NC Department of Health and Human Services

Traumatic Brain Injuries in North Carolina
2019

NC Division of Public Health
Data updated July 22, 2021
Traumatic Brain Injury Technical Notes

Surveillance methods have been updated to identify any mention of an injury in our morbidity data sources. Individual records with multiple injuries listed will be included in the total for each of those injuries, but only counted once for overall total injury count. Previously, only the first listed injury was counted, which has resulted in an increase in the number of specific injuries identified.

For questions or for more information see technical notes document available at https://www.injuryfreenc.ncdhhs.gov/DataSurveillance/

Case definitions used:

• Deaths – ICD-10 codes listed as cause of death for traumatic brain injury (TBI): S01.0-S01.9, S02.2, S02.1, S02.3, S02.7-S02.9, S04.0, S06.0-S06.9, S07.0, S07.1, S07.8, S07.9, S09.7-S09.9, T01.0, T02.0, T04.0, T06.0, T90.2, T90.4, T90.5, T90.8, T90.9

*See technical notes document for a full list of ICD-10 codes used for TBI deaths
Technical Notes, Continued

- **Hospitalizations** – Among records with an ICD-10-CM injury code*, any mention of the following ICD-10-CM codes (includes records resulting in death)

- **Emergency Department Visits** – Any mention of the following ICD-10-CM codes (includes records resulting in hospitalization or death)

<table>
<thead>
<tr>
<th>Code(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S02.0, S02.1</td>
<td>Fracture of skull</td>
</tr>
<tr>
<td>S02.8, S02.91</td>
<td>Fracture of other specified skull and facial bones; unspecified fracture</td>
</tr>
<tr>
<td>S04.02, S04.03, S04.04</td>
<td>Injury of optic chiasm; injury of optic tract and pathways; injuries of visual cortex</td>
</tr>
<tr>
<td>S06</td>
<td>Intracranial injury</td>
</tr>
<tr>
<td>S07.1</td>
<td>Crushing injury of skull</td>
</tr>
<tr>
<td>T74.4</td>
<td>Shaken infant syndrome</td>
</tr>
</tbody>
</table>

*7th character of A, B, or missing (reflects initial encounter, active treatment)

*See technical notes document for a full list of ICD-10-CM injury diagnosis codes*
Proportion of demographic groups reporting having ever experienced loss of consciousness, 2019 BRFSS

<table>
<thead>
<tr>
<th>Demographic Group</th>
<th>Overall 26%</th>
<th>Male</th>
<th>Female</th>
<th>45-54</th>
<th>55-64</th>
<th>65-74</th>
<th>75+</th>
<th>&lt; Highschool</th>
<th>Highschool/GED</th>
<th>Some post highschool</th>
<th>College Grad</th>
<th>Disability</th>
<th>No Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>31%</td>
<td>21%</td>
<td>28%</td>
<td>30%</td>
<td>27%</td>
<td>19%</td>
<td>30%</td>
<td>28%</td>
<td>24%</td>
<td>24%</td>
<td>36%</td>
<td>21%</td>
</tr>
</tbody>
</table>

Source: NC State Center of Health Statistics, 2019 Behavioral Risk Factor Surveillance System (BRFSS) Survey Results
TBI deaths are the tip of the iceberg

Despite NC’s excellent reporting systems, the total burden of TBI in the state is unknown.

- **2,108*** Deaths
- **7,264*** Hospitalizations
- **27,470*** ED Visits
- ? EMS
- ? Outpatient Visits
- ? Medically Unattended Injuries

**INJURY ICEBERG**

Limited to NC Residents, 2019
Source: NC State Center for Health Statistics, Vital Statistics-Deaths (2019) and Hospitalization Discharge Data (2019); NC DETECT (2019)
Analysis by Injury Epidemiology and Surveillance Unit
Traumatic Brain Injury Deaths
TBI-Related Deaths among North Carolina Residents, 2017-2019

North Carolina TBI Death Rate: 20.3 per 100,000

TBI-Related Deaths
rate per 100,000

- <15.0
- 15.0 - 19.9
- 20.0 - 24.9
- 25.0 - 29.9
- ≥30.0
- <5 deaths, rate suppressed
- <10 deaths, interpret rate with caution
TBI deaths have continued to increase over the last 10 years

Limited to NC Residents, 2019


Analysis by Injury Epidemiology and Surveillance Unit
Rates of TBI-related deaths were highest among men and non-Hispanic whites

Limited to NC Residents, 2019, N=2,108


Analysis by Injury Epidemiology and Surveillance Unit
Self-inflicted firearm injury was the leading mechanism-intent category for all TBI deaths.

- Firearm - Self-Inflicted: 33%
- Fall - Unintentional: 31%
- MVT - Unintentional: 17%
- Firearm - Assault: 9%
- Unspecified - Unintentional: 3%
- All Other Mechanisms and Intents: 8%

*Included in other specified are Unspecified – Unintentional (3%), Motor Vehicle-Nontraffic – Unintentional (2%) and Other Land Transport – Unintentional (1%), as well as other mechanisms/intents.
TBI death rates are highest among those 85 and older

Rates begin increasing among ages 75+

Limited to NC Residents, 2019, N=2,108
Analysis by Injury Epidemiology and Surveillance Unit
Fall-Related TBI death rates were highest among adults 85 and older

Limited to NC Residents, 2019, N=644


Analysis by Injury Epidemiology and Surveillance Unit

*Rate suppressed due to count being less than 5
Fall-related TBI death rates were highest among men and non-Hispanic whites
Traumatic Brain Injury Hospitalizations
TBI-Related Hospitalizations among North Carolina Residents, 2017-2019

North Carolina TBI Hospitalization Rate: 67.4 per 100,000

TBI-Related Hospitalizations
rate per 100,000
< 45.0
45.0 - 59.9
60.0 - 74.9
75.0 - 89.9
≥ 90.0
<5 hospitalizations, rate suppressed
<10 hospitalizations, interpret rate with caution
**TBI-related hospitalizations increased by 11% over the last four years**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Hospitalizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>6,591</td>
</tr>
<tr>
<td>2017</td>
<td>6,838</td>
</tr>
<tr>
<td>2018</td>
<td>6,903</td>
</tr>
<tr>
<td>2019</td>
<td>7,264</td>
</tr>
</tbody>
</table>

*Limited to NC Residents, 2019
Source: NC State Center for Health Statistics, Hospitalization Discharge Data (2019)
Analysis by Injury Epidemiology and Surveillance Unit*
TBI-related hospitalization rates were highest among men and non-Hispanic whites.

Limited to NC Residents, 2019, N=7,264; NH – non-Hispanic; Rate not calculated for Other, NH

Source: NC State Center for Health Statistics, Hospitalization Discharge Data (2019)
Analysis by Injury Epidemiology and Surveillance Unit
Unintentional Falls were the leading mechanism-intent category for all TBI hospitalizations

- Fall - Unintentional: 54%
- MVT - Unintentional: 26%
- Struck By/Against - Unintentional: 3%
- Struck By/Against - Assault: 3%
- All Other Mechanisms and Intents: 14%

* Included in other specified are Unspecified - Unintentional (2%), Motor Vehicle-Nontraffic - Unintentional (2%), and Other Specified/Classifiable - Assault (1%), as well as other mechanism/intents.

Limited to NC Residents, 2019
Source: NC State Center for Health Statistics, Hospitalization Discharge Data (2019)
Analysis by Injury Epidemiology and Surveillance Unit
Adults 75 and older have the highest rates of TBI-related hospitalizations

Age was unknown for 20 hospitalizations
Limited to NC Residents, 2019, N=7,264

Source: NC State Center for Health Statistics, Hospitalization Discharge Data (2019)
Analysis by Injury Epidemiology and Surveillance Unit
Traumatic Brain Injury Emergency Department Visits
TBI-related ED visits increased by **15%** over the last four years

Limited to NC Residents, 2019

**Source:** NC DETECT (2019)

Analysis by Injury Epidemiology and Surveillance Unit
TBI-Related Emergency Department Visits (ED) Among North Carolina Residents, 2017-2019

North Carolina TBI ED Visit Rate: 248.8 per 100,000

TBI-Related ED Visits

rate per 100,000

- <150.0
- 150.0 - 199.9
- 200.0 - 249.9
- 250.0 - 299.9
- ≥300.0
- <5 ED visits, rate suppressed
- <10 ED visits, interpret rate with caution
Rates of TBI-related ED visits were highest among men and non-Hispanic whites

NH - non-Hispanic; sex was unknown for 26(<0.1%) injury ED visits and race/ethnicity was unknown for 0,411(<0.1%) injury ED visits
Limited to NC Residents, 2019, N=27,470 ; Rate not calculated for Other
Source: NC DETECT (2019)
Analysis by Injury Epidemiology and Surveillance Unit
Falls were the leading specified cause of TBI-related ED visits

- Fall - Unintentional: 42%
- MVT - Unintentional: 22%
- Struck By/Against - Unintentional: 14%
- Struck By/Against - Assault: 6%
- Unspecified - Assault: 4%
- All Other Mechanisms and Intents: 11%

* Included in other specified are Unspecified - Unintentional (3%), Motor Vehicle-Nontraffic - Unintentional (2%), and Other Land Transport - Unintentional (1%), as well as other mechanism/intents.

Limited to NC Residents, 2019
Source: NC DETECT (2019)
Analysis by Injury Epidemiology and Surveillance Unit
Adults 85 and older have the highest rates of TBI-related ED Visits

Rate per 100,000

Limited to NC Residents, 2019 N=27,470
Source: NC DETECT (2019)
Analysis by Injury Epidemiology and Surveillance Unit
TBI-related ED visit rates were highest among men ages 85 and older

Rate of ED Visits by Sex and Age Group

Limited to NC Residents, 2019, N=27,470
Source: NC DETECT (2019)
Analysis by Injury Epidemiology and Surveillance Unit
Summary of Traumatic Brain Injury in North Carolina

- In 2019, traumatic brain injuries resulted in:
  - Over 2,000 deaths
  - Over 7,000 hospitalizations
  - Over 27,000 emergency department visits

- Most TBI-related injuries and deaths occur among males and non-Hispanic whites

- Rates of TBI are highest in the 75-84 and 85 and older age groups

- Most traumatic brain injuries are related to unintentional falls