Sailing Injuries

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Overview

Sailing Injuries

• What injuries are most common?
• What are the most severe injuries?
• How do they occur?
• Fatalities / Case reports

Oracle pitch-poling In S.F. Bay
Sailing is Multifaceted

Solo Circumnavigation

Volvo Ocean Race

49er One Design Racing

Foiling, Fixed-Wing America’s Cup
## Injury Rates /1,000 Days*

<table>
<thead>
<tr>
<th>Sport</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rugby</td>
<td>69</td>
</tr>
<tr>
<td>Football</td>
<td>33</td>
</tr>
<tr>
<td>Soccer</td>
<td>18</td>
</tr>
<tr>
<td>Surfing</td>
<td>6.6</td>
</tr>
<tr>
<td>Baseball</td>
<td>5.8</td>
</tr>
<tr>
<td><strong>Sailing</strong></td>
<td><strong>0.29 – 4.6</strong></td>
</tr>
<tr>
<td>Tennis</td>
<td>0.2</td>
</tr>
</tbody>
</table>


*Schaefer O, *Sportverletz Sportschaden* 2000


*Or Athlete Exposures*
Annual Fatality Rate
2012

Sailing
28 Deaths / 7,790,000 sailors = 0.35/100,000 Sailors

US Football
16 Deaths / 4,200,000 players = 0.38/100,000 Players
Most Common Acute Injuries
N = 1,226

Top 3: Leg Contusion 11%, Hand Laceration 8%, Arm Contusion 6%

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contusion</td>
<td>40%</td>
</tr>
<tr>
<td>Laceration</td>
<td>26%</td>
</tr>
<tr>
<td>Sprain/Strain</td>
<td>17%</td>
</tr>
<tr>
<td>Fracture</td>
<td>6%</td>
</tr>
<tr>
<td>Concussion</td>
<td>2.5%</td>
</tr>
<tr>
<td>Dislocation</td>
<td>2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anatomic Location</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Extremity</td>
<td>38%</td>
</tr>
<tr>
<td>Hand</td>
<td>23%</td>
</tr>
<tr>
<td>Upper Extremity</td>
<td>17%</td>
</tr>
<tr>
<td>Head/Neck</td>
<td>11%</td>
</tr>
<tr>
<td>Trunk</td>
<td>11%</td>
</tr>
</tbody>
</table>

Nathanson, Mello, Baird “Sailing Injuries and Illness – Results of an Internet-based survey” *Wild Env Med* 2010
# Mechanisms of Injury

N = 1,226

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls</td>
<td>30%</td>
</tr>
<tr>
<td>Lines</td>
<td>22%</td>
</tr>
<tr>
<td>Hit by Object</td>
<td>21%</td>
</tr>
<tr>
<td>Winches</td>
<td>8%</td>
</tr>
</tbody>
</table>

- Falls
  - Deck
  - Hatch, Companionway

- Lines

- Hit by Object
  - Boom, Spinnaker Pole
  - Clew
  - Crew mate

- Winches

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Poor Ergonomics

“One hand for the ship
One hand for yourself”

Nathanson, Mello, Baird “Sailing Injuries and Illness – Results of an Internet-based survey” *Wild Env Med* 2010
What are Contributing Factors?

N= 1,226

- Heavy Weather  23%
- Tacking  17%
- Jibing  13%
- Sail Change  12%
- Alcohol  7%

Nathanson, Mello, Baird “Sailing Injuries and Illness – Results of an Internet-based survey” Wild Env Med 2010
Injuries, Sea Sickness, and Weather
Newport to Bermuda Race 1998 - 2006

2002 race was stormy

Contusions 40% of all injuries

Clipped by spinnaker pole during jibe

Hit by Clew on foredeck
Lacerations 26% of all injuries

Puma’s Bowman Knocked over by a wave during a sail change

Cut by wind generator while removing sea weed from rudder
Hand Injuries 23% of all injuries

Another Grateful E.R. Patient
(Finger crushed in winch)

Released Spinnaker Halyard
(Not wearing gloves)

Wear sailing gloves!
Head Injuries: 10% of Injuries, but 25% of all Severe Injuries

Fischer EG. “Fatal head injuries in sailing”
*Seahorse Int Sail*. 2001

34 Severe Head Injuries:

- > 50% fatal
- 24 caused by a “flying boom”
- Boom related injuries responsible for 80% of head-injury deaths
Sailing Fatalities
USCG Data 2000 – 2011
271 Deaths
(~23 deaths /year)
Primary Event Leading To Death

- Fall Overboard: 111
- Capsize: 78
- Departure from Vessel: 21
- Swamp/Sink: 19
- Collision: 13
- Fire/Electrocution: 5
Cause of Death

- Drowning: 198 cases
- Trauma: 21 cases
- Hypothermia: 11 cases
- Cardiac Arrest: 6 cases
- Carbon Monoxide: 4 cases

77% Not wearing lifejacket
Primary Contributing Factors

- Weather: 51
- Alcohol: 33
- Operator Inexperienced: 21
- Operator Inattention: 20
- Hazardous Waters: 13
- Equipment / Engine: 12
- Overloading: 8
Fatal Sailing Accidents

3 Case Histories
Case #1

_Aegean_, Hunter 37’ 2011 Newport-Ensenada

- On autopilot
- Calm Night
- 5 mile visibility
- 4 – 6 foot swell
- Experienced Crew
- **Next day boat wreckage debris found**
- 3 of 4 bodies recovered
Aegaean Newport-Ensenada

- Inadequate Lookout
- Poor Navigation
- ? Set waypoint for Ensenada
- No Lifejackets

SPOT GPS Track

North Coronado Island
Case #2
ABN Amro Two, 2006 Volvo Ocean Race

- North Atlantic
- Wind speed 20 – 25 knots
- Boat speed 20+ knots downwind
- 15 foot seas
- Trimming Asymmetrical Chute
- Night

Hans Horroevets
ABN Amro Two

• “Stuffed” bow
• No Harness
• Swept overboard
• Water Temp 55° F
• GPS triggered
• Spinnaker doused
• Retrieved 40 minutes later - pulseless

“Stuffing” the bow on Groupama a Volvo 70
Case #3

Wingnuts, Kiwi 35  Chicago – Mackinac Race

• Severe Thunderstorms forecast….
• Crew is well prepared, drops mainsail
• All crew harnessed & tethered
• Squall with wind gusts 60 mph, lightning
• Poor lateral stability boat capsizes
• 2 Tethered crew could not free themselves - drowned
• Other crew cut free using single-hand-opening knives
• Whistles worked to alert rescuers
Summary

• Sailing is relatively safe compared to other sports
• Most Common: Contusions and Lacerations
• Most Severe: Head and Hand injuries
• Alcohol, High Winds/Seas risk factors
• Falls overboard often result in fatal drowning
“Il Mostro”, built in Bristol, RI
Case #4

Low Speed Chase, 2011 Farallon Island Race
Low Speed Chase
2011 Farallon Island Race

- Reaching off a lee shore
- 20 – 25 knots, in control
- 10 – 12+ foot swells
- 120 yards upwind of whitewater
- Hit by “Giant Cresting Wave”
- 7 Crew washed overboard
- Boat got rolled
Low Speed Chase,
2011 Farallon Island Race

- No one was clipped in
- Fallacy: “I’ll clip in when I need to clip in”

- Sailor managing to hold onto boat to shore survived
- 2 Survivors in water wearing lifejackets survived
What Types Of Injuries Most Severe?

N = 70

- **Head/Face** 25%
  - Laceration
  - Concussion
  - Fracture

- **Leg/Foot** 20%
  - Laceration
  - Fracture

- **Hand** 10%
  - Fracture
  - Finger Amputation, Dislocation

Puma’s Bowman knocked over by a wave, struck shroud.
Where do Injuries Occur?
(N = 1,228)

Cockpit 46%
Foredeck 25%
Below deck 3%
Off boat 1%
Amidships 22%
Severe Injuries (N = 70)
“Hospitalized and/or Evacuated”

**Injury Patterns:**
- Planned or accidental **high-wind jibes**, sailor struck by boom, mainsheet, or spinnaker pole
- **Collisions** with other boats
- Catastrophic **rig failure** – high wind
- **Falls** down companionway or through open hatch
- **Burns** when cooking
What **Activities** Result In Injury?

**N = 1,226**

- **Tailing /Grinding** 19%
- **Sail change** 18%
- **Tacking** 17%
- **Walking** 8%
- **Helm** 8%

Crushed in winch