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# WISQARS Cost of Injury for public health research and practice

**Cora Peterson**,

**Ketra L Rice**,

**Dionne D Williams**,

**Robert Thomas**

National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, Georgia

## Abstract

**Aim—**Since 2011 the Centers for Disease Control and Prevention's Web-based Injury Statistics Query and Reporting System (WISQARS) has demonstrated per-injury average and population total medical and non-medical costs of injuries by type (such as unintentional cut/pierce) in the USA. This article describes the impact of data and methods changes in the newest version of WISQARS Cost of Injury.

**Methods—**Data sources and methods were compared for the legacy version of the WISQARS Cost of Injury website (available 2011–2021; most recent prior update was published in 2014 with 2010 injury incidence and costs) and the new version (published 2021; 2015-present injury incidence and costs). Cost data sources were updated for the new website and the basis for medical costs and non-fatal injury work loss costs changed from mathematical modelling (combined estimates from multiple data sources) in the legacy website to statistical modelling of actual injury-related medical and work loss financial transactions in the new website. Monetary valuation of non-medical costs for injury deaths changed from lost employment income and household work in the legacy website to value of statistical life. Quality of life loss costs were added for non-fatal injuries. Per-injury average medical and non-medical costs by injury type (mechanism and intent) and total population injury costs were compared for years 2010 (legacy website data) and 2020

**Correspondence to** Dr Cora Peterson, Centers for Disease Control and Prevention, Atlanta, Georgia, USA; cora.peterson@cdc.hhs.gov.

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**Competing interests** None declared.

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(new website data) to illustrate the impact of data and methods changes on reported costs in the context of changed annual injury incidence.

**Results—**Owing to more comprehensive cost capture yielding higher per-injury average costs for most injury types—including those with high incidence in 2020 such as unintentional poisoning and unintentional falls—reported total US medical and non-medical injury costs were substantially higher in 2020 (US$4.6 trillion) compared with 2010 (US$693 billion) (both 2020 USD).

**Conclusions and relevance—**New data and methods increased the injury costs reported in WISQARS Cost of Injury. Researchers and public health professionals can use this information to proficiently communicate the burden of injuries and violence in terms of economic cost.

## INTRODUCTION

Unintentional and violence-related injuries—in public health terms, this includes, for example, motor vehicle crashes, drug overdoses, falls, suicide and assaults—in the USA are among the most frequent causes of death for all age groups, cause nearly 23 million non-fatal emergency department (ED) visits and incur trillions of dollars in societal costs annually.[1 2] Highlighting the burden of injuries and violence in terms of economic cost is an important part of concentrating the attention and resources needed among individuals, organisations, communities and policy makers to identify and implement cost-effective injury prevention strategies. Since launching in 1999, the Centers for Disease Control and Prevention's (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS, www.wisqars.gov) has been the leading platform for US injury data.[3] Since 2011, WISQARS Cost of Injury (https://wisqars.cdc.gov/cost) has reported per-injury average and total US population costs of injuries by type (eg, unintentional cut/pierce). Those costs have been applied in numerous assessments of the economic burden of injuries and violence.[4–7] Advances in data and methods presented an opportunity to update the WISQARS Cost of Injury website in 2021. The aim of this cost analysis study is to describe the impact of data and methods changes in the new version of the WISQARS Cost of Injury website for researchers and public health professionals so that they can better measure the economic importance of injury prevention.

## METHODS

This study used publicly available data with no patient nor public involvement. The WISQARS Cost of Injury website that was available during 2011–2021 is referred to as the legacy website, as compared with the new website that was published in December 2021 (table 1). First, cost data sources and methods are compared for the legacy website and new website using public documentation.[2 8 9] Then, the total number, age-adjusted rate, average cost by type, and total cost of fatal and non-fatal injuries are compared for years 2010 (most recent surveillance data in the legacy website) and 2020 (most recent surveillance data in the new website) to illustrate the impact of data and methods changes on reported costs in the context of changed annual injury incidence. The 2020 per-injury type number of injuries, average cost by type and percentage change from 2010 are also compared. All injury counts and cost data are publicly available[1]; however, the legacy WISQARS Cost of Injury website

reporting 2010 injury costs was archived when the new website was published in December 2021.

The new website, same as the legacy website, reports societal costs--medical and non-medical costs to multiple payers. All costs are reported here as 2020 USD.[10] Injury incidence data sources are unchanged in the new WISQARS Cost of Injury website. The fatal injury data source is CDC's National Vital Statistics System mortality data. The non-fatal injury data source is the National Electronic Injury Surveillance System—All Injury Program,[11] a US nationally representative probability sample of hospitals; WISQARS non-fatal injury incidence is an estimated number of ED visits for injuries. In the original (published 2011) and first update (published 2014) versions of the WISQARS Cost of Injury website, cost data were presented for US fatal and non-fatal injury incidence for a single year (2005 and 2010, respectively) (table 1). In the new website (published 2021), cost data are presented for US injury incidence annually from 2015 onward. Dollar values in the new website are expressed universally in the currency year of the most recent injury incidence data year (eg, 2020 USD) (table 1). Like the legacy website, the new website reports medical costs for fatal and non-fatal injuries. Work loss costs are reported for non-fatal injuries in the new website but work loss costs were replaced with value of statistical life (VSL) for fatal injuries (more below). Non-fatal injury non-medical costs include an additional element —quality of life loss costs—in the new website.

The new website's primary data sources for fatal injury medical costs are the Healthcare Cost and Utilisation Project (HCUP) 2014–15 Nationwide Inpatient Sample[12] and Nationwide Emergency Department Sample,[13] which were used to generate survey-weighted national estimates of the number of and charges for community hospital encounters with injury fatalities based on discharge records (table 2). The new website's primary data sources for non-fatal injury medical and work loss costs are 2014–15 Merative MarketScan Research Databases, which were used to analyse healthcare provider payments (including inpatient, outpatient and outpatient drugs) and workplace absence data for hundreds of thousands (healthcare provider payment data) or tens of thousands (workplace absence data) of insurance enrollees with non-fatal injuries.[14] These data sources replaced cost estimates based on 2007 and 2010 HCUP data in the legacy WISQARS Cost of Injury website (table 2).[9] Nursing home and hospice cost estimates for fatal injuries in the new website were updated using more recent data from the same sources as the legacy website and no opportunities were identified for more recent data on coroner/medical examiner costs nor ambulance transport costs (table 2).

Medical and work loss costs of injuries by type as described in recent reference studies and applied in the new WISQARS Cost of Injury website were adjusted for patient clinical and demographic characteristics (including comorbidities, sex and age) and compared between injury patients and individuals without injuries to statistically identify the attributable cost of injuries (table 2).[14 15] Supplemental files accompanying this article demonstrate per-injury average medical (fatal and non-fatal injuries) and work loss (non-fatal injuries) costs by injury mechanism, intent and place of death or ED visit disposition (treat and release or hospitalised) as extracted from those reference sources and applied to WISQARS records (online supplemental file 1 (fatal) and online supplemental file 2 (non-fatal)) (table 2).[2]

Another supplemental file (online supplemental file 3) demonstrates source data for the new website's cost inflation approach to translate reported medical and non-medical cost values in reference sources (eg, 2015 USD) to the currency year reported in the WISQARS Cost of Injury website (currently, 2020 USD). These supplemental files aim to provide replication-level detail for analysts seeking that level of knowledge, and also can be useful to researchers seeking per-injury average medical and work loss costs for uncommon injury types (ie, cost data suppressed in the WISQARS Cost of Injury website due to low nationwide injury incidence in a given year).

An important improvement in the new website is that the analytic basis for fatal injury medical costs and non-fatal injury medical and work loss costs changed from mathematical modelling (combined estimates from multiple data sources) in the legacy website to statistical modelling of actual injury-related medical and work loss payments in the new website (table 2). The primary benefit of this methods change for WISQARS Cost of Injury is that such costs are now statistically attributable to injuries based on direct observation of financial transactions. In this way, the new WISQARS Cost of Injury website better represents how much money could be saved by non-fatal injury prevention. The primary limitation of this method change is that the time horizon (period over which costs are assessed) for non-fatal medical and work loss costs is 1 year—owing to sample sizes by injury type in reference source data—in comparison to the legacy website's presentation of estimated lifetime costs for non-fatal injuries. Despite the nominally shorter time horizon for non-fatal injury costs presented in the new website, direct comparison of WISQARS medical and non-medical costs by injury type between the legacy and new websites presented here shows that per-injury average costs are higher—in some cases, much higher—for a majority of both fatal and non-fatal injury types using new data and methods.

Monetary valuation of injury mortality changed from the estimated value of lost employment income and household work (or, work loss) in the legacy website to VSL, and monetised quality of life loss estimates were added as a non-medical non-fatal injury cost element to more comprehensively capture the cost of injury morbidity (table 2). VSL is a monetary estimate of the collective value placed on mortality risk reduction as derived in research studies through revealed preferences (eg, observed wage differences for dangerous occupations) or stated preferences from surveys of individual persons' willingness to pay for mortality risk reduction, and is typically 10 times higher than mortality cost estimates based on foregone employment compensation.[16] For 2020 USD values published currently in the WISQARS Cost of Injury website, VSL estimates were assigned by decedent age to WISQARS records as follows: 0–17 years, US$18.0 million[17]; 18–65 years, US$11.4 million[16] and values descending from US$6.5 million (aged 66 years) to US$440 000 (aged ≥100 years), reflecting the estimate for persons aged 18–65 years adjusted for older adults' decreasing general life expectancy, baseline quality of life and discounted 3% to present value.[2] Quality-adjusted life year (QALY; 1 QALY equals 1 year of perfect health) losses were assigned to WISQARS non-fatal injury records as described in a separate report and valued at US$580 000 per QALY.[18] An accompanying supplemental file demonstrates how data and methods from the US Department of Health and Human Services' Office of the Assistant Secretary for Planning and Evaluation were adapted to yield older adults' VSL

values and QALY values as 2020 USD for the new WISQARS Cost of Injury website (online supplemental file 4).[16 19]

## RESULTS

US population injury costs were substantially higher in 2020 using new WISQARS Cost of Injury data and methods compared with 2010 using legacy website data and methods: US$4.6 trillion in 2020 vs US$693 billion in 2010 (table 3). Non-medical costs based on VSL comprised a higher proportion of total injury costs than previous methods based on the value of lost work productivity (93% in 2020, or US$4.3 trillion out of US$4.6 trillion, vs 75% in 2010, or US$518 billion out of US$693 billion).

### Fatal injuries

The number of injury deaths was higher in 2020 (278,345) than 2010 (180,811) as was the age-adjusted rate of injury deaths (81 vs 57 per 100 000 population) (table 3). The total medical cost of injury deaths was $4 billion in 2020 vs $2 billion in 2010 and the total non-medical cost (ie, VSL in 2020 and work loss in 2010) was US$2.7 trillion in 2020 compared with US$222 billion in 2010 (table 3). Two fatal injury types, unintentional poisoning and unintentional falls, together accounted for nearly 50% of injury deaths in 2020 (129 518/278 345) (figure 1). The number of unintentional poisoning deaths in 2020 (87 404) was 165% (or, more than 2.5 times) higher than the number in 2010 (33 041; not directly reported in figure 1 but calculable from reported data with modest rounding differences) and the number of unintentional fall deaths in 2020 (42 114) was 62% higher than in 2010 (26 009) (figure 1). The per-injury average medical and non-medical costs for those injury types were both approximately 30% higher in 2020 compared with 2010 and 7 times (unintentional poisoning falls) to over 13 times (unintentional falls) higher, respectively, due to data and methods updates in the new WISQARS Cost of Injury website (figure 1).

The change in fatal per-injury average medical cost by injury type in the new website compared with the legacy website ranged from +123% (or, more than doubled) for other specified and classifiable injuries with undetermined intent (51 deaths in 2020, a count that was over three times higher than in 2010, with a per-injury average medical cost of US$10 398 in 2020) to −53% for unintentional overexertion deaths (20 fatal injuries in 2020, 2 times higher than in 2010, with a per-injury average medical cost of US$5171 in 2020) (figure 1). The increase in fatal per-injury average non-medical cost by injury type based on VSL in 2020 compared with valuation based on work loss in 2010 ranged from 6 times to 14 times higher (or, an increase of 499% from the 2010 cost for firearm homicide deaths to an increase of 1347% from the 2010 cost for unintentional unspecified injury deaths; 2020 average non-medical costs for those injury types were US$11.7 million and US$5.1 million, respectively) (figure 1).

### Non-fatal injuries

The number and age-adjusted rate of non-fatal ED treat and release injury visits were both lower in 2020 compared with 2010 (19 million vs 29 million visits and 5653 vs 9367 visits

per 100 000 population, respectively) but the number and age-adjusted rate of non-fatal injury hospitalisations (including transfers) that began in an ED were both higher in 2020 compared with 2010 (4 million vs 3 million hospitalisations and 993 vs 800 per 100 000 population, respectively) (table 3). The total medical cost of non-fatal injuries that were treated in an ED was US$311 billion in 2020 compared with US$173 billion in 2010 and the total non-medical cost of those non-fatal injuries was US$1.6 trillion in 2020 (ie, work loss and lost quality of life) compared with US$296 billion in 2010 (ie, work loss) and (table 3).

Nearly all non-fatal injury types, and especially those with the highest incidence in 2020, had higher per-injury average medical and non-medical costs in 2020 with new WISQARS Cost of Injury website data and methods compared with 2010 with the legacy website (figures 2 and 3). The change in per-injury medical cost for the five most frequent non-fatal injury types among injury ED treat and release visits ranged from +44% for unintentional motor vehicle occupant injuries to +190% for unintentional falls (figure 2), and the same change among non-fatal injury hospitalisations ranged from +16% for unintentional falls to +214% for unintentional other specified injuries (figure 3). The change in per-injury non-medical cost for the five most frequent non-fatal injury types among injury ED treat and release visits ranged from more than double (+136%) for unintentional cut/pierce injuries to more than 25 times higher (+2,464%) for unintentional falls (figure 2), and the same change among non-fatal injury hospitalisations ranged from an increase by over one-third (+37%) for unintentional motor vehicle occupant injuries to over three times higher (+211%) for unintentional falls (figure 3).

## DISCUSSION

This study described the new WISQARS Cost of Injury website data and methods relative to the legacy website then illustrated the impact of data and methods changes by comparing per-injury average and US total population medical and non-medical costs standardised to 2020 USD by injury type for years 2010 (legacy website data) and 2020 (new website data). Injury researchers and public health professionals can use this information to communicate the burden of injuries and violence in terms of economic costs.

US total population injury costs were substantially higher in 2020 using new WISQARS Cost of Injury data and methods compared with 2010 using legacy website data and methods (US$4.6 trillion in 2020 vs US$693 billion in 2010). Analyses presented here indicate that the higher total population cost in 2020 is due to both a higher number of injury deaths and hospitalisations that year compared with 2010, and higher per-injury average costs for many injury types due to WISQARS Cost of Injury data and methods changes. For fatal injury types with lower per-injury average medical costs (eg, −19% in the per-injury medical cost of firearm homicides (figure 1) compared with the legacy website) with new WISQARS Cost of Injury website data based on analysis of actual medical payments, such reductions were more than offset by higher non-medical cost due to a more comprehensive valuation of mortality using VSL (eg, +499% in the per-injury non-medical cost of firearm homicides compared with the legacy website) (figure 1). There was a similar pattern among average costs for non-fatal injury types; no non-fatal injury type demonstrated a decrease in both medical and non-medical costs using new website data and methods.

## LIMITATIONS

The economic cost of injuries in the US reported in WISQARS Cost of Injury is underestimated because only injuries treated in an ED are included (eg, injuries initially treated in urgent care or doctor's offices not included), other non-medical costs such as property damage and criminal justice are not included, and non-fatal costs address only the first year following an injury. A 1-year time horizon is appropriate for many injury types but does not address the long-term physical and mental health consequences of some injuries (eg, traumatic brain injury and violence-related injuries). Reference data sources for the new WISQARS Cost of Injury website employed some of the largest and most comprehensive data sources available for observing financial transactions related to medical care and work loss in the USA (HCUP and MarketScan). Despite this, for less common WISQARS injury types a higher level of aggregation (eg, combined intents by mechanism, or combined mechanisms by non-fatal ED visit disposition) was needed to assign reliably estimated costs to injury records (eg, cut/pierce suicide fatalities in WISQARS were assigned the adjusted average medical cost of all intent type cut/pierce fatalities; online supplemental file 1- demonstrates how costs were assigned if a mechanism and intent pairing had no available data from the reference sources). VSL replaced lost employment income and household work and quality of life loss costs were added as non-fatal non-medical costs in the new WISQARS Cost of Injury website; these changes yield a more comprehensive societal valuation of mortality and morbidity. However, VSL and the cost of diminished quality of life for people with non-fatal injuries are not readily identifiable through financial transactions and thus not as visible to some stakeholders as are direct costs, such as medical care and lost wages. Future updates to WISQARS Cost of Injury could benefit from the addition of property damage and criminal justice costs and improved data on coroner/medical examiner, hospice, nursing home care, ambulance and quality of life loss costs, as well as direct evidence on the duration and amount of medical and non-medical costs attributable to non-fatal injuries.

## CONCLUSION

Injuries are preventable and incur substantial societal costs. Accurate and comprehensive information on the medical and non-medical cost of injuries and violence is essential to monitor the economic burden of injuries and help to prioritise cost-effective public health prevention strategies. Transparency and consistency in the measurement of injury costs can generate confidence among researchers and public health professionals in using economic cost as a meaningful measure of the public health burden imposed by injuries and violence.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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## Data availability statement

Data are available in a public, open access repository. Data are accessible at https://www.cdc.gov/injury/wisqars/index.html.

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**WHAT IS ALREADY KNOWN ON THIS TOPIC**

- Since launching in 1999 Centers for Disease Control and Prevention's Web-based Injury Statistics Query and Reporting System (WISQARS) has been the leading platform for data on fatal and non-fatal injuries in the USA.

**WHAT THIS STUDY ADDS**

- Describes the content and impact of data and methods changes in the newest version of the WISQARS Cost of Injury website. Owing to more comprehensive cost capture, reported US population costs of injury are now substantially higher.

**HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY**

- Injury researchers and public health professionals can use this information to proficiently communicate the burden of injuries and violence in terms of economic costs.

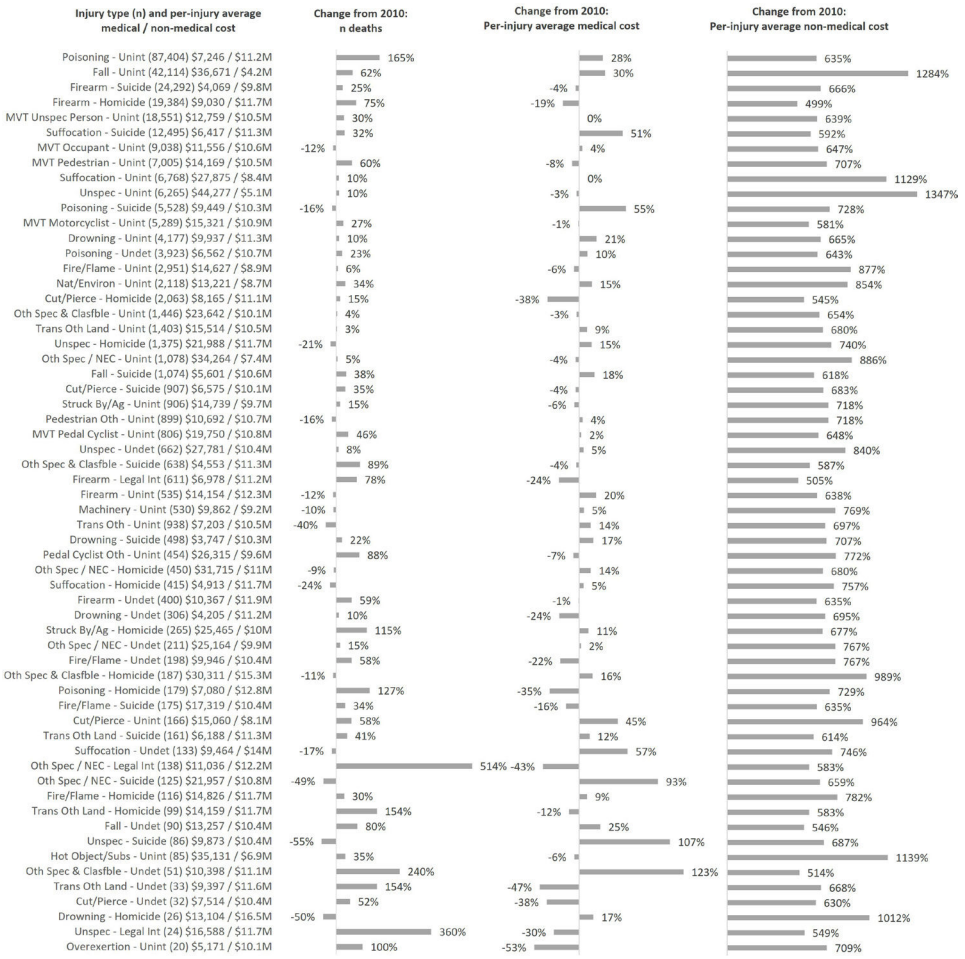


**Figure 1.**

Number and average cost of injuries and change from 2010: Deaths, USA, 2020. Notes. Data source: WISQARS cost of injury. Ranked by 2020 incidence. Costs are 2020 USD. Injury types with ≥20 deaths in both 2010 and 2020 are reported. The legacy WISQARS cost of injury website reporting 2010 injury costs was archived when the new website was published in December 2021. WISQARS, Web-based Injury Statistics Query and Reporting System; VSL, Value of statistical life.

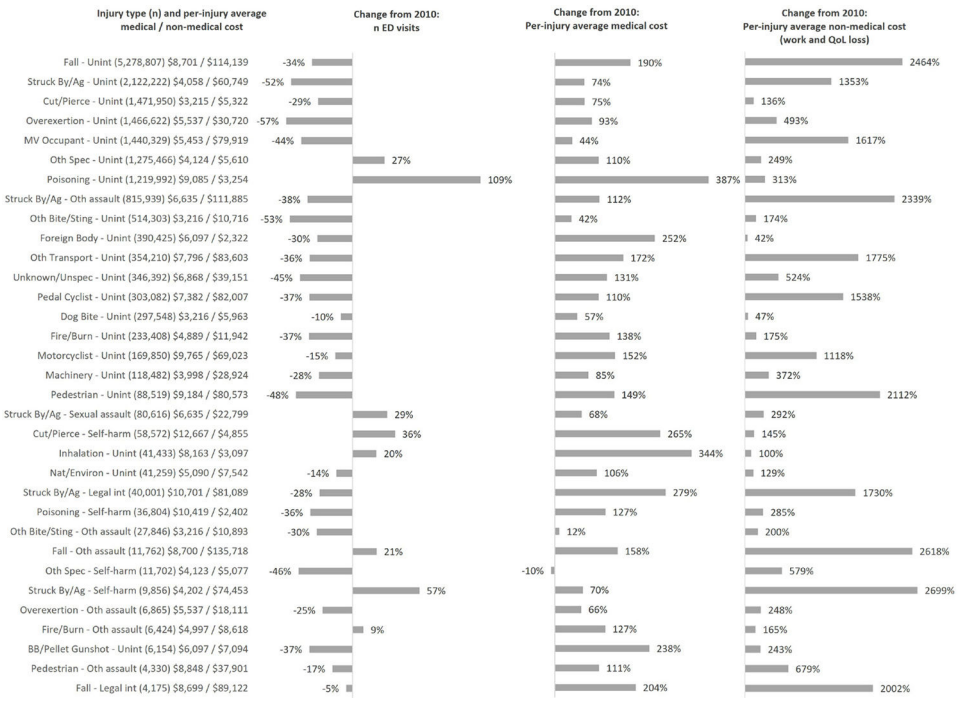


**Figure 2.**

Number and average cost of injuries and change from 2010: Non-fatal ED T&R visits, USA, 2020. notes. Data source: WISQARS cost of injury. Ranked by 2020 incidence. Costs are 2020 USD. Injury types with ≥20 unweighted count, ≥1200 weighted count or coefficient of variation of the estimate ≤30% for both 2010 and 2020 are reported. The legacy WISQARS cost of injury website reporting 2010 injury costs was archived when the new website was published in December 2021. ED, emergency department; QoL, quality of life; T&R, treated and released; WISQARS, Web-based Injury Statistics Query and Reporting System.

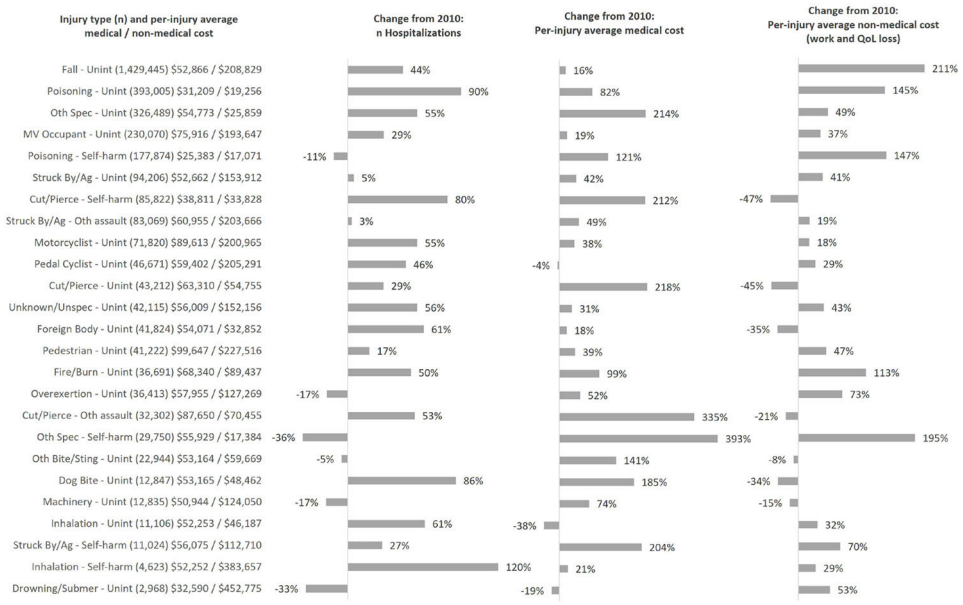


**Figure 3.**

Number and average cost of injuries and change from 2010: Non-fatal hospitalisations, USA, 2020. Notes. Data source: WISQARS cost of injury. Ranked by 2020 incidence. Costs are 2020 USD. Injury types with ≥20 unweighted count, ≥1200 weighted count or coefficient of variation of the estimate ≤30% for both 2010 and 2020 are reported. The legacy WISQARS cost of injury website reporting 2010 injury costs was archived when the new website was published in December 2021. QoL, quality of life; WISQARS, Web-based Injury Statistics Query and Reporting System.

**Table 1**

WISQARS Cost of Injury website updates

| Website version year | Cost base year | Injury incidence data year | Currency year (USD) | Cost element | | | | Methods documentation |
|---|---|---|---|---|---|---|---|---|
| | | | | Medical care | Work loss | Value of statistical life | Quality of life loss | |
| 2011 | 2005 | 2005 | 2005–2010 | Yes | Yes | – | – | Lawrence *et al* (2011)[8] |
| 2014 * | 2010 | 2010 | 1999–2017 | Yes | Yes | – | – | Lawrence and Miller (2014)[9] |
| 2021 | 2015 | 2015–2020 † | Current | Yes | Yes ‡ | Yes | Yes | Peterson *et al* (2021)[2] |

* The 2014 website update comprised updated data from the same sources as were originally used in the 2011 website version; therefore, both the original (2011) and first update (2014) versions of the website are referred to as the legacy website.

† As of October 2022.

‡ In the 2021 website update, work loss is reported only for non-fatal injuries; work loss cost for fatal injuries was replaced with value of statistical life.

WISQARS, Web-based injury Statistics Query and Reporting System.

**Table 2**

WISQARS Cost of Injury website legacy and new website cost elements

| | 2011 & 2014 website | | | | 2021 website | | | |
|---|---|---|---|---|---|---|---|---|
| **Cost element** | **Primary cost data sources** | **Cost measure** | **Cost measure assigned to WISQARS records based on** | **Reference** | **Primary cost data sources** | **Cost measure** | **Cost measure assigned to WISQARS records based on** | **Reference** |
| Fatal injuries | | | | | | | | |
| Medical care | 2010 HCUP NIS[12] and 2007 HCUP NEDS[13] | Average cost per injury type | Place of death, injury nature, injury body region, age and sex | Lawrence and Miller (2014)[8] | 2014–5 HCUP NIS[12] and 2014–5 HCUP NEDS[13] | Regression-adjusted (demographic, clinical, insurance factors) attributable average cost per injury type | Place of death, injury mechanism, injury intent | Peterson, Xu, Florence (2021)[15] |
| Coroner/ medical examiner * | Hickman *et al* (2007)[20] | Average cost per referred death | All records | Lawrence and Miller (2014)[8] | Hickman, *et al* (2007)[20] | Average cost per referred death | All records | Peterson, Xu, Florence (2021)[15] |
| Ambulance transport * | GAO (2012)[21] | Average cost per death in healthcare location | Healthcare place of death | Lawrence and Miller (2014)[8] | GAO (2012)[21] | Average cost per death in healthcare location | Healthcare place of death | Peterson, Xu, Florence (2021)[15] |
| Nursing home * | 2008 Genworth Cost of Care Survey[22] and 2004 NNHS[23] | Average cost per stay | Nursing home place of death | Lawrence and Miller (2014)[8] | 2015 Genworth Cost of Care Survey[24] and Kelley *et al* (2010)[25] | Average cost per stay | Nursing home place of death | Peterson, Xu, Florence (2021)[15] |
| Hospice * | 2007 NHHS[26] | Average cost per hospice care episode | Hospice place of death | Lawrence and Miller (2014)[8] | Hargraves and Brennan (2016)[27] and CMS (2015)[28] | Average cost per hospice care episode | Hospice place of death | Peterson, Xu, Florence (2021)[15] |
| Work loss | 2002–2009 Current Population Survey[29] and Grosse, Krueger, Mvundura (2009)[30] | Lost employment income and value of household work | Decedent age and sex | Lawrence and Miller (2014)[8] | Not included (replaced by VSL) | N/A | N/A | N/A |
| Value of statistical life | Not included. | N/A | N/A | N/A | HHS ASPE (2016)[16] | Data from reference sources | Decedent age group | Peterson, *et al* (2021)[2] |
| Non-fatal injuries | | | | | | | | |
| Medical care | 2010 HCUP NIS[12]; 2007 HCUP SID[31]; 1996–99 MEPS[32]; 1979–88 DCI[33]; Berkowitz *et al* (1990)[34]; Miller *et al* (2004)[35]; 2008 Genworth Cost of Care Survey[22]; 2004 NNHS[23]; | Average cost per injury type | Injury nature, injury body region, age and sex | Lawrence and Miller (2014)[8] | 2014–5 MarketScan Outpatient Services and Inpatient Admissions[37] | Regression-adjusted (demographic, clinical, insurance factors) attributable average cost per injury type | Injury mechanism, injury intent, ED disposition | Peterson, Xu, Florence (2021)[15] |

| Cost element | 2011 & 2014 website | | | | 2021 website | | | |
|---|---|---|---|---|---|---|---|---|
| | Primary cost data sources | Cost measure | Cost measure assigned to WISQARS records based on | Reference | Primary cost data sources | Cost measure | Cost measure assigned to WISQARS records based on | Reference |
| | GAO (2012),[21] 2011 NHEA,[36] 2010–11 MarketScan Outpatient Services[37] | | | | | | | |
| Work loss | 1987–1996 NHIS[38]; 1993 SOII[39]; 2002–2009 CPS[29]; Grosse, Krueger, Mvundura (2009)[30]; 1979–96 DCI | Lost employment income and value of household work | Injury nature, injury body region, age and sex | Lawrence and Miller (2014)[8] | 2014–5 MarketScan Health and Productivity Management[37] | Regression-adjusted (demographic, clinical, insurance factors) attributable average cost † per injury type | Injury mechanism, ED disposition | Peterson, Xu, Barnett (2021)[14] |
| Quality of life loss | Not included. | N/A | N/A | N/A | Hirsch (1983)[40] ASPE (2016)[16] | Monetised QALY loss per injury ‡ | Injury Impairment Index III, injury diagnosis and body part, ED disposition, age group. | Lawrence and Miller (2020) |

* Part of medical cost on WISQARS Cost of Injury website.

† Workplace, short-term disability and workers' compensation absences.

‡ $580K/QALY (2020 USD).[16]

CPS, Current Population Survey; DCI, Detailed Claim Information workers' compensation database of the National Council on Compensation; HCUP, Healthcare Cost and Utilisation Project; MEPS, Medical Expenditure Panel Survey; N/A, not applicable; NEDS, Nationwide Emergency Department Sample (before 2012, National Emergency Department Sample); NHEA, National Health Expenditure Accounts; NHHS, National Hospice and Home Care Survey; NHIS, National Health Interview Survey; NIS, Nationwide Inpatient Sample; NNHS, National Nursing Home Survey; QALY, Quality-adjusted life year; SID, State Inpatient Database; SOII, Survey of Occupational Injury and Illness; VSL, Value of statistical life; WISQARS, Web-based Injury Statistics Query and Reporting System.

## Table 3

Number, rate, average cost and total cost of fatal and non-fatal injuries, USA, 2010 and 2020

| Outcome | Measure | 2010 | 2020 |
|---|---|---|---|
| Fatal | Deaths | 180811 | 278345 |
| | Rate per 100 000 population | 57 | 81 |
| | Average medical cost | US$13 640 | US$14 460 |
| | Average non-medical cost | US$1 million | US$10 million |
| | Total medical cost | US$2 billion | US$4 billion |
| | Total non-medical cost * | US$222 billion | US$2.7 trillion |
| | Total cost | US$224 billion | US$2.7 trillion |
| Non-fatal | ED treat and release visits | 29 million | 19 million |
| | Rate per 100 000 population | 9367 | 5653 |
| | Average medical cost | US$2751 | US$6439 |
| | Average non-medical cost | US$4147 | US$60 304 |
| | Total medical cost | US$79 billion | US$119 billion |
| | Total non-medical cost † | US$118 billion | US$1.1 trillion |
| | Subtotal cost | US$197 billion | US$1.2 trillion |
| | Hospitalisations ‡ | 3 million | 4 million |
| | Rate per 100 000 population | 800 | 993 |
| | Average medical cost | US$37 269 | US$54 449 |
| | Average non-medical cost | US$70 252 | US$138 215 |
| | Total medical cost | US$94 billion | US$192 billion |
| | Total non-medical cost | US$178 billion | US$488 billion |
| | Subtotal cost | US$272 billion | US$680 billion |
| | Total non-fatal | 31 million | 22 million |
| | Rate per 100 000 population | 10 168 | 6646 |
| | Average medical cost | US$5559 | US$14 119 |
| | Average non-medical cost | US$9527 | US$72 768 |
| | Total medical cost | US$173 billion | US$311 billion |
| | Total non-medical cost | US$296 billion | US$1.6 trillion |
| | Total cost | US$469 billion | US$1.9 trillion |
| Both | Total medical cost | US$175 billion | US$316 billion |
| | Total non-medical cost | US$518 billion | US$4.3 trillion |
| | Grand total cost | US$693 billion | US$4.6 trillion |

Data source: CDC WISQARS (https://www.cdc.gov/injury/wisqars). Costs are 2020 USD. Rates are age adjusted. The legacy WISQARS Cost of Injury website reporting 2010 Cost of Injury data was archived when the new website was published in December 2021.

* Includes value of statistical life in 2020.

† Includes lost work productivity and quality of life loss in 2020.

‡ Includes transferred patients.

CDC, Centers for Disease Control and Prevention; ED, emergency department; WISQARS, Web-based Injury Statistics Query and Reporting System.