Health Maintenance Checklist

1. Provide evidence-based general preventive care:
   - Immunization
   - Cancer screening
   - Cardiovascular and metabolic health

2. Review and provide preventive care for common secondary health issues after SCI: urohealth, bowel, autonomic dysfunction, respiratory health, sexual and reproductive health, bone health, skin integrity, mental health, pain, spasticity, musculoskeletal conditions

Case Report

Jennifer is a 45-year-old female who comes to your family practice asking about general health and screening tests, particularly whether she should receive a Papanicolaou (Pap) test. She sustained a spinal cord injury (SCI) at T5 4 years ago that resulted in paraplegia. A review of her history indicates that her last Pap test was 5 years ago. She has concerns that she will not be able to transfer to the height of the exam table, and she has spasticity of the legs. What would you do?

Introduction

Individuals with SCI are living longer and are affected by the same health issues as able-bodied individuals, but they also have secondary health issues unique to SCI.1,2 Furthermore, they are known to have challenges accessing the same level of primary care as able-bodied individuals, and they have unmet health needs.3-5 The barriers to care are well described: inaccessibility (e.g., inaccessible office, lack of accessible equipment), lack of primary care physician (PCP) knowledge and confidence in managing SCI, systematic issues (e.g., cost, geographical discrepancies, fragmented care systems), and attitudinal issues (e.g., misconceptions that people with disabilities do not develop the same diseases or cannot undergo the investigations).4,6-8

McColl and colleagues suggest that ideal primary care for individuals with SCI involves having an accessible premise and an awareness of unmet needs (e.g., sexual health) and performing an annual comprehensive evaluation.3,9,10 PCPs have an important role in facilitating specialist involvement for secondary conditions and...
multidisciplinary follow-up for disability-related issues.1,10

Preventive care for individuals with SCI often requires a greater time commitment per visit or more frequent visits.1 Effective management needs to be patient-centered and deliberately planned, and it requires collaboration and coordination of all health care providers. Many barriers to delivering optimal primary care are not immediately surmountable. This article provides guidance for preventive health and health maintenance measures for PCPs managing individuals with SCI. In the absence of specialist involvement, the PCP may have greater responsibility (e.g., urohealth surveillance). Alternatively, specialist involvement warrants vigilance to avoid unnecessary duplication in ordering investigations (e.g., lab and diagnostic imaging). We recommend SCI specialist involvement for any patient with SCI-related comorbidities (e.g., neurogenic bladder and/or bowel, mobility issues, or spasticity) or for cases that the PCP is not comfortable managing.

It is important to note that there is often limited evidence for specific recommendations, and many are based on expert opinion. Therefore, this article is intended as a guide and not a complete list. Please refer to the other articles in this issue for more detailed information.

General Preventive Care

Even though evidence-based preventive care recommendations vary between jurisdictions, individuals with SCI should receive the same preventive care (e.g., immunization, cancer screening, etc.) as the general population. The following discussion summarizes preventive health care needs, including the differences specific to the management of individuals with SCI and special considerations when performing investigations (e.g., accessibility, physical considerations, planning).2

Immunizations

Vaccines have contributed significantly to preventive health and control of infections and are particularly important in people with underlying chronic medical conditions, especially in those with SCI.11-13 Ensure routine immunizations are up to date; individualized risk factors and local guidelines should inform further immunizations.

Suggestions for people with SCI:

- Annual influenza vaccination is highly recommended for adults and children (6 months old and older).11-15 Refer to local evidence-based guidelines as to type and number of doses of influenza vaccine.
- Pneumococcal vaccination is not a routine recommendation in adults under 65 years old, but it may be an important additional vaccination in SCI, particularly in patients with lesions at T8 or higher due to impaired respiratory function (refer to local evidence-based guidelines as to type of pneumococcal vaccines for patients under age 65 with chronic medical conditions and for children age 2 years or less).11-13,15
- Note: Individuals with SCI who have other comorbid conditions (e.g., asplenia) may require additional vaccines.11

Cancer Screening

Population cancer screening is an important component of preventive care, and recommendations will vary depending on geographical evidence-based guidelines.16 The literature does not show an increased risk of these cancers among people with SCI versus the general population but does suggest screening does not occur at the same rates.6,10,14,17,18

This section will discuss SCI-specific considerations to facilitate screening.

Breast cancer screening

Women with SCI and other disabilities are less likely to receive a mammogram.6,19 Barriers to obtaining a mammogram include lack of health insurance, factors related to skills/attitudes of health care workers, and physical barriers (inaccessible facilities and equipment).6,18,20

Suggestions:

- Adhere to evidence-based guidelines.
- Be knowledgeable of accessible facilities, and coordinate with the facility and staff to ensure they can accommodate individual patient needs.
Cervical cancer screening

Women with SCI often encounter barriers to Pap testing. Physical barriers are the most obvious (e.g., inaccessible premises, inaccessible examination tables). A less obvious barrier is the possibility that the clinician lacks expertise with managing unique conditions such as spasticity, bladder issues, and autonomic dysreflexia (AD).\(^6,20\) (A description of AD can be found in the section, Preventive Care for Common Secondary Health Issues After SCI.)

Suggestions:

- Adhere to evidence-based guidelines.
- If the exam table is not accessible, a home visit may be an alternative strategy.
- Have patient empty bowel and bladder prior to exam.
- Spasticity in the lower extremities may decrease flexibility, and additional assistance may be required for positioning the patient.
- If a patient has a history of AD:
  - Monitor blood pressure and have anesthetic gel (lidocaine) to coat the speculum or administer nifedipine 30 minutes prior to procedure if required.\(^21-23\)
  - Referral to a gynecologist may be necessary.
  - Consultation with a rehabilitation specialist may be necessary (especially in patients with AD).

Colorectal cancer screening

With SCI, fecal screening tests may be falsely positive due to hemorrhoids or from regular digital extraction as part of the bowel program.\(^7\) Colonoscopy has been determined to be safe and effective but requires planning and coordination.\(^7,24\) Colonoscopy diagnostic yield may be low due to poor preparation and may require a modified or extended preparation that may be difficult for patients. The clinician should be aware of individuals at risk of AD and understand management of AD. The bowel preparation and resultant increased stooling can cause skin problems. Patients may be wary of having a colonoscopy performed due to their fear of disrupting their established bowel program.

Suggestions:

- Adhere to evidence-based guidelines.
- Understand the patient’s current bowel program and associated issues (e.g., AD, spasticity).
- An extended preparation may be required for colonoscopy. Some studies show success with a multiday inpatient bowel preparation regime.\(^24\)
- Communicate to the specialist and facility performing a colonoscopy the unique needs of the patient. This may include the potential need for extended bowel preparation, extra time needed for the procedure, assistance or equipment for patient transfers, or risk of AD.

Prostate cancer screening

The United States Preventive Services Task Force recommends that periodic PSA screening in men between 55 and 69 years should be an individual decision.\(^25\) Several studies have found the PSA level and cancer risk between men with SCI and non-SCI age-matched controls did not have any significant differences or increased risk.\(^26-29\)

Suggestion:

- Adhere to evidence-based guidelines.

Cardiovascular and metabolic health

As individuals with chronic SCI are predisposed to accelerated atherogenesis, dyslipidemia, and glycemic dysregulation, it is not surprising that cardiovascular disease has emerged as a leading cause of mortality among people with SCI.\(^10-12,30\) Neurogenic obesity frequently occurs in persons with chronic SCI, resulting in the cardiometabolic syndrome of insulin resistance, dyslipidemia, hypertension, and ultimately accelerated arteriosclerosis.\(^30\) The primary intervention required for long-term management includes behavior modification such as diet and exercise.

It is important to note that cardiovascular disease symptoms can present atypically in patients with cervical and upper thoracic SCI.\(^15,30\) Chest pain
may be absent, and other symptoms such as AD, spasticity, syncope, and dyspnea may be present.

Suggestions:
- Encourage cessation of tobacco use.\textsuperscript{14,21,22,30}
- Recommend adoption of a heart-healthy diet with focus on fruits, vegetables, low-fat dairy, poultry, fish, legumes and nuts to achieve neutral or negative (fat loss) energy balance.\textsuperscript{22}
- Encourage exercise $\geq 150$ minutes per week to increase energy expenditure sufficiently to achieve neutral or negative (fat loss) energy balance.\textsuperscript{22}
- Measure lipids in asymptomatic adults with SCI, with fasting LDL (estimated using the Friedewald equation when fasting TG levels are TG levels are $<200$ mg/dL or by direct measurement when higher), TC, TG, and HDL-C. Repeat at least every 3 years if levels are normal.\textsuperscript{22}
- Screen lipids annually if there are multiple risk factors, confirmed dyslipidemia, or initiation of treatment.\textsuperscript{22}
- Use cardiovascular disease risk calculators with caution as they are not specific to SCI population and may underestimate risk.\textsuperscript{22,23}
  - Initiation of pharmacotherapy may be guided by other indicators such as low HDL-C, high C-reactive protein.\textsuperscript{22}
  - At least moderate intensity statin therapy should be used.\textsuperscript{22}
- Screen adults with SCI for diabetes/prediabetes. Repeat every 3 years if normal.\textsuperscript{22}
  - Use American Diabetes Association guidelines for diagnosis and treatment.\textsuperscript{22}
  - Medication selection should incorporate patient characteristics; be aware of side effects that may be greater in individuals with SCI (e.g., hypotension, urinary tract infection).\textsuperscript{22}
- Assess weight annually with an obesity surrogate of BMI $\geq 22$ kg/m$^2$, unless more accurate body composition testing is available.\textsuperscript{22,23}
- Obtain involvement of a specialist to help manage cardiometabolic issues.

**Hypertension**

Diagnosis of hypertension can be challenging in patients with SCI due to autonomic instability and postural influences.\textsuperscript{22} Blood pressure is commonly lower in individuals with tetraplegia and lesions above T7 (e.g., 100/60 mm Hg).

Suggestions:
- Measure blood pressure at every routine visit and at least annually.\textsuperscript{14,22,23,31}
- Apply evidence-based guidelines for treating hypertension as per general population; for most, the threshold for initiating pharmacotherapy is $>140/90$ mm Hg.\textsuperscript{22}
- Consider patient characteristics when selecting an antihypertensive agent (e.g., diuretic and bladdertic therapy).\textsuperscript{22}

**Preventive Care for Common Secondary Health Issues After SCI**

**Urohealth**

Neurogenic lower urinary tract dysfunction (NLUTD) and urinary tract infection (UTI) are common secondary complications that result in significant morbidity and can greatly affect quality of life.\textsuperscript{32,33} The vast majority of individuals with SCI experience bladder dysfunction.\textsuperscript{34–36}

Suggestions:
- Regularly review patient’s bladder care/program (at least annually).\textsuperscript{32,33}
- Annually evaluate serum creatinine and calculated creatinine clearance to assess renal function.\textsuperscript{32,33}
- Perform renal ultrasound to assess upper tracts annually (or at least every 2 years).\textsuperscript{32,33}
- Perform urodynamic studies at baseline and if there is a change in function (UTIs, incontinence, difficulty catheterizing, autonomic dysreflexia, urolithiasis).\textsuperscript{32,33,37}
- Consider cystoscopy in individuals with long-term indwelling catheters due to an increased prevalence of bladder cancer several years post injury.\textsuperscript{38,39}
- Avoid testing and treating asymptomatic bacteriuria.\textsuperscript{33,35,39}
**Bowel health**

Neurogenic bowel dysfunction (NBD) can greatly affect quality of life; some effects include incontinence, skin breakdown, lengthy bowel programs, social isolation, intimacy issues, and employment issues.\(^{40-44}\)

Suggestions:
- Assess bowel program regularly
- Method (upper motor neuron vs. lower motor neuron), length, timing, diet, laxatives, complications (e.g., blood, incontinence), patient satisfaction.\(^{45,46}\)
- Stool consistency (e.g., Bristol Stool Chart).\(^{47}\)
- Recommend adequate fiber and fluids.\(^{2,48}\)
- Be aware that many individuals require suppositories, laxatives, or manual assistance.\(^{2,45,46}\)

**Autonomic dysfunction**

AD is a potentially life-threatening emergency that can occur with SCI at T6 or above (it has been reported in patients with SCI as low as T8-12).\(^{42,43,47,49-51}\) The chief finding of AD is an increase in systolic blood pressure of 20 mm Hg or more above baseline (baseline systolic blood pressure with high level SCI often 80-100 mm Hg).\(^{48}\) AD may also include profound headache, sweating above the level of SCI, blurred vision, piloerection, and anxiety. It is caused by noxious stimuli below the level of the lesion and is often triggered by bladder or bowel irritation.\(^{49-51}\)

Suggestions:
- Educate patients about AD and ask them about their risks for or instances of AD (especially with SCI at T6 and above).\(^{49}\)
- Regularly review triggers, severity, plan of action, and changes.\(^{49}\)
- Have an AD management protocol and kit in the office and consider a home kit for patients.\(^{49}\)
- Document AD clearly in patient medical records and when referring to other health care providers.\(^{49,51}\)
- Advise patients to carry an AD wallet card or mobile alert.\(^{49,51}\)
- Refer patients to a specialist if AD is severe or worsening.\(^{49,51}\)

Orthostatic hypotension (OH) is common in cervical and high thoracic SCI when an individual assumes an upright position.\(^{52}\) Symptoms can include fatigue, dizziness, blurred vision, light-headedness, dyspnea, and perhaps cognitive impairment.\(^{53-56}\)

Suggestions:
- Document baseline blood pressure.
- Ask about symptoms of OH in appropriate patients.
- Consider nonpharmacological and pharmacological treatments.

**Respiratory health**

Respiratory diseases, particularly pneumonia, remain the leading cause of mortality and a frequent reason for hospitalization.\(^{57-61}\) Respiratory complications are greater with higher levels of injury and severity of SCI.\(^{2,62}\) Permanent ventilator assistance via tracheostomy is usually required with injury at C3 and above. Injuries at C5 or above often require some level of ventilator support.\(^{63}\) Many patients with injuries below this level will have respiratory compromise.

Suggestions:
- Ensure that immunizations are up to date.
- Monitor for signs and symptoms of sleep-disordered breathing (SDB).
- If feasible, polysomnography is recommended if SDB is suspected, particularly in complete tetraplegia.\(^{2}\)
- Encourage regular respiratory muscle training.
- Consider pulmonary function tests (spirometry).\(^{2}\)
- Encourage weight management.
- Encourage tobacco cessation.\(^{2}\)
- Refer to specialist:
  - Individuals with higher level injuries requiring respiratory support.
  - Individuals with deterioration in respiratory function, frequent infections, and SDB.

**Sexual and Reproductive Health**

For individuals with SCI, sexuality and sexual health are important topics that medical providers often do not address adequately.\(^{64,65}\)
Suggestions:
- Ask, listen, and follow-up:
  - How is your sexual health?
  - Have you experienced any difficulty in the areas of sexual health?
  - Do you or your partner have any concerns or questions that have not been addressed?
- Explore multiple etiologies and factors related to the identified issue:
  - Consider pharmacological (e.g., antispasmodics, pain medications) and psychosocial factors (e.g., depression) as potential causes of sexual dysfunction.
  - Make referrals as clinically indicated.
  - There are pharmacological (e.g., phosphodiesterase inhibitors) and nonpharmaceutical interventions (e.g., sex devices, positioning) that can be implemented by the PCP.

Bone health

Patients with SCI are at high risk for developing sublesional osteoporosis. Most bone loss occurs in the first year after complete motor paralysis, and fractures occur most commonly in the distal femur and proximal tibia.\(^{66,67}\)

Inability to access investigations and limitations of dual-energy x-ray absorptiometry (DXA) are barriers to diagnosis. Ideally DXA should be performed at the distal femur and proximal tibia, but this protocol is not universally available. There is currently lack of evidence and clear guidelines for diagnosis and management of osteoporosis in SCI.\(^{68}\)

Suggestions:
- Have a high index of suspicion for fragility fracture when there is an observable change in a limb (e.g., edema, redness, deformity, increased spasticity, AD).
- Consider referral to a specialist for management of fractures and sublesional osteoporosis.
- Consider assessing bone mass with DXA at baseline and perhaps periodically (every 1-2 years thereafter).
- Consider optimizing metabolic parameters through calcium and vitamin D supplementation.
- Consider excluding secondary causes of osteoporosis in individuals with fractures and sublesional osteoporosis (e.g., thyroid stimulating hormone, complete blood count, alkaline phosphatase, vitamin D, calcium, creatinine).
- Consider recommending physical modalities to maintain bone density (e.g., ambulation, functional electrical stimulation).

Pressure injury

Skin breakdown from pressure injury is common after SCI and leads to poor outcomes such as significant disability, loss of quality of life and independence, social and occupational impacts, and tremendous use of health care resources.\(^{31}\) Common sites are over bony prominences such as the ischial tuberosity, calcaneus, malleoli, and sacrum.\(^{31}\)

Suggestions:\(^{31}:\)
- Educate patient and caregiver (e.g., daily inspection, good hygiene, and early signs).
- Recommend frequent pressure relief.
- Provide early identification and assessment.
- Refer to appropriate resources (specialty clinic, community wound nursing, occupational therapy).

Mental health

Major depression is more common in individuals with SCI and is underrecognized and undertreated.\(^{69}\) Risk factors include prior mental health issues, unstable work, history of substance abuse, lower education, and chronic pain.\(^{70}\) Depression after SCI is associated with worse medical and functional outcomes.\(^{71,72}\) Specific SCI barriers to management include limited access to care (e.g., accessibility, financial limitations), nonadherence, and multiple medical and psychosocial comorbidities.

Suggestions:
- Screen for depression routinely using the Patient Health Questionnaire-2 or Patient Health Questionnaire-9.\(^{73}\)
- Recommend cognitive behavioral therapy and pharmacology (e.g., venlafaxine XR) as effective treatments for major depression after SCI.\(^{74,75}\)
○ Recognize that management of risk factors (e.g., pain) and other modalities (e.g., exercise) are important.73,76,77

Pain after SCI

Pain is a common secondary complication of SCI and is associated with interference in daily activities and poorer quality of life.

Suggestions:
○ Assess pain regularly (suggest at minimum annually) and differentiate between the different types of pain (nociceptive, neuropathic).
○ Advocate and explore nonpharmacological interventions (e.g., exercise, therapies) along with medications to optimize chronic pain management.

Spasticity

Spasticity is a common condition in SCI and has been reported as a clinical impairment in 40% to 60% of individuals.78,79 Spasticity can be exacerbated by a number of factors, but a significant worsening of spasticity along with other symptoms might give a clue to a potentially reversible condition (e.g., UTI) or perhaps serious complication (e.g., syringomyelia). Be sure to assess for reversible causes of spasticity.31

Suggestions:
○ Regularly assess spasticity.80
○ Bothersome vs. beneficial (e.g., help with transfers and mobility), severity, complications (e.g., fractures), triggers, worsening or change
○ Consider nonpharmacological (exercise, seating, physiotherapy) and pharmacological treatments.31
○ Refer to specialists as needed.

Neurological/functional status

Deterioration in neurological function or general function may indicate a new issue or a need to focus on an identified need (e.g., syringomyelia is a fluid-filled cyst that can occur at the site of the SCI that can develop months to years after injury and cause worsening neurological function).1,31

Suggestions:
○ Regularly, at least annually, ask about changes in neurological signs and symptoms (sensory/motor change) and change in functional ability from baseline.
○ If changes are present, assess and consider investigations or referral to specialist.

Musculoskeletal health

Overuse injuries are common in individuals with SCI due to repetitive stress (e.g., transfers, wheelchair propulsion) on normal or abnormal tissues (e.g., weakened arm muscles in C5 tetraplegia).14 Shoulder injuries are most common, but elbow and wrist injuries are also common.14,31

Suggestions:
○ Regularly inquire about overuse injuries.
○ Early identification and management is important, consider1,31:
  ▪ Activity modification
  ▪ Physiotherapy, exercise
  ▪ Occupational therapy, seating/positioning adjustments

Case Resolution

You arrange a home visit to perform the Pap test. Jennifer has an attendant to help with her lower extremity spasticity and as chaperone. She does not have a history of AD to worry about. She agrees to receive influenza and pneumococcal vaccinations. You give her a requisition to do some screening bloodwork including fasting blood sugar, A1C, and lipid panel. You do a more comprehensive assessment and discuss preventive health and SCI secondary complications more thoroughly while there. This encounter has you thinking about the accessibility of your office and what accommodations you might make.
Conclusion

Primary care is essential to providing preventive care and health maintenance in individuals with SCI. In order to achieve this, primary care must not only be accessible but also be knowledgeable in the unique issues associated with SCI, flexible in the approach, and instrumental in coordinating and communicating with the patient's entire health care team.

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REFERENCES


