Drowning in Injury Statistics

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Drowning Defined

- Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid
- Outcomes: fatal and nonfatal
- In line with other injury causes

Drowning: the Problem

- 2nd leading cause of injury death in children 1-14 years
- 5th leading cause of unintentional injury deaths in all ages
  - 3850 deaths (including the 350 boating-related)
- One year of injuries in the US result in a total lifetime cost of $5.3 Billion

Fatal Drowning Data

- National Vital Statistics System
- Death Certificate data

Codes:

- Bathtub (W65-W66)
- Swimming pool (W67-W68)
- Natural water (W69-W70)
- Other/Unspecified (W73, W74)
- Boating related (V90, V92)
Nonfatal Drowning Data

- National Electronic Injury Surveillance System – All Injury Program
- Representative sample
- US hospital emergency departments
- All injuries treated in the EDs
- Numbers are weighted estimates
Drowning Surveillance: the Problem

- Rates vary by age, location, gender, race/ethnicity, abilities & other factors
- Data systems often lack these details
- Current rates are population based rather than based on exposures
Trends in Fatal Drowning

Rate per 100,000 population

Female
Male
Total


National Vital Statistics System E830, E832, E910 & V90, V92, W65-W74
Fatal Drowning Rates by Age Group, 1999-2007

Rate per 100,000 population

National Vital Statistics System V90, V92, W65-W74
Fatal Drowning Rates by Age Group, 1999-2007

Rate per 100,000 population

<1  1-4  5-9  10-14  15-19  20-24  25-34  35-44  45-54  55-64  65-74  75-84  85+
Fatal Drowning Rates by Gender, 1999-2007

Rate per 100,000 population

Male
Female
Total

<1 1-4 5-9 10-14 15-19 20-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

National Vital Statistics System V90, V92, W65-W74
Fatal Drowning Rates by Gender, 1999-2007

Rate per 100,000 population

<1 1-4 5-9 10-14 15-19 20-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

Male
Female
Total

National Vital Statistics System V90, V92, W65-W74
Fatal Drowning Rates by Gender, 1999-2007

Rate per 100,000 population

Males

Female

National Vital Statistics System V90, V92, W65-W74
Drowning Rates by Race/Ethnicity, 1999-2007

National Vital Statistics System V90, V92, W65-W74
Fatal Drowning Rates by Race/Ethnicity, 2006-2007

Rate per 100,000 population

- Black
- White
- Hispanic
Fatal Drowning Rates Location, 1999-2007

Rate per 100,000 population

- Bathtub
- Pool
- Natural water
- Boating

National Vital Statistics System V90, V92, W65-W74

Rate per 100,000 population

- Black
- White
- Hispanic

National Vital Statistics System W67-W68

Rate per 100,000 population

Rate per 100,000 population

- Black
- White
- Hispanic

<1 1-4 5-9 10-14 15-19 20-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

National Vital Statistics System W65-W66
Fatal Drowning by Urbanization, 1999-2007

- For all drowning:
  - Rates significantly lower in large metro areas
- For swimming pool drowning:
  - Rates significantly higher in large metro areas

National Vital Statistics from wonder.cdc.gov
Fatal Drowning by Region, 1999-2007

For all drowning:
- Northeast 0.7
- Midwest 1.0
- West 1.3
- South 1.5

For pool drowning:
- Northeast 0.1
- Midwest 0.1
- West 0.3
- South 0.3

Rate per 100,000; National Vital Statistics W65-W74 from wonder.cdc.gov
Characteristics of Drowning

Commonly occur:

- Weekends: Friday-Sunday: 56% of nonfatal
- Summer: Jun-Aug: 56% of nonfatal, 51% of fatal

Gilchrist J, et al. MMWR 2004; only in recreational water settings
Drowning: Location by Age

Nonfatal

- 0-4
- 5-14
- 15+
- Unspecified
- Natural water
- Public pool
- Private pool

Fatal

- 0-4
- 5-14
- 15+
- Unspecified

Gilchrist J, et al. MMWR 2004; only in recreational water settings
<table>
<thead>
<tr>
<th>Disposition</th>
<th>Annual Estimate</th>
<th>Percent</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated and Released</td>
<td>2114</td>
<td>42.7</td>
<td>0.73</td>
</tr>
<tr>
<td>Hospitalized or Transferred</td>
<td>2622</td>
<td>53.0</td>
<td>0.89</td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>213</td>
<td>4.3</td>
<td>--</td>
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</tbody>
</table>
Injury Pyramid

All Unintentional Injuries

- Death: 111,034
- Hospitalization: 1,612,148
- Emergency Department: 25,460,031
- Outpatient: 117,449,000
- Elsewhere or untreated: ?

Injury Pyramid

All Unintentional Injuries

- 117,449,000
- 25,460,031
- 1,612,148
- 111,034
- ?

Death
Hospitalization
Emergency Department
Outpatient
Elsewhere or untreated

Drowning

- 2114
- 2622
- 3450

Summary

- Leading cause of injury death
- Small children at greatest risk – pools
- Men at higher risk than women
  - Choices of activities
  - Increased use of alcohol
- Severe nature of injury
  - Dramatic hospitalization rate
  - Inverted injury pyramid
Importance of Prevention

- Advanced in-hospital care does not improve outcomes
- Half of victims in ED are hospitalized
- Severe, disabling injuries
Prevention of Drowning

- Primary prevention: prevent water entry
  - Four sided isolation pool fencing
  - Other adjunctive barriers
Prevention of Drowning

Secondary prevention: prevent harm

- Lifejackets
- Avoiding alcohol use
- Improve swimming ability
- Water safety training (e.g. rip currents)
- Lake front slope gradients
Improving Swimming Ability

Adults’ self-reported inability to swim

<table>
<thead>
<tr>
<th></th>
<th>% Men</th>
<th>% Women</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>17</td>
<td>45</td>
<td>32</td>
</tr>
<tr>
<td>African Am.</td>
<td>44</td>
<td>77</td>
<td>62</td>
</tr>
<tr>
<td>Asian</td>
<td>26</td>
<td>63</td>
<td>47</td>
</tr>
<tr>
<td>Hispanic</td>
<td>31</td>
<td>57</td>
<td>44</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>51</td>
<td>37</td>
</tr>
</tbody>
</table>

58% of AA children “at-risk swimmer”; related to parental swimming ability and fear of drowning

Improving Swimming Ability

Creating opportunities

• Access to appropriate supervised aquatic environments

• Access to training/lessons
Improving Swimming Ability

- Increasing participation
  - Desirability compared to other activities
  - Understanding that it is a life-saving skill
  - Role models
Prevention of Drowning

Tertiary prevention: improve outcomes

- Lifeguards
- Bystander CPR
- Rapid Emergency Service Response
Prevention Strategies

Commonly referred to as the 3 E’s

- Education
- Environmental Modification/Engineering
- Enact/Enforce Legislation/Policy
- Economic Incentives
- Evaluation/Evidence
  - Effectiveness
  - Epidemiologic
  - Economic
- Experience, Engagement, Empowerment
Education

Necessary but often not sufficient

Many potential audiences:

- Parents
- Children
- Care givers
- Policy makers
- Law enforcement
- Engineers
Education

Knowledge for decision making

- Dangers of aquatic settings
- How to minimize risk

Skills for action

- Swimming skills
- Supervision skills
- Rescue skills
- CPR & basic first aid training
Environmental Modification

- Often most effective
- Passive
  - Pool fencing/Barriers
  - Slope gradient change
- Active (behavior change)
  - Weight-bearing pool covers
  - Supervision/lifeguards
  - Lifejacket loaner programs
Enacting Legislation
To affect individual behavior

- Boating and alcohol laws
- Lifejacket use laws
- Only effective with ENFORCEMENT
Enacting Legislation
To modify products or environment

- Local ordinances/Building codes
  - Pool fencing
  - Suction entrapment prevention systems

- Manufacturing standards
  - Consumer Product Safety Commission
  - US Coast Guard
Enacting/Enforcing Laws

- Time consuming and difficult
- Policy-makers must be educated first
- Enforcement resources must be included
- Laws/policies most effective
  - If population is educated and accepting
  - If enforced or perceived to be enforced
Policies

Swimming skill

- Training through school
- Pediatricians “prescribing” lessons
- Lessons arranged/supported by apt. complex
- Lessons supported by industry

CPR skills

- Hospital policies about training
- School based training
- Faith-based organizations supporting training
Policies

Water safety education
- Checklists or education through service co.
- Inspection/education by child protective services agencies

Fences/safety devices
- Adopt-a-fence program through EMS
- Discounts through pool builders/industry
Economic Burden: Drowning

- **Total lifetime medical costs:**
  - $95 Million ($22M in 0-4 year olds)
  - 82% related to in-hospital care
  - More than $9,400 per event

- **Total lifetime productivity losses:**
  - $5.2 Billion
  - 88% due to fatalities
  - More than $517,000 per event

- **Total lifetime costs from 1 year:** $5.3 Billion

Difficulties

- Drowning is a rare event
- Poor behavior is often reinforced
- Different groups at risk in different ways
- Prevent efforts - differ by age/location
Health Belief Model

Perceptions & modifying factors.

Demographic, sociopsychological, and structural variables.

Assessments

Cost / benefit analysis.

Likelihood of action.

Perceived threat.

Perceived seriousness & susceptibility

“How dangerous is it?”

“Will I get it?”

Cue to action.

Age, race, ethnicity etc. Peers, personality, social pressure etc. Prior contact, or knowledge about the disease.

Media campaigns, lay advice, reminders from G.P., magazines, articles etc.
Call to Action

- Work together
- Consider groups who can influence high risk populations
  - Aim for policy change
- Consider focusing on early aquatics
  - Engage industry
- Learn from each other
  - Use existing tools and resources
Thanks

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“The findings and conclusions in this presentation are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention.”