Clinical Question:
What orthostatic vital sign procedure is needed to detect significant fluid volume alterations in adult and pediatric patients?

Problem:
Orthostatic, or postural, vital signs are used to evaluate the body’s response to position changes when volume loss is suspected. Under normal conditions blood pooling in the lower extremities during position change is directed back to the upper body through the vasoconstriction of blood vessels (Winslow, Lane, & Woods, 1995). This vasoconstriction is accomplished through unloading of the arterial baroreceptors to enhance sympathetic outflow, which increases systemic vascular resistance, venous return and cardiac output (Arnold, Shibao, 2013). Baroreceptors are mechanoreceptor sensory neurons that are excited by stretching of the corresponding blood vessel. The most important arterial baroreceptors are the carotid sinus baroreceptors and the aortic arch baroreceptors (Aung, 2013). However, conditions leading to hypovolemia and autonomic failure may result in a sudden drop in blood pressure known as orthostatic hypotension (OH) and result in impaired perfusion to the upper body. The American Autonomic Society and the American Academy of Neurology define OH as a 20 mmHg or greater decrease in systolic blood pressure (SBP) and a 10 mmHg or greater decrease in diastolic blood pressure (DBP) within three minutes of standing (American Academy of Neurology, 1996). This drop in blood pressure may be associated with symptoms such as lightheadedness, dizziness, blurred vision, weakness, fatigue, cognitive impairment, nausea, palpitations, tremulousness, headache, neck ache and syncope (American Academy Neurology, 1996; Cooke et al., 2009; Koziol-McLain, Lowenstein, & Fuller, 1991; Naschitz, & Rosner, 2007; Sarasin et al., 2002).

An increase in heart rate is often noted when there is a change in posture. This compensatory change occurs in response to the sudden drop in blood pressure (Naschitz & Rosner, 2007; Winslow, Lane, & Woods, 1995; Smith, Porth, & Erickson, 1994). While heart rate is not included in the official definition for OH per the American Academy of Neurology, changes in heart rate aid the differential diagnosis for OH. For instance, a drop in blood pressure accompanied by a rise in heart rate indicates volume depletion, while no change in heart rate may point to a neurogenic cause (Naschitz, & Rosner, 2007). Knopp, Claypool, and Leonardi (1980) found that in adults a heart rate increase of 30 beats per minute or more is considered indicative of volume loss.

The most common reason for performing orthostatic vital signs in the emergency department (ED) is to evaluate fluid volume status. However, research has shown orthostatic vitals are not reliably sensitive to volume losses less than 1000-mL in adult patients (Barraf, & Schriger, 1992; Knopp, Claypool, & Leonardi, 1980). Studies have also revealed wide variations in response to the orthostatic challenge among normal adult individuals (Koziol-McLain, Lowenstein, & Fuller, 1991; Levitt, Lopez, Lieberman, & Sutton, 1992).

To add to the confusion, the procedure for measurement of orthostatic vital signs is not standardized as evidenced by a review of the literature reflecting significant variations in practice. The duration of position change differs between research studies as do the position changes (lying to standing, lying to sitting to standing). There is even some debate as to which findings are the most important indicators of OH and what the cut-points are for vital signs changes.
### Description of Decision Options / Interventions and the Level of Recommendation:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Level</th>
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| Ensure patient rests in supine position 5-10 minutes prior to first blood pressure measurement  
  – obtain and record a blood pressure and heart rate | B     |
| Assist patient into standing position  
  – obtain and record blood pressure and heart rate at one and three minutes | B     |

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<tr>
<th>Interpretation</th>
<th>Level</th>
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| When measuring orthostatic vital signs, one or more of the following findings may indicate intravascular volume loss:  
  - Decrease in systolic blood pressure of 20 mmHg or more  
  - Decrease in diastolic blood pressure of 10 mmHg or more  
  - Increase in heart rate of 20 beats per minute or more | B     |
| Symptoms such as dizziness and syncope, in combination with orthostatic vital sign changes alone  
  – document pertinent symptoms and vital signs as orthostatic variables  
  A position change from supine to standing has better diagnostic accuracy in volume depleted adults compared to position changes from supine to sitting, and then to standing. | B     |
| Orthostatic vital signs alone lack the sensitivity to reliably detect volume losses less than 1,000ml | B     |

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<tr>
<th>Pediatric and Adolescent Population</th>
<th>Level</th>
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<tbody>
<tr>
<td>Pediatric and Adolescent Population (less than 17 years): Insufficient evidence appears in the literature to make recommendations about orthostatic vital signs in the pediatric and adolescent population with fluid volume alteration</td>
<td>I/E</td>
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</tbody>
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### Levels of Evidence:

- **A (High)**: Based on consistent and good quality of evidence; has relevance and applicability to emergency nursing practice.
- **B (Moderate)**: There are some minor inconsistencies in quality of evidence; has relevance and applicability to emergency nursing practice.
- **C (Weak)**: There is limited or low quality patient-oriented evidence; has relevance and applicability to emergency nursing practice.
- **NR (Not Recommended)**: Based upon current evidence.
- **I/E (Insufficient Evidence)**: Insufficient evidence upon which to make a recommendation.
- **N/E (No Evidence)**: No evidence upon which to make a recommendation.

Access the full clinical guideline at: [http://bit.ly/2gWzHN1](http://bit.ly/2gWzHN1)