Data Sources for Injury Epidemiology Analysis

EPI 603

February 1, 2011
Injury Epidemiology Data

• Some private-use data is available (e.g., National Trauma Data Bank and National Burn Registry)

• There are more public-use resources dedicated to injury than for most other health-related issues

• These datasets cover a wide array of injuries
Public-Use Dataset Examples

• National Automotive Sampling Survey (NASS)
• Fatality Analysis Reporting System (FARS)
• National Health Interview Survey (NHIS)
  – Medical Expenditure Panel Survey (MEPS)
• National Electronic Injury Surveillance System (NEISS)
• National Traumatic Occupational Fatality Surveillance System (NTOF)
• Uniform Crime Reports (UCR)

http://www.cdc.gov/ncipc/osp/InventoryInjuryDataSys.htm
Public-Use Datasets

• Each dataset has certain strengths and limitations
  – NASS/FARS: Limited to motor vehicle collision-related injuries (deaths for FARS)
  – NEISS: Only includes basic injury descriptors (e.g., body region/diagnosis), limited to injuries resulting in emergency care
  – MEPS: Data structure difficult to utilize (good data programming skills a must)
WEB-BASED INJURY STATISTICS QUERY AND REPORTING SYSTEM (WISQARS)
WISQARS

• Provides basic descriptive statistics for fatal/non-fatal injury rates
• Can stratify rates by
  – Age
  – Race
  – Sex
  – Year
  – State
• http://www.cdc.gov/injury/wisqars.index.html
### 2006, United States
Unintentional MV Traffic Deaths and Rates per 100,000
All Races, Both Sexes, All Ages
ICD-10 Codes: V30-V39 (.4-.9), V40-V49 (.4-.9), V50-V59 (.4-.9),
V60-V69 (.4-.9), V70-V79 (.4-.9), V81.1 V82.1,V83-V86 (.0-.3),
V20-V28 (.3-.9),V29 (.4-.9),V12-V14 (.3-.9),V19 (.4-.6),
V02-V04 (.1-.9),V09.2,V80 (.3-.5),V87(.0-.8),V89.2

<table>
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<tr>
<th>Sex</th>
<th>Number of Deaths</th>
<th>Population</th>
<th>Crude Rate</th>
<th>Age-Adjusted Rate**</th>
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</thead>
<tbody>
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<td>30,330</td>
<td>146,946,194</td>
<td>20.64</td>
<td>20.51</td>
</tr>
<tr>
<td>Females</td>
<td>13,334</td>
<td>151,416,779</td>
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<td>8.62</td>
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<td>Total</td>
<td>43,664</td>
<td>298,362,973</td>
<td>14.63</td>
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</table>
### Unintentional All Transport Nonfatal Injuries and Rates per 100,000

2006, United States, All Races, Both Sexes, All Ages
Disposition: All Cases

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of Injuries</th>
<th>Population</th>
<th>Crude Rate</th>
<th>Age-Adjusted Rate**</th>
<th>Number of Records</th>
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<th>Upper 95% Confidence Limit</th>
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<td>Both Sexes</td>
<td>4,262,553</td>
<td>298,362,973</td>
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<td>1,433.64</td>
<td>73,106</td>
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<td>8.6%</td>
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<td>Males</td>
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<td>-</td>
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<td>17</td>
<td>274</td>
<td>46.0%</td>
<td>59</td>
<td>1,134</td>
</tr>
</tbody>
</table>
WISQARS Data

• WISQARS fatal data come from the CDC annual mortality data files provided by the National Center for Health Statistics (NCHS)
  – Data are derived from the Multiple Cause of Death data (http://www.cdc.gov/nchs/products/elec_prods/subject/mortmcd.htm)

• WISQARS nonfatal data come from the National Electronic Injury Surveillance Survey – All Injury Program (NEISS-AIP)
WIDE-RANGING ONLINE DATA FOR EPIDEMIOLOGIC RESEARCH (WONDER)
WONDER


- Very similar to WISQARS fatal
  - Uses data from the Compressed Mortality File (http://www.cdc.gov/nchs/products/elec_prods/subject/mcompres.htm)
WONDER

• Produces injury mortality rates that can be stratified by
  – Location (i.e., region, division, state, county)
  – Year
  – Age group
  – Race
  – Sex
  – Cause of death
  – Urbanization (i.e., population density classification)
<table>
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<td>299,398,484</td>
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WISQARS and WONDER

• **Strengths**
  – Cover a wide range of injuries
  – Nationally representative estimate of annual injuries

• **Limitations**
  – Limited to reporting injury rates by basic demographics
FATALITY ANALYSIS REPORTING SYSTEM (FARS)
FARS Background

• Census of fatal motor vehicle collisions (MVCs) in the United States
  – Includes Washington, D.C. and Puerto Rico

• To be included, a MVC must:
  – Occur on a public roadway
  – Result in the death of at least one individual (whether a motorist or non-motorist) within 30 days
FARS Background

• NHTSA has contracts with agencies in each state that collect information on fatal MVCs
• Data can come from multiple sources
  – Police Accident Reports (PARs)
  – State vehicle registration files
  – State Highway Department Data
  – Coroner/Medical Examiner reports
  – Hospital records
FARS Data

• Data are divided into three datasets
  – Accident-level
    • e.g., time/location of MVC, number of vehicles involved
  – Vehicle-level
    • e.g., vehicle body type, most harmful event
  – Person-level
    • e.g., demographics, date/time of death (if applicable)
<table>
<thead>
<tr>
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<th>ACCIDENT VARIABLES</th>
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FARS Data

- Alcohol data
  - FARS does provide blood alcohol content data
  - Due to missingness of data, the use of BAC data involves imputation techniques
The Impact of a Vision Screening Law on Older Driver Fatality Rates

Gerald McGwin Jr, MS, PhD; Scott A. Sarrels, BS; Russell Griffin, MPH; Cynthia Owsley, PhD, MSPH; Loring W. Rue III, MD

Objective: To evaluate the impact of the Florida visual acuity licensing standard for drivers 80 years and older on fatal motor vehicle collision (MVC) involvement.

Methods: Motor vehicle collision fatality rates for all Florida residents and for drivers 80 years and older were compared before and after the visual acuity licensing standard was implemented in January 2004.

Results: From 2001 to 2006, there was a nonsignificant ($P=.06$) increase in MVC fatality rates in Florida; in contrast, fatality rates among drivers 80 years and older demonstrated a significant downward linear trend ($P=.01$). When comparing prelaw (2001-2003) and postlaw (2004-2006) periods, the fatality rate among all-aged occupants increased by 6% (rate ratio, 1.06; 95% confidence interval, 0.99-1.14); conversely, fatalities among drivers 80 years and older decreased significantly by 17% (rate ratio, 0.83; 95% confidence interval, 0.72-0.98).

Conclusions: Despite little evidence for an association between visual acuity and MVC involvement, the results of this study suggest that a vision screening law targeting Floridians 80 years and older resulted in a reduction in the MVC fatality rate among such drivers. The exact mechanism responsible for this association is unclear and future research should attempt to identify what might explain this relationship.

Arch Ophthalmol. 2008;126(11):1544-1547
FARS

• Strengths
  – Contains an accurate assessment of the number of fatal MVCs in the U.S.
  – Data are put through quality control checks to ensure accuracy and completeness of data

• Limitations
  – Can only be used for fatal MVCs
  – Data limited to what is available in PARs and other public/medical records
FARS

• Data can be downloaded at 

• Data go back to 1975, but caution must be taken when combining older datasets since the variable names/values change over years
FARS in SAS

- FARS data are available as SAS datasets; however, each SAS dataset has formats associated with them. As a result, if you tried to read FARS data into SAS without the formats, you will get an error similar to:
To get around this problem, you must tell SAS to ignore the formats using the NOFMTERR system option:

```plaintext
optionsnofmterr;
data Acc03; set FARS03.Accident; run;
```

Using this code, the dataset is properly read into SAS:

```
optionsnofmterr;
data Acc03; set FARS03.Accident; run;
```

```
NOTE: Format FSTATEFS was not found or could not be loaded.
NOTE: Format FMONTH was not found or could not be loaded.
NOTE: Format FNAME was not found or could not be loaded.
NOTE: Format FREF was not found or could not be loaded.
NOTE: Format FSALES was not found or could not be loaded.
NOTE: Format FJUNCT was not found or could not be loaded.
NOTE: Format FLOWSF was not found or could not be loaded.
NOTE: Format FCLDSFS was not found or could not be loaded.
NOTE: Format FNAMEFS was not found or could not be loaded.
NOTE: Format FREFSFS was not found or could not be loaded.
NOTE: Format FSALESFS was not found or could not be loaded.
NOTE: Format FJUNCTFS was not found or could not be loaded.
NOTE: Format FLOWSFS was not found or could not be loaded.
NOTE: Format FCLDSFS was not found or could not be loaded.
NOTE: There were 30052 observations read from the data set FARS03.ACCIDENT.
NOTE: DATA statement used (total process time):
  real time: 0.81 seconds
  cpu time: 0.10 seconds
```
NASS
GENERAL ESTIMATES SYSTEM (GES)
NASS GES

• Annual survey of MVCs in the United States

• Began in 1988
  – Created to identify traffic safety problems areas and form bases of cost/benefit analysis of traffic safety initiative
NASS GES

• GES was intended to be used to answer general questions about traffic safety
  – When and how often do MVCs occur?
  – What types of vehicles are involved in MVCs?
  – How severely was a person injured?
NASS GES

• In order to be included, a MVC must:
  – Have a PAR completed
  – Involve at least one vehicle on a traffic way
  – Result in property damage, injury, or death

• Approximately 50,000 MVCs are surveyed each year
NASS GES Sampling

• GES data collectors visit 400 police agencies across 60 sites in the United States on a weekly, biweekly, or monthly basis
  – A list is compiled of all qualifying MVCs, and a sample of that list is then selected
  – Collectors send the PARs for the selected MVCs to a contractor for coding, where trained personnel transfer the data from the PARs into an electronic data file
NASS GES Sampling

• Unlike FARS data, GES utilizes a method of sampling called probability sampling (i.e., the chances of a MVC being included are based on a given set of variables (e.g., geographic location))

• Sampling involves three distinct stages
  – Primary Sampling Units (PSUs) (i.e., geographic areas)
  – Police Jurisdictions (PJs)
  – Police Accident Reports (PARs)
NASS GES Sampling

• The PAR sampling is based on three basic strata
  – Stratum 1: MVCs in which one vehicle was towed from the scene due to damage
  – Stratum 2: MVCs in which no vehicle was towed, but at least one person was injured
  – Stratum 3: All other crashes

• Strata 1 and 2 involve more severe crashes, and are oversampled in PAR selection

• In 2002, stratum 1 was separated into 3 groups based on highest injury severity incurred due to MVC
NASS GES Sampling

• Because the GES survey is not a simple random sample of PARs, data must be weighted to account for the probability of selection
  – Weights are simply the inverse of the product of the probability of selection in each of the three selection stages

\[ w(i) = \frac{1}{P(i)_{PSU \ selection} \times P(i)_{PJ \ selection} \times P(i)_{PAR \ selection}} \]
NASS GES Data Sets

• Accident – 1988 to current
  – Data on MVC characteristics and environmental conditions at time of MVC. There is one record per MVC.

• Vehicle – 1988 to current
  – Data describing vehicles involved in the MVC. There is one record per vehicle.

• Person – 1988 to current
  – Data on all persons involved in the crash, including non-motorists (e.g., pedestrians). There is one record per person.

• Event – 2000 to current
  – Data for harmful events in a crash (e.g., striking another vehicle/object), damage to each vehicle, and vehicle’s role in the event. There is one record per harmful event.
NASS GES Injury Coding

• Injuries in GES are coded according to KABCO scale
  – 0 = No injury (O)
  – 1 = Possible injury (C)
  – 2 = Non-incapacitating injury (B)
  – 3 = Incapacitating injury (A)
  – 4 = Fatal injury (K)
  – 5 = Injured, severity unknown (U)
  – 6 = Died prior to MVC
  – 9 = Unknown if injured
NASS GES Injury Coding

• KABCO scale scores have limitations
  – Codes are reported by police officers without medical training and usually without a hands-on examination
  – Victims are sometimes transported from the scene before the police officer completing the PAR arrives
  – Research has suggested that there is significant variability in KABCO scoring across states because of differing thresholds regarding reportable MVCs
NASS GES Analysis

• Because of the complex sampling scheme used in GES, analyses must account for statistical weights and clustering of samples (i.e., grouping of MVCs by PSUs/PJs)

• In SAS, to do so you must use the PROC SURVEY set of procedure codes
  – PROC SURVEYFREQ
  – PROC SURVEYMEANS
  – PROC SURVEYLOGISTIC
  – PROC SURVEYREG
Proc SurveyFreq data=GESdata;
strata PSUStrat;
cluster PSU;
weight weight;
tables FuelCat*Quarter / row wchisq;
run;
PROC SURVEYREG

Proc SurveyReg data=demogs;
  strata PSUStrat;
  cluster PSU;
  weight weight;
  class FuelCat;
  model Age = FuelCat / anova solution;
run;
PROC SURVEYLOGISTIC

Proc SurveyLogistic data=Injuries;
strata PSUStrat;
cluster PSU;
weight weight;
class ChestSAB (ref='n') CurbCat BeltUse IntrCat;
model IncapInj (Event='1') = ChestSAB TotalDV CurbCat Age Sex BeltUse IntrCat;
run;
NASS GES Analysis

• To date, SAS cannot compute adjusted risk ratios for data with a complex sampling scheme
• Other statistical applications should be used
  – SUDAAN
  – Stata
  – SPSS
The association between price of regular-grade gasoline and injury and mortality rates among occupants involved in motorcycle- and automobile-related motor vehicle collisions

Eddie Hyatt a, Russell Griffin a, b, Loring W. Rue III a, Gerald McGwin Jr. a, b, *

a Center for Injury Sciences at UAB and Section of Trauma, Burns, and Surgical Critical Care, Department of Surgery, School of Medicine, University of Alabama at Birmingham, Birmingham, AL, USA
b Department of Epidemiology, School of Public Health, University of Alabama at Birmingham, Birmingham, AL, USA

ABSTRACT

Motorcyclists have been reported to be more likely to die in a motor vehicle collision (MVC) than automobile occupants. With the recent increase in the pump price of gasoline, it has been reported that people are switching to motorcycles as main modes of transportation. This study evaluated the association between motor vehicle collision-related injury and mortality rates and increases in gasoline prices for occupants of automobiles and riders of motorcycles.

There were an estimated 1,270,512 motorcycle MVC and 238,390,853 automobile MVC involved occupants in the U.S. from 1992 to 2007. Higher gasoline prices were associated with increased motorcycle-related injuries and deaths; however, this association no longer remained after accounting for changes in the number of registered vehicles.

The current study observed that, while the number of injuries and fatalities in motorcycle-related MVCs increase with increasing gasoline price, rates remained largely unchanged. This suggests that the observed increase in motorcycle-related injuries and fatalities with increasing gasoline price is more a factor of the number of motorcycles on the road rather than operator characteristics.

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NASS GES

• Strengths
  – Weighted analyses provided a nationally representative sample of annual MVCs in the United States
  – Data are quality-checked by trained personnel
  – Large sample size (50,000-56,000 MVCs each survey)

• Limitations
  – Relies heavily on police-reported data
  – Quality of injury severity information may be questionable
  – Should not be used to estimate MVC-related mortality numbers/rates (use FARS instead)
  – Need knowledge of how to analyze probability samples correctly
NASS GES

- Data can be downloaded at ftp://ftp.nhtsa.dot.gov/GES/
NASS
CRASHWORTHINESS DATA SYSTEM (CDS)
NASS CDS

• Similar to GES
  – Probability sample of police-reported MVCs
  – MVC must be
    • Police reported
    • Involved a harmful event (i.e., proper damage or injury)
    • Involve at least one vehicle in transport on a roadway
  – Three stages of sampling
    • Primary Sampling Units
    • Police Jurisdictions
    • MVCs
NASS CDS

• Unlike GES, CDS only samples approximately 5,000 MVCs each survey
  – Severe MVCs are oversampled (and thus have lower statistical weights)
• The smaller number of sampled MVCs allows for greater data collection
NASS CDS

• While the GES is limited to police-reported data, the CDS includes very detailed information for every MVC

• Trained investigators collect information from vehicle inspections, MVC scene inspections, interviews with police, individuals involved in the MVC, and other sources to collect data on the MVC
NASS CDS

- Data is separated into multiple datasets
  - Accident (accident.sas7bdat)
  - Event (event.sas7bdat)
  - General vehicle (GV.sas7bdat)
  - Occupant assessment (OA.sas7bdat)
  - Occupant injury (OI.sas7bdat)
  - Vehicle exterior (VE.sas7bdat)
  - Vehicle interior (VI.sas7bdat)
NASS CDS Injury Coding

• Occupant injury dataset contains detailed injury information
  – Up to 59 injuries (through 2008 CDS) are coded per individual involved in MVC
  – Injuries are coded using Abbreviated Injury Scale (AIS)
NASS CDS Injury Coding

- Each AIS code contains 7 digits that describe (in order)
  - Body region (e.g., lower extremity)
  - Type of anatomic structure (e.g., skeletal)
  - Specific anatomic structure (e.g., femur)
  - Level of injury (e.g., condyle)
  - Severity of injury
NASS CDS Injury Coding

- As you can, the above person had 4 injuries (INJURY NUMBER)

- Highlighted injury:
  - Body region = 8 (Lower Extremity)
  - Type of anatomic structure = 5 (Skeletal)
  - Specific anatomic structure = 16 (Fibula)
  - Injury level = 08 (Lateral malleolus fracture)
  - Injury severity = 2
  - So the AIS code is 851608.2, representing a fracture to the lateral malleolus of the fibula

- Side note: This individual was in a MVC that had a 1/104.103 or 0.96% chance of being selected
NASS CDS Injury Coding

• Injury severity
  – AIS codes are given injury severity scores (i.e., AIS scores) on a 1-6 scale
    • 1 = minor
    • 2 = moderate
    • 3 = serious
    • 4 = severe
    • 5 = critical
    • 6 = maximum (often fatal)
NASS CDS Injury coding

• Detailed level of injury data in CDS allow for examining injury outcomes such as
  – Specific injuries (e.g., femoral fractures)
  – Severity of injuries sustained
  – Body region injured
    • Often subsetted by the severity of the injury (e.g., AIS 3+ upper extremity injury)
NASS CDS Analytical Example

```r
Proc SurveyLogistic data=all2;
strata PSUStrat;
cluster PSU;
weight RatWgt;
class BagCat_ CurbCat;
model Thrx2pl (Event='1') = BagCat_ BeltUse IntrCat TrackPos Driver CurbCat;
run;
```
Injury risks between first- and second-generation airbags in frontal motor vehicle collisions

Paul A. MacLennan\textsuperscript{a,b,*}, William S. Ashwander\textsuperscript{a}, Russell Griffin\textsuperscript{a}, Gerald McGwin Jr.\textsuperscript{a,b,c,d}, Loring W. Rue III\textsuperscript{a,b}

\textbf{A B S T R A C T}

\textit{Background:} Airbags in vehicles manufactured after 1997 were depowered to decrease injury risks for infants/children and small adults. It is possible that compared to earlier airbags second-generation airbags provide less injury protection due to their depowered nature.

\textit{Methods:} A cohort study was conducted using 1995–2004 national data. Risk ratios (RRs) and 95% confidence intervals (CIs) compared injury risks for occupants involved in frontal collisions in vehicles wherein a first- or second-generation airbag deployed by body region and injury severity using the Abbreviated Injury Scale (AIS). Associations were adjusted for crash severity, seatbelt use, seat position, occupant location, and vehicle curb weight.

\textit{Results:} For upper extremity injuries reduced RRs were observed for AIS 1 or greater (RR = 0.76, CI 0.67–0.86), AIS 2 or greater (RR = 0.76, CI 0.58–1.00) and AIS 3 (RR = 0.81, CI 0.64–1.03). Elevated risks were observed for AIS 5 thoracic injuries (RR = 1.46, CI 1.04–2.07) but were made null when differences in age and gender were adjusted for.

\textit{Conclusions:} Vehicles equipped with first- and second-generation airbags appear to offer similar protection for front-seated occupants. The observed decreased risks for upper extremity injury and increased risks for severe thoracic injuries warrant further attention.

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<table>
<thead>
<tr>
<th></th>
<th>First-generation (n = 6,061,289)</th>
<th>Second-generation (n = 3,817,055)</th>
<th>Crude RR (95% CI)</th>
<th>Adjusted RR&lt;sup&gt;b&lt;/sup&gt; (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Head/face/neck</strong></td>
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<tr>
<td>AIS ≥ 1</td>
<td>1,123,988</td>
<td>673,545</td>
<td>0.96 (0.79–1.15)</td>
<td>0.95 (0.80–1.13)</td>
</tr>
<tr>
<td>AIS ≥ 2</td>
<td>116,625</td>
<td>78,696</td>
<td>1.06 (0.74–1.52)</td>
<td>0.94 (0.71–1.24)</td>
</tr>
<tr>
<td>AIS ≥ 3</td>
<td>26,082</td>
<td>24,064</td>
<td>1.46 (0.74–2.88)</td>
<td>1.15 (0.55–2.42)</td>
</tr>
<tr>
<td>AIS ≥ 4</td>
<td>11,457</td>
<td>10,597</td>
<td>1.46 (0.73–2.89)</td>
<td>1.09 (0.54–2.20)</td>
</tr>
<tr>
<td>AIS ≥ 5</td>
<td>6,101</td>
<td>4,326</td>
<td>1.14 (0.73–1.79)</td>
<td>0.80 (0.50–1.27)</td>
</tr>
<tr>
<td>AIS 6</td>
<td>591</td>
<td>1,131</td>
<td>3.00 (1.46–6.18)</td>
<td>1.05 (0.43–2.56)</td>
</tr>
<tr>
<td><strong>Thorax</strong></td>
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<tr>
<td>AIS ≥ 1</td>
<td>746,168</td>
<td>447,297</td>
<td>0.94 (0.82–1.08)</td>
<td>0.97 (0.86–1.10)</td>
</tr>
<tr>
<td>AIS ≥ 2</td>
<td>54,303</td>
<td>54,873</td>
<td>1.62 (1.25–2.10)</td>
<td>1.28 (1.00–1.64)</td>
</tr>
<tr>
<td>AIS ≥ 3</td>
<td>34,228</td>
<td>28,855</td>
<td>1.36 (0.94–1.99)</td>
<td>1.09 (0.74–1.61)</td>
</tr>
<tr>
<td>AIS ≥ 4</td>
<td>10,947</td>
<td>10,915</td>
<td>1.56 (0.97–2.50)</td>
<td>1.08 (0.53–2.21)</td>
</tr>
<tr>
<td>AIS ≥ 5</td>
<td>3,733</td>
<td>4,009</td>
<td>1.69 (1.47–1.93)</td>
<td>1.46 (1.04–2.07)</td>
</tr>
<tr>
<td>AIS 6</td>
<td>1,055</td>
<td>1,792</td>
<td>2.66 (0.48–14.85)</td>
<td>1.70 (0.19–14.87)</td>
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<tr>
<td><strong>Abdomen/pelvis</strong></td>
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<tr>
<td>AIS ≥ 1</td>
<td>256,568</td>
<td>175,657</td>
<td>1.10 (0.82–1.48)</td>
<td>1.08 (0.78–1.48)</td>
</tr>
<tr>
<td>AIS ≥ 2</td>
<td>22,697</td>
<td>15,129</td>
<td>1.05 (0.66–1.66)</td>
<td>0.85 (0.51–1.42)</td>
</tr>
<tr>
<td>AIS ≥ 3</td>
<td>7,668</td>
<td>6,424</td>
<td>1.29 (0.79–2.11)</td>
<td>1.03 (0.56–1.88)</td>
</tr>
<tr>
<td>AIS ≥ 4</td>
<td>3,265</td>
<td>3,187</td>
<td>1.50 (0.71–3.18)</td>
<td>1.49 (0.48–4.58)</td>
</tr>
<tr>
<td>AIS ≥ 5</td>
<td>991</td>
<td>1,452</td>
<td>2.30 (0.62–8.59)</td>
<td>2.11 (0.27–16.53)</td>
</tr>
<tr>
<td><strong>Spine</strong></td>
<td></td>
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<tr>
<td>AIS ≥ 1</td>
<td>553,731</td>
<td>418,230</td>
<td>1.20 (0.92–1.56)</td>
<td>1.22 (0.92–1.63)</td>
</tr>
<tr>
<td>AIS ≥ 2</td>
<td>28,353</td>
<td>22,492</td>
<td>1.24 (0.74–2.07)</td>
<td>1.07 (0.67–1.71)</td>
</tr>
<tr>
<td>AIS ≥ 3</td>
<td>6,513</td>
<td>5,821</td>
<td>1.39 (0.94–2.06)</td>
<td>1.09 (0.72–1.64)</td>
</tr>
<tr>
<td>AIS ≥ 4</td>
<td>1,329</td>
<td>1,444</td>
<td>1.67 (0.88–3.19)</td>
<td>1.02 (0.48–2.16)</td>
</tr>
<tr>
<td>AIS ≥ 5</td>
<td>1,038</td>
<td>1,060</td>
<td>1.64 (0.81–3.29)</td>
<td>0.96 (0.47–1.99)</td>
</tr>
<tr>
<td><strong>Upper extremity</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>AIS ≥ 1</td>
<td>1,677,090</td>
<td>790,555</td>
<td>0.75 (0.66–0.85)</td>
<td>0.76 (0.67–0.86)</td>
</tr>
<tr>
<td>AIS ≥ 2</td>
<td>116,780</td>
<td>60,272</td>
<td>0.82 (0.63–1.08)</td>
<td>0.76 (0.58–1.00)</td>
</tr>
<tr>
<td>AIS 3</td>
<td>27,371</td>
<td>15,402</td>
<td>0.95 (0.72–1.24)</td>
<td>0.81 (0.64–1.03)</td>
</tr>
<tr>
<td><strong>Lower extremity</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIS ≥ 1</td>
<td>1,133,894</td>
<td>703,133</td>
<td>0.99 (0.84–1.17)</td>
<td>1.01 (0.85–1.18)</td>
</tr>
<tr>
<td>AIS ≥ 2</td>
<td>174,638</td>
<td>142,359</td>
<td>1.27 (0.97–1.66)</td>
<td>1.15 (0.90–1.45)</td>
</tr>
<tr>
<td>AIS ≥ 3</td>
<td>43,720</td>
<td>32,912</td>
<td>1.21 (0.97–1.51)</td>
<td>0.99 (0.75–1.29)</td>
</tr>
<tr>
<td>Death</td>
<td>28,104</td>
<td>16,136</td>
<td>0.91 (0.41–2.02)</td>
<td>0.64 (0.29–1.41)</td>
</tr>
</tbody>
</table>

<sup>a</sup> Adjusted for maximum intrusion, seatbelt use, seat track position, driver/passenger status, and vehicle curb weight.

<sup>b</sup> Referent group is first generation airbag.

<sup>c</sup> Based on weighted observations.
NASS CDS

• Strengths
  – Nationally representative data
  – Very detailed information on a wide variety of characteristics
  – Detailed injury coding allows for examining many different injury-related outcomes
  – Data collected by trained personnel from a variety of sources
NASS CDS

• Limitations
  – Like GES, it is not suggested that CDS be used to estimate the number/rate of MVC-related mortality
    • You can use it for comparing mortality risk between/among groups, but note limitation when doing so
  – Survey was redone in 1988 (has been done since the 1970s); as a result, it is suggested to not combine pre-1988 data with data from 1988 and later
  – Cannot determine injury risks by state as you can in FARS
  – Limited data for certain characteristics (e.g., child seats)
NASS CDS

- Data can be downloaded at ftp://ftp.nhtsa.dot.gov/NASS/
NATIONAL ELECTRONIC INJURY SURVEILLANCE SURVEY (NEISS)
NEISS

- WISQARS nonfatal injury data are derived from NEISS-AIP data.
- The NEISS-AIP was begun in 2000 as a spinoff from the NEISS.
- Conducted by the Consumer Product Safety Commission (CPSC), the NEISS is a survey of consumer product-related injuries in the U.S.
The NEISS is a probability sample of 100 hospital emergency rooms in the United States.

Each ER has a trained employee that reviews ER records to identify consumer product-related injuries.

The selected records are sent to the CPSC, where NEISS personnel transfer the medical record information to an electronic file.
NEISS

• NEISS data contain information on characteristics available in medical records
  – Demographics
  – Body region and specific body part injured
  – Up to two consumer products involved in the injury
  – A narrative detailing the events surrounding the injury (e.g., RIB FX, CLAVICLE FX. PT WAS RIDING A BIKE AND WRECKED.)
Incidence of Golf Cart-Related Injury in the United States

Gerald McGwin, Jr., PhD, Jonathan T. Zoghby, BS, Russell Griffin, MPH, and Loring W. Rue III, MD

**Background:** Golf carts have become a popular mode of transportation off of the links because of their small size, low maintenance, and ease of use. Case reports suggest severe, debilitating injuries as a consequence of golf cart incidents. To date, there has been no national population-based study of golf cart-related injuries.

**Methods:** The National Electronic Injury Surveillance System identified individuals who visited participating emergency departments from January 1, 2002 to December 31, 2005 for injuries sustained as a result of golf carts.

**Results:** An estimated 48,255 (95% confidence interval, 35,342–61,108) golf cart-related injuries occurred in the U.S. between 2002 and 2005; the injury rate was 4.14 of 100,000 population. The highest injury rates were observed in 10 to 19 year olds and those aged 80 and older. Male patients had a higher injury rate than female patients, and whites had a higher rate than blacks or Asians. Contusions/abrasions were the most common diagnosis for the hip and lower extremity region; fractures were the most common diagnosis for shoulder and upper extremity region; and intracranial injuries, including concussions, subdural hematomas, and hemorrhage, were the most common diagnosis for head and neck region. The two most common geographic settings of injuries were sports fields such as golf courses (45.0%) and places of residence (16.0%).

**Conclusion:** The popularity of golf carts as a means of transportation calls for mandatory safety standards to be met along with implementation of available safety courses for children who will potentially be operating these vehicles.

**Key Words:** Golf, Injury, Incidence, Epidemiology.

*J Trauma.* 2008;64:1562–1566.
Comparison of Severe Injuries Between Powered and Nonpowered Scooters Among Children Aged 2 to 12 in the United States

Russell Griffin, MPH; Chris T. Parks, BS; Loring W. Rue III, MD; Gerald McGwin, Jr, MS, PhD

Objective.—A substantial increase in the number of nonpowered and powered scooter injuries since 2000 has occurred in the United States. Because of differences in weight and operational speed between scooter types, it is possible that the type and severity of injuries may differ. The purpose of the current study is to compare demographics and injury characteristics between scooter types, focusing on differences in injury severity.

Methods.—The 2002–2006 National Electronic Injury Surveillance System provided information about individuals aged 2 to 12 years who sought treatment at an emergency department due to powered or nonpowered scooter–related injury in the United States. We defined severe injury as an injury resulting in the hospitalization, staying in the hospital for observation, or transfer of the injured patient. Logistic regression analysis, adjusted for sex, age, and geographic location in which the injury occurred, estimated odds ratios (ORs) and 95% confidence intervals (CI) for the association between scooter type and severe injury.

Results.—There were an estimated 15 752 and 185 007 injuries related to powered and nonpowered scooters, respectively. Powered scooter–related injuries were over 3 times as likely to be severe (OR 3.57, 95% CI, 1.91–6.65). This association was more prominent among females (OR 5.80, 95% CI, 2.02–16.63) than males (OR 2.90, 95% CI, 1.44–5.82).

Conclusion.—Data suggest that, compared with nonpowered scooter–related injuries, powered scooter–related injuries are more often severe. This association is stronger among females than males. The higher risk of severe injury due to powered scooter use could result from increases in concussions and hip and lower extremity injuries.

KEY WORDS: child; epidemiology; injury, powered scooter; scooter

Ambulatory Pediatrics 2008;8:379–82
NEISS Analysis in SAS

```sas
Proc SurveyLogistic data=test;
strata Strat;
cluster PSU;
weight weight;
class Sex (Ref='2') AgeCat (Ref='4') Race (Ref='1')
 LocatCat (Ref='1') BodPart (Ref='Head & Neck') Powered (Ref='2');
model SevereInj (Event='1') = Powered Sex AgeCat Race LocatCat BodPart;
run;
```
• **Strengths**
  – Nationally representative sample of consumer product-related injuries in the United States
  – Data reviewed by trained personnel for validity and completeness

• **Limitations**
  – Injury data limited in detail
    • Body region injured
    • Body part injured
    • Mechanism
    • Disposition (e.g., treated and released, hospitalized)
NEISS

• Data can be downloaded at
  http://www.cpsc.gov/library/neiss.html
  or
  http://www.icpsr.umich.edu/icpsrweb/ICPSR/access/index.jsp
  • Search for “National Electronic Injury Surveillance System All Injury Program”