, and is 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:

None.

Summary of clinical evidence:

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
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</table>
| Forleo (2013)  | Meta-analysis of studies on effectivenes of tilt table testing | **Key points:**
|                | 55 trials, 4361 subjects with syncope/unknown origin, 1791 controls (no syncope) |
|                | Head-up tilt testing highly effective for diagnosing vasovagal syncope |
| Macedo (2012)  | Comparison of specificity, sensitivity, accuracy of tilt table testing | **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 % 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 |
| Uhm (2012)     | Study of prognostic factors for neurocardiogenic syncope | **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 |
| Vlay (2000)    | Study of safety and tolerability of isoproterenol administered during tilt table testing | **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 |

Glossary
Isoproterenol — A drug given intravenously to persons undergoing a tilt table test, to increase heart rate and cardiac output during tilt table testing (also known as Isoprel).

Neurocardiogenic syncope — See vasovagal syncope.

Postural orthostatic tachycardia syndrome — A condition in which a change from the supine to upright condition causes an abnormally rapid heart rate (tachycardia), causing lightheadedness or fainting.

Syncope — Fainting or swooning due to a reduced blood flow to the brain, often from low blood pressure.

Tilt table test — A test used in persons with syncope or postural orthostatic tachycardia syndrome, involving elevation of patients from the supine position to measure changes in blood pressure and pulse, to aid in understand the cause(s) of fainting.

Vasovagal syncope — Fainting or swooning when the body overreacts to certain triggers, causing heart rate and blood pressure to suddenly drop and blood flow reduction to the brain and loss of consciousness (also known as neurocardiogenic syncope).

References

Professional society guidelines/other:


Peer-reviewed references:


**Clinical trials:**

Searched clinicaltrials.gov on June 10, 2016 using terms terms “tilt table.” | Open Studies. 51 studies found, six (6) relevant.


CMS National Coverage Determinations (NCDs):
No NCDs identified as of the writing of this policy.

Local Coverage Determinations (LCDs):
No LCDs identified as of the writing of this policy.

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.

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<td>Evaluation of cardiovascular function with tilt table evaluation, with continuous ECG monitoring and blood pressure monitoring, with or without pharmacological intervention</td>
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