

## The Economic Impact of Work and Productivity Loss Following High-Energy Lower-Extremity Trauma

*Joseph Levy, PhD; Lisa Reider, PhD; Ellen MacKenzie, PhD; Gregory De Lissovoy; Daniel Oscar Scharfstein; Andrew N. Pollak, MD; Reza Firoozabadi, MD; Saam Morshed, MD; Clifford B. Jones, MD, FACS; Joshua Layne Gary, MD; Stephen Matthew Quinnan, MD; Kristin Archer, PhD; Laurence Kempton, MD; Robert V. O'Toole, MD; Maningbe Keita, BA; Michael J. Bosse, MD; METRC  
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, United States*

**Purpose:** Our objective was to estimate the 1 year economic impact of high-energy lower-extremity trauma (HELET) using the Work Productivity and Activity Impairment (WPAI) questionnaire. The WPAI assesses productivity by documenting lost employment, missed hours of work (“absenteeism”), and productivity loss while working (“presenteeism”) attributable to injury.

**Methods:** The study included patients aged 18-65 years surgically treated for HELET of the tibia, ankle, or foot enrolled in 3 prospective multicenter studies between 2011 and 2017. The analysis was restricted to 859 individuals employed prior to injury. Work status was assessed using the WPAI at 3, 6, and 12 months after injury. Total work and productivity loss were estimated using a Markov model based on time-dependent transition probabilities in work status over 1 year. Adjustments were made for absenteeism and presenteeism based on survey responses. The number of work hours lost together with the number of unproductive hours while working was converted to dollars using the mean wage plus fringe benefits rate reported by the U.S. Bureau of Labor Statistics in 2018: \$36.63 per hour or \$76,190 annually assuming 2,080 work hours per year. Average wages lost due to injury were computed by type of productivity loss and subgroups thought to impact return to work.

**Results:** Of 859 patients, 20%, 28%, and 51% returned to work by 3, 6, and 12 months, respectively. The estimated 1-year productivity loss due to injury was 1616 hours per patient (1358 hours attributed to lost employment; 62 hours to reduced time at work, and 196 hours due to presenteeism). The average impact per patient was \$58,547 in lost productivity, representing 77% of expected annual wages. The economic impact varied by injury (type IIIB tibia fractures: \$68,115; open pilon / ankle: \$65,536; below-knee amputation: \$64,246; type IIIA open tibia: \$56,697; other foot: \$51,583; open talus / calcaneus \$49,959), gender (men: \$61,099; women: \$52,517), and age (<40 years: \$62,375; ≥40 years: \$53,517).

**Conclusion:** The impact of HELET on work and productivity the year after injury is substantial. Our analysis estimates that patients in the year following their injury will produce only 23% of what we would expect of a healthy individual, with the majority of lost productivity attributable to lost employment.