

- [Spinal Cord Injury](#)
- [Spinal Cord Injury \(SCI\) Guideline \(2009\)](#)

Spinal Cord Injury

SCI: Introduction (2009)

Guideline Overview

Guideline Title

Spinal Cord Injury (2009) Evidence-Based Nutrition Practice Guideline

Guideline Narrative Overview

The focus of this guideline is on medical nutrition therapy (MNT) for adults with spinal cord injury (SCI) in the acute care, rehabilitation, and community-dwelling phases of injury.

Nutritional assessment of the spinal cord-injured person is challenging, because the physiological responses to the injury have an overriding effect on the usual indices of nutrition assessment. There are physiological, psychological and environmental factors that can influence nutritional status.

- Primary goals of nutrition therapy for adults with SCI are:
 - To prevent or correct malnutrition and/or nutrient deficiencies
 - To achieve and/or maintain appropriate nutritional parameters such as body weight and nutrition-related laboratory values
 - To prevent or contribute to treatment of nutrition-related complications of SCI such as pressure ulcers
 - To enhance, to the maximum extent possible, independence and quality of life, including nutrition quality of life
 - To define the role and cost-effectiveness of the dietitian in the provision of MNT for the spinal cord-injured person
 - To promote the availability and provision of MNT across the continuum of care for spinal cord-injured persons

MNT is based on:

- The patient's individualized nutrition goals as determined by the patient, the dietitian, and the interdisciplinary care team
- Appropriate interventions and strategies to achieve nutrition goals
- The patient's ability and motivation to implement nutrition therapy recommendations

Guideline Development

This guideline is intended for use by Registered Dietitians (RDs) involved in providing MNT to adults with spinal cord injury. Clinical judgment is crucial in the application of these guidelines. Careful consideration should be given to the application of these guidelines for patients with significant medical comorbidities. This guideline must be individualized based on the needs of the adult with SCI, but it will assist the Registered Dietitian in the task of integrating MNT into the overall medical management of SCI.

Topics include:

- Caloric and protein needs in the acute and rehabilitation phases of SCI
- Lipid abnormalities in SCI
- Role of the Registered Dietitian in SCI
- Cranberry juice and urinary tract infections
- Fiber/fluid and neurogenic bowel
- Nutrition care for pressure ulcers
- Nutrition care to prevent overweight in SCI
- Physical activity and SCI

The recommendations are based on the work performed by the American Dietetic Association Spinal Cord Injury expert working group. The number of supporting documents for these topics is below:

- *Recommendations*: Twenty-five (25)
- *Conclusion Statements*: Thirteen (13)
- *Evidence Summaries*: Thirteen (13)
- *Article Worksheets*: Eighty-seven (87).

The expert working group based their recommendations upon a systematic review of the literature in multiple practice areas. The expert working group was assisted in their literature review by evidence analysts who abstracted individual research articles and by lead analysts who summarized the evidence in evidence tables and evidence summaries.

To view the guideline development and review process, [click here](#).

Application of the Guideline

This guideline will be accompanied by a set of companion documents (i.e., a toolkit) to assist the practitioner in applying the guideline. The toolkit will contain materials such as the Medical Nutrition Therapy protocol, documentation forms, outcomes management tools, client education resources and case studies. The toolkit is currently under development and will undergo pilot-testing through the ADA's Dietetic Practice-Based Research Network prior to publication.

Revision

The literature search will be repeated for each guideline topic on an annual basis to identify new research that has been published since the previous search was completed. Based on the quantity and quality of new research, a determination will be made about whether the new information could change the published recommendation or rating.

If a revision is unwarranted, then the search is recorded, dated and saved until the next review and no further action is taken. If the determination is that there could be a change in the recommendation or rating, then the supporting evidence analysis

question(s) will be re-analyzed following the standard ADA Evidence Analysis Process (see ADA *Evidence Analysis Manual in the Methodology section*).

When the analysis is completed, the expert workgroup will approve and re-grade the conclusion statements and recommendations. The guideline will undergo a complete revision every three to five years.

Medical Nutrition Therapy and Spinal Cord Injury

Scientific evidence supports the importance of the Registered Dietitian (RD) as a member of the interdisciplinary team caring for adults with spinal cord injury.

The registered dietitian plays an integral role on the interdisciplinary care team by determining the optimal nutrition prescription and developing the nutrition care plan for spinal cord-injured patients in all phases of injury. Based on the patient's plan for treatment, potential for rehabilitation, and concurrent comorbidities, the dietitian monitors and evaluates the effectiveness of the nutrition care plan in promoting the patient's nutritional health and quality of life. Based on the results of his/her ongoing monitoring and evaluation of the patient's nutritional status, the dietitian adjusts the nutrition care plan as necessary to achieve desired outcomes.

Populations to Whom This Guideline May Apply

This guideline applies to adult with spinal cord injury.

Other Guideline Overview Material

For more details on the guideline components, click an item below:

- [Scope of Guideline](#)
- [Statement of Intent](#)
- [Guideline Methods](#)
- [Implementation of the Guideline](#)
- [Benefits and Harms of Implementing the Recommendations](#)

Contraindications

Clinical judgment is crucial in the application of these guidelines. Careful consideration should be given to the application of these guidelines for patients with significant medical co-morbidities.

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Spinal Cord Injury

SCI: Scope of Guideline (2009)

Below, you will find a list of characteristics that describe the **scope** of this guideline.

Guideline Category

Assessment of Therapeutic Effectiveness, Counseling, Evaluation, Management, Prevention, Treatment

Clinical Specialty

Neurological Surgery, Neurology, Nutrition, Physical Medicine and Rehabilitation

Intended Users

Registered Dietitians, Advanced Practice Nurses, Health Care Providers, Nurses, Occupational Therapists, Physical Therapists, Physician Assistants, Physiatrists, Physicians, Respiratory Care Practitioners, Speech-Language Pathologists, Students

Guideline Objective(s)

Overall Objective

- To provide MNT guidelines that result in positive clinical outcomes in the acute, rehabilitation, and community-dwelling stages of spinal cord injury

Specific Objectives

- To define evidence-based nutrition recommendations specific to spinal cord injury for Registered Dietitians to implement in collaboration with other healthcare providers as part of the interdisciplinary care team
- To guide practice decisions that promote good clinical outcomes
- To reduce variations in practice among RDs
- To promote the best possible nutrition quality of life in spinal cord-injured persons
- To provide the RD with guidelines for making recommendations to adjust MNT or for recommending other therapies to achieve desired outcomes
- To assist the RD in customizing nutrition strategies to each individual patient's type and level of injury, ability to consume nutrients, metabolic profile, potential for rehabilitation, current lifestyle, and personal preferences

- To define guidelines for interventions that have measurable clinical outcomes
- To define the highest quality of care within cost constraints of the current healthcare environment

Target Population

Adult (19 to 44 years), Middle Age (45 to 64 years), Aged (65 to 79 years), Male, Female

Target Population Description

Adults in the acute, rehabilitation, or community-dwelling phases of spinal cord injury

Interventions and Practices Considered

This guideline is based on ADA's Nutrition Care Process and Model, which involves the following steps:

- Nutrition Assessment
- Nutrition Diagnosis
- Nutrition Intervention
- Nutrition Monitoring and Evaluation.

This guideline addresses topics that correspond to the following areas of the Nutrition Care Process. Please refer to the Algorithms in this guideline for a more detailed view of the recommendations and their application within the Nutrition Care Process.

I. Referral to a Registered Dietitian

II. Medical Nutrition Therapy

A. Nutrition Assessment, Monitoring and Evaluation

Below you will find the most prevalent nutrition assessment, monitoring and evaluation terminology related to spinal cord injury from the *International Dietetics and Nutrition Terminology Manual: Standardized Language for the Nutrition Care Process*. Third Edition. Possible nutrition assessment, monitoring and evaluation terms for persons with spinal cord injury are not limited to the link below.

1. Food/Nutrition-related History (FH)
 - Diet history (FH-1.1)
 - Diet order (FH-1.1.1)
 - Diet experience (FH-1.1.2)
 - Eating environment (FH-1.1.3)
 - Energy intake (FH-1.2)
 - Total energy intake (FH-1.2.1.1)
 - Food and beverage intake (FH-1.3)
 - Fluid/beverage intake (FH-1.3.1)
 - Food intake (FH-1.3.2)
 - Enteral and parenteral Nutrition Intake (FH-1.4)
 - Bioactive substance intake (FH-1.5)
 - Caffeine intake (FH-1.5.3)
 - Macronutrient intake (FH-1.6)
 - Fat and cholesterol intake (FH-1.6.1)
 - Protein intake (FH-1.6.2)
 - Carbohydrate intake (FH-1.6.3)
 - Fiber intake (FH-1.6.4)
 - Micronutrient intake (FH-1.7)
 - Medication and herbal supplement use (FH-2)
 - Food and nutrition knowledge (FH-3.1)
 - Beliefs and attitudes (FH-3.2)
 - Behavior (FH-4)
 - Adherence (FH-4.1)
 - Avoidance behavior (FH-4.2)
 - Restrictive eating (FH-4.2.2)
 - Mealtime behavior (FH-4.4)
 - Social network (FH-4.5)
 - Factors affecting access to food and food/nutrition-related supplies (FH-5)
 - Food/nutrition program participation (FH-5.1)
 - Safe food/meal availability (FH-5.2)
 - Food and nutrition-related supplies availability (FH-5.4)
 - Access to assistive eating devices (FH-5.4.2)
 - Access to assistive food preparation devices (FH-5.4.3)
 - Physical activity and function (FH-6)
 - Nutrition-related ADLs and IADLs (FH-6.2)
 - Physical activity (FH-6.3)
 - Nutrition-related patient/client-centered measures (FH-7)
2. Anthropometric Measurements (AD)
 - Height/length (AD-1.1.1)
 - Weight (AD-1.1.2)
 - Frame size (AD-1.1.3)
 - Weight change (AD-1.1.4)
 - Body compartment measurements (AD-1.1.7)
3. Biochemical data, medical tests and procedures (BD)
 - Electrolyte and renal profile (BD 1.2)
 - Gastrointestinal profile (BD 1.4)
 - Glucose/endocrine profile (BD 1.5)
 - Inflammatory profile (BD 1.6)
 - Lipid profile (BD-1.7)

- Metabolic rate profile (BD-1.8)
 - Mineral profile (BE-1.9)
 - Nutritional anemia profile (BE-1.10)
 - Protein profile (BE-1.11)
 - Vitamin profile (BE-1.13)
4. Nutrition-focused physical findings (PD)
 5. Client history (CH)
 - Personal history (1)
 - Patient/Client/Family Medical/Health history (2)
 - Treatment/therapy/alternative medicine (2.2)
 - Social history (3)
 6. Comparative standards (CS)
 - Estimated energy needs (CS-1.1.1)
 - Estimated fat needs (CS-2.1)
 - Estimated protein needs (CS-2.2)
 - Estimated carbohydrate needs (CS-2.3)
 - Estimated fiber needs (CS-2.4)
 - Estimated fluid needs (CS-3.1)
 - Estimated vitamin needs (CS-4.1)
 - Estimated mineral needs (CS-4.2)
 - Ideal/reference body weight (CS-5.1.1)

B. Nutrition Diagnosis

Below you will find the most prevalent nutrition diagnoses related to spinal cord injury care from *International Dietetics & Nutrition Terminology Reference Manual: Standardized Language for the Nutrition Care Process*. Third Edition. Possible nutrition diagnoses for persons with spinal cord injury are not limited to the list below.

1. Intake (NI)
 - Energy balance (1)
 - Increased energy expenditure (NI-1.2)
 - Inadequate energy intake (NI-1.4)
 - Excessive energy intake (NI-1.5)
 - Oral or nutrition support intake (2)
 - Inadequate oral food/beverage intake (NI-2.1)
 - Excessive oral food/beverage intake (NI-2.2)
 - Inadequate intake from enteral/parenteral nutrition (NI-2.3)
 - Excessive intake from enteral/parenteral nutrition (NI-2.4)
 - Inappropriate infusion of enteral or parenteral nutrition (NI-2.5)
 - Fluid intake (3)
 - Inadequate fluid intake (NI-3.1)
 - Excessive fluid intake (NI-3.2)
 - Excessive bioactive substance intake (NI-4.2)
 - Excessive alcohol intake (NI-4.3)
 - Nutrient (5)
 - Increased nutrient needs (specify) (NI-5.1)
 - Malnutrition (NI-5.2)
 - Inadequate protein-energy intake (NI-5.3)
 - Decreased nutrient needs (specify) (NI-5.4)
 - Imbalance of nutrients (NI-5.5)
 - Fat and cholesterol (5.6)
 - Excessive fat intake (NI-5.6.2)
 - Inappropriate intake of fats (NI-5.6.3)
 - Protein (5.7)
 - Inadequate protein intake (NI-5.7.1)
 - Excessive protein intake (NI-5.7.2)
 - Carbohydrate and fiber (5.8)
 - Inadequate carbohydrate intake (NI-5.8.1)
 - Excessive carbohydrate intake (NI-5.8.2)
 - Inappropriate intake of types of carbohydrate (specify) (NI-5.8.3)
 - Inconsistent carbohydrate intake (NI-5.8.4)
 - Inadequate fiber intake (NI-5.8.5)
 - Excessive fiber intake (NI-5.8.6)
 - Vitamin (5.9)
 - Inadequate vitamin intake (specify) (NI-5.9.1)
 - Excessive vitamin intake (specify) (NI-5.9.2)
 - Mineral (5.10)
 - Inadequate mineral intake (specify) (NI-5.10.1)
 - Excessive mineral intake (specify) (NI-5.10.2)
2. Clinical
 - Functional (1)
 - Swallowing difficulty (NC-1.1)
 - Biting/chewing (masticatory) difficulty (NC-1.2)
 - Altered GI function (NC-1.4)
 - Biochemical (2)
 - Weight (3)
3. Behavioral-environmental (NB)
 - Knowledge and beliefs (1)
 - Physical activity and function (2)

- Food safety and access (3)

C. Nutrition Intervention (Planning and Implementation)

Below you will find the most prevalent nutrition interventions related to spinal cord injury care from *International Dietetics & Nutrition Terminology Reference Manual: Standardized Language for the Nutrition Care Process*. Third Edition. Possible nutrition interventions for persons with spinal cord injury are not limited to the list below.

Individualized prescription based on:

1. Food/Nutrition Intervention
2. Physical activity Interventions
3. Behavioral Interventions
4. Pharmacotherapy, when indicated

1. Food and/or nutrient delivery

- Meals and snacks (1)
- General/healthful diet (1.1)
- Modify distribution, type, or amount of food and nutrients within meals or at specified time (ND-1.2)
- Specific foods/beverages or groups (ND-1.3)
- Enteral and Parenteral nutrition (2)
- Medical food supplements (3.1)
- Vitamin and mineral supplements (3.2)
- Bioactive substance supplements (3.3)
- Feeding assistance (4)
- Feeding environment (5)
- Nutrition-related medication management (6)

2. Nutrition education (E)

- Initial/brief nutrition education (1)
- Comprehensive nutrition education (2)

3. Nutrition counseling (C)

- Theoretical basis/approach (1)
- Strategies (2)

4. Coordination of nutrition care (D)

- Coordination of other care during nutrition care (1)
- Discharge and transfer of nutrition care to new setting or provider (2)

D. Monitoring and Evaluation

Below you will find the nutrition monitoring and evaluation terms related to spinal cord injury care from *International Dietetics & Nutrition Terminology Reference Manual: Standardized Language for the Nutrition Care Process*. Third Edition. .

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Spinal Cord Injury

SCI: Statement of Intent (2009)

Spinal Cord Injury Statement of Intent

Evidence-based nutrition practice guidelines are developed to help Registered Dietitians, practitioners, patients, families, and consumers make shared decisions about health care choices in specific clinical circumstances. If properly developed, communicated, and implemented, guidelines can improve care.

While the evidence-based nutrition practice guideline represents a statement of promising practice based on the latest available evidence at the time of publication, the guideline is not intended to overrule professional judgment. Rather, it may be viewed as a relative constraint on individual clinician discretion in a particular clinical circumstance. The independent skill and judgment of the health care provider must always dictate treatment decisions. These nutrition practice guidelines are provided with the express understanding that they do not establish or specify particular standards of care, whether legal, medical or other.

The Role of Patient and Family Preference

This guideline recognizes the role of patient and family preferences for possible outcomes of care, when the appropriateness of a clinical intervention involves a substantial element of personal choice or values. With regard to types of evidence that are associated with particular outcomes, Shaughnessy and Slawson (1-3) describe two major classes. Patient-oriented evidence that matters (POEM) deals with outcomes of importance to patients, such as changes in morbidity, mortality, or quality of life. Disease-oriented evidence (DOE) deals with surrogate end-points, such as changes in laboratory values or other measures of response. Although the results of DOE sometimes parallel the results of POEM, they do not always correspond.

When possible, ADA recommends using POEM-type evidence rather than DOE. When DOE is the only guidance available, the guideline indicates that key clinical recommendations lack the support of outcomes evidence.

References

1. Slawson DC, Shaughnessy AF. Becoming an information master: using POEMs to change practice with confidence. Patient-Oriented Evidence that Matters. *J Fam Pract*. 2000 Jan;49(1):63-7. Erratum in: *J Fam Pract* 2000 Mar;49(3):276.
 2. Slawson DC, Shaughnessy AF, Ebell MH, Barry HC. Mastering medical information and the role of POEMs--Patient-Oriented Evidence that Matters. *J Fam Pract*. 1997 Sep;45(3):195-6.
 3. Shaughnessy AF, Slawson DC. POEMs: patient-oriented evidence that matters. *Ann Intern Med*. 1997 Apr 15;126(8):667.
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Spinal Cord Injury

SCI: Guideline Methods (2009)

General and Specific Methods for SCI Guideline

Below are links to both the general methods that ADA has put in place for evidence analysis and creating the guidelines, as well as the specific search methods and criteria for each question.

General Methods

[Click here](#) to view a description of the ADA's process of evidence analysis and guideline creation.

Methods for Specific Topics

To view descriptions of search criteria and findings for each topic covered in this guideline select Specific Topics from the Introduction section.

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Spinal Cord Injury

SCI: Implementation of the Guideline (2009)

This publication of this guideline is an integral part of the plans for getting the ADA MNT evidence-based recommendations on spinal cord injury to all dietetics practitioners engaged in, teaching about or researching the topic. National implementation workshops at various sites around the country and during the ADA Food Nutrition Conference Expo (FNCE) are planned. Additionally, there are recommended dissemination and adoption strategies for local use of the *ADA Spinal Cord Injury Evidence-Based Nutrition Practice Guideline*.

The guideline development team recommended multi-faceted strategies to disseminate the guideline and encourage its implementation. Management support and learning through social influence are likely to be effective in implementing guidelines in dietetic practice. However, additional interventions may be needed to achieve real change in practice routines.

Implementation of the guideline will be achieved by announcement at professional events, presentations and training. Some strategies include:

- **National and local events:** State dietetic association meetings and media coverage will help launch the guideline
- **Local feedback adaptation:** Presentation by members of the work group at peer review meetings and opportunities for CEUs for courses completed
- **Education initiatives:** The guideline and supplementary resources will be freely available for use in the education and training of dietetic interns and students in approved Commission on Accreditation of Dietetics Education (CADE) programs
- **Champions:** Local champions will be identified and expert members of the guideline team will prepare articles for publications. Resources will be provided that include PowerPoint presentations, full guidelines and pre-prepared case studies.
- **Practical tools:** Some of the tools that will be developed to help implement the guideline include specially-designed resources such as clinical algorithms, slide presentations, training and toolkits.

Specific distribution strategies include:

Publication in full: The guideline is available electronically at the ADA Evidence Analysis Library website and announced to all ADA Dietetic Practice Groups. The ADA Evidence Analysis Library will also provide downloadable supporting information and links to relevant position papers.

- [Spinal Cord Injury](#)
- [Spinal Cord Injury \(SCI\) Guideline \(2009\)](#)
- [SCI: Introduction \(2009\)](#)

Spinal Cord Injury

SCI: Benefits and Risks/Harms of Implementation (2009)

Benefits and Risks or Harms of Implementing the Recommendations

Safety issues must be reviewed carefully for each adult with spinal cord injury. General benefits and risks associated with implementation of the guideline are addressed for each recommendation.

When implementing these recommendations:

- Review the patient's age, socioeconomic status, cultural issues, health history, and co-morbid conditions. An individualized assessment of each patient's home resources, including caregiver availability and meal preparation resources, is vital in this population.
- Because the life adjustments associated with a catastrophic spinal cord injury are usually overwhelming to both the patient and the patient's family, appropriate consultations with mental health and social services professionals should be considered when planning nutrition care.

Potential Benefits

A primary goal of implementing these recommendations includes improving the nutritional status and quality of life of adults with spinal cord injury. MNT employing a variety of nutrition interventions may result in improved nutritional intake, mobility, nutrition-related clinical parameters, weight management, and improved overall nutritional quality of life. Additional benefits of nutrition care provided by a Registered Dietitian may include increased ability to participate in therapies, reduction in the risk of onset and progression of nutrition-related comorbidities such as pressure ulcers, and increased ability to participate in home and community activities. MNT can reduce complications, decrease length of stay and enhance rehabilitation outcomes.

Although costs of medical nutrition therapy sessions and reimbursement vary, MNT is essential for improved outcomes in patients with spinal cord injury. MNT can be considered cost effective when weighing the benefits of appropriate nutrition therapy to prevent co-morbidities versus the cost of medical intervention. For example, MNT to ensure adequate protein and micronutrient intake may promote healthy skin integrity, thus saving the considerable costs of treatment for a developed pressure ulcer.

Risk or Harm Considerations

When implementing nutrition care for persons with spinal cord injury, evaluate barriers that may hinder the application of nutrition recommendations. Use clinical judgment in applying the guidelines when evaluating patients with co-morbid conditions.

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Spinal Cord Injury

SCI: Executive Summary of Recommendations (2009)

Executive Summary of Recommendations

Below are the major recommendations and ratings for the Academy of Nutrition and Dietetics Spinal Cord Injury (SCI) Evidence-Based Nutrition Practice Guideline. View the Guideline Overview section for Background Information.. More detail (including the evidence analysis supporting these recommendations) is available on this website to Academy members and EAL subscribers under [Major Recommendations](#).

To see a description of the Academy Recommendation Rating Scheme (Strong, Fair, Weak, Consensus, Insufficient Evidence), [click here](#).

The SCI Recommendations are listed below. *[Note: If you mouse-over underlined acronyms and terms, a definition will pop up.]*

- [Screening and Referral](#)
SCI: Role of the Registered Dietitian
 A registered dietitian should be an active participant of the interdisciplinary team providing care for patients with spinal cord injuries in the acute phase, rehabilitation setting and community setting. Evidence suggests that medical nutrition therapy provided to patients with spinal cord injuries by a registered dietitian results in improved nutrition-related patient

outcomes, such as adequate nutrient intake and management of serum lipids, weight, dysphagia, bowel function and pressure ulcers.

**Fair
Imperative**

SCI: Nutrition Screening for Lipid Abnormalities

Screening for lipid abnormalities is recommended for all persons with spinal cord injury living in the community setting in order to reduce morbidity and mortality. Studies show that spinal cord injury is associated with increased risk for cardiovascular disease due to inactivity and immobilization.

**Fair
Conditional**

• **Nutrition Assessment**

SCI: Assessment: Energy Needs in the Acute Phase

If the patient with spinal cord injury is in the acute phase of spinal cord injury, the registered dietitian (RD) should assess energy needs by measuring energy expenditure. Patients with spinal cord injury have reduced metabolic activity due to denervated muscle. Actual energy needs are at least 10% below predicted needs. Indirect calorimetry is more accurate than estimation of energy needs in critically ill patients.

**Strong
Conditional**

SCI: Assessment: Energy Needs in the Acute Phase using Predictive Equations

If the patient with spinal cord injury is in the acute phase of spinal cord injury, and indirect calorimetry is not available, the registered dietitian may consider estimating energy needs with the Harris-Benedict formula, using admission weight, an injury factor of 1.2 and an activity factor of 1.1. No research was available to compare Harris-Benedict with other predictive equations in this population.

**Weak
Conditional**

SCI: Assessment: Energy Needs in the Rehabilitation Phase

If the patient with spinal cord injury is in the rehabilitation phase, the registered dietitian may estimate energy needs using 22.7kcal per kg body weight for patients with quadriplegia and 27.9kcal per kg for those with paraplegia. Patients with spinal cord injury have reduced metabolic activity due to denervated muscle.

**Weak
Conditional**

SCI: Assessment of Protein Needs in the Acute Phase

If the patient with spinal cord injury is in the acute phase, the registered dietitian should calculate protein needs at 2.0g per kg of ideal body weight per day to lessen the obligatory negative nitrogen balance that occurs during the acute phase.

**Weak
Conditional**

SCI: Assessment of Protein Needs in the Rehabilitation and Community Living Phases

If the person with spinal cord injury is in the rehabilitation phase or community living phase, then the registered dietitian should calculate protein needs at 0.8g to 1.0g per kg of body weight per day for maintenance of protein status in the absence of pressure ulcers or infection.

**Weak
Conditional**

SCI: Nutrition Assessment in the Acute Care Setting

If a patient is in the acute phase of spinal cord injury, the registered dietitian should conduct a nutrition assessment within the first 48 hours post-injury, in order to determine nutrient needs, provide nutrition support recommendations and identify conditions that may predispose the patient to nutrition-related complications. Evidence suggests that early nutrition support is associated with improved patient outcomes. The nutrition assessment should include but is not limited to:

- *Food- and nutrition-related history:* Energy intake, diet order, food or beverage intake
- *Anthropometrics:* Weight change
- *Biochemical and medical tests and procedures:* Swallow study, inflammatory profile, metabolic profile, albumin, prealbumin
- *Nutrition-focused physical findings:* Digestive system, cardiovascular and pulmonary systems
- *Client history:* Treatment and therapy
- *Comparative standards:* Energy needs, protein needs, ideal and reference body weight, fluid needs.

**Strong
Conditional**

SCI: Nutrition Assessment in the Rehabilitation Setting

If a patient is in the rehabilitation phase of spinal cord injury, the registered dietitian should conduct a nutrition assessment to develop and implement an individualized therapeutic nutrition plan for the patient. Evidence suggests that medical nutrition therapy by a registered dietitian may result in improved ability to participate in therapies and in an improved transition into the community setting. The nutrition assessment should include but is not limited to:

- *Food- and nutrition-related history:* Energy intake, diet order, food beverage intake, fiber intake, medication and herbal supplement use, mealtime behavior, nutrition-related ADLs and IADLs, physical activity, weight change
- *Anthropometrics:* Weight change
- *Biochemical and medical tests and procedures:* Swallow study, inflammatory profile, metabolic profile, albumin
- *Nutrition-focused physical findings:* Digestive system; cardiovascular-pulmonary system, skin
- *Client history:* Social history
- *Comparative standards:* Energy needs, protein needs, ideal or reference body weight, fluid needs, fiber needs.

**Fair
Conditional**

SCI: Nutrition Assessment in the Community Setting

If a person with spinal cord injury is living in the community setting, the registered dietitian should conduct a nutrition assessment as part of the annual medical exam to develop and implement an individualized therapeutic nutrition plan. The nutrition assessment should include but is not limited to:

- *Food- and nutrition-related history* (specifically knowledge deficits, beliefs and attitudes, body image, mealtime behaviors, physical ability to self-feed, access to food- and nutrition-related supplies, meal preparation and food avoidances)
- *Anthropometric measurements* (specifically body composition, weight)
- *Biochemical data, medical tests and procedures* (specifically serum lipid and glucose levels)
- *Social history* (specifically isolation)
- *Nutrition-focused physical findings* (specifically bowel and bladder function). Evidence suggests that annual nutrition assessment by a registered dietitian is necessary to identify nutrition-related concerns that may affect the health and quality of life of persons with spinal cord injury.

**Fair
Conditional**

SCI: Pressure Ulcers: Prevention

The Registered Dietitian (RD) should assess persons with spinal cord injury for risk factors associated with the development of pressure ulcers. The RD should determine the frequency of nutrition reassessment based on changes in nutritional or medical parameters and institutional protocols. Research suggests that maintenance of nutrition-related parameters, including anthropometrics, skin integrity, dietary intake, lifestyle factors and biochemical indices, may be associated with reduced risk of pressure ulcers.

**Fair
Imperative**

SCI: Assessment of Biochemical Parameters Associated with Prevention of Pressure Ulcers

The Registered Dietitian should assess laboratory indices associated with the risk of pressure ulcers such as albumin, prealbumin, zinc, vitamin A and vitamin C as part of the nutrition assessment of persons with spinal cord injury. Biochemical parameters as close to normal as possible or within the normal range are associated with reduced risk of pressure ulcers.

**Fair
Imperative**

SCI: Assessment of Anthropometric, Nutrition and Lifestyle Factors Associated with Prevention of Pressure Ulcers

The Registered Dietitian should assess anthropometric, nutrition and lifestyle factors, including weight, food and nutrition-related history (food intake, alcohol intake, physical activity and function) and smoking history for persons with spinal cord injury. Evidence suggests that the risk of developing pressure ulcers is reduced in individuals who maintain a normal weight, consume adequate amounts of nutrients and do not have a history of smoking or alcohol abuse.

**Fair
Imperative**

SCI: Assessment of Body Composition: Estimation of Ideal Body Weight

The registered dietitian should estimate ideal body weight for persons with spinal cord injury by adjusting the Metropolitan Life Insurance tables for individuals of equivalent height and weight. There are two reported methods for adjusting the tables:

- Quadraplegia, reduction of 10% to 15% lower than table weight; paraplegia, reduction of 5% to 10% lower than table weight
- Quadriplegia, 15 lbs to 20 lbs lower than table weight; paraplegia, 10 lbs to 15 lbs lower than table weight.

**Consensus
Imperative**

SCI: Assessment of Body Composition: BMI and skinfold measurements

The registered dietitian should not use body mass index (BMI) or skinfold measurements to measure body composition in persons with spinal cord injury. These methods may not provide reliable results since they were developed based on able-bodied persons.

**Fair
Imperative**

SCI: Assessment of Body Composition: BIA and DEXA

For persons with spinal cord injury who are medically stable, the registered dietitian should consider using bioelectric impedance analysis (BIA) or dual-energy X-ray absorptiometry (DEXA) to assess body composition. Evidence suggests that BIA and DEXA correlate with measures of total body water (TBW) when labeled water is used to provide a reference value for TBW. Persons with spinal cord injury have significantly higher fat mass and lower lean mass than persons without spinal cord injury.

**Fair
Conditional**

SCI: Nutrition Assessment for Prevention and Treatment of Overweight and Obesity

The Registered Dietitian should assess the weight and body composition of persons with spinal cord injury (SCI), and adjust energy level or implement weight management strategies as appropriate. The SCI population is at a higher risk of associated comorbidities such as diabetes, metabolic syndrome and cardiovascular disease. Lower levels of spontaneous physical activity and a lower thermic effect of food result in decreased energy expenditure and energy needs. See Nutrition Assessment recommendations for methods to determine weight and energy needs, and [ADA Adult Weight Management Evidence-based Nutrition Practice Guideline](#) for methods to manage overweight and obesity.

**Strong
Imperative**

SCI: Physical Activity and Energy Needs

The registered dietitian should consider the body weight, co-morbid conditions including abnormal blood lipids and obesity, level of physical activity, rate of propulsion and type of wheelchair used by the person with spinal cord injury when assessing energy needs. Evidence suggests that the use of a manual standard wheelchair increases energy needs, heart rate, oxygen consumption and ventilation, especially as speed and resistance levels increase, compared to ultralight wheelchairs and pushrim-activated, power-assisted wheelchairs.

**Fair
Imperative**

SCI: Assessment: Energy Needs For Persons with Spinal Cord Injury with Pressure Ulcers

If a person with spinal cord injury has a pressure ulcer, the registered dietitian should measure energy needs by indirect calorimetry (IC). If indirect calorimetry is not available, any of the following predictive equations may be used to calculate energy needs :

- 30kcal to 40kcal per kg of body weight per day
- Harris-Benedict times stress factor (1.2 for stage II ulcer, 1.5 for stage III and IV ulcers).

No evidence currently exists to suggest that any one of the above predictive equations is superior to the others. Persons with spinal cord injury with pressure ulcers have higher energy needs than persons with spinal cord injury who have similar levels of injury and no pressure ulcers. Evidence suggests that additional energy is needed for optimal healing of pressure ulcers.

**Consensus
Conditional**

SCI: Assessment: Protein Needs For Persons with Spinal Cord Injury with Pressure Ulcers

If a person with spinal cord injury has a pressure ulcer, the registered dietitian should calculate protein needs as follows:

- 1.2g to 1.5g of protein per kg body weight per day (Stage II pressure ulcers)
- 1.5g to 2.0g of protein per kg body weight per day (Stage III and IV pressure ulcers).

Persons with spinal cord injury with pressure ulcers have higher protein needs than persons with spinal cord injury who have similar levels of injury and no pressure ulcers. Evidence suggests that additional protein is needed for optimal healing of pressure ulcers.

- Arginine and its relationship to wound healing has been researched for over 30 years, primarily in animal

- models. Clear and definitive guidelines for its safe and effective use have yet to be established.
- Glutamine should not be routinely provided to all patients with wounds due to insufficient data.

Consensus Conditional

SCI: Assessment: Fluid Needs for Persons with Spinal Cord Injury with Pressure Ulcers

If a person with spinal cord injury has a pressure ulcer, the registered dietitian should assess hydration status to determine fluid needs. Assessment of hydration status includes evaluation of parameters such as input and output, urine color, skin turgor, BUN and serum sodium. Increased fluid losses may result from the evaporation of fluids from a severe pressure ulcer, draining or open wounds, fever or the use of an air-fluidized bed. [Current fluid recommendations](#) are based on guidelines for the non- SCI population.

- Normal requirement: 30ml to 40ml per kg
- Minimum of 1.0ml per kcal per day
- 10ml to 15ml per kg additional fluids may be required with the use of air fluidized beds set at a high temperature (more than 31° to 34°C or more than 88° to 93°F)
- Fluid loss includes evaporation from open wounds, wound drainage and fever
- These guidelines are only a general indication of insensible water loss; the registered dietitian will need to monitor other parameters of hydration status.

Consensus Conditional

SCI: Assessment: Micronutrient Needs for Persons with SCI with Pressure Ulcers

If a person with spinal cord injury has a pressure ulcer, the registered dietitian should recommend a daily vitamin and mineral supplement that meets no more than 100% of the RDA. Certain micronutrients play a role in the process of wound healing; however, the optimal nutrient intake is not known at this time. Few rigorous scientific studies exist in this area, even for the non- SCI population. Therefore, comprehensive evidence-based practice guidelines are not developed for micronutrient needs. If a person with spinal cord injury has a pressure ulcer and has a suspected or documented micronutrient deficiency, the registered dietitian should provide additional supplementation. Caution should be used when supplementing greater than the Tolerable Upper Intake Level (UL). The dietitian should re-evaluate the need for micronutrient supplementation every seven to 10 days. **Vitamin A** Vitamin A deficiency results in impaired wound healing and alteration in immune function that may increase the likelihood of wound infections. Documented recommendations for amount of Vitamin A for enhanced wound healing in injured patients is 10,000 IU to 50,000 IU per day and 10,000 IU IV for moderate-severely injured patients or malnourished patients for a limit of 10 days. For patients receiving steroids, 10,000 IU to 15,000 IU for one week has been recommended to counteract the anti-inflammatory effects of steroids. Vitamin A supplementation should be implemented cautiously and judiciously because of potential toxicity. Additional research is needed to confirm optimal dosage. **Vitamin C** Vitamin C deficiency has been associated with delayed wound healing. In patients with Vitamin C deficiency, supplementation has been shown to enhance wound healing. High doses of Vitamin C for healing chronic wounds is widely recommended in the literature. The Agency for Health Care Research and Quality recommends 100mg to 200mg per day of Vitamin C for Stage I and II pressure ulcers and 1,000mg to 2,000mg per day of Vitamin C for Stage III and IV pressure ulcers. Additional research is needed to confirm optimal dosage.

Vitamin E The effect of Vitamin E in healing acute and chronic wounds is controversial. Further research is needed in humans with controlled randomized trials to determine risks and benefits of various doses of Vitamin E and the effect on healing. **Zinc** Zinc deficiency is associated with delayed wound healing due to a decrease in collagen and protein synthesis and impaired immune competence. Replacement therapy guidelines have not been well defined in the literature. ZnSo4 220mg (50mg elemental Zinc) twice per day is recommended as a standard adult oral replacement. High-dose supplementation of zinc should be limited to two to three weeks. Dosage should be individualized according to zinc status and metabolic demands. **Iron** Anemia assessed by hemoglobin and hematocrit levels reduces oxygen supply to tissues, thus impairing healing of pressure ulcers. If low hemoglobin concentration is due to iron deficiency anemia, it may be a factor in tissue hypoxia and impaired wound healing. Supplementation should be provided as indicated to correct iron deficiency anemia.

Consensus Conditional

SCI: Nutrition Assessment of Lipid Abnormalities

If persons with spinal cord injury living in the community setting have lipid abnormalities, the registered dietitian should include age, ethnicity, gender, time since injury, level of injury, activity level, dietary habits, smoking behavior, alcohol intake and overweight or obese status in the food and nutrition-related history. Studies show that these factors are associated with abnormal blood lipids, particularly decreased HDL cholesterol, in persons with spinal cord injury.

Strong Conditional

• [Nutrition Intervention](#)

SCI: Nutrition Education and Counseling for Lipid Abnormalities

If persons with spinal cord injury living in the community setting have total cholesterol levels more than 200mg per dL (5.2mmol per L), then a Registered Dietitian (RD) should provide comprehensive nutrition education and counseling regarding a cardioprotective diet. Persons with spinal cord injury can achieve improvements in lipid values similar to those of other individuals with disorders of lipid metabolism, and persons with spinal cord injury are at higher risk of cardiovascular conditions.

Fair Conditional

SCI: Cranberry Juice

If consistent with patient preference and other nutritional considerations, the Registered Dietitian may recommend that cranberry juice be included in the diet of persons with spinal cord injury to reduce urinary tract infections. Consumption of one cup (250ml) cranberry juice, three times per day, may be associated with a reduced urinary tract biofilm load.

Weak Conditional

SCI: Urologic Health: Cranberry extract supplements

The Registered Dietitian should not recommend cranberry extract supplements to promote urologic health (prevention of urinary tract infections, urologic stones, etc.) in spinal cord injured persons. Evidence suggests that cranberry extract supplements, ingested in tablet or capsule form, are not effective in prolonging the UTI-free period or decreasing bacteriuria or WBC count in persons with spinal cord injuries.

Fair Imperative

SCI: Fiber and Neurogenic Bowel: Level of Fiber Intake

The Registered Dietitian should prescribe for persons with spinal cord injury with neurogenic bowel an initial fiber intake of 15g per day, with gradual increases up to 30g per day of fiber, as tolerated from a variety of sources. A fiber intake of 15g per day may be associated with significant improvements in bowel function. However, fiber intake greater than 20g per day may be associated with undesirable prolonged intestinal transit times in persons with spinal cord injury.

Weak

Conditional

SCI: Nutrition Education Regarding Physical Activity

If a person with spinal cord injury has lipid abnormalities and weight management issues, then the registered dietitian should provide initial brief nutrition education regarding the relationship between physical activity and improving lipid levels. Evidence suggests that appropriate physical activity may result in improvements of blood lipid parameters and weight in persons with spinal cord injury.

Fair

Conditional

SCI: Nutrition Education Regarding Physical Activity in Overweight and Obese Persons with SCI

If a person with spinal cord injury is overweight or obese, the registered dietitian should encourage physical activity as part of a comprehensive weight management program. A carefully planned [weight management program](#) incorporating physical activity has been shown to reduce and maintain weight in overweight and obese persons with spinal cord injury. Evidence suggests that appropriate physical activity, such as wheelchair sports, swimming, electrical stimulation exercise and body weight supported treadmill training may result in improvements of blood lipid parameters and weight in persons with spinal cord injury.

Weak

Conditional

SCI: Nutrition Intervention for Treatment of Overweight and Obesity

If a person with spinal cord injury is overweight or obese, the registered dietitian should implement weight management strategies as appropriate. The [SCI](#) population is at a higher risk of associated comorbidities such as diabetes, metabolic syndrome and cardiovascular disease. Lower levels of spontaneous physical activity and a lower thermic effect of food result in decreased energy expenditure and energy needs. See the Nutrition Assessment recommendations for foods to determine [weight](#) and [energy needs](#) and the [ADA Adult Weight Management Evidence-based Nutrition Practice Guideline](#) for methods to manage overweight and obesity.

Strong

Imperative

SCI: Nutrition Intervention to Prevent Development of Pressure Ulcers

If a patient with spinal cord injury is at risk of pressure ulcer development as indicated by biochemical, anthropometric and lifestyle factors, the registered dietitian should implement aggressive nutrition support measures. The range of options may include medical food supplements and enteral and parenteral nutrition. Research suggests that improved nutrition intake, body weight and biochemical parameters may be associated with reduced risk of pressure ulcer development.

Strong

Conditional

SCI: Nutrition Prescription for SCI Persons with Pressure Ulcers

A nutrition prescription should be formulated as part of the nutrition intervention for persons with spinal cord injury ([SCI](#)) and pressure ulcers, which includes the energy, protein, fluid and micronutrient requirements. Evidence suggests that additional energy and protein is needed for optimal healing of pressure ulcers. Fluid and micronutrient needs will vary depending on the person's status. See the [Assessment of Nutritional Needs for Pressure Ulcers](#) for determining levels of each of these.

Consensus

Imperative

SCI: Coordination of Care in Spinal Cord Injury

The Registered Dietitian ([RD](#)) should implement [MNT](#) and coordinate care with the interdisciplinary team providing care for persons with spinal cord injury in the [acute phase](#), [rehabilitation setting](#) and [community setting](#). The interdisciplinary team is composed of health professionals including but not limited to: Physicians, nurses, occupational therapists, physical therapists, speech therapists, [RDs](#), exercise physiologists and mental health professionals. Evidence suggests that optimal care of each patient requires a multidisciplinary approach in all aspects of patient care, including nutrition.

Weak

Imperative

SCI: Fluid and Neurogenic Bowel: Estimating Fluid Needs to Promote Optimal Stool Consistency

The registered dietitian should estimate the fluid needs of persons with spinal cord injury with neurogenic bowel by using the guidelines of the Consortium on Spinal Cord Medicine, as follows:

- One ml fluid per kcal estimated energy needs plus 500ml or
- 40ml per kg body weight plus 500ml.

A minimum of 1.5L of fluid per day may promote optimal stool consistency in persons with spinal cord injury and neurogenic bowel. Persons with spinal cord injury and neurogenic bowel often have an increase in colonic transit time, resulting in excessive fluid reabsorption and the formation of hardened stools. Further research is needed to establish fluid intake guidelines for this population.

Consensus

Conditional

• [Nutrition Monitoring and Evaluation](#)

SCI: Monitoring and Evaluation in Acute Care Setting

If a patient is in the acute phase of spinal cord injury, a Registered Dietitian should provide ongoing monitoring of the patient's nutrition status. Evidence suggests that conditions such as hypoproteinemia, hypoalbuminemia, anemia, poor bowel function and dysphagia are better managed when patients receive adequate nutrition care from a Registered Dietitian.

Fair

Conditional

SCI: Monitoring and Evaluation of Protein Intake in Acute Care Setting: Overfeeding

If a patient with spinal cord injury is in the acute phase (zero to four weeks post-injury), the registered dietitian should monitor the patient's protein intake to ensure that the patient does not consume more than 2.0g per kg of body weight per day. Efforts to achieve positive nitrogen balance with excessive nutrition support are generally unsuccessful and may result in substrate overload and metabolic complications with subsequent poor outcomes.

Weak

Conditional

SCI: Monitoring and Evaluation of Energy Needs During the Rehabilitation Phase

The registered dietitian should monitor weight, functional capacity and physical activity and adjust energy needs as necessary. As patients with spinal cord injury progress through the rehabilitation phase and move into the community setting, changes in these factors may affect energy needs.

Weak

Conditional

SCI: Nutrition Monitoring and Evaluation for Fiber and Neurogenic Bowel

The Registered Dietitian ([RD](#)) should monitor at regular intervals the fiber intake of persons with spinal cord injury and neurogenic bowel, and the amount of dietary fiber provided should be adjusted as necessary. Provision of excessive fiber

may result in unacceptable flatulence, significant increase in stool volume and painful abdominal distension, while provision of inadequate fiber may result in constipation or bowel impaction.

**Weak
Conditional**