Young Adults at Risk for Excess Alcohol Consumption Are Often Not Asked or Counseled About Drinking Alcohol

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BACKGROUND: Excessive alcohol consumption is most widespread among young adults. Practice guidelines recommend screening and physician advice, which could help address this common cause of injury and premature death.

OBJECTIVE: To assess the proportion of persons ages 18–39 who, in the past year, saw a physician and were asked about their drinking and advised what drinking levels pose health risk, and whether this differed by age or whether respondents exceeded low-risk drinking guidelines [daily (>4 drinks for men/>3 for women) or weekly (>14 for men/>7 for women)].

DESIGN: Survey of young adults selected from a national internet panel established using random digit dial telephone techniques.

PARTICIPANTS: Adults age 18–39 who ever drank alcohol, n=3,409 from the internet panel and n=612 non-panel telephone respondents.

MAIN MEASURES: Respondents were asked whether they saw a doctor in the past year; those who did see a doctor were asked whether a doctor asked about their drinking, advised about safe drinking levels, or counseled to reduce drinking.

KEY RESULTS: Of respondents, 67% saw a physician in the past year, but only 14% of those exceeding guidelines were asked and advised about risky drinking patterns. Persons 18–25 were the most likely to exceed guidelines (68% vs. 56%, $p<0.001$) but were least often asked about drinking (34% vs. 54%, $p<0.001$).

CONCLUSIONS: Despite practice guidelines, few young adults are asked and advised by physicians about excessive alcohol consumption. Physicians should routinely ask all adults about their drinking and offer advice about levels that pose health risk, particularly to young adults.

KEY WORDS: alcoholism and addictive behavior; communication; patient education; prevention.

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INTRODUCTION

Evidence supporting the effectiveness of screening and brief intervention for unhealthy alcohol use among adults is strong and the need for screening compelling. Unhealthy use is a spectrum of consumption, including abuse and dependence, that risks health,¹ and its prevalence is highest among adults age 25 and younger. Proactive guidelines recommend screening and physician advice, which could help address this common cause of injury and premature death.^{2–7} Recent reviews of clinical trials found alcohol brief interventions to be effective in adults in the United States,^{8,9} among college students,^{10–13} and cross-nationally.¹⁴

In the United States, unhealthy alcohol use is the third leading preventable cause of death,¹⁵ causing over 71,000 deaths annually and shortening the lives of those who die by approximately 30 years on average.¹⁶ Unhealthy alcohol use is the fifth leading cause of disability for men in the United States and eleventh for women.¹⁷ Binge drinking, defined by NIAAA¹⁸ as a male consuming five or more and a female four or more drinks on an empty stomach over a two-hour period, is responsible for more than half of the deaths associated with unhealthy alcohol use.¹⁶ Binge drinking is associated with alcohol poisoning, unintentional injuries, suicide, hypertension, pancreatitis, sexually transmitted diseases, meningitis, interpersonal violence, drunk driving, and lost economic productivity.¹⁹ Further, cardiovascular benefits attributed to moderate alcohol use disappear when binge drinking occurs at least monthly.²⁰

Worldwide, unhealthy alcohol use is the eighth leading cause of death, accounting for 2.5 million (3.8%) deaths, including 320,000 people between ages 15 and 29.²¹ Unhealthy alcohol use is the third leading cause of disability and accounts for 4.6% of disability adjusted life years (DALYs).²¹ The burden is particularly high in the European region where unhealthy alcohol use accounts for 11% of deaths and 12% of DALYs.²²

In the United States, the age groups with the highest percentages who meet Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) alcohol dependence criteria are ages 18–20 (12%) and 21–24 (11%).²³ Analyses of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) indicate that, of persons ages 18 and older (mean age 44) who ever in their life met alcohol

dependence criteria, two-thirds did so before age 25.²⁴ Of those with current dependence in the year preceding the survey, only 16% received alcohol treatment during that year.²⁵

A national survey of 853 physicians practicing general internal medicine, family medicine, obstetrics-gynecology, and psychiatry revealed that 88% usually or always ask new patients about alcohol use, and 82% offer some sort of intervention to problem drinkers.²⁶ However, in contrast less than one-third of 7,371 adults in a 1998 national survey who visited a general medical provider in the past year reported being asked about their alcohol or drug use.²⁷ Recent young adult survey data have not been reported, and NESARC did not ask respondents about physician inquiry or advice about alcohol.

This study explores what proportions of young adults nationwide in the United States saw a physician in the past year and, of those, were asked by their physician about their drinking practices and advised about drinking levels that pose health risk or counseled to reduce their drinking. It also examined whether those proportions differed by age and whether respondents exceeded low-risk drinking guidelines.

METHODS

In 2006, we conducted a U.S. national survey of current or former drinkers aged 18 to 39 focusing on drinking practices and alcohol-related problems. This study was approved by the Boston Medical Center Institutional Review Board.

Knowledge Networks used list-assisted random digit dialing (RDD) telephone techniques to identify a national panel sample. For our study, we randomly selected a sample of panel households, recruited in the past 2 years, with one adult age 18–39 randomly selected per household. Screening e-mails were sent to 6,200 panel members inviting them to participate in a study of alcohol-related behavior and experiences; those not responding to the invitation within a month were offered a short version of the survey and 189 responded. We defined current or former drinkers as individuals who ever consumed at least 12 drinks in a 12-month period, the criterion used to define drinkers in the 1992 National Longitudinal Alcohol Epidemiologic Survey. Of the 5,788 respondents to the screening e-mail (93% response rate), 4,012 were identified as current or former drinkers. Six-hundred and three eligible respondents were randomly selected for a separate sub-study and not included in the analysis. The remaining 3,409 respondents screening positive continued on to take the survey.

Surveying a pre-recruited panel raises the concern that persons who agreed to serve on a survey panel may not be representative of the general population. To minimize selection bias and improve the generalizability of the study sample, the same survey was administered by phone to a stratified, random sample of $n=612$ persons from the RDD sample underlying the panel (the telephone survey included three groups not in the panel), those who had not been reached for panel recruitment (28% response rate), those who refused to join the panel (63% response rate), or those who had dropped off the panel (58% response rate). The combined sample ($n=4,021$) was weighted to reflect sampling probabilities and the

national population by age, sex and race/ethnicity. By American Association for Public Opinion Research (AAPOR) definitions, the co-operation rate for the Internet survey sample was 93% (e.g., 93% of panel respondents sent an e-mail screening invitation responded, and all those eligible continued on to the survey). The overall population response rate for the combined sample, accounting for the acceptance rate into panel, response rates for the telephone survey and the sample weighting was 37%.

Survey Instrument

Both the online and telephone surveys used the same instrument. Questions measured demographic characteristics (age, sex, race/ethnicity), education, and drinking practices.

Questions taken from NESARC asked respondents their frequency, usual and maximum amount of alcohol consumption during the past year, and how often men consumed 5 or more drinks or women consumed 4 or more in a single day. NIAAA has established low-risk drinking limits as no more than four drinks in a day for men or three for women (not binge drinking) and no more than fourteen drinks per week for men and seven for women. Healthy adults who do not exceed these limits are at lower risk of alcohol-related injury or illness. These limits do not apply to pregnant women, persons using medications, driving motor vehicles, operating machinery, under age 21, or with medical conditions that contraindicate drinking.²⁸ Respondents were categorized as 1) current drinkers not exceeding the NIAAA guidelines, 2) drinkers exceeding either the daily or the weekly guidelines, 3) drinkers exceeding both the daily and weekly guidelines, and 4) former drinkers, those who did not drink more than 12 drinks in the past 12 months but did so in at least one previous year.

Respondents were also asked: "Did you see a doctor for any reason in the past year?" Those responding yes were asked additional separate questions: Did the doctor ask you about how much you drink, offer advice about what level of drinking is a risk factor for your health, and advise you to reduce your drinking?

Data Analyses

Analyses used SUDAAN,²⁹ a statistical software program that adjusts for survey design and weighting. Chi-square tests evaluated bivariate associations between study outcomes, age, and whether respondents exceeded weekly or daily limits.

Logistic regression analyses explored whether respondent age (categorized 18–20, 21–25, and 26–39) and whether drinking in excess of daily or weekly low-risk drinking limits or both were associated with whether respondents saw a physician in the past year, or whether a physician asked about their drinking, advised about drinking levels that pose health risk, and counseled to reduce drinking. Analyses controlled for gender, race/ethnicity, employment status, education, and family history of alcoholism. An additional regression controlled for whether respondents were Internet panel members or from the phone supplement sample. Analyses of whether respondents saw a physician in the past year included all respondents. Analyses exploring whether respondents were asked or counseled by a doctor about their

drinking focused on those seeing a physician in the past year. Odds ratios and 95% confidence intervals (CIs) were calculated. Of the 4,021 respondents, 189 were slow responders given the short version of the survey which did not include data on doctor visits. These respondents were excluded from these analyses, leaving a final sample of 3,799.

RESULTS

Table 1 describes respondent characteristics. In the past year, 16% did not drink alcohol, 24% drank at or below daily or weekly limits, 47% exceeded either daily or weekly limits (almost all of them daily), and 13% exceeded both. Those ages 18–20 and 21–25 were more likely to exceed weekly or daily drinking limits (Table 2). Those given the short vs. full version of the survey were somewhat younger (31% vs. 22% below 26 years) but did not differ on sex, race, education level, or past year drinking pattern.

Of respondents, 67% saw a physician in the past year but only 14% of those exceeding daily or weekly guidelines were asked and advised about risky drinking patterns (Table 3). Only 26% of those ages 18–20 and 42% ages 21–25 who saw a doctor recalled being asked about their drinking, compared to 54% ages 26–39 ($p < 0.001$) (Table 3). Of respondents who saw a physician and exceeded either daily or weekly guidelines, 49% recalled being asked about their drinking, but only 14% were advised about low-risk drinking guidelines and 7% were advised to cut down. Neither measure differed significantly by age. Among those who exceeded both limits, only 24% were

advised about low-risk guidelines and 21% to reduce drinking. Even though respondents ages 18–25 were most likely to exceed drinking limits (68% vs. 56%, $p < 0.001$), they were least often asked about drinking (34% vs. 54%, $p < 0.001$).

Regression analyses (Table 4) indicated seeing a doctor in the past year did not significantly vary by age or exceeding drinking guidelines. Females, those with a family history of alcoholism, some college education, and persons who were retired, disabled, or a homemaker more often saw a doctor.

Among respondents who saw a doctor in the past year, those age 18–20 (adjusted odds ratio [AOR], 0.3; 95% confidence interval [CI], 0.2–0.6) and 21–25 (AOR, 0.6; 95% CI, 0.4–0.8) were significantly less likely than those 26–39 to have recalled being asked about their drinking, controlling for drinking pattern. Drinking pattern did not predict whether someone recalled being asked about drinking. Those with a family history of alcoholism more often recalled being asked, and those with less than a high school education less often recalled being asked about their drinking.

Compared with drinkers who saw physicians and did not exceed the daily or weekly low-risk guidelines, those exceeding both were more often advised about drinking levels that pose health risk (AOR, 2.4; 95% CI: 1.4–3.9) and to reduce their drinking (AOR, 7.0; 95% CI, 3.0–16.2). Males and Hispanics were more frequently advised about drinking levels. Males and persons with family history of alcoholism were more often encouraged to cut down.

Those who exceeded the daily or weekly guidelines were not significantly more likely to be advised about drinking limits or to cut down than those not exceeding either guideline. Further, being advised about drinking guidelines or cutting down did not differ significantly by age. Respondents under age 21 were half as likely as those ages 26 and older to receive advice to reduce their drinking independent of their drinking pattern, but this was not statistically significant. Results did not change when we analyzed whether respondents were part of the Internet panel or in the phone sample. Phone sample respondents more often recalled being asked about their drinking (AOR 1.9; 95% CI 1.4–2.6) and given advice about drinking guidelines (AOR 2.0; 95% CI 1.4–3.1).

DISCUSSION

This national survey indicated two-thirds of adults ages 18–39 saw a physician in the past year. Only 14% of those young adults who saw a physician and exceeded daily or weekly limits remembered being asked about their drinking and advised of risky drinking levels. Although respondents ages 18–25 were more likely than those 26–39 to exceed low-risk drinking daily and weekly guidelines, they were less likely if they saw a doctor to recall being asked how much alcohol they drank.

Per clinical practice recommendations, alcohol screening should be universal. Most patients with alcohol disorders are not identified and unhealthy alcohol use is less likely to be detected when screening is not done universally.

Given the health burden posed by alcohol among young adults, it is particularly important to explore why only one in seven persons ages 18–39 in this national sample who exceeded drinking guidelines and saw a physician recalled

Table 1. Sample Characteristics of Ever-Drinkers Ages 18–39 (n=3,799)

	N	%
Age		
18–21	250	9.0
21–25	590	23.2
26–39	2,959	67.8
Past Year Drinking pattern		
1. Former drinker	597	15.9
2. Did not exceed NIAAA guidelines	1,003	24.4
3. Exceeded daily or weekly guidelines	1,751	46.9
4. Exceeded daily and weekly guidelines	448	12.8
Sex		
Male	1,835	51.3
Race		
White non-Hispanic	2,696	66.4
Black non-Hispanic	313	10.6
Hispanic	495	16.2
Other	293	6.9
Education		
Not a high school graduate	304	10.3
High school graduate	957	29.3
Some college	1,267	35.0
College graduate or higher	1,270	25.4
Employment		
Employed	2,887	74.0
Unemployed	269	8.7
Retired, disabled, homemaker	500	12.5
Other	136	4.9
Family history of alcohol problems		
Yes	2,006	53.6

Table 2. Drinking Patterns in the Past Year Among Ever-Drinkers, by Age (n=3,799)

	1. Former Drinker	2. Did not exceed NIAAA guidelines	3. Exceeded daily or weekly guidelines	4. Exceeded daily and weekly guidelines
	%	%	%	%
18-20 (n=250)	13.8	19.3	57.3	9.5
21-25 (n=590)	8.5	23.8	49.8	17.9
26+ (n=2959)	18.7	25.3	44.5	11.6

$p < 0.001$ from a chi-square test comparing the distribution of drinking patterns across the three age groups.

being asked and advised of drinking levels that pose risk to health and why this less often occurred among people ages 18–25, those most likely to exceed low-risk drinking limits.

Several explanations can be offered. First, this finding is derived from survey self-report. Some respondents seen by a physician in the past year may have been asked and advised about potentially unhealthy drinking levels but failed to recall such interaction. Respondents' answers were not corroborated by their physicians. However, even if some respondents were counseled, if they could not recall this, it is doubtful that their knowledge, attitudes, beliefs, behavior, and health were influenced.

Second, our survey's 37% response rate is low, raising questions about internal validity and generalizability. However, the response rate was for participating in both the panel and this survey. Of our random sample of panel members, 93% were surveyed. A previous paper³⁰ comparing this combined sample with NESARC (overall response rate 81%) indicated the two surveys' respondents ages 18–39 had similar demographic characteristics, drinking patterns, proportions who exceeded NIAAA guidelines, and associations between lifetime alcohol dependence and current risky drinking and gender, education, family history of alcohol problems, and age of drinking onset. Also, an internet panel may be less likely to represent low SES and rural populations with limited internet availability. However, the Knowledge Networks panel RDD sample oversampled telephone numbers from phone banks with higher concentrations of Blacks and Hispanics. Subjects agreeing to participate in the panel who did not have internet access were given WebTV and Internet access for free.

The standing Internet panel from which our sample was drawn was initially recruited to participate in a variety of non-alcohol related surveys. Thus, nonresponse to enrollment in the panel is

not related to this survey's topic, alleviating a major concern regarding nonresponse. Further, to increase the study's representativeness, we surveyed both Internet panel members and another sample of non-panel members drawn from the RDD sample that generated the panel. Nonetheless, we recommend cautious interpretation of our results.

Lastly, the survey did not specify primary care practices, the setting where alcohol screening is most convincingly recommended. Episodic care and specialist practices clearly have opportunities to screen, and screening is recommended in trauma centers. Although this may partly account for the very low proportions of patients screened, it seems unlikely to be a satisfactory explanation.

Numerous barriers discourage routine alcohol screening and brief interventions. First, screening and advising patients takes time. Although true, brief validated 1–3 item screening tools are now available.^{3,31,32} Second, many clinicians may feel these practices require specific training they have not received. While also true, easy to use training resources are widely available to meet this need.³ Third, alcohol treatment services may be lacking, particularly for young people and in rural areas. Fourth, reimbursement can be an issue. In 25 states, laws allow insurance companies to withhold treatment reimbursement for persons injured under the influence of alcohol.³³ Though infrequently invoked, these laws may discourage screening, particularly in emergency departments and trauma centers where alcohol-related injuries are common. Recently, 12 states repealed these laws.³³ Further, recently new CPT billing codes for screening and counseling patients about alcohol were established. If states adopt these codes in Medicaid and private insurers agree to reimburse, an important barrier may be overcome. Fifth, some physicians' drinking behaviors may influence whether they offer advice.³⁴

Table 3. Interactions with Physicians, Ever-Drinkers Ages 18–39

	Age 18-20	Age 21-25	Age 26+	Total	p value
	(n=250)	(n=590)	(n=2,959)	(n=3,799)	
	%	%	%	%	
Saw a doctor in the past year*	62.2	63.8	68.5	66.8	0.13
	(n=164)	(n=404)	(n=2,098)	(n=2,668)	
	%	%	%	%	
Doctor asked about drinking†	25.6	41.5	53.9	48.8	<0.001
Doctor advised about low-risk drinking guidelines†	12.4	14.5	14.4	14.3	0.85
Doctor advised cutting down†	5.3	7.8	6.5	6.7	0.63

* Of all respondents

† Of those respondents who saw a doctor in the past year

Table 4. Multiple Logistic Regression Analyses of Associations with Physician Interactions

	Saw doctor in past year [†] AOR (95% CI)	Doctor asked about drinking [†] AOR (95% CI)	Doctor advised about drinking guidelines [†] AOR (95% CI)	Doctor advised cutting down [†] AOR (95% CI)
Age				
18-20		0.40 (0.24, 0.67)		
21-26		0.62 (0.45, 0.84)		
26+	—	—	—	—
Past year drinking patterns				
1. Former drinker				
2. Did not exceed guidelines	—	—	—	—
3. Exceeded daily or weekly guidelines				
4. Exceeded daily and weekly guidelines	0.70 (0.50, 0.98)		2.36 (1.42, 3.92)	7.01 (3.03, 16.20)
Male	0.54 (0.44, 0.66)		2.10 (1.50, 2.93)	2.85 (1.65, 4.89)
Family history of alcohol problems	1.48 (1.22, 1.80)	1.33 (1.06, 1.67)		1.87 (1.14, 3.09)
Race				
White non-Hispanic	—	—	—	—
Black non-Hispanic				
Hispanic			1.96 (1.25, 3.07)	
Other				
Employment				
Employed	—	—	—	—
Unemployed				
Retired/disabled/homemaker	1.59 (1.13, 2.24)			
Other				
Education				
Less than high school		0.58 (0.34, 0.98)		
High school graduate	—	—	—	—
Some college	1.48 (1.15, 1.91)			
Bachelor's degree or higher	2.01 (1.55, 2.60)			

* Of all respondents

† Of those who saw a doctor in the past year

While limited clinician time, inadequate systems and heavily loaded clinical agendas shared by patients and physicians are barriers in such settings, these do not seem to be issues for preventive services like blood pressure assessment which is universally done during physician visits despite absence of any recommendation to do so frequently. Furthermore, although screening rates clearly need to be improved across the entire age range we studied, if the observed screening effort is optimal, then it should be redirected to younger adults, those with the higher prevalence of unhealthy alcohol use, and greatest risk of morbid and mortal consequences.

In summary, although most young adults in this national sample saw a physician in the past year, half or fewer were asked about their drinking despite evidence-based practice guidelines that recommend the practice. Furthermore, although the youngest adults were more likely to drink too much, they were least likely to have been asked how much they drank. Since the prevalence of unhealthy alcohol use is highest among youth, and since screening and brief intervention have efficacy, screening young adults should be routine. Screening is a recommended preventive service; in some settings (like the largest health system in the US—the VA) screening rates are close to 100%.³⁵ While future studies are needed to confirm our findings and explore reasons why young adults are least likely to be asked about their drinking, efforts to implement universal screening and intervention (e.g. performance measures, training, and appropriate reimbursement) should continue, particularly with young adult patients who are most at-risk and least likely to be identified.

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REFERENCES

1. **Saitz R.** Clinical practice: unhealthy alcohol use. *N Engl J Med.* 2005;352(6):596–607.
2. Institute of Medicine. Broadening the Base of Treatment for Alcohol Problems: Report of a Study by a Committee of the Institute of Medicine. Washington: National Academy Press; 1990.
3. National Institute on Alcohol Abuse and Alcoholism. Helping Patients Who Drink Too Much: A Clinician's Guide. updated 2005th ed. Bethesda: U.S. Department of Health and Human Services; 2007. NIH Pub. No. 07–3769.
4. Scientific Affairs Council on, American Medical Association. AMA Guidelines for Physician Involvement in the Care of Substance Abusing Patients. Chicago: American Medical Association; 1979.
5. American Society of Addiction Medicine. Public policy statement on screening for addiction in primary care settings. *ASAM News.* 1997;17:17–18.
6. U.S. Preventive Services Task Force. Guide to Clinical Preventive Services. 2nd ed. Alexandria: International Medical Publishing; 1998.
7. American Academy of Pediatrics. Policy statement—alcohol use by youth and adolescents: a pediatric concern. *Pediatrics.* 2010;125(5):1078–1087.
8. **Solberg LI, Maciosek MV, Edwards NM.** Primary care intervention to reduce alcohol misuse- ranking its health impact and cost effectiveness. *Am J Prev Med.* 2008;34(2):143–152.
9. **Kaner EF, Dickinson HO, Beyer FR, et al.** Effectiveness of brief alcohol interventions in primary care populations. *Cochrane Database Syst Rev.* 2007;Issue 2. Art No.: CD004148.
10. **Larimer ME, Crouce JM.** Identification, prevention, and treatment revisited: individual-focused college drinking prevention strategies 1999–2006. *Addict Behav.* 2007;32:2439–2468.
11. **Carey KB, Scott-Sheldon LA, Carey MP, DeMartini KS.** Individual-level interventions to reduce college student drinking: a meta-analytic review. *Addict Behav.* 2007;32:2469–2494.
12. **Schaus J, Sole M, McCoy T, et al.** Screening for high-risk drinking in a college student health center: characterizing students based on quantity, frequency, and harms. *J Stud Alcohol Drugs.* 2009;12(Supplement):34–44.
13. **Fleming MF, Balousek SL, Grossberg PM, et al.** Brief physician advice for heavy drinking college students: a randomized controlled trial in college health clinics. *J Stud Alcohol.*
14. **Babor TF, Caetano R, Casswell S, Edwards G, Giesbrecht N, Graham K, Grube JW, Hill L, Holder H, Homel R, Livingston M, Österberg E, Rehm J, Room R, Rossow I.** Alcohol: No Ordinary Commodity: Research and Public Policy. 2nd ed. New York: Oxford University Press; 2010.
15. **Mokdad AH, Marks JS, Stroup DF, Gerberding JL.** Actual causes of death in the United States, 2000. *JAMA.* 2004;291(10):1238–45.
16. **Midanik L, Chaloupka F, Saitz R, Toomey TL, Fellows JL, Dufour M, Landen M, Brounstein PJ, Stahre MA, Brewer RD, Naimi TS, Miller JW.** Alcohol-attributable deaths and years of potential life lost—United States, 2001. *MMWR Morb Mortal Wkly Rep.* 2004;53(37):866–870. reprinted in *JAMA*, Dec. 15, 2004;292:2831–32.
17. **McKenna MT, Michaud CM, Murray CJ, Marks JS.** Assessing the burden of disease in the United States using disability-adjusted life years. *Am J Prev Med.* 2005;28(5):415–23.
18. National Institute on Alcohol Abuse and Alcoholism. Alcohol development and youth: A multi-disciplinary overview. *Alcohol Res Health.* 2004/2005;28(3):175.
19. **Courtney KE, Polich J.** Binge drinking in young adults: data, definitions, and determinants. *Psychol Bull.* 2009;135(1):142–156.
20. **Roerecke M, Rehm J.** Irregular heavy drinking occasions and risk of ischemic heart disease: a systematic review and meta-analysis. *Am J Epidemiol.* 2010;171(6):633–44.
21. World Health Organization. Strategies to Reduce Harmful Use of Alcohol: Draft Global Strategy. Sixty-Third World Health Assembly, Provisional Agenda Item 11.10, March 2010.
22. **Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J.** Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet.* 2009;73:2223–33.
23. Office of the U.S. Surgeon General. The Surgeon General's Call to Action to Prevent and Reduce Underage Drinking. Rockville: U.S. Department of Health and Human Services; 2007.
24. **Hingson RW, Heeren T, Winter MR.** Age at drinking onset and alcohol dependence - age at onset, duration, and severity. *Arch Pediatr Adolesc Med.* 2006;160(7):739–746.
25. **Grant BF, Dawson D, Stinson F, Chou S, Dufour M, Pickering R.** The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991–1992 and 2001–2002. *Drug Alcohol Depend.* 2004;74:223–234.
26. **Friedmann PD, McCullough D, Chin MH, Saitz R.** Screening and intervention for alcohol problems: a national survey of primary care physicians and psychiatrists. *J Gen Intern Med.* 2000;15(2):84–91.
27. **D'Amico EJ, Paddock SM, Burnam A, Kung FY.** Identification of and guidance for problem drinking by general medical providers: results from a national survey. *Med Care.* 2005;43(3):229–236.
28. National Institute on Alcohol Abuse and Alcoholism. Rethinking Drinking: Alcohol and Your Health. Bethesda: U.S. Department of Health and Human Services; 2009. NIH Pub. No. 09–3770.
29. **Shah BU, Barnwell BG, Breller GS.** SUDAAN User's Manual Release 7. Research Triangle Park: Research Triangle Institute; 1996.
30. **Heeren T, Edwards EM, Dennis JM, Rodkin JM, Hingson R, Rosenbloom DL.** A comparison of results from an alcohol survey of a pre-recruited internet panel and the National Epidemiological Survey on Alcohol and Related Conditions. *Alcohol Clin Exp Res.* 2008;32(2):222–229.
31. **Smith PC, Schmidt SM, Allensworth-Davies D, Saitz R.** Primary care validation of a single-question alcohol screening test. *J Gen Intern Med.* 2009;24(7):783–88.
32. **Taj N, Devera-Sales A, Vinson DC.** Screening for problem drinking: does a single question work? *J Fam Pract.* 1998;46:328–335.
33. National Institute on Alcohol Abuse and Alcoholism. Alcohol Policy Information System. Available at <http://www.alcoholpolicy.niaaa.nih.gov/>. Accessed August 5, 2011.
34. **Frank E, Elon L, Naimi T, Brewer R.** Alcohol consumption and alcohol counseling behavior among US medical students: Cohort study. *BMJ.* 2008;337:1–10.
35. **Bradley KA, Williams EC, Achtmeyer CE, Volpp B, Collins BJ, Kivlahan DR.** Implementation of evidence-based alcohol screening in the Veterans Health Administration. *Am J Manag Care.* 2006;12(10):597–606.