

Research Report

Visible and Invisible Consequences of Electrical Injury

Electricity is an important element of our daily lives, providing lighting in our domestic, industrial, and public environments; power to household appliances, electronic devices, industrial machinery, health care devices, and several modes of private and public transportation. But electricity could also be the cause of severe and devastating injuries at domestic or workplace settings. Workplace electrical injuries are the second most common form of occupational related burn injuries in Ontario, Canada,¹ affect mainly young electricians, construction workers, labourers, crane operators,² and they account for 6% of all yearly occupational fatalities in the US.³

Electrical injury can produce “visible” consequences (i.e., external and easily discernible to others), including cutaneous wounds produced by contact with the electrical current (e.g., entry and exit wounds), heat produced by the arc flash, ignition of clothing, muscle twitching, muscle contractures, and bone fractures due to concurrent falls or trauma.⁴

But electrical injury can also produce “invisible” consequences (i.e., internal and not discernible to others) due to damage to deeper tissues and organs (e.g., muscle, tendons, arteries, veins, nerves, internal organs). Many of these symptoms are quite vague and nonspecific, and they may not be present immediately after the incident, but may appear hours, days, weeks, months, or even years after the incident and may progressively get worse in time.⁴ These symptoms may include those depicted in the table below and can affect the individual’s quality of life,⁵ reintegration into the community, and their ability to return to work.^{5,6}

Invisible Consequences of Electrical Injury

Category	Symptoms
General	Fatigue, Chronic pain, Sleep disturbances ⁴
Physical	Muscle weakness, Numbness, Loss of sensation ⁴
Cognitive	Concentration and memory problems, Easy distractibility ⁴
Psychological	Anxiety, Flashbacks and nightmares, Depression, Post-traumatic Stress Disorder ^{4,7,8}

The main problem with the “invisible” consequences of electrical injury is that those symptoms may raise suspicion from family members, employers, co-workers, or physicians, of being intentionally created by the individual for personal gain (i.e. malingering),⁹ and these individuals may not receive the same compensation, level of care, workplace accommodations, and sympathy than those individuals with “visible” consequences of electrical injury.¹⁰

The evaluation and treatment of individuals who have suffered an electrical injury must be performed by a multidisciplinary team of professionals with expertise in electrical injury. This expertise is found among members of the Electrical Injury Program at the Outpatient Services of the St. John's Rehab campus, Sunnybrook Health Sciences Centre in Toronto, Ontario. This multidisciplinary team includes a burn surgeon, a nurse, physical and occupational therapists, a psychologist, a social worker, and a return to work coordinator. For more information you can contact them by phone at: (416) 224-6948, by fax at: (416) 226-3358, by E-mail at: info@stjohnsrehab.com or visit their website at: http://sunnybrook.ca/content/?page=SJR_patvis_prog_electrical.

The best approach to avoid the “visible” or “invisible” consequences of electrical injury is to prevent them by getting the proper safety training, identifying electrical hazards, avoiding working with energized (“live”) equipment, wearing personal protective equipment, using insulated tools, and following safe work procedures.¹¹ For more detailed information you can consult the “CSA Z462-12 – Workplace Electrical Safety” standard produced by the Canadian Standards Association.¹¹

This report has been written by Dr. Manuel Gomez, director of the St. John's Rehab Research Program at Sunnybrook Health Sciences Centre in Toronto (<http://sunnybrook.ca/research/team/member.asp?t=11&m=505&page=172>).

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