

## SPINAL CORD INJURY: A PRACTICAL GUIDE TO NUTRITIONAL MANAGEMENT



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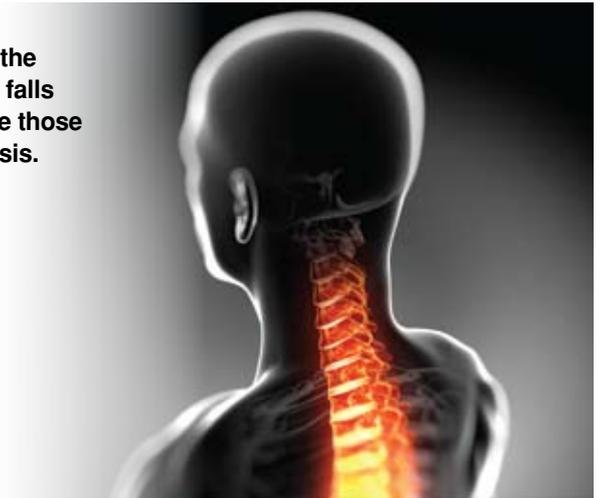
**Traumatic and non-traumatic spinal cord injury (SCI) results in approximately 750 newly injured people in the UK and Ireland annually. The commonest causes are falls from heights and road traffic accidents. SCI can leave those affected with varying degrees of life-changing paralysis.**

SCI occurs when there is partial or complete severing of the spinal cord. This results in interruptions to the autonomic nervous system that is carried in the spinal canal. An American Spinal Injury Association Impairment Score (ASIA scale) is used to classify the degree of injury sustained. ASIA A is classified as having no sensory or motor function in the sacral segments (S4-5). The level of impairment reduces to ASIA E which is classified as normal motor and sensory functions (1). This variability arises from the different levels of lesion of the spinal column: paraplegia is when function is lost to lower limbs, with tetraplegia being when upper limbs are also affected. There are also incomplete and complete injuries. When there is a complete injury all sensory and motor function is lost below the level of injury. An injury is classified as incomplete when there is some degree of sensory or motor sparing. This can be to a greater or lesser extent. Spinal cord injury can therefore result in many differing levels of functional ability.

### ACUTE CARE

Following the initial injury, patients are immobilised and placed on complete bed rest. They usually undergo surgical fixation of their spine and may require additional surgery for any other injuries received at the time of the accident. During this time, the immobilised patient will experience loss of muscle mass. The lack of autonomic nerve system stimulating muscle contraction below the level of injury results in further muscle loss. This muscle wastage is seen as dramatic weight loss, especially from individuals with high muscle mass pre-injury. The temptation is to increase calories and protein to compensate and prevent further loss. Evidence is lacking on the percentage weight loss that can safely be tolerated without it affecting recovery. A local unpublished audit indicated that, on average, patients lost around 13 percent of their reported pre-injury weight. This would initially be considered extreme, but this weight loss is considered inevitable and obligatory (2, 3).

In view of the variability between injuries, calculating nutritional requirements becomes complex and individual. There is minimal good quality evidence for nutritional re-



quirements in the acute stage. This is possibly due to low patient numbers and the vast range of differing injuries. However, historically, it was felt the metabolic demand following initial spinal cord injury substantially increased requirements. Research is now indicating that nutritional requirements, especially for energy, are less than previously thought and there is increasing concern that over-feeding is a recognised problem. Actual energy needs have been found to be 10 percent less than predicted requirements. The American Dietetic Association (ADA) recommends the use of the Harris Benedict formula with a 1.1 activity factor for bed rest and a 1.2 injury factor (4). Caution should still be exercised in using this for all injury types. Those who have a high complete lesion will have a greater reduction in requirement compared to an incomplete lower injury.

In the ADA guidelines, protein requirements for newly injured patients are estimated to be 2.0g/kg body weight. Adjustments may be needed for those with higher or lower levels of injury. It is recognised that a negative nitrogen balance is inevitable at the acute stage and higher intakes to correct this could be futile (5). All other recommendations for micronutrients are to meet the RNI. Daily multivitamins may be required if dietary intake is insufficient (6).

Monitoring weight during the acute phase is problematic. Weighing hoists, using spinal boards or dedicated bed weighing equipment, are required for those patients on compulsory bed rest and may not be available. For those using weighing hoists, there may be restrictions on the number of times patients can be lifted, limiting the

frequency of weights available. Whilst efforts need to be made to monitor weight, a more subjective approach is possibly all that can be achieved. Whilst weight loss is inevitable, and there are difficulties in calculating nutritional requirements with certainty, it is essential that poor nutritional intake does not contribute to the weight loss.

Feeding patients on bed rest is also problematic. Due to the effect on the autonomic nervous system, all patients experience an initial paralytic ileus. SCI guidelines are for patients not to be enterally fed for the first 48 hours post injury (7). With intensive care units often having standard protocols for early enteral nutrition, it is important that local policies are in place to prevent early inappropriate enteral nutritional support following a SCI. After 48 hours, the enteral route becomes available. However, for the injuries above T12, problems can still arise and can delay successful initiation of enteral feeding. The parenteral route then needs to be considered. Whilst the majority of patients are fit and well prior to a traumatic SCI, there are an increasing percentage of elderly patients (8) and those with a history of drug and alcohol abuse, surviving a SCI. This results in an increasing percentage of patients with pre-existing nutritional problems and will increase the urgency for appropriate nutritional support.

As patients are generally nursed lying completely flat, enteral nutrition needs to be used with careful monitoring. Where possible, patients should be encouraged to take food orally, although generally they can only manage small, frequent meals and snacks, often resulting in the need for supplementary intakes. There can be practical problems with eating and feeding whilst lying down, increasing the need for assistance at meal times. Once the spine is considered sufficiently stable for the patient to be mobilised the practical problems of providing nutrition reduce.

#### LONG TERM PROBLEMS

##### Bowel management

The reflex action of the gastrointestinal tract is affected by the spinal cord injury. Not only is there the initial paralytic ileus but from here onwards the bowel action is compromised. Following SCI, the bowel will either be a reflex bowel or a flaccid bowel. Bowel management is different for the differing types. The reflex (upper motor neurone bowel) results in patients being able to open their bowel with the possible use of laxatives. The flaccid bowel (lower motor neurone bowel) results in patients being unable to voluntarily control their bowels. Manual evacuation is then required. This makes bowel management the most reported issue for people with a SCI (9). From a dietary point of view, there may be a requirement to adjust the dietary fibre content accordingly, to provide the most appropriate stool consistency for the specific bowel management. For the reflex bowel, a softer stool is required (high

fluid/fibre content) and for a flaccid bowel a harder more constipated stool is required. This may result in avoiding insoluble fibre (9). Further information and guidelines on bowel management can be found on the Multidisciplinary Association for Spinal Cord Injury Professionals (MAS-CIP) website.

#### Pressure ulcers

Due to the lack of sensation, SCI patients are susceptible to developing pressure ulcers. Being either under or overweight can increase the risk of pressure ulcers. A balanced diet is essential in maintaining good skin condition.

#### Weight control

Due to lack of mobility, patients are prone to increasing body weight. For stable established patients, energy requirements have been documented to be approximately 28Kcal/kg for those with paraplegia and 22Kcal/kg for those with tetraplegia (10). This is lower than the able-bodied population and reflects their lower mobility and reduced muscle mass. However, as with the able-bodied population, activity can be used to increase energy requirements and promote a healthy weight. Protein needs also reduce to 0.8-1.0g/kg body weight.

Evidence suggests that SCI patients can have 22 percent higher fat mass than weight and height matched able-bodied controls (11). This is associated with the changing body composition. Suggestions are that ideal body weights should therefore be lower than the able-bodied population and that weight for paraplegics is 4.5-6.8kg less than height matched controls and for tetraplegics it is 6.8-9.1kg less (12). This would indicate that BMI ranges are also altered with suggestion made that an ideal BMI should be between 18 and 23.

In view of reduced energy requirements, if patients do want or need to lose weight, it can be extremely difficult. Not only can it require significant reduction in intake, additional barriers to physical activity can make increasing energy expenditure difficult. Gyms may not have suitable equipment; it can be difficult to push wheelchairs on uneven or hilly terrain. However, with increasing risk of central obesity, immobility and fat mass, the prevalence of diabetes and coronary heart disease is higher in the SCI population, making it an important issue to tackle (13).

Not only are there health risks to the increasing weight, as patients get heavier and everyday tasks become more difficult, this can also increase isolation and can result in an ever-deteriorating spiral. At the other extreme, isolation can also lead to neglect and low body weight and the subsequent effect on health and skin condition.

Working with this patient population highlights the need for patient-centred individual care that is tailored to their social situation and physical abilities.

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**Questions relating to:** *Spinal cord injury: a practical guide to nutritional management.*

Type your answers below and then **print for your records**. Alternatively print and complete answers by hand.

Q.1	How does spinal cord injury (SCI) occur?
A	
Q.2	What is a 'complete' injury?
A	
Q.3	When is an injury classified as 'incomplete'?
A	
Q.4	What causes muscle loss and therefore weight loss to the injured patient?
A	
Q.5	What are the ADA nutrition guidelines for newly injured patients?
A	
Q.6	Why can weighing hoists be problematic?
A	
Q.7	Describe how patients should be fed in the first 48 hours post injury.
A	
Q.8	Describe how patients who are recovering completely flat on their backs, should be fed.
A	
Q.9	Following SCI, the bowel will either be reflex or flaccid. Describe both bowel types.
A	
Q.10	What are the energy requirements for established stable patients and what would be needed to reduce body weight?
A	
Q.11	What are the ideal body weights and BMI for SCI patients?
A	

Please type extra notes here . . .