Risk Drinking: At Risk for What?

Deborah A. Dawson, Ph.D.
National Institute on Alcohol Abuse and Alcoholism
National Institutes of Health
USA
General outline of topics

• Conceptual and practical issues in defining risk drinking
• Evidence from risk curves
• Low-risk drinking guidelines
  ▪ International variation
  ▪ A comparison of Canadian and Australian guidelines
  ▪ A comparison of low-risk and moderate drinking guidelines, and gray area in between
  ▪ An approach to validating guidelines
• Screening for risk drinking and AUD
Conceptual and Practical Issues
Conceptual issues

• What aspects of consumption should be considered?
  
  ▪ **Volume vs. heavy episodic drinking (HED)**
  
  ▪ **Volume** better captures overall exposure to alcohol and is more stable over time, but a moderate volume may reflect either frequent consumption of low quantities or infrequent consumption of high quantities

  ▪ **HED** provides more information about drinking at levels that may increase the risk of acute alcohol-related harm, but not very stable or informative unless frequency is known
Relationship of volume to frequency of HED: Top 20% of drinkers

Average daily volume > 19.00g
Frequency of HED > monthly

24.2% 51.6% 24.2%

Source: Wave 1 NESARC unpublished data
Relationship of volume to frequency of HED: Top 10% of drinkers

Average daily volume > 35g

- 20.6%
- 58.8%
- 20.6%

Frequency of HED > weekly

Source: Wave 1 NESARC unpublished data
Conceptual issues

• What types of harm should be considered?
  ▪ Alcohol use disorders
  ▪ Mortality, morbidity, accidents and injury, social harm, harm to others
  ▪ Most severe harms
  ▪ Most prevalent harms
  ▪ Harms most strongly attributable to alcohol
  ▪ Harms for which data are available that can be linked with drinking at individual level
Conceptual issues

• What types of studies are most appropriate for assessing associations?
  
  ▪ **Cross-sectional studies**
    
    ▪ *Used to assess the associations of current drinking levels with existing harm*
    
    ▪ *ED studies for evaluating in the event risk of various drinking levels*
    
    ▪ *Screening studies of AUD*
  
  ▪ **Prospective studies**
    
    ▪ *Used to assess the future risk of harm associated with a baseline level of drinking*
    
    ▪ *Generally used for evaluating risks of mortality and chronic disease*
Conceptual issues

• How do we determine the appropriate threshold for risk drinking?
  ▪ *Relative versus absolute risk*
  ▪ *Choice of referent group: lifetime abstainers versus lowest-risk drinkers*
  ▪ *How to handle linear risk curves*
  ▪ *How to handle different thresholds for different types of harm*
  ▪ *Net zero approach – balancing benefits and risks associated with moderate drinking*
Practical issues

• How should we account for the quality of the data?

• Consideration of data available for monitoring levels of risk drinking and adherence to drinking guidelines

• Enough vs. too much information?
  - Weekly vs. daily limits vs. both
  - Gender-specific limits (5+ vs. 5+/4+)
  - Different limits for other subpopulations
  - Context-specific limits
Evidence from Risk Curves
Data sources

• National Epidemiologic Survey on Alcohol and Related Conditions (NESARC)
  – *Wave 1: n=43,093, (response rate = 81%)*
  – *Wave 2: n=34,653 (response rate=87%)*
  – *Represented adults 18+ living in households and selected group quarters*
  – *Oversampled African Americans, Hispanics and young adults 18-24*
  – *Queried alcohol use, AUD, and a host of comorbid psychiatric and medical conditions*
Data sources

- Meta-analysis of injury/collision data from various ED, roadside testing, and case-control and case-crossover studies
- Meta-analysis of ED studies from 10 countries
- Meta-analyses of all-cause and cause-specific mortality and morbidity
- Australian low-risk drinking guidelines
Prevalence of past-year DSM-IV alcohol dependence, by ADV* of ethanol intake

*Average daily volume of ethanol intake (g)

Source: Wave 1 NESARC unpublished data
Adjusted OR for past-year DSM-IV alcohol dependence, by ADV* of ethanol intake
(No adjustment for frequency of HED)

Source: Wave 1 NESARC unpublished data
Adjusted OR for past-year DSM-IV alcohol dependence, by ADV* of ethanol intake (Adjusted for frequency of HED)

*Average daily volume of ethanol intake (g)

Source: Wave 1 NESARC unpublished data
Prevalence of past-year DSM-IV alcohol dependence, by frequency of HED

Frequency of HED (5+ standard drinks for men, 4+ standard drinks for women)

Source: Wave 1 NESARC unpublished data
Adjusted OR for past-year DSM-IV alcohol dependence, by frequency of HED
(Not adjusted for ADV of ethanol intake)

Source: Wave 1 NESARC unpublished data
Adjusted OR for past-year DSM-IV alcohol dependence, by frequency of HED
(Adjusted for ADV of ethanol intake)

Frequency of HED (5+ standard drinks for men, 4+ standard drinks for women)

Source: Wave 1 NESARC unpublished data
Adjusted OR for various types of injury in association with a 10g increase in alcohol consumption prior to the event

<table>
<thead>
<tr>
<th>Type of injury</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intentional injuries</td>
<td>1.38</td>
</tr>
<tr>
<td>Falls</td>
<td>1.25</td>
</tr>
<tr>
<td>Motor vehicle crashes</td>
<td>1.24</td>
</tr>
<tr>
<td>Other unintentional injuries</td>
<td>1.32</td>
</tr>
</tbody>
</table>

Source: Meta-analysis of 31 ED, roadside testing, case-crossover and other population based studies (Taylor et al., 2010)
Adjusted OR for various types of injury in association with any drinking in 6 hours prior to the event

<table>
<thead>
<tr>
<th>Type of injury</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intentionally inflicted by someone else</td>
<td>20.7</td>
</tr>
<tr>
<td>Intentionally self-inflicted</td>
<td>23.1</td>
</tr>
<tr>
<td>Traffic accident</td>
<td>3.9</td>
</tr>
<tr>
<td>Blunt force trauma</td>
<td>8.2</td>
</tr>
<tr>
<td>Stabbed, cut, bitten, shot</td>
<td>3.7</td>
</tr>
<tr>
<td>Fell, tripped</td>
<td>3.3</td>
</tr>
<tr>
<td>Other unintentional injuries</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Source: Meta-analysis of 10 ED case-crossover studies based on WHO collaborative study on alcohol and injuries (Borges et al., 2006)
Adjusted OR for any type of injury in association with various numbers of drinks in 6 hours prior to the event

<table>
<thead>
<tr>
<th>Number of drinks</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1.0</td>
</tr>
<tr>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>2-3</td>
<td>3.9</td>
</tr>
<tr>
<td>4-5</td>
<td>6.5</td>
</tr>
<tr>
<td>6 or more</td>
<td>10.1</td>
</tr>
</tbody>
</table>

Source: Meta-analysis of 10 ED case-crossover studies based on WHO collaborative study on alcohol and injuries (Borges et al., 2006)
# Average daily volume of consumption at which adjusted relative risk of all-cause mortality was significantly increased

<table>
<thead>
<tr>
<th>Study</th>
<th>Referent</th>
<th>Total</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castelnuovo et al. 2006: Meta-analysis of 34 studies conducted prior to 2005</td>
<td>Nondrinkers</td>
<td>≈38g</td>
<td>≈45g</td>
<td>≈35g</td>
</tr>
<tr>
<td>Gmel et al., 2003: Meta-analysis of all-cause mortality studies conducted prior to 2000</td>
<td>Lifetime abstainers 45 and older</td>
<td>---</td>
<td>40-70g</td>
<td>30-50g</td>
</tr>
<tr>
<td>Stockwell et al., under review: Meta-analysis of 8 studies free of serious design flaws</td>
<td>Long-term abstainers 40 and older</td>
<td>Threshold for men slightly lower than those shown above, similar threshold for women (unpublished data)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Adjusted relative risks of chronic health outcomes by volume of ethanol intake

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Relative risk of outcome, by average daily volume (g) of ethanol intake</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Lip, oral, pharyngeal cancers</td>
<td>1.31</td>
</tr>
<tr>
<td></td>
<td>1.33</td>
</tr>
<tr>
<td>Esophageal cancer</td>
<td>1.17</td>
</tr>
<tr>
<td>Liver cancer</td>
<td>1.08</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>1.08</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.15</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>≤1</td>
</tr>
<tr>
<td>Ischemic stroke</td>
<td>≤1</td>
</tr>
<tr>
<td>Hemorrhagic stroke</td>
<td>1.16</td>
</tr>
<tr>
<td>Liver cirrhosis</td>
<td>1.21</td>
</tr>
</tbody>
</table>

Source: Australian Guidelines, 2009
Adjusted ORs for association between frequency of HED and 3-year incidence of substance use disorders

Source: Dawson et al., 2008
Adjusted ORs for association between frequency of HED and 3-year initiation of substance use

Frequency of HED (days/year)

Source: Dawson et al., 2008
Adjusted ORs for association between frequency of HED and 3-year incidence of mood and anxiety disorders

Source: Dawson et al., 2008
Adjusted ORs for association between frequency of HED and 3-year occurrence of social harm

Source: Dawson et al., 2008
Low-Risk Drinking Guidelines
International drinking guidelines

• Daily limits only:
  ─ Austria, Czech Republic, France, Italy, Netherlands, Portugal, Singapore, Spain, Sweden, Switzerland, Scotland, US Dietary Guidelines
    ─ Vary from 20 - 70g (M and W)

• Weekly limits only:
  ─ Denmark, Finland, Ireland, South Africa
    ─ Vary from 140 – 252g (M) and from 70 – 168g (W)

• Weekly and daily limits:
  ─ Australia, Canada, New Zealand, Poland, Slovenia, United Kingdom, US NIAAA
    ─ Weekly limits vary from 100 – 204g (M) and from 70 – 140g (W)
    ─ Daily limits vary from 20 – 56 (M) and from 10 – 42 (W)

*Gender invariant

Source: ICAP website
A comparison of recently revised Australian and Canadian guidelines

<table>
<thead>
<tr>
<th></th>
<th><strong>Australia</strong></th>
<th></th>
<th><strong>Canada</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender invariant weekly limits</strong></td>
<td></td>
<td><strong>Gender-specific weekly limits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>140g</td>
<td>Women</td>
<td>140g</td>
<td>Men</td>
</tr>
<tr>
<td>Women</td>
<td>140g</td>
<td></td>
<td></td>
<td>Women</td>
</tr>
<tr>
<td><strong>Gender invariant daily limits</strong></td>
<td></td>
<td><strong>Gender-specific daily limits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>40g</td>
<td>Women</td>
<td>40g</td>
<td>Men</td>
</tr>
<tr>
<td>Women</td>
<td>40g</td>
<td></td>
<td></td>
<td>Women</td>
</tr>
</tbody>
</table>

Sources: Room, 2010; Stockwell et al., 2010
# A comparison of recently revised Australian and Canadian guidelines

<table>
<thead>
<tr>
<th><strong>Australia</strong></th>
<th><strong>Canada</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on absolute risk of alcohol-related death of &gt;1 in 100 people</td>
<td>Based on relative risk of all-cause mortality</td>
</tr>
<tr>
<td>Disregarded any possible health benefits of drinking</td>
<td>Net zero approach considered net effects of drinking</td>
</tr>
<tr>
<td>Proposed age-specific limits (lower limits for those 65+ and 18-29)</td>
<td>Age-specific limits not highlighted but involve one less drink for men and women 60+</td>
</tr>
</tbody>
</table>

Sources: Room, 2010; Stockwell et al., 2010
A comparison of two sets of U.S. drinking guidelines

<table>
<thead>
<tr>
<th></th>
<th>NIAAA</th>
<th>Old Dietary Guidelines</th>
<th>Proposed New Dietary Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeding limits represents high risk drinking</td>
<td>Limits represent moderate drinking</td>
<td>Limits represent moderate drinking</td>
<td></td>
</tr>
<tr>
<td>Based primarily on risks of AUD</td>
<td>Based primarily on chronic disease, mortality risks</td>
<td>Based primarily on chronic disease, mortality risks</td>
<td></td>
</tr>
<tr>
<td>Men 14 drinks/wk and 4 on any day; Women 7 drinks/wk and 3 on any day</td>
<td>Men 2 drinks on any day; Women 1 drink on any day</td>
<td>Men 2 drinks/day on average and 4 on any day; Women 1 drink/day on average and 3 on any day</td>
<td></td>
</tr>
</tbody>
</table>

Sources: NIAAA, 2010; USDA 2005 and 2010
Gray area between moderate and risk drinking

• Consumption that exceeds the Old Dietary Guidelines but lies within the limits of the proposed new Dietary Guidelines
  ▪ Men who do not exceed the limits of 14 drinks/week or 4 drinks on any day but who do exceed old 2-drink limit on some days
  ▪ Women who do not exceed the limits of 7 drinks/week or 3 drinks on any day but who do exceed old 1-drink limit on some days

• Are they at increased risk compared to men who never drink more than 2 drinks on any day or women who never drink more than 1 drink on any day?
Validating Drinking Guidelines

Slides not available because paper currently being prepared for publication
Screening for Risk Drinking and AUD
Commonly used screeners

• Screeners based on alcohol problems
  ▪ CAGE, RAPS4
  ▪ TWEAK, T-ACE
  ▪ MAST, SMAST, BMAST

• Screeners based on alcohol problems and consumption
  ▪ AUDIT
  ▪ RAPS4-QF

• Screeners based solely on consumption
  ▪ AUDIT-C (three AUDIT consumption items)

• Single-item screeners
  ▪ Frequency of drinking 5+/4+ drinks
  ▪ Maximum drinks consumed
Performance of selected consumption-based screeners in screening for AUD

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AUDIT-C score of ≥3</td>
<td>92.5</td>
<td>73.6</td>
<td>166.1</td>
</tr>
<tr>
<td>AUDIT-C score of ≥4</td>
<td>83.7</td>
<td>83.1</td>
<td>166.8</td>
</tr>
<tr>
<td>Past-year frequency of 5+/4+ drinks ≥ once/yr.</td>
<td>86.7</td>
<td>82.1</td>
<td>168.8</td>
</tr>
<tr>
<td>Maximum quantity of past-year drinks ≥4</td>
<td>90.4</td>
<td>78.8</td>
<td>169.2</td>
</tr>
<tr>
<td>Maximum quantity of past-year drinks ≥5</td>
<td>82.7</td>
<td>85.2</td>
<td>167.9</td>
</tr>
</tbody>
</table>

Source: Dawson et al., 2005, 2010
Optimal cutpoints of single-item screeners for any AUD or risk drinking

<table>
<thead>
<tr>
<th>Subpopulation</th>
<th>Frequency 5+/4+</th>
<th>Maximum drinks</th>
</tr>
</thead>
<tbody>
<tr>
<td>All adults 18+</td>
<td>≥1/year (87.5, 100.0)</td>
<td>≥4 (90.2, 96.3)</td>
</tr>
<tr>
<td>Men</td>
<td>≥1/year (89.6, 100.0)</td>
<td>≥5 (89.5, 100.0)</td>
</tr>
<tr>
<td>Women</td>
<td>≥1/year (84.3, 100.0)</td>
<td>≥4 (84.2, 100.0)</td>
</tr>
<tr>
<td>Ages 18-34</td>
<td>≥1/year (94.6, 100.0)</td>
<td>≥4 (95.9, 95.6)</td>
</tr>
<tr>
<td>Ages 35-64</td>
<td>≥1/year (85.0, 100.0)</td>
<td>≥4 (88.2, 95.7)</td>
</tr>
<tr>
<td>Ages 65+</td>
<td>≥1/year (64.3, 100.0)</td>
<td>≥2 (97.2, 82.0)</td>
</tr>
<tr>
<td>White</td>
<td>≥1/year (87.6, 100.0)</td>
<td>≥4 (90.2, 96.0)</td>
</tr>
<tr>
<td>African American</td>
<td>≥1/year (77.5, 100.0)</td>
<td>≥3 (92.7, 88.8)</td>
</tr>
<tr>
<td>Native American</td>
<td>≥1/year (91.2, 100.0)</td>
<td>≥4 (92.3, 97.3)</td>
</tr>
<tr>
<td>Asian</td>
<td>≥1/year (89.3, 100.0)</td>
<td>≥4 (90.5, 96.9)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>≥1/year (92.6, 100.0)</td>
<td>≥4 (93.8, 96.4)</td>
</tr>
</tbody>
</table>

(Sensitivity and specificity in parentheses)

Source: Dawson et al., 2010
Summary and Conclusions
Summary

• Defining risk drinking is difficult, because the thresholds vary by type of harm and whether associations are determined prospectively or cross-sectionally

• Risk curve data are open to a range of interpretations, as exemplified by the variation in drinking guidelines across and within countries

• Our ability to assess the relationship between alcohol consumption and harm is strongly affected by the type of consumption data that are available
Conclusions

• As better data become available, we need to constantly re-examine our definitions of risk drinking

• We need to include a broader range of consumption measures in future surveys to permit testing different thresholds for harm

• As definitions of AUD evolve under DSM-V, we need to check that our screeners still perform as well as they did for DSM-IV diagnoses
References


References


Stockwell et al., under review. Data from meta-analysis currently under review provided in personal communication.

Taylor et al., 2010. The more you drink, the harder you fall: A systematic review and meta-analysis of how acute alcohol consumption and injury or collision risk increase together. Drug and Alcohol Dependence 110: 108-116.
