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Average lost work productivity due to non-fatal injuries by type in the USA

Cora Peterson, **Likang Xu**, **Sarah Beth L Barnett**
National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

Abstract

Objective—To estimate the average lost work productivity due to non-fatal injuries in the USA comprehensively by injury type.

Methods—The attributable average number and value of lost work days in the year following non-fatal emergency department (ED)–treated injuries were estimated by injury mechanism (eg, fall) and body region (eg, head and neck) among individuals age 18–64 with employer health insurance injured 1 October 2014 through 30 September 2015 as reported in MarketScan medical claims and Health and Productivity Management databases. Workplace, short-term disability and workers' compensation absences were assessed. Multivariable regression models compared lost work days among injury patients and matched controls during the year following injured patients' ED visit, controlling for demographic, clinical and health insurance factors. Lost work days were valued using an average US daily market production estimate. Costs are 2015 USD.

Results—The 1-year per-person average number and value of lost work days due to all types of non-fatal injuries combined were approximately 11 days and US$1590. The range by injury mechanism was 1.5 days (US$210) for bites and stings to 44.1 days (US$6196) for motorcycle injuries. The range by body region was 4.0 days (US$567) for other head, face and neck injuries to 19.8 days (US$2787) for traumatic brain injuries.

Conclusions and relevance—Injuries are costly and preventable. Accurate estimates of attributable lost work productivity are important to monitor the economic burden of injuries and help to prioritise cost-effective public health prevention activities.

INTRODUCTION

Injuries are a leading cause of mortality and morbidity in the USA. In clinical and public health terms, injuries comprise a range of unintentional and violence-related health outcomes; for example, MVCs, drug poisoning, falls, suicide and assaults. There are more than 30 million emergency department (ED) visits for non-fatal injuries each year[1] and US medical expenditures for injury and poisoning exceed US$133 billion annually.[2]

Estimates of lost work productivity—sometimes called an indirect cost, as distinct from the direct cost of medical care for injuries—attributable to injuries are important to monitor the economic burden of injuries and help to prioritise cost-effective prevention activities. Attributable work loss estimates exist for a range of health outcomes, including migraine,[3] influenza,[4] cardiovascular events[5] and non-Hodgkin's lymphoma.[6] Previous estimates of lost work productivity due to injuries by type—mechanism (eg, fall) and body region (eg, head and neck)—in the USA were calculated using hospital data from 2010 and were based on absenteeism due to only work-related injuries.[7] Those estimates have been applied in numerous assessments of the economic and public health impact of violence and unintentional injuries.[8-13] The aim of this study was to estimate attributable lost work productivity of US non-fatal injuries comprehensively by type of injury.

METHODS

This study used publicly available data with no patient nor public involvement. The 1-year per-person average number and value of lost work days due to non-fatal injuries treated in an ED (or, index visit) during 1 October 2014 through 30 September 2015 among individuals age 18–64 years with employer health insurance were estimated using MarketScan medical claims and Health and Productivity Management (HPM) databases (www.ibm.com) (figure 1) and an average daily estimate of market productivity.[14] MarketScan data come from large employers, health plans, and government and public organisations, and are not nationally representative. MarketScan medical claims databases include more than 10 million insurance enrollees and MarketScan HPM databases include work absences data from nearly 3 million employees.[15]

Lost work days and associated costs were estimated for injuries by mechanism[16] (table 1) and body region[17] (table 2) using established classifications based on International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes 800–999 and External Cause of Injury codes (E-codes). Both classifications—mechanism and body region—are important in different contexts, and work loss per injury type is not comparable across classifications. For example, patients with different injury types by body region (eg, torso vs head) can have the same injury type by mechanism (eg, motor vehicle traffic) or vice versa. Transition to ICD-10-CM coding for medical payments occurred outside the study period, on 1 October 2015.[18] ICD-10-CM injury classification frameworks are proposed and will be finalised in the future (www.cdc.gov/nchs/injury/injury_tools.htm).

This study's time horizon for work loss estimates was 1 year. Costs are presented as 2015 USD and represent a human capital-based productivity cost perspective; that is, the estimated value of work loss due to injury, as opposed to an employee cost perspective (eg, lost wages) or an employer cost perspective (eg, sick leave payments and premiums for disability insurance). This study's estimates reflect only market productivity and do not address household and other non-market productivity that is also lost when a person is injured.

Data

Lost work productivity due to all types of non-fatal injuries was estimated among patients with an ED visit with a primary diagnosis of injury in the MarketScan Outpatient Services (primarily treat-and-release (T&R)) and Inpatient Services (hospitalisation following ED treatment) databases. Because these databases can have more than one primary diagnosis listed per patient per ED visit, the primary visit diagnosis was defined as the primary diagnosis (index injury) on the ED claim record to which facility charges for the visit were assigned. Patients admitted as inpatients following the ED index visit were identified by an admission (ie, MarketScan Inpatient Admissions database) on the day of or day following the index visit. The sample of injury patients identified in this way was recently used to estimate the average medical cost of injuries by type.[19] Among that sample, for this study, authors identified injury patients aged 18–64 years with employer health insurance who had reported workplace absence data (or, 'eligibility' for such reporting—an important distinction because enrollees can have zero reported absences for a given period) in MarketScan HPM for 12 months beginning with patients' ED index visit (figure 1).

MarketScan HPM demonstrates employees' absent work days separately by type based on administrative data from employers: workplace absences (ABS; eg, sick or annual leave), short-term disability (STD; typically applicable up to 12 months of workplace absence), long-term disability (LTD; typically applicable after STD runs out) and workers' compensation (WC; for workplace-related illnesses and injuries). This study assessed ABS, STD and WC absences; LTD was considered outside the scope of this study's 1-year time horizon (empirically, less than 1% of analysed injury patients had LTD absences during the 1-year observation period). Absences by type are reported separately in MarketScan HPM and enrollee eligibility for each absence type reporting is independent—meaning, an enrollee could be eligible for STD and WC absence reporting but not ABS—and therefore analysis of each absence type comprised separate enrollee samples (figure 1).

To estimate the per-person number and value of work absent days attributable to non-fatal injuries among patients' total work absences in the year following the injury, patients' total 1-year absences by type were compared with absences among control enrollees. Controls had eligibility for reported absences by type in MarketScan HPM, no ED visits with a first-listed injury diagnosis during 1 October 2014 through 30 September 2015, and insurance enrolment that matched injury patients' observation period (12 months of continuous enrolment prior to the index injury month to identify comorbidities and 12 months of continuous enrolment after the index injury month to observe work absences—25 months in total). Injury patients were matched to controls (SAS 9.4 *gmatch*) 1:5 using MarketScan

Annual Enrollment tables based on age, sex (male/female), region of residence, health plan type (eg, health maintenance organisation) and comorbidity count (0, 1, 2+ (using Elixhauser Comorbidity Software V.3.7) diagnosed in the 12 months prior to the index injury date in any clinical location).

Absent days by type

Work absences by type—ABS, STD and WC—were assessed among injury patients and control enrollees as the number of absent days by type during the period from the index visit date and the following 364 days. ABS absences are reported in the data source in terms of hours within a reporting period (eg, X hours during X/X/XXX–X/X/XXXX) while STD and WC work absence dates are directly reported (eg, X/X/XXXX–X/X/XXXX). ABS hours were included when the ABS record reporting period start date and end date were within the 1-year observation period per individual following the index injury ED visit. Total ABS hours were divided by 8 to estimate the corresponding number of workdays. Where reported absent dates for STD or WC overlapped in the data source, such dates were made consecutive (eg, an individual with one STD record indicating absence from 1 to 15 September and a second STD indicating absence from 13 to 20 September—the total absent period was assumed 1 to 20 September). STD and WC absence periods were multiplied by 5/7 to identify the number of work (ie, weekday) day absences. STD absences were included when the modified absence start date (ie, after making overlapping absence dates consecutive) was within the 1-year observation period. WC absences were included when the 'event date' (ie, injury date) for the WC case as reported in the data source was within the 1-year observation period. If a 'return to work' date for an STD or WC absence was not reported or exceeded the 1-year observation period, the number of absent days for that record was set to a maximum that reflected the end of the 1-year observation period applicable to that enrollee.

Value of lost work days

The value of lost work days for all absence types was based on an estimated average annual market productivity value reflecting total employee compensation, including wages and benefits, for males and females of all ages (US$36 935 as 2016 USD).[14] This estimate was divided by 260 weekdays per year, and reduced slightly using US Gross Domestic Product price indices[20] to adjust the reported 2016 USD annual value in the source to an estimated 2015 USD daily value (US$141). STD and WC payments typically replace only a portion of employee compensation during lost work days. However, in this analysis, ABS, STD and WC lost work days were all assigned the same total estimated daily market productivity value, based on the assumption that total employee compensation—rather than STD or WC insurance payout—more accurately reflects the value of lost work during days away from employment.

Analysis

Authors used SAS V.9.4 to derive patient samples and Stata V.14 for regression models. The 1-year per-person average attributable number of lost work days due to non-fatal injuries was estimated using individual multivariable negative binomial models with robust standard errors (Stata 14 *nbreg*) per injury type (eg, cut/pierce injuries), with injury patients' and

control enrollees' number of absent days by type (ABS, STD or WC) as the dependent variable. The regression models controlled for all enrollee matching factors (eg, age, sex, region of residence, health plan type, number of comorbidities) as covariates. The regression-adjusted average number of absent days due to non-fatal injuries by type (eg, cut/ pierce) by absence type (eg, ABS) was estimated as the marginal effect of the covariate identifying injury patients (Stata 14 *margins, dydx* (*injury*)) in each model. Such count models were assessed for all injury types with at least 50 injury patients and control enrollees with at least one absence (online supplementary STables 1-6).

For injury types with just one associated absence type with statistically higher (ie, 95% CI greater than zero) regression-adjusted estimated attributable number of lost work days (eg, STD absences for other pedal cyclist injuries), 'total days' estimates reflect that absence type's mean number of days and 95% CI from the regression model. Otherwise, variance for 'total days' estimates was based on a probabilistic combination of multiple absence type estimates (eg, ABS+STD for cut/pierce injuries) using Excel Palisade @RISK (Ithaca, NY) (see table notes). This approach allowed for an estimated distribution (ie, prediction interval, PI) for 'total days' estimates despite different enrollee samples contributing to estimates of lost days per absence type. The monetary value of total lost work days was estimated as the mean and 95% CI or PI values for total lost days estimates per injury type multiplied by the average daily production estimate (described above).

Results are reported in terms of 1-year per-person regression-adjusted attributable average lost work days and estimated value for each injury type by absence type, including total days estimates (table 1: Injuries by mechanism, table 2: Injuries by body region). The number of analysed injury patients and controls, the simple mean difference in number of absences by type for injury patients versus controls, and regression-adjusted mean and 95% CI for the estimated attributable number of absent days by type are reported in online supplemental file (online supplementary STable 1 and STable 2). The online supplemental file also demonstrates the same results for two mutually exclusive injury patient subgroups: patients who had index ED T&R visits and patients hospitalised after the index visit (patient counts in figure 1) (online supplementary STable 3-STable 6). Group characteristics of injury patients versus matched controls (eg, average age) are also reported (online supplementary STable 7).

RESULTS

The estimated per-person regression-adjusted attributable average 1-year number and estimated value of lost work days due to all types of non-fatal injuries initially treated in an ED were approximately 11 days and US$1590 (table 1). There was a negligible difference in these results depending on whether the number of absent days was modelled by injury mechanism (table 1, 'Total' estimate) or body region (table 2, 'Total' estimate) among the patient sample. The estimated attributable number of days and associated value by injury mechanism ranged from 1.5 days (95% PI 0.4 to 2.6) and US$210 (95% PI 51 to 370) for bites and stings injuries to 44.1 days (95% PI 33.2 to 54.8) and US$6196 (95% PI 4662 to 7702) for motorcycle injuries (table 1). The range by body region of injury type was 4.0 (95% PI 3.5 to 4.6) days and US$567 (95% PI 487 to 643) for other head, face and neck

injuries to 19.8 (95% PI 15.8 to 23.5) days and US$2787 (95% PI 2227 to 3304) for traumatic brain injuries (TBIs) (table 2). Such estimates were higher among patients hospitalised after their index visit (approximately 61 days and US$8480; online supplementary STable 3 and STable 5) compared with patients with T&R index injury ED visits (approximately 10 days and US$1400; online supplementary STable 4 and STable 6).

DISCUSSION

This study estimated work loss attributable to injuries by comparing injured and non-injured employees to update existing lost work productivity estimates for US non-fatal injuries comprehensively by injury mechanism and body region. The breadth and specificity of estimated costs reported here was made possible through a large multistate data source containing information on millions of injury patients. In presenting estimated lost work productivity for two injury classification schemes in their entirety, this study helps to highlight that many injury types are uncommon among the working-age population—even the large data source assessed for this analysis did not permit specific estimates for some injury types.

This study's per person regression-adjusted 1-year estimated attributable average work loss due to all injury types combined (11 days) is similar to a recent estimate of annual work loss due to migraine (83 hours, or 10 days) which, like the present study, was derived using MarketScan data and a matched control approach.[3] Compared with other studies with similar data and methods, this study's estimate for all injury types combined (11 days) exceeds estimated attributable work loss due to a bout of influenza (6 hours, or <1 day)[4] and work loss in the month following a cardiovascular event or related procedure (56 hours, or 7 days),[4] and is lower than estimated work loss attributable to non-Hodgkin's lymphoma in the year following diagnosis (32 days).[6] Despite similar analysis methods to identify work loss attributable to a particular health event, the cited previous studies used a variety of methods to value work loss; therefore, comparisons between the present study and those previous studies in terms of number of lost work days are more relevant than comparison of dollar values.

LIMITATIONS

In this study, work loss due to non-fatal injuries was assessed in a large convenience sample over the subsequent 1 year following an index injury ED visit. This timeframe underestimates lost work productivity for injuries resulting in long-term physical disability —for example, spinal cord injuries—as well as injuries resulting in long-term physical and mental health consequences, such as violent assault.[8921] This study underestimates the cost of lost work productivity due to injuries overall because it did not address the cost of Social Security disability or Supplemental Security Income benefits—applicable when a medically determinable physical or mental impairment results in the inability to do any substantial gainful activity for at least 12 months.[22] This study assessed patients with at least 12 months of employer absence data following an index injury ED visit, which excludes individuals who lost their job due to injury; this is another way in which the average work loss data presented underestimate work loss due to injuries.

This study did not address injuries among working and non-working adults without employer health insurance (including people with Medicaid and Medicare), unemployed people nor those >64 years old—groups who may have higher average lost productivity due to injuries than the patient sample assessed for this study. This study did not investigate caregiver (eg, family member) work loss due to injuries—including care for injured children —nor factors associated with higher or lower injury costs among patients with the same injury type. For example, TBI is associated with a range of disability outcomes based on injury severity, while this study assessed an average productivity loss among all patients with TBI combined (this is how TBI is represented in the analysed injury classification by body region).[17] Patients with injury were classified by their first chronological injury during the observation period; subsequent injuries during the observation period were not directly examined. This study did not estimate work loss by injury intent (eg, self-harm vs unintentional) nor nature of injury (fracture vs burn) due to sample sizes within the two injury type classifications that were the focus of the study (ie, mechanism and body region of injury). This study assessed work loss costs only for injury types with sufficient sample sizes within the study population (eg, estimates for motor vehicle traffic injuries presented, but not drowning/submersion injuries). Even within a large database such as MarketScan HPM, this means work loss for some injury types was not estimable.

This study assessed each selected absence type in the data source separately and summed across absence types for a total estimated number of lost work days. This is the same approach as previous studies with similar objectives and methods that used the same data source.[34623] Authors did not attempt to investigate norms at employers contributing absence data to MarketScan to assess whether this method's approach resulted in any double-counting of absent days (eg, if an employer's practice is for an employee to log 'sick' days on a timecard while on short-term disability). This study did not assess presenteeism (or reduced productivity while at work due to injury) nor non-market lost productivity (such as household work), nor the cost of diminished quality of life due to injuries. This study assessed the value of lost work days as an average among insured working-age men and women; disparities in labour market participation and compensation could otherwise lead to the inequitable conclusion that preventing injuries among individuals with the highest compensation could yield the highest cost-savings. Some economic analyses include data on a monetised form of diminished quality of life due to illness and injuries; in some cases, such data include the value of lost work productivity and therefore should not be summed with data presented here (due to likely double-counting) to estimate a total cost of injuries.

CONCLUSION

Non-fatal injuries are preventable and incur substantial lost work productivity at a high cost to individuals, employers and society. Accurate information on lost work productivity due to injuries is important to monitor the economic burden of injuries and help to prioritise cost-effective public health prevention activities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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What is already known on this subject

- Accurate estimates of attributable work loss are important to monitor the economic burden of injuries and help to prioritise cost-effective public health prevention activities.

What this study adds

- This study estimated average lost work productivity costs due to non-fatal injuries in the USA comprehensively by injury type.

	Patients age 18-64 years old with commercial insurance treated in emergency departments for injuries[a]	n=349,785

	Absence Type	Patient group	Injury	Control
Injury patients with workplace absence reporting and at least one matched control enrollee	Workplace absence (e.g. sick and annual leave)	Total	11,282[b]	50,409
		• Treated and released[c]	10,894	
		• Hospitalised[c]	388	
	Short-term disability	Total	67,821[b]	330,167
		• Treated and released[c]	65,838	
		• Hospitalised[c]	1,983	
	Workers' compensation	Total	43,109[b]	206,201
		• Treated and released[c]	41,875	
		• Hospitalised[c]	1,234	

Figure 1.

Sample selection of patients with non-fatal emergency department–treated injuries in MarketScan, 1 October 2014 through 30 September 2015. [a]Patients age 18–64 years with commercial health insurance are a subset of the injury patient sample described in Peterson, Xu, Florence (2019).[19] [b]Absences by type are reported separately in MarketScan Health and Productivity Management database and enrollee eligibility for each absence type reporting is independent—meaning, an enrollee could be eligible for short-term disability and workers' compensation absence reporting but not workplace absences (eg, annual leave)—and therefore analysis of each absence type comprised separate enrollee samples. [c]Refers to whether injury patients were treated and released or hospitalised after index injury emergency department visit.

Table 1

Average per-person 1-year number and associated value of lost work days due to non-fatal injuries (by mechanism) initially treated in an emergency department 1 October 2014 through 30 September 2015, employer health insurance enrollees age 18–64 years, MarketScan

Mechanism	Measure	Workplace absence	Short-term disability	Workers' compensation	Total days and cost*
Cut/pierce	Absent days, n	2.1 (0.1–4.0)	1.9 (1.2–2.7)		3.9 (2.4–5.4)
	Estimated cost	US$288 (13–564)	US$267 (162–373)		US$555 (344–754)
Drowning/submersion	Absent days, n				
	Estimated cost				
Fall	Absent days, n	5.3 (3.6–7.0)	10.5 (9.4–11.6)	1.0 (0.5–1.6)	16.8 (15.4–18.4)
	Estimated cost	US$744 (501–987)	US$1476 (1322–1631)	US$142 (65–221)	US$2362 (2164–2582)
Fire/burn	Absent days, n				
	Estimated cost				
Fire/flame	Absent days, n				
	Estimated cost				
Hot object/substance	Absent days, n				
	Estimated cost				
Firearm	Absent days, n				
	Estimated cost				
Machinery	Absent days, n				
	Estimated cost				
Motor vehicle traffic	Absent days, n	6.6 (4.1–9.2)	14.7 (12.5–16.9)	2.2 (0.9–3.4)	23.5 (20.9–26.0)
	Estimated cost	US$931 (574–1287)	US$2065 (1758–2373)	US$302 (131–472)	US$3298 (2932–3650)
Occupant	Absent days, n	5.4 (2.5–8.2)	13.4 (10.7–16.0)	3.3 (1.2–5.4)	22.0 (18.8–25.2)
	Estimated cost	US$755 (354–1156)	US$1881 (1509–2254)	US$463 (166–758)	US$3099 (2650–3545)
Motorcyclist	Absent days, n	12.4 (4.9–19.9)	31.7 (18.6–44.8)		44.1 (33.2–54.8)
	Estimated cost	US$1741 (683–2797)	US$4456 (2618–6293)		US$6196 (4662–7702)
Pedal cyclist	Absent days, n				
	Estimated cost				
Pedestrian	Absent days, n				
	Estimated cost				
Unspecified motor vehicle	Absent days, n		11.3 (7.2–15.3)		11.3 (7.2–15.3)

Mechanism	Measure	Workplace absence	Short-term disability	Workers' compensation	Total days and cost*
	Estimated cost		US$1586 (1017–2155)		US$1586 (1017–2155)
Other pedal cyclist	Absent days, n		6.4 (3.0–9.8)		6.4 (3.0–9.8)
	Estimated cost		US$900 (418–1381)		US$900 (418–1381)
Other pedestrian	Absent days, n				
	Estimated cost				
Other transport	Absent days, n		17.8 (9.6–25.9)		17.8 (9.6–25.9)
	Estimated cost		US$2496 (1344–3647)		US$2496 (1344–3647)
Natural/environmental	Absent days, n				
	Estimated cost				
Bites and stings	Absent days, n		1.5 (0.4–2.6)		1.5 (0.4–2.6)
	Estimated cost		US$210 (51–370)		US$210 (51–370)
Overexertion	Absent days, n	3.8 (1.4–6.2)	7.8 (6.2–9.3)	1.2 (0.2–2.1)	12.7 (10.6–14.8)
	Estimated cost	US$533 (200–868)	US$1091 (877–1305)	US$162 (32–290)	US$1786 (1488–2084)
Poisoning	Absent days, n		13.0 (7.3–18.7)		13.0 (7.3–18.7)
	Estimated cost		US$1826 (1028–2625)		US$1826 (1028–2625)
Struck by/against	Absent days, n		4.6 (3.6–5.6)		4.6 (3.6–5.6)
	Estimated cost		US$644 (509–780)		US$644 (509–780)
Suffocation	Absent days, n				
	Estimated cost				
Other specified, classifiable	Absent days, n		3.1 (1.5–4.6)		3.1 (1.5–4.6)
	Estimated cost		US$433(214–651)		US$433(214–651)
Other specified, NEC	Absent days, n	5.4 (1.6–9.2)	6.7 (4.8–8.5)	1.4 (0.2–2.6)	13.5 (10.3–16.7)
	Estimated cost	US$758 (218–1299)	US$935 (678–1192)	US$200 (28–370)	US$1893 (1452–2349)
Unspecified	Absent days, n		7.1 (5.0–9.1)		7.1 (5.0–9.1)
	Estimated cost		US$995 (707–1282)		US$995 (707–1282)
Adverse effects	Absent days, n				
	Estimated cost				
E-code missing	Absent days, n	3.6 (2.9–4.3)	6.3 (6.0–6.7)	1.3 (1.0–1.5)	11.2 (10.6–11.8)
	Estimated cost	US$508 (406–607)	US$889 (839–939)	US$180 (145–215)	US$1576 (1493–1658)
Total†	Absent days, n	3.6 (3.1–4.1)	6.6 (6.3–6.9)	1.1 (0.9–1.3)	11.3 (10.8–11.8)
	Estimated cost	US$505 (429–581)	US$928 (889–966)	US$153 (127–179)	US$1586 (1518–1652)
Total†	Absent days, n				
	Estimated cost				

Table 2

Average per-person 1-year number and associated value of lost work days due to non-fatal injuries (by body region) initially treated in an emergency department during 1 October 2014 to 30 September 2015, employer health insurance enrollees age 18–64 years, MarketScan

Body region	Body region	Measure	Workplace absence	Short-term disability	Workers' compensation	Total days and cost[*]
Head and neck	Traumatic brain injury	Absent days, n	7.6 (3.3–11.9)	12.2 (9.2–15.2)		19.8 (15.8–23.5)
		Estimated cost	US$1066 (464–1668)	US$1721 (1299–2141)		US$2787 (2227–3304)
	Other head, face and neck	Absent days, n		3.2 (2.6–3.8)	0.8 (0.4–1.3)	4.0 (3.5—4.6)
		Estimated cost		US$450 (370–530)	US$117 (56–177)	US$567 (487–643)
	Head and neck, total	Absent days, n	1.9 (0.6–3.1)	4.4 (3.8–5.0)	0.8 (0.4–1.2)	7.0 (6.0–8.1)
		Estimated cost	US$262 (89–434)	US$619 (531–706)	US$107 (52–162)	US$987 (841–1134)
Spine and back	Spinal cord	Absent days, n				
		Estimated cost				
	Vertebral column	Absent days, n	5.4 (3.6–7.2)	8.4 (7.4–9.4)	2.3 (1.5–3.2)	16.1 (14.6–17.7)
		Estimated cost	US$754 (503–1005)	US$1184 (1046–1320)	US$328 (210–444)	US$2265 (2053–2491)
	Spine and back, total	Absent days, n	5.4 (3.6–7.2)	8.5 (7.5–9.5)	2.3 (1.5–3.2)	16.2 (14.5–17.7)
		Estimated cost	US$754 (503–1005)	US$1195 (1057–1333)	US$326 (210–444)	US$2275 (2045–2487)
Torso	Torso	Absent days, n	3.7 (1.7–5.6)	7.9 (6.8–9.1)	0.9 (0.3–1.5)	12.5 (10.8–14.2)
		Estimated cost	US$513 (242–783)	US$1115 (952–1278)	US$131 (48–215)	US$1759 (1513–1992)
Extremities	Upper extremities	Absent days, n	3.1 (2.1–4.0)	6.2 (5.7–6.6)	1.1 (0.8–1.4)	10.3 (9.5–11.1)
		Estimated cost	US$429 (301–557)	US$865 (799–931)	US$155 (108–201)	US$1448 (1342–1557)
	Lower extremities	Absent days, n	4.6 (3.5–5.8)	8.6 (8.0–9.2)	1.0 (0.6–1.3)	14.2 (13.3–15.2)
		Estimated cost	US$652 (491–814)	US$1208 (1122–1294)	US$138 (89–187)	US$1998 (1864–2132)
	Torso, total	Absent days, n	3.7 (3.0–4.5)	7.2 (6.9–7.6)	1.0 (0.8–1.3)	12.0 (11.4–12.6)
		Estimated cost	US$524 (425–626)	US$1018 (965–1071)	US$145 (111–177)	US$1687 (1598–1771)
Unclassifiable by site	Other or multiple	Absent days, n	4.1 (1.0–7.3)	6.3 (4.4–8.2)	1.6 (0.2–3.0)	12.0 (9.2–14.7)
		Estimated cost	US$581 (142–1019)	US$887 (624–1150)	US$224 (28–419)	US$1691 (1288–2071)
	System-wide	Absent days, n	3.8 (1.4–6.2)	2.9 (2.0–3.8)	1.2 (0.2–2.2)	7.9 (5.9–9.8)
		Estimated cost	US$531 (194–869)	US$405 (284–527)	US$172 (30–314)	US$1108 (831–1384)
	Unclassifiable by site, total	Absent days, n	3.9 (2.0–5.8)	4.1 (3.2–4.9)	1.4 (0.5–2.3)	9.4 (7.8–11.1)
		Estimated cost	US$551 (284–817)	US$571 (451–690)	US$202 (76–329)	US$1324 (1090–1567)
Total[†]	All body regions	Absent days, n	3.6 (3.1–4.1)	6.6 (6.3–6.9)	1.1 (0.9–1.3)	11.3 (10.8–11.7)

Body region	Body region	Measure	Workplace absence	Short-term disability	Workers' compensation	Total days and cost*
		Estimated cost	US$506 (430–582)	US$927 (887–966)	US$155 (128–180)	US$1587 (1520–1650)

All costs are 2015 USD. Values are mean (95% CI or prediction interval (PI))—in the case that multiple estimates by absence type were probabilistically combined). Blank cells indicate results were not calculated for the injury type due to (1) low number of observations (<50 injury or control enrollees with >0 absences) in the data source, or (2) the regression-adjusted attributable number of lost work days due to the injury type was not statistically significantly higher among injured patients compared with control enrollees. Number of injury patients and controls, average absence days by type, and the simple mean difference between injury and control enrollees demonstrated in online supplementary table 1. Source data: MarketScan Health and Productivity Management dataset, 2014–2016. Injury classification is based on the ICD-9-CM Barrell Matrix (www.cdc.gov/nchs/injury/injury_tools.htm).

*
Variance for 'Total' days estimates was based on a probabilistic combination of variance for multiple absence type value estimates (eg, workplace absence+short-term disability absence estimates for traumatic brain injuries) using Excel Palisade @RISK (Ithaca, NY). For those calculations, 1000 sums drawn from Pert distributions representing each absence type—with mean (95% CI) estimates of absent days by type included as the distributions' most likely, minimum and maximum values—were computed, and the middle 95% of resulting values comprise the reported PI range. Total cost was assessed as the mean number of days and 95% PI values multiplied by the estimated value of lost work days as described in the Methods text (US$141).

†
'Total' category models controlled for body region.