ALCOHOL USE, SUICIDE AND SUICIDAL BEHAVIOR: EVIDENCE FROM STUDIES IN THE EMERGENCY DEPARTMENT AND OTHER SETTINGS

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More of the Epidemiology Piece

- Association of acute alcohol consumption (with or without intoxication) with attempted and completed suicide – what we know from epidemiological studies
- Methodological issues, and implications for future research

Literature review of published studies of adult population, 18 years and older

(Cherpitel CJ, Borges G, Wilcox H. Acute alcohol use and suicidal behavior: a review of the literature. Alcohol. Clin. Exp. Res. 28:18S-28S, 2004)

Acute use measured by

- Any drinking prior to the event
- Intoxication

Drinking Prior to the Event

- Estimated BAC
- Self-reports of drinking prior to the event (suicide attempts)

  "Window" for self-reports varied from 3 hours to 12 hours

  6 hours was most commonly used

Intoxication at Time of the Event

- Varies according to legal level operating in a jurisdiction
- Varies, individually, in relation to amount consumed by body mass and alcohol tolerance

Several Confounding Factors – Affect the association of acute alcohol use and suicidal behavior

- Amount usually consumed/ alcohol dependence and tolerance
- Other drug use - interaction effects with alcohol
- Co-morbid psychiatric disorders (depression)

Studies of Completed Suicide – sources of data

- Coroner's case-series
- Psychological autopsy

Coroner's Case-series

BAC is determined on toxicology screen

Psychological Autopsy

Data are collected from the victim's family members and close friends on precipitating and contributing factors to help create a psychiatric profile of the person

37 Studies of Completed Suicide Covering 12 Countries

- United States (12 studies)
- Finland (8 studies)
- Australia (4 studies)
- Sweden (3 studies)
- Canada (2 studies)
- Scotland (2 studies)
- Brazil
- England
- Germany
- Northern Ireland
- Norway
- South Africa

Alcohol positive cases – completed suicide

Mean 37%

Range 10 – 67%

Varied by method of suicide

Range of Alcohol Positive Cases by Method of Completed Suicide

	Percent
Asphyxiation, hanging, strangulation, suffocation (5 studies)	10-38
Burn, self-mutilation, electrocution (2 studies)	43-67
Drowning (4 studies)	6-26
Gunshot wound (8 studies)	20-62
Jumping from a height (4 studies)	6-26
Self-poisoning (by solid, liquid or gas)	7-51
Stabbing, cutting, piercing (3 studies)	7-16
Railway, motor vehicle intentional accidents (6 studies)	3-65

Studies of Attempted Suicide – sources of data

- Emergency department studies
- Population-based studies – rare events in general population

16 Studies of Attempted Suicide Covering 12 Countries

- England (3 studies)
- Northern Ireland (2 studies)
- United States (2 studies)
- Bulgaria
- Canada
- Finland
- India
- Mexico
- Netherlands
- Scotland
- Spain
- Tanzania

Alcohol positive cases – attempted suicide

Mean 40%

Range 10 – 73%

Majority of these studies focused on self-poisoning cases – less likely to result in death

Risk at which alcohol places the individual for a completed or attempted suicide is not available from these studies

- Control subjects are needed to establish risk
- Difficult with completed suicides

Two kinds of control studies have been used to examine risk for attempted suicide in ED settings

- Case-control study
- Case-crossover study

Can also address the issue as to whether high concentrations of alcohol in blood diminish the risk of suicide because of the depressive effect of alcohol on the central nervous system leading to inability to initiate suicidal behavior

Case-Control Study

(Borges G., Rosovsky H. Suicide attempts and alcohol consumption in an emergency room sample. J. Stud. Alcohol 57:543-548, 1996)

- Eight emergency departments in Mexico City (2,528 injured and non-injured patients)
- 40 patients (1.6%) attempted suicide - cases

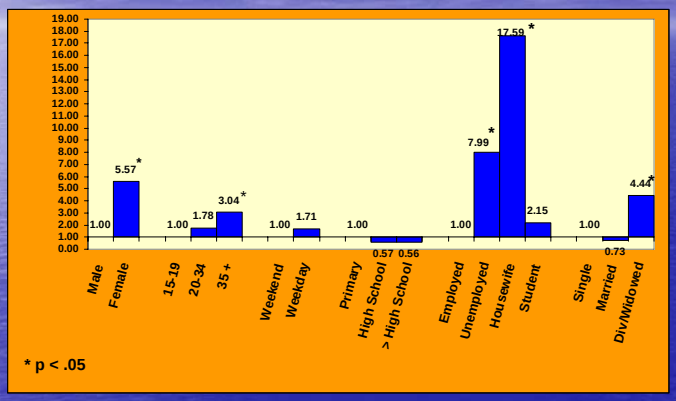
Control subjects – criteria for epidemiologic studies

- Individuals without the outcome under study (suicide attempt)
- Individuals without conditions related to the exposure under study (alcohol)
- Individuals, had they developed the outcome under study, would have gone to the same ED and would have been included as cases

Control Patients (372)

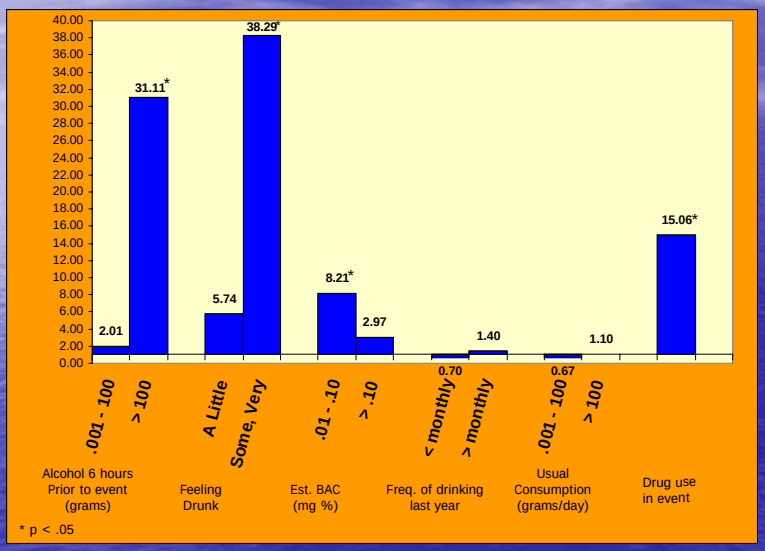
- Occupational accidents (232)
- Recreational accidents (excluding near drowning) (124)
- Animal bites (16)

Figure 1. Case-Control Study – Risk (Odds Ratio) for Suicide Attempt by Demographic Characteristics



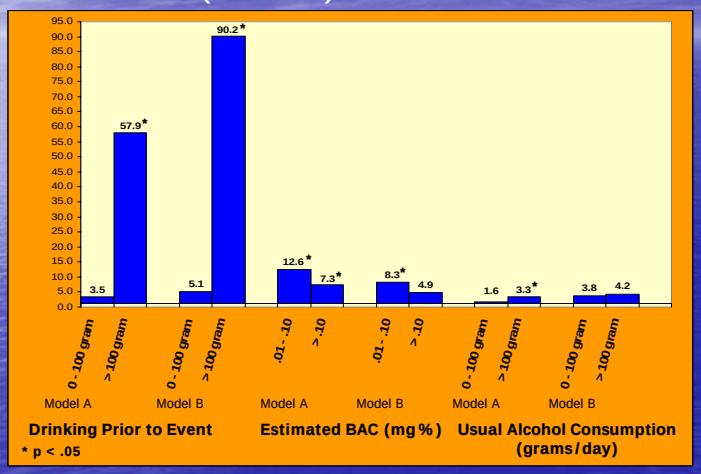
(Borges G., Rosovsky H. Suicide attempts and alcohol consumption in an emergency room sample. J. Stud. Alcohol 57:543-548, 1996)

Figure 2. Case-Control Study – Risk for Suicide Attempt by Substance Use Characteristics



(Borges G., Rosovsky H. Suicide attempts and alcohol consumption in an emergency room sample. J. Stud. Alcohol 57:543-548, 1996)

Figure 3. Case-Control Study – Risk of Suicide Attempt by Drinking Characteristics Controlling for Demographic Characteristics (Model A) and also Controlling for Drug Use Prior to the Event (Model B)



(Borges G., Rosovsky H. Suicide attempts and alcohol consumption in an emergency room sample. J. Stud. Alcohol 57:543-548, 1996)

- Self-reported alcohol consumption prior to the suicide attempt suggests a dose-response relationship.
- Estimated BAC at the time of ED admission suggests at higher levels, attempted suicide may be less likely.
  - BAC at time of ED admission has not been well correlated with self-reports of consumption
- Usual alcohol consumption not significantly associated with suicidal attempts.
  - Did not test for interaction or usual use with acute use

- Drug use is likely a major mode of attempted suicide (47% of those attempting suicide reported drug use within six hours prior to attempt)
  - When controlling for drug use prior to the attempt, risk related to alcohol use increased from an odds ratio of 60 to an odds ratio of 90
  - Potential interaction of alcohol use and drug use – not tested

Case-Crossover Study

- Case-Control studies cannot control for other unknown variables which may be important in the alcohol-suicide relationship
- Case-Crossover design was developed to address this concern (*Maclure M. Amer. J. Epidemiol. 1991*)
- Measures the impact of a transient effect (alcohol consumption) on an acute event (suicide attempt) (originally applied to the study of heavy physical exertion on triggering an acute myocardial infarction) (*Mittleman M, Maclue M, Tofler G. New Eng. J. Med. 1993*)

Each individual is used as his or her own control

2 Methods

- Predetermined control period approach
- Usual frequency approach

- Between-person characteristics that may be associated with a suicide attempt, such as demographic characteristics and usual drinking patterns are controlled.
- Allows for an analysis of acute alcohol consumption on suicide attempt without the potential effect of other confounding variables.

Case-Crossover Study

(Borges G, Cherpitel CJ, Macdonald S, Giesbrecht N, Stockwell T, Wilcox H. A case-crossover study of acute alcohol use and suicide attempt. J. Stud. Alcohol 65:708-714, 2004)

18 EDs which used probability sampling of patients

- Mexico City (8)
- Acapulco, Mexico (3)
- Pachuca, Mexico (3)
- Australia (Western Australia)
- Canada (Alberta)
- Canada (Quebec)
- United States (Santa Clara, CA)

Studies are part of the Emergency Room Collaborative Alcohol Analysis Project, all using the same methods and instruments

Cases of attempted suicide (102)

Mexico – 43

Australia – 47

Canada – 9

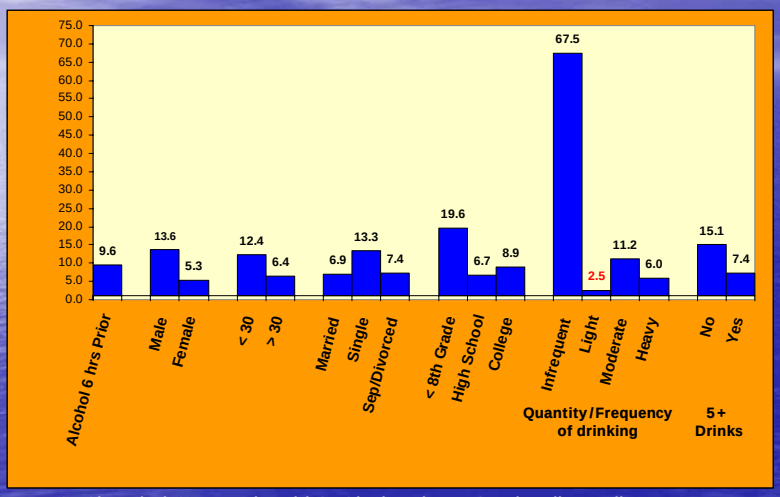
United States – 3

- 48% female
- 59% under 30
- 23% were BAC positive
- 35% reported drinking within six hours prior to the suicide attempt

Relative Risk of attempted suicide from drinking – derived from each patient's drinking within six hours prior to injury compared to the expected likelihood of drinking during that time based on reported usual frequency and quantity of drinking during the last year.

- Overall relative risk 9.6
- Range 29.9 in Mexico (episodic/fiesta drinking)
  6.1 in Australia (more frequent drinking)

Figure 4. Case-Crossover Analysis of Relative risk (RR) of Suicide Attempt from Drinking Within Six Hours Prior to the Event – Effect of Risk Modifiers



(Borges G, Cherpitel CJ, Macdonald S, Giesbrecht N, Stockwell T, Wilcox H. A case-crossover study of acute alcohol use and suicide attempt. J. Stud. Alcohol 65-708-714, 2004)

Some suggestion that a higher risk is associated with drinking within one hour prior to the event, and risk decreases as the length of time between the last drink and the suicide attempt increases.

- Numbers were small for these analyses.
  - Only 18 of 36 patients provided exact time between drinking and suicide attempt
  - Half of these reported drinking within one hour prior to the suicide attempt
- Recall for drinking in closer proximity to the suicide attempt is probably better than for drinking further removed from the event.

To highlight methodological limitations of studies – attempted and completed suicide

Small sample sizes – a relatively rare event

- In the review of published studies on prevalence of alcohol, 7 of the completed suicide studies and 3 of the attempted suicide studies had sample sizes less than 50
- These prevalence estimates of alcohol involvement will be less precise and account for the broad range found for the prevalence of alcohol in both attempted and completed suicide cases

Few studies reported suicide across all methods – it would be expected that alcohol's prevalence comparatively may vary by method

Misclassification bias

- For an intoxicated individual – in the absence of some indication of intention it may be difficult to determine whether a fatal injury was intentional, or whether it was accidental and due to an inebriated state.
- Poisoning and drowning are the two cause-of-death categories most implicated in suicide misclassification.
- The black-white suicide paradox
  - Between 1999 & 2002 suicide rates for whites were double those for blacks (11.8/100,000 vs. 5.5/100,000)
    - Raises the question of a disparity in data quality with blacks being more likely to be misclassified

Ascertainment of BAC is problematic

- Criteria for postmortem toxicology screening – varies in relation to time since death occurred
- Level of BAC regarded as a contributory cause
- Ascertainment often incomplete
  - Trauma centers/EDs
  - Coroner

Limitations of Study Designs

- Based on cross-sectional or retrospective studies
- Data are limited to prevalence estimates
- No control populations
- Risk of suicide associated with drinking prior to the event cannot be estimated

Risk can be estimated from

- Case-control study design
- Case-crossover study design

Future Epidemiological Research

- Case-crossover study – pre-determined control period method
- Develop surveillance systems in emergency departments

NIAAA, 1999

Need to "develop more innovative research designs to examine the causal role of alcohol in suicide, homicide and other violent events."

National Institute on Alcohol Abuse and Alcoholism. Report of a Sub-committee of the National Advisory Council on Alcohol Abuse and Alcoholism on the Review of the Extramural Research Portfolio for Epidemiology, 1999.