Early Identification of Cardiovascular Diseases in People With Spinal Cord Injury: Key Information for Primary Care Providers

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels, which include coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis, and pulmonary embolism. People living with spinal cord injury (SCI) are at higher risk for CVD than the general population. Therefore, early detection of CVD is critical to allow intervention before severe damage occurs. This information page presents key facts pertaining to CVDs in people aging with SCI and suggests actions that physicians/primary care providers can take to improve early detection and reduce disease severity.

Key facts about CVDs in people with SCI

1. CVDs are a major cause of morbidity and mortality among people aging with SCI.
   - The prevalence of heart disease is 17.1% (ages 65–69y) for people with SCI compared with 4.9% (ages 65–69y) for individuals without SCI.1
   - Hypertensive and ischemic heart diseases are the fourth leading cause of death among people aging with SCI (40–70y).2

2. Individuals with SCI have an accelerated trajectory of aging in the cardiovascular system.
   - People with SCI have an accelerated trajectory of aging in the cardiovascular system compared with same-aged individuals in the general population.3
   - Common risks of accelerated aging in association with cardiovascular system include obesity, inflammatory stress (because of obesity, recurrent urinary tract, and skin breakdown), impaired fasting glucose and frank diabetes, dyslipidemia, and hypertension (depending on the nature and level of injury).4,5

3. People with SCI may not show symptoms of CVD, even when it is present.
   - Because of neurologic impairment accompanying SCI, people with SCI may experience symptoms of CVD differently than those experienced by people without SCI, which could result in delayed treatment and greater progression of CVD.
   - Individuals with cervical spine injuries may be unable to recognize pain of angina pectoris because of disruption of cardiac pain fibers and other sensory pathways; therefore, an ischemic cardiac event may pass unnoticed.6
   - In the general population, symptoms of CVD often are triggered by strenuous activity; however, because of physical activity limitations, people with SCI have fewer opportunities for symptoms of possible CVD to be revealed.7

4. Specific factors are associated with the development of advanced CVD in individuals with SCI.
   - Risk of all types of CVD increases with age, level of SCI (tetraplegia), and severity of injury (complete injury).8
   - People with tetraplegia are at higher risk of developing all types of CVDs (coronary artery disease, hypertension, cerebrovascular disease, valvular disease, and dysrhythmias) and cerebrovascular disease when compared with people with paraplegia.8
   - Paraplegia is associated with higher risk of coronary heart disease when compared with tetraplegia.8
   - Some CVD risk factors appear to be more prevalent based on the level of injury. These are listed in appendix 1.

Considerations for improved detection and reduced risk in patients with SCI

1. Begin screening for metabolic syndrome earlier in life, even in the absence of observable signs and symptoms of CVD. The SCI population should be screened at earlier stages, keeping in consideration the time passed since the onset of injury. Any of the following conditions may increase the risk for CVD. Additionally, if ≥2 conditions occur in combination, the risk increases.
   - Waist circumference: waist size >37in (94cm).5 Waist circumference can be measured using a constant tension, flexible measuring tape at the narrowest part of the waist after a normal expiration, while lying supine (back-lying) on the bed.
   - Lipid profile: high-density lipoprotein cholesterol level of <50mg/dL for women and <40mg/dL for men, total cholesterol/high-density lipoprotein cholesterol ratio >4, and low-density lipoprotein cholesterol >159mg/dL.
   - Plasma glucose: fasting plasma glucose ≥100mg/dL (5.6mmol/L)5 or 2-hour oral glucose tolerance test plasma glucose ≥200mg/dL (11.2mmol/L).23 Fasting plasma
glucose may be unstable in people with SCI; therefore, a 2-hour oral glucose tolerance test should be completed.

- Blood pressure: Hypertension: a resting blood pressure $\geq 140/90$ mmHg or being on medicine to treat high blood pressure. A diagnosis of hypertension or prehypertension should be made after careful monitoring and exclusion of sporadic elevations because of episodes of autonomic dysreflexia. Autonomic dysreflexia is characterized by an increase in systolic blood pressure $>20$ mmHg above an individual’s baseline.

2. Request additional testing if needed to assess risk factors specific to people with SCI (see Appendix 1).

3. Encourage cessation of tobacco use. Research indicates that people with disabilities are less likely to be asked about smoking and be provided with resources to support smoking cessation than their nondisabled peers. Smoking and/or tobacco use cessation is associated with reduced risk for heart disease (within 1–2 y of quitting), stroke, peripheral vascular disease, and cancer. Speak with your patients with SCI about their tobacco use and provide encouragement to quit when needed.

4. Recommend physical activity. Adults with disabilities are 82% more likely to be physically active if their doctor recommends it. However, only 44% of adults with disabilities received a physical activity recommendation from their doctor during their regular physician visit. Decreased sedentary time and increased physical activity help prevent secondary complications and should be major goals for people with SCI. Consumer-oriented resources to encourage physical activity are available elsewhere.

5. Recommend nutritional counseling. Decreases in muscle mass and lower levels of physical activity reduce calorie needs in people with SCI. Without appropriate dietary modifications after SCI, energy intake readily exceeds daily energy expenditure, predisposing people with SCI to undesirable weight gain and consequent cardiovascular risks. Nutrition plays an essential role in achieving and maintaining optimal cardiovascular health. Encourage your patients to consult with a registered dietitian who has expertise in working with people with physical disabilities and is affiliated with your health care system or elsewhere in the community.

Authorship

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Disclaimer

This information is not meant to replace the advice of a medical professional. You should consult your health care provider regarding specific medical concerns or treatment.

Appendix 1  Risk factors for CVD in people with SCI$^{7-9,22}$

<table>
<thead>
<tr>
<th>Tetraplegia (injury to the cervical spine)</th>
<th>Paraplegia (injury to the thoracic spine [T1 and below])</th>
<th>Risk Factors for Both Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Left ventricle atrophy</td>
<td>• Hypertension</td>
<td>• Lower plasma concentration of HDL</td>
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<tr>
<td>• Reduced left ventricle cavity size</td>
<td>• Exaggerated postprandial lipemia</td>
<td>• Higher plasma concentration of LDL</td>
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<tr>
<td>• High BMI (men: $&gt;22$ kg/m$^2$, women: $&gt;21$ kg/m$^2$)</td>
<td>• High BMI (men: $&gt;26$ kg/m$^2$, women: $&gt;28$ kg/m$^2$)</td>
<td>• Elevated fasting triglycerides</td>
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<td></td>
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<td>• Elevated inflammatory cytokines—C-reactive protein</td>
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<td></td>
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<td>• Depression of serum testosterone and growth hormone/IGF-I levels</td>
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<td></td>
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<td>• Diabetes</td>
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<td></td>
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<td>• Hyperinsulinemia</td>
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<td>• Visceral obesity</td>
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</tbody>
</table>

Abbreviations: BMI, body mass index; HDL, high-density lipoprotein; IGF-I, insulin-like growth factor 1; LDL, low-density lipoprotein.

References


