

APPENDIX 2: Additional Methodological Details

The etiology of the trauma was defined as the mechanism by which the traumatic event occurred and consisted of the following fifteen categories: motor vehicle accident, fall from a height (e.g., a ladder or a tree), same height fall that occurs while moving faster than normal walking speed (e.g., skiing or running), same height fall that occurs while walking or standing still, fall of unknown origin, penetrating or lacerating injury (e.g., knife, gunshot, or cutting off a finger with a power tool), injury occurred as the result of a fight or abuse (e.g., an injury from someone else's fist or foot), drowning or near drowning, swallowing or inhaling a foreign or over-sized object, electrocution, burns or smoke inhalation, suffocation or asphyxiation, intentional self-inflicted trauma, any other trauma, and trauma of unknown origin.

The presenting site or sites of injury included: the head (includes face), neck (soft tissue, excludes cervical cord), upper extremities (includes shoulders), chest (includes ribs, sternum, and thorax), spinal cord (includes cervical, thoracic, and lumbar), abdomen (includes pelvis, but excludes hips), hips, lower extremities, blood vessels, nerves, other internal sites, other sites, and unknown site.

A keyword search of the database's narrative summaries employed the following words: accident (al), amputat (e) (ion), asphyxiation, athlet (e) (ic), auto, automobile, bicycle, bike, blunt, burn (ed) (s), car, contusion, crush (ing), current, dislocat (e) (ion), drowning, electric (al) (uted), fall (en), fell, foreign (body), fracture (d) (s), gun, hanging, homicide, horse rider, injur (y) (ed) (ies), intracranial, jump (ed) (er), lacerat (e) (ion), lightening, motor (cycle), MVA, nerve, penetrat (e) (ed) (ion) (ing), shoot (ing), shot, skateboard, smoke inhalation, spinal cord, sport, sprain, stab (ed) (ing), suffocation, suicide, tear, temperature exposure, torn, trauma (tic), vehicle, and wound. The keyword search yielded 1457 narratives. These narratives were initially screened to eliminate any that clearly fell outside our definition of trauma based on the trauma registry criteria.

National Inpatient Sample (NIS) data from the National Hospital Discharge survey was used to estimate the national prevalence of trauma discharges between 1990 and 2001. We used the NIS injury

definition as a proxy for trauma. NIS injury discharges were defined as discharges with a primary ICD-9-CM diagnosis injury code of 800-909.2, 909.4, 909.9, 910-994.9, 995.5-995.59, or 995.80-995.85. Codes for complications of care and adverse effects as well as their late effects were excluded.¹

We used the NIS annual reports for our denominator of surgical discharges. Any discharge with at least one surgical procedure listed was included as a surgical discharge.²⁻¹⁴ Surgical discharges were defined by the NIS annual reports using ICD-9-CM procedure codes as follows:

Surgical operations—All procedures except those listed under “nonsurgical procedures” are listed as surgical operations.

Nonsurgical procedures—Procedures generally not considered to be surgery are listed as nonsurgical procedures. These include diagnostic endoscopy and radiography, radiotherapy and related therapies, physical medicine and rehabilitation, and other nonsurgical procedures. The following ICD-9-CM codes are for diagnostic and nonsurgical procedures: 01.18-01.19, 03.31, 03.39, 04.19, 05.19, 06.19, 07.19, 08.19, 09.19, 09.41-09.49, 10.29, 11.29, 12.29, 14.19, 15.09, 16.21, 16.29, 18.01, 18.11, 18.19, 20.31, 20.39, 21.00+21.02, 21.21, 21.29, 22.19, 24.19, 25.09, 26.19, 27.29, 28.19, 29.11, 29.19, 31.41–31.42, 31.48-31.49, 33.21–33.23, 33.29, 34.21–34.22, 34.28–34.29, 37.26-37.27, 37.29, 38.29, 39.95, 40.19, 41.38-41.39, 42.22–42.23, 42.29, 44.11-44.13, 44.19, 45.11-45.13, 45.19, 45.21-45.24, 45.28-45.29, 48.21-48.23, 48.29, 49.21, 49.29, 50.19, 51.10-51.11, 51.19, 52.19, 54.21, 54.29, 55.21–55.22, 55.29, 56.31, 56.35, 56.39, 57.31–57.32, 57.39, 57.94-57.95, 58.21–58.22, 58.29, 59.29, 60.18-60.19, 61.19, 62.19, 63.09, 64.19, 64.94, 65.19, 66.19, 67.19, 68.11, 68.19, 69.92, 70.21–70.22, 70.29, 71.19, 73.4, 73.51–73.59, 73.91–73.92, 75.31-75.32, 75.34-75.35, 75.94, 76.19, 78.80-78.89, 80.20-80.29, 81.98, 83.29, 84.41–84.43, 84.45-84.47, 85.19, 86.19, 86.92, 87–99.⁴

We calculated the national trauma surgery prevalence by dividing the number of trauma discharges by the number of surgical discharges each year.

Multivariate model for the probability of trauma

The multivariate logistic regression model for the probability of trauma was used to determine the year-adjusted odds ratio and p-value comparing the NIS and ASA Closed Claims Project rates in the 1990-2001 time period. In this multivariate logistic regression using aggregate rather than raw data, the dependent variable was the probability of trauma. The independent variables in the regression analysis were a) year and b) a categorical indicator of whether the case was from the Closed Claims Project vs. NIS dataset. We also ran a model with an interaction between the year and the categorical indicator of whether the case was from the Closed Claims Project vs. NIS dataset to test whether the odds ratios comparing Closed Claims Project and NIS datasets were different across years.

The multivariate model can be described by the following formula:

$$\log it(Y_i) = a + bX_i + \sum_{j=1991}^{2001} c_j Z_{ji} \quad (A1)$$

where *logit* is the logit transformation, Y_i is the indicator of trauma for claim i (0 = no trauma and 1 = trauma), X_i is the indicator of NIS and ASA Closed Claims Project data set for claim i (0 = NIS and 1 = ASA Closed Claims Project), $Z_{1991,i}$ through $Z_{2001,i}$ are indicator variables of years 1991 through 2001 (0=false, 1= true) for claim i , a is the intercept, b is the log of the year-adjusted odds ratio for NIS compared to ASA Closed Claims Project and c_{1991} through c_{2001} are log odds ratios for years 1991 through 2001 compared to 1990.

We also ran a logistic regression model that tested for the interaction between NIS/ASA (X) and year (Z_j s). The formula for the model with the interaction was:

$$\log it(Y_i) = a + bX_i + \sum_{j=1991}^{2001} c_j Z_{ji} + \sum_{j=1991}^{2001} d_j X_i Z_{ji} \quad (A2)$$

All the terms in A2 common with equation A1 have the same meaning as in equation A1 and terms d_{1991} through d_{2001} are log odds ratios for interactions of years 1991 through 2001 (compared to 1990) with the

NIS/ASA designation. We tested for the interaction between NIS/ASA and year by calculating the likelihood ratio test that compared the fits of models described by equations A1 and A2.

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