

## Need for Appropriate Amount and Level of Care in Paraplegics Patients

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### ABSTRACT

Paraplegic patients suffer physical and emotional disability and are at heightened risk for comorbidities and potentially life-threatening complications. The economic costs associated that paraplegics face are significant and vary depending on factors such as level of disability and presence of chronic pain and/or depression. Providing the right amount and level of care is critical for optimizing health and life expectancy and minimizing suffering in paraplegic patients.

**Keywords:** Spinal cord injury; Paraplegics; Physical; Paralysis; Prognosis; Bone

## INTRODUCTION

More than 2.5 million people across the globe are living with the consequences of Spinal Cord Injury (SCI), with up to 500,000 suffering from an SCI annually [1-4]. In the U.S. alone, there are approximately 18,000 new cases of SCI each year [5,6]. Paraplegic patients experience SCI lesions in the lower thoracic area, which causes paralysis in the lower body [3,7].

Paraplegics' suffer complete and incomplete injuries at similar rates, each of which lead to physical, sensory, and autonomic dysfunction [6]. For those who developed the condition, it is clear that despite some improvements in long-term survival, life expectancy continues to be reduced [8]. The 40-year survival rate for paraplegics is 62% [7,8]. In general, recovery is more successful in those who experience their SCI at a younger age [9].

Here we describe the clinical realities for paraplegics and the range of care needs that are required to appropriately minimize pain and suffering and maximize longevity.

## PARAPLEGIA OFTEN RESULTS FROM TRAUMATIC ACCIDENTS

As with other forms of SCI, paraplegics have most often endured trauma through incidents like falls, vehicular accidents, and gunshot wounds [2,7,10]. However, certain health conditions such as those that lead to inflammation or blood flow disruptions can also cause patients to become paraplegics [11,12].

In the context of trauma, a complex cascade of physiological events occurs following SCI, leading to the disruption of signals across the spinal cord. Given the important role of the spinal cord in movement and sensory experience, these functions become disrupted [3]. In addition to the initial insult, the body's response to the insult—namely, inflammation, ischemia, and apoptosis—cause further spinal destruction [13].

While paraplegics may be any sex, race, or age, these factors are predictive of SCIs, with about 8 in 10 SCIs occurring in males and about a quarter in the black population [5,6]. Most SCIs in men occur in late adolescence and early adulthood, while women are at highest risk early and late in life but experience SCIs less frequently in middle age [2,7].

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## PARAPLEGICS EXPERIENCE BODILY CHANGES THAT INCREASE RISK FOR COMPLICATIONS

Acute care following SCI has improved overtime, but unmet needs in long-term care persist [7,14]. Secondary effects in paraplegics pose risks that make it vital that appropriate care is provided to ensure complications are rapidly identified and addressed. According to the National Spinal Cord Injury Statistical Center at the University of Alabama, pneumonia and septicemia have in recent years had the greatest influence on life expectancy in SCI patients followed for 45 years following their injury [15,16]. The complications paraplegics face include:

### Respiratory complications

The paralysis in the abdominal muscles and intercostal muscles that occurs in paraplegics leads to a reduction in vital capacity that has been observed to be as high as 90%. The reduced vital capacity leads to respiratory complications including pneumonia [17,18]. Some research has found that in paraplegics who have never smoked and in whom the injury is low-level, forced vital capacity and forced expired volume are normal [19]. However, restoring lung volume is a major focus of treatment for high paraplegics [17].

### Metabolic complications

Because of the immobility that paraplegics endure, those with the condition tend to undergo changes in body composition that place them at risk for metabolic disturbances and diseases such as coronary heart disease, diabetes, and osteoporosis [20]. For instance, paraplegics tend to gain fat mass and lose both bone and muscle mass. Proper nutrition is thus of high importance in this group of patients. Behavioral research has shown that while female paraplegics appear to consume foods more consistent with nutritional recommendations, male paraplegics report higher than recommended carbohydrate intake, highlighting the need for nutritional support [21].

Research into metabolic risk factors amongst paraplegics has shown that total fat mass in high paraplegics is directly related to how long the patient has experienced paralysis [22]. Similarly, risk of osteoporosis is highest in paraplegics who have been injured longer or who have been bedridden for longer durations. Bone loss tends to be most dramatic in the femoral region, especially in young men. Whereas the use of a manual wheelchair may increase bone density in upper extremities, lower extremity osteopenia commonly occurs in paraplegics over time [23].

### Urinary tract infections

For centuries, recurrent Urinary Tract Infections (UTIs) have occurred in patients with SCI following neurogenic bladder development [24]. While UTIs were a primary cause of death in paraplegics before the discovery of antibiotics, these drugs and sterilization processes have improved outcomes for this set of patients. Nonetheless, paraplegic patients continue to be at heightened risk for UTIs.

### Deep vein thrombosis and pulmonary embolism

Deep vein thrombosis and pulmonary embolism are well-recognized risks in those who have suffered SCI [25,26]. Recent research has shown that deep vein thrombosis often occurs within the first six months of enduring injury, but the timing can vary widely [25]. On the other hand, pulmonary embolism tends to occur in the first three months after injury [26]. Nonetheless, there are several specific risk factors that are associated with likelihood of developing these complications. Additionally, paraplegics appear at high risk for deep vein thrombosis compared to patients with other forms of SCI [27].

### Decubiti, cellulitis, and osteomyelitis

Like patients with other immobility syndromes, paraplegic patients have been specifically observed to be at high risk for decubiti [28]. Avoiding excessive pressure, encouraging movement, and treating decubiti as soon as they occur have been identified as the most beneficial ways to manage this complication. In cases where decubiti are not properly managed, infections may occur. As a result, infections like cellulitis and osteomyelitis are common in SCI patients [29].

### Autonomic dysreflexia

Autonomic dysreflexia is a life-threatening complication, with a 22% mortality rate, that commonly occurs in patients with SCI [30,31]. Changes in hemodynamics in the spine place paraplegics at increased risk for this condition [32]. This condition is particularly common in SCIs above T6 [31]. However, autonomic dysreflexia can actually occur with lesions below T6 with complete and incomplete SCI. The need to recognize and treat autonomic dysreflexia early in SCI patients has been acknowledged as vital to preventing other serious complications, such as cardiac arrest, cerebral hemorrhage, and seizures [31].

### Other complications

Paraplegics are at an elevated risk for several other disorders, including sleep apnea and blood abnormalities [23]. The most common blood abnormality identified in paraplegics is raised globulin levels, which are likely due to chronic infection in this patient population [22].

## PARAPLEGICS FACE SIGNIFICANT SOCIAL AND ECONOMIC COSTS

In addition to the clinical manifestations, paraplegics also face significant disruptions to their quality of life due to the impact on their social interactions and face exorbitant health-related costs. Compared to those with quadriplegia, which from a clinical standpoint is more severe, paraplegics suffer similar levels of disruption to their social lives and personal relationships [33]. While only just over 1 in 10 SCI survivors can maintain a job, less than half of those who are not married at the time of their injury go on to get married later in life [2].

The financial expenses for paraplegics also significantly alter this population's life following their diagnosis. According to the University of Alabama's National Spinal Cord Injury Statistical Center, paraplegics' average yearly expenses in 2022 in the first year following SCI amounted to \$641,153 [6]. In subsequent years, the average cost was \$84,934. Lifetime costs depend on several factors, including age [6]. For example, for those who are 25 years old at the time of their injury, lifetime costs are estimated at \$2,854,343, whereas for those who are 50 at the time of injury, lifetime costs are estimated at \$1,873,220 [6]. It is also important to note that for paraplegics who suffer from chronic pain and/or depression, costs will be significantly higher, as they will need aid and attendant care, increased chronic pain management, and psychiatric/psychological care.

## THE RIGHT LEVEL AND AMOUNT OF CARE IS CRITICAL FOR THE WELL-BEING OF PARAPLEGICS

While care immediately following injury can be life saving and has improved over time, there has been less focus on how to best support paraplegics over the long-term. Studies focusing on the functional priorities of paraplegics have shown that these patients are most interested in improving their lower extremity function, sexual function, and bowel and bladder function [34-36].

These priorities amongst paraplegics point to desire for independence. The level of independence that can be achieved in paraplegics varies. For instance, paraplegics with T1-T9 American Spinal Cord Association Impairment (ASIA) Scale A-C injuries tend to be considered modified independent, with abdominal activation for cough and truncal balance compromised [23]. By contrast, paraplegics with T10-L1 ASIA A-C injuries are usually able to generate enough cough to clear secretions and have better truncal balance. Nonetheless, both populations of paraplegics will likely need ultra-light weight wheel chairs for mobility.

More function at lower levels is present in paraplegics with L2-S5 ASIA A-C injuries. Even for those with ASIA D, who may have enough lower body function for ambulation, an ultra-light weight wheel chair is recommended [23].

## DISCUSSION

While populations of complete paraplegics and incomplete paraplegics may require no aid and attendant care, many complete paraplegics and incomplete paraplegics suffer from chronic pain and have a decreased physical functional capacity as a result of their chronic pain. In these cases, depending on the frequency, duration, intensity, and pattern of pain, a graduated amount of aid and attendant care (increasing) will be required as the patient ages. As these patients age and suffer the secondary effects of aging, combined with their impairment (loss of body systems), greater disability over time will occur. If a patient requires custodial care (bathing, dressing, meal preparation), a CNA or home health aid would be appropriate. Paraplegic patients who suffer from medical complications will

require care from an LPN or LVN. If the patient is medically fragile and suffering from ongoing medical complications, the care should be provided by an RN. Without the right amount and level of aid and attendant care, chronic pain management and psychiatric/psychological care, paraplegic patients are deprived of the quality of life and life expectancy they could otherwise enjoy, despite their physical deficits, emotional lability, and psychiatric disease.

## CONCLUSION

People with SCIs commonly become paraplegics, with permanent disruption in their physical, sensory, and autonomic functions. Their spinal destruction, coupled with their immobility, places them at risk for significant health-related complications, as well as reductions in quality of life. It is critically important to determine the specific level of injury, pain, and disability for each SCI patient to accurately identify the amount and level of aid and attendant care that is required to best manage the paraplegic's disability and comorbidities to maximize their quality of life and life expectancy.

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