

# Aging with Spinal Cord Injury: An Update



Joel E. Frontera, MD\*, Patrick Mollett, DO

## KEYWORDS

• Spinal cord injury • Life expectancy • Quality of life • Disability • Complications

## KEY POINTS

- Persons with spinal cord injury (SCI) are living longer compared with 50 years ago. The average age of injury is trending toward older individuals.
- There is a significant variation in mortality among persons with SCI.
- Healthy SCI individuals tend to have better quality of life (QoL) measures than expected.
- Secondary health issues after SCI are affecting patient's QoL and social participation.
- All organ systems are in some way affected after SCI.

## INTRODUCTION

According to the National Spinal Cord Injury Statistical Center's *Spinal Cord Injury (SCI) Facts and Figures* released in 2016,<sup>1</sup> there are approximately 17,000 new SCI cases each year in the United States. The annual incidence is approximately 54 cases per million population. During the past 40 years, there has been a significant change in the patterns of injury. Data show that the average age at the time of injury has increased from 29 years in the 1970s to approximately 42 years in the current decade. SCI cases are becoming more incomplete and older, approximately 80% of new SCI cases are men, and incomplete tetraplegia is the most frequent diagnosis.

Life expectancy for patients with SCI has improved with advancements in medical knowledge and management compared with life expectancy after World War II. However, unfortunately, there has been a plateau since the 1980s and it is still below the average years of life of a person without SCI. Mortality rates are higher during the first year after SCI, especially after high-level injuries and those requiring ventilator assistance.

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Department of Physical Medicine and Rehabilitation, McGovern Medical School, The University of Texas Health Science Center at Houston, 6431 Fannin Street, MSB G.550A, Houston, Texas 77030, USA

\* Corresponding author.

E-mail address: [joel.e.frontera@uth.tmc.edu](mailto:joel.e.frontera@uth.tmc.edu)

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The National SCI database shows that pneumonia and septicemia have the greatest impact on decreased life expectancy in persons with SCI. Other factors, such as cancer, stroke, metabolic disorders, cardiovascular diseases, and mental disorders, also contribute to the mortality rates of this population.

This article covers some of the medical issues that affect SCI patients and discusses some of the day-to-day issues that face this patient population, such as quality of life (QoL), complications, and barriers for independence.

## HEALTH COMPLICATIONS OF PERSONS WITH SPINAL CORD INJURY

As persons with SCI continue to age and as the average age of onset of SCI continues to trend older, multiple health complications are being noted by the medical professionals who work with this patient population.<sup>2</sup> On injury, a significant number of SCI patients develop issues with spasticity, weakness, and pain, as well as neurogenic bowel and bladder. Other issues now seen in a patient's medical history are osteoporosis,<sup>3</sup> pressure injuries, cardiovascular diseases,<sup>4,5</sup> and metabolic syndromes.<sup>6-9</sup> These issues have been shown to have a negative effect on QoL, social participation, and sex life.<sup>10</sup> The human body is expected to reach maximum functional status at approximately 25 years of age. This is the time that the major organ systems may reach peak functional capacity. After 25 years, this peak capacity tends to decrease at about 1% per year.<sup>11</sup> Immediately after SCI, the body accelerates its functional and metabolic decline; however, after the initial insult, the aging process continues at a normal rate. This may correlate with the findings that people that suffer SCI later in life may have poorer functional outcomes than those injured earlier in their life.<sup>12</sup>

## CARDIOVASCULAR DISEASES

Even though pulmonary complications and infections are among the most common causes of death among persons with SCI, cardiovascular diseases are becoming increasingly common causes of premature death in this population. This is also associated with preventable risk factors such as smoking, decreased activity, and obesity.<sup>13</sup> The concern is that these preventable risk factors in combination with the underlying neurologic disorder may place this population at a greater risk for premature death than non-SCI persons.<sup>14</sup>

Multiple issues can affect the overall cardiovascular health in the long term. Some investigators note an accelerated risk for cardiovascular disorders that increases morbidity and mortality in SCI patients. The term cardiometabolic syndrome has been suggested to identify some of the effects post-SCI.<sup>9</sup> It has been shown that there is a significant decrease in cardioprotective high-density lipoprotein post-SCI. Dallmeijer and colleagues<sup>15</sup> have argued that this may be caused by post-SCI immobilization. Other causes include a poor diet and an increase in caloric content. Cardiometabolic syndrome also includes insulin resistance, obesity, and hypertension. The combination of all of these factors at the same time may have a profound effect on post-SCI health. Research continues to work on finding specific biomarkers for cardiovascular disease in SCI to guide medical evaluation and management.<sup>16</sup> Markers such as levels of C-reactive protein and plasma homocysteine, which have been shown to be predictors for increased atherogenesis and vascular disease, respectively, seem to be elevated in persons with SCI compared with non-SCI persons.<sup>17-19</sup>

## MUSCULOSKELETAL CHANGES

Acute changes after SCI in muscle can predispose muscle to increase fatigability. Changes at the muscular level, such as increased atrophy, increased fat mass, and

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