Pediatric (ages 0-14) mortality and volumes
As Washington’s Trauma System Matured, Pediatric (Age<15) Inpatient Trauma Mortality Improved Quickly

(Department of Health Criteria, excluding transfer-outs)

The percentage of hospital deaths, 1997-2013

Percent Died

Ages 0-14
All Trauma

In recent years, we have observed a surge in older adult deaths. Earlier, the youth had most inpatient trauma deaths.

Percent Died by Age, 1995-1999

Percent Died by Age, 2008-2012
While the Overall Mortality Came Down, Major TBIs are Still the Deadliest of All Pediatric Trauma with 7 percent Case Fatality in 2013 (Department of Health criteria, excluding transfers in)

The Percentage of Major TBI (Max Head AIS>=3) Deaths Among Pediatric (Ages<15) Trauma Patients
While Washington’s Adult Trauma Volume Increased Significantly Over the Years, Since 2001 the Statewide Pediatric Volume Stayed Stable, Around 2,400 to 2,800 Patients (Department of Health criteria, excluding transfers-out)
Starting with 2003, the percentage of pediatric trauma in the trauma registry went down (Department of Health criteria, excluding transfers-out)

Pediatric (ages 0-14) Trauma in WTR, 1997-2013

- **Number**
- **Percentage**
Since 2001, the statewide pediatric volume stayed stable, around 2,400 to 2,800 patients, and the Level 2 pediatric centers increased their number of pediatric patients (Department of Health criteria, excluding transfers-out).
Most major (ISS 16+) pediatric (age <15) trauma patients receive definitive care from level I - II pediatric designated services

(Department of Health Criteria, admitted patients only)

The percentage of pediatric patients with serious injuries (ISS 16+) receiving definitive hospital care by level I-II pediatric designated services
Some of This Decline in Pediatric Patient Volumes as well as the Mortality Could be Attributed to Washington’s Injury Prevention Activities

### Injury Prevention - Related State Laws

- **Personal Flotation Devices/Life Jackets (1999):** All people on a personal watercraft (PWC) and any person under 12 years of age on a vessel under 19 feet in length must wear a U.S. Coast Guard-approved life jacket that fits the individual.

- **Child Passenger Safety (2005):** A child must be restrained in a child restraint system (rear-facing, forward-facing, or booster seat) until the child is 8 years old, unless the child is four feet nine inches tall or taller. Children under 13 years of age shall be transported in the back seat where it is practical to do so.

- **Zach Lystedt Law (2009):** A youth athlete suspected of sustaining a concussion or head injury in a practice or game shall be removed from play or competition at that time. The youth removed may not return to play until he or she is evaluated by a licensed health care provider who is trained in the evaluation and management of concussion, and receives written clearance to return to play.
Currently, there is no state law requiring helmet use. However, some cities and counties do require helmet use with bicycles.

<table>
<thead>
<tr>
<th>Location Name</th>
<th>Who is Affected</th>
<th>Effective Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen</td>
<td>All ages</td>
<td>2001</td>
</tr>
<tr>
<td>Bainbridge Island</td>
<td>All ages</td>
<td>2001</td>
</tr>
<tr>
<td>Bremerton</td>
<td>All ages</td>
<td>2000</td>
</tr>
<tr>
<td>DuPont</td>
<td>All ages</td>
<td>2008</td>
</tr>
<tr>
<td>Eatonville</td>
<td>All ages</td>
<td>1996</td>
</tr>
<tr>
<td>Fircrest</td>
<td>All ages</td>
<td>1995</td>
</tr>
<tr>
<td>Gig Harbor</td>
<td>All ages</td>
<td>1996</td>
</tr>
<tr>
<td>Kent</td>
<td>All ages</td>
<td>1999</td>
</tr>
<tr>
<td>King County</td>
<td>All ages</td>
<td>1993, 2003 updated to include Seattle</td>
</tr>
<tr>
<td>Lynnwood</td>
<td>All Ages</td>
<td>2004</td>
</tr>
<tr>
<td>Lakewood</td>
<td>All ages</td>
<td>1996</td>
</tr>
<tr>
<td>Milton</td>
<td>All ages</td>
<td>1997</td>
</tr>
<tr>
<td>Orting</td>
<td>Under 17</td>
<td>1997</td>
</tr>
<tr>
<td>Pierce County</td>
<td>All ages</td>
<td>1994</td>
</tr>
<tr>
<td>Port Angeles</td>
<td>All ages</td>
<td>1994</td>
</tr>
<tr>
<td>Port Orchard</td>
<td>All ages</td>
<td>2004</td>
</tr>
<tr>
<td>Poulsbo</td>
<td>Under 18</td>
<td>1995</td>
</tr>
<tr>
<td>Puyallup</td>
<td>All ages</td>
<td>1994</td>
</tr>
<tr>
<td>Renton</td>
<td>All ages</td>
<td>1999</td>
</tr>
<tr>
<td>Spokane</td>
<td>All ages</td>
<td>2004</td>
</tr>
<tr>
<td>Steilacoom</td>
<td>All ages</td>
<td>1995</td>
</tr>
<tr>
<td>Tacoma</td>
<td>All ages</td>
<td>1994</td>
</tr>
<tr>
<td>University Place</td>
<td>All ages</td>
<td>1996</td>
</tr>
<tr>
<td>Vancouver</td>
<td>All ages</td>
<td>2008</td>
</tr>
<tr>
<td>All Military Installations</td>
<td>All ages</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The WTR is more likely to capture those injuries with no injury prevention device use, because they tend to be more life-threatening than those injuries with seat belts or helmets. (Department of Health criteria, excluding transfers in)

Protective device use in Pediatric (ages<15) motor vehicle occupant injuries

Helmet use in pediatric (ages<15) bicycle injuries
Demographic and injury characteristics
Watch out for those youngsters! After puberty, penetrating and intentional injuries go up!

(Department of Health criteria, excluding transfers in)

The percentage of penetrating injuries by age, 2010-2013

The percentage of intentional injuries by age, 2010-2013
Most Commonly Observed Injury Mechanisms in Pediatric Trauma, 2011-2013
(Department of Health criteria, excluding transfers out)

- Falls: 40%
- Motor Vehicle: 10%
- Sports or Play Injury: 12%
- Pedestrian vs. Vehicle: 4%
- Other Injuries: 19%
- Burns: 8%
- Bicycle: 7%
In Recent Years, Falls Show an Upward Trend While Motor Vehicle-Related Injuries are on the Decline
(Department of Health criteria, excluding transfers in)

Trends for Top Pediatric (Age<15) Injury Mechanisms

- Bicycle
- Burn
- Fall
- Motor Vehicle
- Pedestrian vs. Vehicle
- Sports or Play Injury
- Other
Pediatric (ages 0-14) falls from windows and balconies
We See an Increase in Pediatric (Ages 0-14) Falls From Windows and Balconies (Department of Health criteria, excluding transfers in)

The Percentage of Building-Related Pediatric (Ages <15) Falls

![Graph showing the percentage of building-related pediatric falls from 1999 to 2013](chart.png)
This Increase in Building-Related Falls Mostly Affects Children Ages 1-6
(Department of Health criteria, excluding transfers out)

The Percentage of Building-Related Pediatric Falls by Age Groups

- Age <1
- Ages 1-6
- Ages 7-14
No Gender Differences Among Children Ages 1-6 With Window-Balcony Falls
(Department of Health criteria, excluding transfers out)

The Percentage of Building-Related Pediatric Falls by Gender

- Females
- Males
Regional Distribution of Building-Related Falls Among Children Ages 1-6
(Department of Health criteria, excluding transfers out)

Pediatric Window-Balcony Falls by Region, 2011-2013

- Central: 37%
- West: 27%
- Southwest: 10%
- North: 14%
- South Central: 4%
- Northwest: 0%
- East: 7%
- North Central: 1%

N=333
Washington Trauma Registry Data

Window Falls Among Children Ages 1-6 During 2011-2013

ZIP code level analysis
The Outcomes of Building-Related Trauma Among Children Ages 1-6, 2011-2013

(Department of Health criteria, excluding transfers out)

- Out of 333 statewide window/balcony falls:
  - 92 (28 percent) received ICU care
  - 18 (5 percent) had serious (AIS 3+) head injury
  - 2 (1 percent) died
  - 321 (96 percent) were discharged home
  - 10 (3 percent) were discharged to a rehab facility or received rehab care at home.
Other issues related to the management of pediatric trauma care
Median emergency department length of stay of transfer out patients

(Department of Health criteria)
The percentage of spleen injuries managed with splenectomies declined over time

(Department of Health criteria, hospital admissions)

The percentage of splenectomies by age

- Children (Ages 0-14)
- Adults (Ages 15+)

Graph showing the percentage of spleen injuries managed with splenectomies over time.
The use of CT scans to diagnose pediatric TBIs is going down in pediatric designated centers

Pediatric (Ages 0-14) Utilization of Head CTs for Minor Head Injuries (AIS <=3) by Pediatric Designation Level

- Adult Designation Only
- Peds Level I
- Peds Level II
- Peds Level III
WTR Records with No Emergency Department Systolic Blood Pressure Recorded by Age and Year

(Department of Health Criteria, excluding transfers-out)
Full Trauma Team Activations (FTTA) for hypotensive pediatric (age 5-14) and older adult (age 55+) trauma patients are lower than other adult age groups (DOH Criteria, Age-Appropriate Systolic Blood Pressure Thresholds, and Excluding Transfers in)

The Percentage of Full Trauma Team Activations (FTTA) for Hypotensive Trauma Patients

Age 0-14  Age 15-24  Age 25-54  Age 55-74  Age 75+
In summary

- After the implementation of Washington’s Trauma System, outcomes of pediatric (age <15) trauma improved significantly.
- This suggests effectiveness of coordinated trauma care efforts in this age group.
- Two major coordinated efforts took place.
  - Injury prevention resulted in a relative decline in pediatric volumes in recent years.
  - Better trauma care resulted in a decline in pediatric inpatient mortality.
- Despite all these improvements, TBIs are still the main cause of pediatric deaths, and rising pediatric window-balcony falls in ages 1-6 is a concern.
Thanks!

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