IACAPAP Textbook of Child and Adolescent Mental Health

Section G

SUBSTANCE USE DISORDERS

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ALCOHOL MISUSE

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The Triumph of Bacchus or *The Drunks* (c.1629). Diego Velázquez, *Museo del Prado*, Madrid.

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Ethanol (ethyl alcohol), a natural product of the fermentation of foodstuffs rich in carbohydrates, has been part of human culture from the dawn of civilization, prized for its relaxing properties and facilitation of social intercourse; it may have also had survival value. Alcoholic beverages are legally available in most countries (exceptions are: Afghanistan, Brunei, Iran, Kuwait, Libya, Saudi Arabia, Sudan and Yemen). The majority of people use alcohol in a responsible manner most of the time. Yet, excessive consumption has large damaging social and health consequences. This chapter deals with the harmful effects of ethanol consumption in young people, henceforth referred to as *alcohol*. The terms *alcohol use disorder* (AUD), *alcohol dependence*, and *alcoholism* will be used interchangeably.

Alcoholic beverages can be classified as *fermented* and *distilled*. Fermented beverages are the product of fermentation of sugary foods. For example, beers are made from cereals, wines from grape juice and sake from rice; there are many other fermented beverages around the world from other foodstuffs. Distilled drinks (*spirits*) are produced by concentrating the ethanol in fermented products. For example, whiskeys are distilled from fermented cereals, brandies from fruit juices and rum from molasses. Vodka can be distilled from any fermented food – mostly grain or potatoes. Vodka and similar spirits are distilled so thoroughly that no taste from their particular starting foodstuff remains (Wikipedia).

The ethanol content of a drink is typically measured as millilitres of alcohol per 100 millilitres of the beverage expressed as a per cent – alcohol by volume (ABV). For example, a beer with 6% alcohol contains 6mL of alcohol per 100mL. Fermented beverages have a maximum of 18%; the alcohol content of spirits is much higher (e.g., 40%-50% for whiskey and vodka).

"A secure supply of alcohol appears to have been part of the human community's basic requirements much earlier than was long believed. As early as around 9,000 years ago, long before the invention of the wheel, inhabitants of the Neolithic village of Jiahu in China were brewing a type of mead with an alcohol content of 10%" (Thadeusz, 2009).

BURDEN OF ALCOHOL USE

Worldwide, alcohol is one of the main risk factors for incident disability-adjusted life-years (DALYs) in 10–24-year-olds, representing 7% of all DALYs (compared with 4% for unsafe sex, 3% for iron deficiency and 2% for illicit drug use) (Gore et al, 2011). Overall, about 4% of deaths worldwide are attributable to alcohol. Males (with a 6% mortality rate attributable to alcohol), poorer people and lower-income countries suffer a relatively greater burden than wealthier ones. Impact, in particular fatal injuries, is greater in the young of both sexes.

Per head consumption

Alcohol consumption and problems related to alcohol vary widely around the globe. Worldwide consumption in 2005 was equal to 6 L of pure alcohol per person aged 15 years or older. A large portion of this consumption – 29% (approximately 2 L per person) – was homemade, illegally produced or sold outside normal government controls. Eastern European countries have the highest consumption, riskiest patterns of drinking, and alcohol-related deaths and disabilities. One in every five deaths is due to harmful drinking in the Commonwealth of Independent States (CIS) (Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan and Ukraine). About 12% of drinkers show heavy episodic drinking. The proportion of people drinking alcohol to intoxication is lowest in western European countries and highest in CIS countries. Outside the CIS, risky patterns of drinking and rates of disease and disability attributable to alcohol are also high in Mexico and in most South American countries. Abstention rates are low in high-income, high consumption countries (e.g., Europe, North America), and high in North African and South Asian countries with large Muslim population, female abstention rates being very high in these regions (WHO, 2011). Click on the picture to access the WHO's *Global Status Report on Alcohol and Health 2011*.

"Across England, half a million children between the ages of 11 and 15 will have been drunk in the past four weeks, and young people under 18 will have consumed the equivalent of 2 million bottles of wine in the past week alone […] since 1990 the amount of alcohol consumed by 11 to 15 year olds who drink has doubled" (Donaldson, 2009). Click on the figure to access this document.

Alcohol is a causal factor in 60 types of diseases and injuries and a component cause in 200 others (WHO, 2011), including:

- Accidents, injuries and harm to both drinkers and the people around them (family, friends, bystanders)
- Reduced school, college and work performance, absenteeism
- Family disharmony, violence, abuse
- Suicide, homicide, crime
- Injury and death from motor vehicle and work accidents
- Risky sexual behaviour, sexually transmitted diseases, HIV infection
- Teratogenesis, with a range of negative outcomes to the foetus including low birth weight, cognitive deficits, and foetal alcohol spectrum disorders
- Neurotoxicity and inhibition of brain maturation, especially frontal lobe development
- Acquired brain damage in later years
- Cancer (oesophagus, liver, bowel, breast etc.) and other diseases (e.g., cirrhosis of the liver).

Alcohol-attributable costs amount to more than 1% of GDP in most nations, the United States of America (US) having the largest (2.7%) of the high-income countries and South Korea the highest (3.3%) among middle-income nations. The total annual cost of alcohol use to the US economy was estimated in 1998 to be $184 billion, and £20 billion in the United Kingdom (UK) in 2001 (Saunders et al. 2011).

Wet and _dry_ patterns of drinking

A *wet* pattern of drinking is characterised by frequent consumption of small amounts of alcohol, mostly wine, at meal times or family celebrations; it is common in Southern European countries.

A *dry* pattern is typified by irregular heavy drinking, often to intoxication, at less family-oriented social events. This pattern is more common in Central and Northern European countries.

There is an overlap between wet and wine-drinking countries, dry and beer- and spirit-drinking societies. However, this distinction is weakening, particularly among the young.

EPIDEMIOLOGY

There is wide variation in adolescents' drinking and attitudes to alcohol around the world, which are influenced by family, peers, schools, religious beliefs, and national and cultural mores. Drinking alcohol has become in many cultures a rite of passage into adulthood. In these cultures, drinking is but one aspect of teenage risk-taking behaviour (e.g., smoking, risky sex, illicit drug use) associated with rebelliousness and challenging of rules.

In recent decades there has been a worldwide increase in alcohol consumption due to:

- Industrialization of the developing world
- Globalization
- Growing wealth
- Increased availability of high alcohol pre-prepared drinks (e.g., alcopops)
- Lower relative prices of alcoholic beverages
- Increased publicity and marketing

Young men drink more than women but there is growing evidence that women are increasingly following men's patterns of consumption. This may be due to women becoming emancipated from traditional female roles and increasingly equal to men in terms of their aspirations and achievements.

"I drank an 'Irish car bomb' and a beer and two shots of Smirnoff vodka. I was perfectly fine. Then it hit me all at once (I think I drank too fast). I was told the following day that I tried to kiss people at the party including a girl, her sister and another boy (I'm a girl by the way). I woke to thorns in my feet, dirt in my shoes, my cell phone was in the woods, my keys in another person's custody, and my car rearranged. I woke not having to pee, so I hope I didn't just decide to pee in front of everybody. Oh god, I think I would die of shame!" (Anonymous).

THE PATHOPHYSIOLOGY OF ALCOHOL USE

Alcohol is rapidly absorbed and distributed throughout the body. Alcohol is a brain depressant causing disinhibition, impaired memory and decision making, and incoordination. With further doses this may progress to stupor, coma and death from respiratory depression. Other biological effects of alcohol include nausea, vomiting (with the risk of aspiration of vomit leading to asphyxiation), *hangover*, amnesic episodes (*blackouts*), and diseases such as acute gastritis. The

Table G.1.1. Alcohol intoxication: symptoms observed at various blood alcohol concentrations (BAC)

BAC range* (g/100 mL of blood) and [alcohol consumed − approximate standard drinks**]	Observable effects
0.01-0.05 [1-3]	Normal behaviour on observation, subjective feelings of relaxation, talkative, more confident.
0.05-0.08 [3-5]	**Euphoria**: increased self-confidence, talkativeness, disinhibition, loss of concentration, impaired psychomotor coordination.
0.09-0.15 [5-9]	**Excitement**: Slurring of speech, unsteady balance, emotional instability, loss of judgement.
0.16-0.25 [9-16]	**Confusion**: disorientation, confusion, nausea, vomiting, memory impairment, staggering gait, apathy, incoordination, loss of bladder control.
Above 0.25 [>16]	**Stupor, coma**: unconsciousness, breathing is suppressed, gag and cough reflexes diminished and possibly paralyzed, breathing slows, becomes increasingly irregular and may cease completely (death may occur at BAC above 0.45).

*This is a rough guide; BAC varies according to gender, weight and age; with regular alcohol consumption tolerance to alcohol and neuro-adaptation develops over time. Therefore this should not be taken as a guide to consumption. **In the previous 3 hours.

effects of various blood alcohol concentrations (BAC) are summarised in Table G.1.1.

Blackouts. Alcohol interferes with the formation of new memories. A common by-product of inebriation is memory loss for events that occurred while the person was intoxicated — blackout, a form of anterograde amnesia. Blackouts do not involve loss of consciousness, just loss of memory. The typical blackout lasts 2 to 6 hours, corresponding to the peak BAC. Blackouts are more likely when people drink large amounts of alcohol in a short time (i.e., with a rapid rise in BAC).

Hangovers develop when BAC returns from a high level to zero and may last longer than 24 hours. They are characterised by symptoms such as misery, drowsiness, concentration problems, dry mouth, dizziness, gastro-intestinal complaints, sweating, nausea, hyper-excitability, and anxiety. It is not known why symptoms can persist after alcohol and its metabolites have been eliminated from the body. Surprisingly, the causes of alcohol hangover are not known. A multitude of physiological changes take place after excessive drinking (e.g., dehydration, endocrine changes, metabolic acidosis) and all may contribute to hangover. It has also been hypothesized more recently that hangovers may be related to immune system activation or neurotransmitter imbalance. Adolescents seem to be less prone to experiencing hangovers.

Metabolism

A person's BAC will generally increase by 10-20 mg/100 ml for each 10g of alcohol consumed (about one standard drink) although it varies according to gender, weight, age, individual characteristics and previous drinking history (e.g., tolerance to alcohol). Alcohol is chiefly metabolized in the liver by oxidation to

Monitoring the Future and *ESPAD*

The *Monitoring the Future* project began in 1975 to survey substance use behaviours, attitudes and values of US secondary school students, college students and young adults. About 50,000 8th, 10th and 12th grade students are surveyed each year. Data and reports are available at the website.

The *European School Survey Project on Alcohol and Other Drugs* (ESPAD) began in 1995 and currently surveys more than 100,000 school students aged 16 years from 35 European countries. The 2007 survey is the last reported (Hibell et al., 2009).

Click on the respective picture to acess the *Monitoring the Future* and ESPAD websites.

Watch video by clicking on the picture

acetaldehyde via the enzymes alcohol dehydrogenase and aldehyde dehydrogenase. Acetaldehyde undergoes further conversions to form carbon dioxide and water. The metabolic breakdown of alcohol takes place at a constant rate of 7 g to 10 g per hour; this speed is not influenced by the amount of alcohol consumed.

Alcohol and the Developing Brain

The developing brain is likely to be exposed to alcohol during the foetal period via maternal drinking and during the rapid brain transformations of adolescence through the initiation of alcohol use (Spear, 2011). Alcohol during pregnancy is teratogenic; about 1% of all births in western countries are estimated to exhibit alcohol-induced deficits, collectively known as *foetal alcohol spectrum disorders* (FASD). A small group of these children show the *foetal alcohol syndrome* (FAS). FASD is likely when pregnant women binge-drink or repeatedly use alcohol. Timing is critical; the typical facial features of FAS are the result of exposure to alcohol during the third week – before women realize they are pregnant (see Chapter B.1).

Studies in humans and in laboratory animals suggest that the effects of alcohol on the adolescent brain may be slightly different from those in adults. For example, adolescents appear to be more resistant than adults to the intoxicating and aversive effects of alcohol (e.g., nausea, vomiting, anxiety, slurred speech) often cues to stop drinking – but more sensitive to the social facilitation effects. These differences may result in a relatively higher tolerance and intake of alcohol during adolescence (Spear, 2011).

Gary Reinbach, a 22 year old Englishman from Dagenham, Essex, died in hospital after he was refused a liver transplant because he could not prove he had not drank alcohol for at least six months — one of the requirements for liver transplant in the UK. Mr Reinbach had been admitted to hospital 10 weeks earlier with cirrhosis of the liver. His family said he had started drinking at 11 years of age and drank heavily after the age of 13 (Rouse, 2009).

Early Onset of Drinking

The earlier the onset of alcohol use the more likely the adverse outcomes. Onset of drinking before 14 years of age is an indicator of high risk for future

Table G.1.2. Factors that increase the risk of alcohol use disorders.

Factor	Comments
Genetic	• Adoption, twin and extended family studies show moderate to strong genetic components to the liability to use alcohol and to develop AUDs • The genetic causation of early onset drinking and subsequent dependence is less clear • Genetic factors leading to alcohol use, drug use, and behavioural disorders may overlap.
Individual	• Psychiatric disorder such as ADHD, conduct disorder, anxiety • Poor school performance.
Family	• Parental or sibling use of alcohol or drugs • Permissive parental attitudes to drinking • Poor parental supervision.
Social	• Having friends who use alcohol, tobacco or other substances • Easy availability (e.g., cheap alcohol) • Less strict laws about minimum drinking age, marketing and publicity • Culture of the country or social group (e.g., military settings, college, fraternity) • Being an indigenous minority group (e.g., American Indian, Canadian Inuit, Aboriginal Australian).

Alcohol use significantly increases the risk of suicide. To watch video click on the picture.

Figure G.1.1 Australian standard drinks. Source: Australian Government, NHMRC.

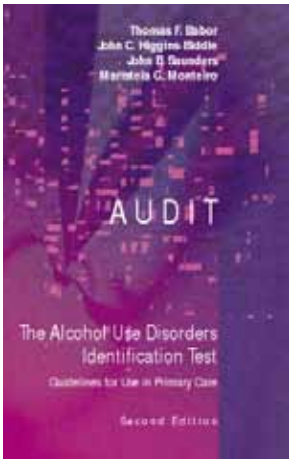
Standard drink

Within a given country, a standard drink is a drink that contains a specific amount of pure alcohol. One standard drink always contains the same amount of alcohol regardless of container size or type of alcoholic beverage (see Figure G.1.1).

Although the standard drink is used to quantify alcohol intake, there is no international agreement (standard) on what constitutes a standard drink, varying substantially from country to country — from 6 g of alcohol in Austria to 19 g in Japan (1.2 mL of ethanol equals 1 g). For example, a standard drink is 8 g of alcohol in the UK, 10 g in Australia, 12 g in France, and 14 g in Canada and the US. As a result, 500 mL of beer with an ABV of 5% represents 1 standard drink in Japan, 1.4 in the US, 1.6 in Denmark, Finland and France, 2.0 in Australia, Ireland and Poland, and 3.2 in Austria. This is confusing.

Table G.1.3. Issues that need to be clarified during assessment.

Age at initiation		The age at which more than a sip of alcohol was consumed
Frequency of consumption		Daily, weekly, irregularly?
Amount and type		Ask about the last drinking occasion and to recall the number of each type of drink consumed according to brand and in the adolescent's words ("I drank an 'Irish car bomb' [cocktail of Guinness stout, Bailey's Irish cream, and Jameson Irish whiskey] and a beer and two shots of Smirnoff vodka") – it is often easier for adolescents to remember this than the type of alcohol (beer, wine or spirits)
Pattern		Drinking patterns change over time, thus it is useful to ask about (1) recent drinking (e.g., past week or last drinking occasion) and (2) the heaviest drinking period
Context		– *Are there particular triggers for use, such as boredom, sadness, anger, anxiety?* – *Do you drink alone, with friends or both?* – *What are your friends' attitudes to alcohol?* – *What benefits do you get out of drinking?* – *Is alcohol available at home?* – *What do your parents think about drinking?* – *How do you pay for it?* – *Do you use other drugs?*
Alcohol-related consequences	***Intoxication***	– *Have you ever been drunk? If so, how many times?* – *Some young people deliberately plan to get drunk…do you?* – *Have you ever had blackouts (when you cannot remember the next day what happened the night before)?* – *Have you been involved in fights when under the influence of alcohol?* – *Have you been caught drink-driving?*
	Hangover	– *Have you ever had a hangover?* – *Does a hangover happen often when you drink?*
	Accidents	– *Have you been involved in a car accident after drinking?*
	Risk-taking	– *Have you had unprotected sex or sexual intercourse after having been drinking?* – *Did you regret that later?* – *Have you ever driven a car while intoxicated?*
Impairment		Whether alcohol use causes impairment in other areas of psychosocial functioning



Click on the picture to access *AUDIT, the Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care*

A two-question screen

Newton and colleagues (2011) recommend two questions to screen for possible alcohol misuse in emergency departments. Youth who answer yes to at least one of these questions have an eightfold risk of having an AUD and should be referred for assessment:

- *In the past year, have you sometimes been under the influence of alcohol in situations where you could have caused an accident or gotten hurt?*
- *Have there often been times when you had a lot more to drink than you intended to have?*

AUD and is associated with a more rapid progression to and longer duration of alcoholism and greater difficulty achieving abstinence (Skidmore et al, 2011).

Conduct disorder, anxiety, depression, ADHD, shyness, being abused, family conflict, poor parenting, inadequate monitoring, poverty, parental modelling of drinking, and peer influences have all been noted in the research literature as risk factors for early-onset drinking (Skidmore et al, 2011).

ETIOLOGY

The aetiology of AUDs is multifactorial. Some of the best known aetiological factors are summarized in Table G.1.2.

CLINICAL ASSESSMENT

Building rapport with the adolescent is the key aspect of a successful assessment. Many clinicians find that a non-judgemental approach using motivational interviewing techniques achieves the best results. Optimally, assessment requires information from multiple sources and is usually conducted as part of a wider substance use evaluation – several substances are often involved. School reports can be helpful by highlighting inconsistencies, repeated absences and other relevant behaviours. Issues that need to be clarified during assessment are summarised in Table G.1.3.

Confidentiality

Like in most psychiatric assessments of young persons, confidentiality and its limits are best dealt with at the beginning of the clinical interview. Check that the young person understands what is meant by confidentiality. The concept of adolescence varies between cultures with regard to the adolescent's independence and capacity to make decisions, and the role of the family. As a result, laws and expectations about confidentiality differ making it difficult to give unambiguous guidance that can be universally applied. Nonetheless professionals need to keep in mind that confidentiality, particularly if children are older than 14 years, is a key issue when assessing alcohol use: if adolescents are unsure about the confidentiality of their disclosures they are less likely to give accurate information. Parents also need to be made aware that respecting confidentiality is standard practice in adolescent health care (see Chapter A.1). It is often helpful to explain to parents that the purpose of confidentiality is not to exclude them but to facilitate the young person's personal development (Bonomo, 2011).

Validity of self-reports

Much of the information described in research studies has been obtained from the adolescents themselves (e.g., using self-report questionnaires) but there is some concern about its validity. Overall, information given by adolescents is more valid than that obtained from other sources. Parents often do not know the extent of their children's alcohol (or substance) use and tend to under-report these problems. Computer-assisted questionnaires may improve validity

Screening

Except in countries in which alcohol consumption is not allowed and this is enforced, clinicians need to assume that most adolescents presenting with mental health problems consume alcohol unless there is evidence to the contrary. Therefore, they should be screened for alcohol use.

Adolescents' alcohol (or drug) consumption is a sensitive topic which ought to be tackled similarly to suicide risk assessment. For example, questioning from the general to the specific and, when appropriate, using a *third person* approach (*Do students at your school drink alcohol? What about your friends…? Do you ever drink?* Alternatively: *Does your family drink alcohol during meals? Do you also drink?*). Once it is established that the teenager drinks, the age of onset of drinking, pattern of alcohol consumption and alcohol-related consequences need to be clarified. Careful questioning about the frequency, amount, types of alcohol consumed and circumstances associated with drinking is essential; this can be established

conversationally or using questionnaires or rating scales. Such a discussion will also provide opportunities for education, for example to explain non-judgementally what a standard drink is, the effects of different levels of alcohol in the blood and other relevant matters. Using standard drinks allows a quantification of consumption (g/day).

The assessment interview

The clinical interview of adolescents with a suspected alcohol problem should broadly follow the structure of a psychiatric assessment (see Chapter A.5) rather than focussing exclusively on alcohol use, and adjusting the interview style to the developmental stage and age of the adolescent. Psychiatric disorders (ADHD, conduct disorder, depression etc.) are often present in adolescents who misuse alcohol.

Enough information should be collected to answer the following questions (Goldstein 2010):

- What factors predispose the adolescent to use alcohol?
- What precipitates alcohol use and what were the triggers for this episode?
- Are there perpetuating factors that make it difficult for the adolescent to abstain?
- Does a family member (parent, sibling) misuse alcohol? What about peers?
- Are there protective factors that can be used in treatment?

Instruments

Among the many screening instruments one of the most widely used is the WHO's *Alcohol Use Disorders Identification Test (AUDIT*). The AUDIT was developed to screen for excessive drinking and to assist in brief assessment and management. Using AUDIT scores, four levels of risk have been defined (Babor et al, 2001):

- *Low-risk drinking or abstinence* (score lower than 8): no intervention required.
- *Alcohol use in excess of low-risk recommendations* (score 8 to 15): provide brief intervention using education and advice
- *Harmful or hazardous drinking* (score 16 to 19): combination of education, advice, brief counselling and continued monitoring, with further diagnostic evaluation or specific treatment if there is no improvement
- *High risk or dependence* (score above 19): these individuals require specific diagnostic evaluation and possible treatment for alcohol dependence.

Many measures have been published: questionnaire- or interview-based, short or comprehensive. They often assess not only alcohol but also other substance use (Teeson et al, 2011). Reliability and validity of these instruments when applied to adolescents is not well known.

Biomarkers

A biomarker is a biological characteristic that can be used to measure the progress of a disease (in this case AUD) or the effects of treatment. There are two main types of biomarkers: state and trait. *State biomarkers* provide information about drinking activity while *trait biomarkers* give indications of a person's genetic predisposition to alcoholism (Peterson 2004/2005)

Biomarkers contribute to diagnosis (for example, elevated gamma-glutamyltransferase [GGT] without obvious explanation would raise suspicions),

Biomarkers

Of recent alcohol use:

- BAC (usually measured with a breathalyser)

Of chronic alcohol use (e.g., 5 or more drinks per day, most days of the week). All have relatively low sensitivity and specificity and should be interpreted with caution:

- Increase in GGT
- Increase in aspartate aminotransferace (AST)
- Increase in alanine aminotransferace (ALT)
- Increase in mean corpuscular volume (MCV)

Binge drinking and extreme drinking

The traditional view of an alcoholic binge was an extended period of consumption to the point of being incapable of performing the usual activities or until losing consciousness. However, the definition of a binge is contentious. It has been redefined in the research literature as the consumption in a drinking session of five standard drinks for men and four standard drinks for women (on the grounds that this could lead to a significantly increased risk of harm). Please note the provisos highlighted in the standard drink section.

Extreme drinking is a growing phenomenon among young people in many countries. It is exemplified by prolonged, excessive drinking over a short period with the aim of getting drunk. While in the past being inebriated was frowned upon, disapproval has lessened in the current youth culture.

Table G.1.4. Diagnosing alcohol use disorder and alcohol withdrawal.

Alcohol use disorder	Alcohol withdrawal

• Continued use of alcohol in spite of it causing:
  • impairment of functioning
  • risk to themselves or others (e.g., driving under the influence)
  • social or interpersonal problems
  • physical health problems
• Tolerance
• Withdrawal symptoms
• Craving
• Desire or unsuccessful efforts to reduce alcohol use
• Spending much time in activities to obtain, consume or recover from the effects of alcohol
	• Autonomic hyperactivity (e.g., sweating, pulse rate greater than 100)
	• Increased hand tremor
	• Insomnia
	• Nausea or vomiting
	• Transient visual, tactile, or auditory hallucinations
	• Psychomotor agitation
	• Anxiety
	• Grand mal seizures

Make a diagnosis if two or more symptoms are present. If more than four symptoms, the problem is severe.	Make a diagnosis if two (or more) of these symptoms develop within hours or a few days of ceasing or reducing heavy or prolonged alcohol intake

to evaluate harm (e.g., liver damage) and to monitor abstinence but should always be interpreted with caution and taken in context clinically. There are no clinically useful trait biomarkers available yet.

DIAGNOSIS

Alcohol intoxication, *AUD* (also known as *alcohol dependence*, *addiction*, or *alcoholism*) and *alcohol withdrawal* are the clinical diagnoses relevant to adolescent alcohol misuse. The traditional classifications distinguish between alcohol *abuse* and alcohol *dependence*. However, research has failed to provide convincing evidence of the validity and clinical usefulness of this distinction. The recent trend (e.g., DSM-V) is for a single diagnosis of AUD with several levels of severity.

Alcohol intoxication

Intoxication is the most common alcohol-related problem found in adolescents – when severe, also called *alcohol poisoning*. A diagnosis of intoxication can be made *after excluding other causes* (such as haed injury or encephalitis) if individuals display at least one sign of intoxication (e.g., slurred speech,

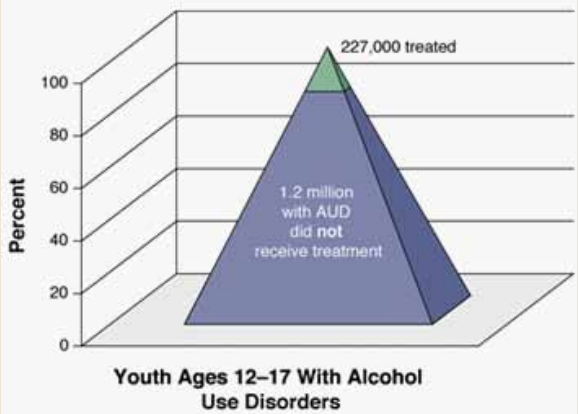


Figure G.1.2 In the US in 2002, only 16% of the 1.4 million youth aged 12 to 17 estimated to have alcohol use disorders reported receiving any type of service for these problems.
Source: National Institute on Alcohol Abuse and Alcoholism (NIAAA)

A 17-year-old German man was taken to emergency because of vomiting and dizziness after having run two 100 m races at school. He was hyperventilating, slightly tachycardic and tired but could be awaken. He subsequently revealed having drunk 3 L of an energy drink and 1 L of vodka (equivalent to 4600 mg of taurine, 780 mg of caffeine and 380 g of alcohol). Combining energy drinks with alcohol is becoming increasingly popular among youth. The combination, particularly in large amounts, poses considerable risk. (Schöffl et al, 2011).

incoordination, unsteady gait, nystagmus, attention or memory impairment, stupor, coma) after ingesting alcohol and are significantly impaired in their functioning as a result. When compared with adults, adolescents are much more likely to use alcohol episodically and heavily (binges), making drinking more dangerous. Rapid drinking of large amounts, often related to a bet or dare, is particularly hazardous.

Alcohol use disorder (AUD)

Repeated excessive consumption of alcohol leads over time to AUD – alcohol dependence (addiction) or alcoholism. AUD is a clinical syndrome in which alcohol is consumed irrespective of the person's circumstances and despite its harmful consequences. The person's life becomes increasing focused on obtaining alcohol (*craving*), consuming it, experiencing and recovering from its effects, and tends to be self-perpetuating (Saunders, 2011). The traditional symptoms of dependence are *tolerance* (need to consume increasing amounts) and *withdrawal* (physical symptoms upon cessation of consumption). Diagnostic criteria for AUD are summarised in Table G.1.4.

Alcohol withdrawal

The diagnosis of alcohol withdrawal is summarized in Table G.1.4. Withdrawal symptoms reflect an overactivity of the autonomic nervous system and typically appear between 6 and 48 hours after ceasing consumption. They rarely last longer than 48 hours. Withdrawal symptoms are infrequent in adolescents.

Although young persons may have stopped consuming alcohol some time before their presentation to the emergency department, BAC may continue to rise through the initial medical assessment, resuscitation, and treatment phases.

TREATMENT

Only a very small minority of people with AUDs receive treatment – about 10% in the US, with the initial treatment episode typically occurring 8-10 years after the onset of the disorder (see Figure G.1.2). Most individuals who develop AUD started drinking during their adolescent years. Thus, the focus in this age group should be prevention and early intervention – i.e., delaying the onset of drinking, reducing the amount of alcohol consumed, reducing binge drinking, minimising the risks, and detecting misuse early. If alcohol misuse is left untreated it often progresses to alcoholism.

ALCOHOL INTOXICATION

Alcohol intoxication is a common occurrence among adolescents, typically identified and handled informally by peers, teachers, relatives, or police; only a small proportion comes to the attention of health practitioners. Nevertheless, severe intoxication (alcohol poisoning) is an acute illness that requires immediate attention, particularly if ingestion of other substances has occurred also. An adolescent that initially appears mildly intoxicated may easily go unnoticed to become unresponsive and risk dying. Severely intoxicated adolescents can become hypothermic, develop arrhythmias, compromised heart function and breathing. Lack of gag or cough reflexes can lead to acute respiratory obstruction should the youth vomit (Vaca and Sayegh, 2011).

The key aspect of management is aggressive respiratory and cardiovascular supportive care. If the patient is intoxicated but awake and with a secure airway, a physical examination should be performed to exclude traumatic injuries (e.g., head injury) that may mimic the symptoms of intoxication or co-exist with it. Once intoxication is treated it is essential to follow up the adolescent and deliver a short intervention or treatment if necessary.

ALCOHOL WITHDAWAL

Once it is found that no significant comorbid physical illnesses are present, adolescents who show alcohol withdrawal symptoms can – and should – be treated on an ambulatory basis, if at all possible involving the family. *Supportive care* (reassurance and encouragement in a peaceful environment without criticism and with limited interpersonal interactions, plenty of fluids and good nutrition, and administration of thiamine and multivitamins) is enough to manage withdrawal in the majority of cases in which symptoms are not severe.

In severe cases, particularly if the risk of seizures is high (e.g., history of previous seizures, abnormal electrolytes, concomitant benzodiazepine abuse), the current treatment of choice is benzodiazepines, usually diazepam, following similar protocols to those in adults. This can be done either on a *fixed schedule* (doses are given at specified amounts and intervals) or, preferably, following a *symptom-triggered regime* (benzodiazepines are administered if the score in an alcohol withdrawal rating scale is above a specified cut-off). If there is severe agitation or hallucinations, the addition of haloperidol to diazepam may be helpful. Following successful withdrawal, it is essential to offer treatment for their alcoholism.

ALCOHOL USE DISORDER (AUD)

Alcoholic adolescents present specific challenges for therapists: they rarely seek treatment for alcohol misuse on their own accord but are brought by parents, or compelled by the school or the courts. In some countries, adolescents who violate alcohol policies (e.g., driving under the influence of alcohol, intoxication at school) are often ordered by the court or school authorities to undergo treatment. These individuals, often referred to as *mandated patients*, are at high risk for alcohol-related harm. There is evidence that mandated young people benefit from interventions as much as non-mandated individuals. Whether improvement is due to the intervention or to having been caught is unclear although both may play a role.

Teenagers are difficult to engage, usually don't want to stop drinking and don't see anything wrong with it. Building rapport, getting them to understand the risks of alcohol misuse and building motivation to change are essential first steps. Rather than a therapy, *motivational interviewing* is a widely accepted technique that can be used across most of the treatments mentioned to foster rapport and understanding of the risks of alcohol misuse; it seeks to enhance motivation to change by providing education and feedback and by exploring and resolving ambivalence. Family involvement in treatment results in better outcomes.

One of the advantages of treating AUDs is that one is able to objectively monitor consumption, i.e., abstinence. According to some treatment guidelines this "should be a routine part of the formal evaluation and ongoing assessment of substance use both during and after treatment" (Bukstein et al, 2005). Rather than having to rely on adolescents' reports, the advent of affordable breathalysers that can be used at home makes monitoring easier but their usefulness is limited to a few hours after alcohol is consumed and the adolescent should agree to the monitoring.

Goals of treatment vary according to country, therapy, therapist and patient. In some countries (e.g., US) treatment mostly seeks to achieve abstinence; other countries (e.g., some European countries) favour a *harm minimization* or *harm reduction* approach. Abstinence is the only effective option for many patients; however some who do not accept abstinence can achieve sensible drinking. The goal in AA is abstinence; the aim of other treatments can be abstinence or responsible use. Tailoring the treatment to the specific needs, personality and beliefs of the individual adolescent increases the likelihood of success.

Mandated patients

Individuals who have violated alcohol policies or laws and are ordered by the appropriate authority or court to undergo treatment for their alcohol misuse.

Stages of change

The stages of change model allows clinicians to understand the process whereby people move through different phases of readiness to change. These are:

- *Pre-contemplation*: not acknowledging that there is a problem that needs to be changed
- *Contemplation:* acknowledging that there is a problem but not yet wanting to make a change
- *Preparation/ determination:* getting ready to change – i.e., accepting treatment
- *Action*: changing behaviour – i.e., undergoing treatment
- *Maintenance*: maintaining the behaviour change – i.e., continuing with treatment/abstinence
- *Relapse*: return to former behaviours and abandoning the changes achieved

Responsible alcohol use

Drinking in a way that is unlikely to cause significant risk of harm to the individual or to others.

Table G.1.5. Summary of psychosocial treatments for alcohol use disorders and their effectiveness.

Treatment	Description	Evidence
Motivational enhancement therapy	Assumes that responsibility and capacity for change lie within the patient. The therapist provides individualized feedback about the effects of the patient's drinking. Working closely together, therapist and patient explore the benefits of abstinence, review treatment options, and design a plan to implement treatment goals.	The motivational interviewing technique — a key component of motivational enhancement therapy — was shown in adults to overcome patients' reluctance to enter treatment more effectively than did other conventional approaches.
Brief interventions	Up to 4 sessions, typically follows CBT principles and incorporates education, motivational interviewing, and individualised feedback. Often delivered opportunistically (e.g., following an alcohol-related motor vehicle crash).	Lump together a variety of interventions. Good evidence of effectiveness in adults, particularly in milder cases, but limited evidence in adolescents. There is concern about maintenance of gains over time.
Internet & cellular phone-based interventions	Much research interest and activity in this area. Mostly used to deliver brief interventions or to complement other treatments (e.g., face-to face). The better ones include education and individualised feedback.	Evidence beginning to emerge that they can be effective as part of a multimodal approach and if individualised feedback is provided. Cellular phone reminders appear to be effective in quitting smoking.
Family therapy	Assumes that the adolescent's behaviour is shaped (caused or reinforced) by family interactions. Therapies follow a variety of models.	The most widely practised and studied set of treatments in this age group but evidence of effectiveness is still limited.
Multy-systemic therapy	Delivered in adolescents' social environment (family, school, neighbourhood…) it provides intensive support seven days a week, 24 hours a day, and the treatments required (family, individual, pharmacological). Costly and resource-intensive.	There is evidence of effectiveness in complex cases with significant comorbidity (e.g., delinquency, conduct problems).
Contingency management	It follows operant conditioning principles by rewarding initiating treatment and maintaining abstinence. A key aspect is the availability of an objective measure of abstinence such as a negative breath test.	An attractive approach that empowers parents. The few studies available are promising but definite evidence is still lacking.
Cognitive behaviour therapy (CBT)	Individually or in conjunction with family therapy	CBT combined with family therapy obtains better results than CBT alone
Alcoholics Anonyms (AA)	"A fellowship of men and women who share their experience, strength and hope with each other that they may solve their common problem and help others to recover from alcoholism". The only requirement for membership is a desire to stop drinking (i.e., the goal is abstinence). AA follows a 12-steps program. Few AA groups for adolescents. AA attendance is often encouraged in multimodal treatments.	Some evidence of effectiveness in adults but limited research available in adolescents.
Multi-modal treatments	Treatment in practice is often multimodal, for example including family therapy, contingency management and AA attendance.	Multimodal treatments usually more effective than their unimodal counterparts.

Contingency management

Following Stanger et al (2009), a program of this kind would involve: (1) assessment of the problem; (2) adolescent and parents formally agreeing to undertake the program under the supervision of the clinician; (3) a detailed schedule of incremental voucher-based monetary or other rewards for consecutive negative breathalyser readings (parents would be expected to purchase or borrow a personal breathalyser) for the length of the treatment (e.g., 3 months). Because poor parental support and participation in treatment can become a barrier, parents may be rewarded also for their participation.

Because adolescent drinking takes place mostly during unsupervised time outside school, the breathalyser is used twice weekly at the parent's discretion when the adolescent arrives home from situations in which drinking might have taken place. The first negative breathalyser reading is rewarded, for example, with a $2 voucher, with $2 increments for each consecutive negative breath test. There is also a $10 bonus for each three consecutive negative tests. Vouchers are reset back to their initial value if results are positive, from which they can escalate again after an agreed number of consecutive negative results (e.g., three).

Example: 1st negative test: $2; 2nd negative test: $4; 3rd negative test: $6 + $10 (bonus for three consecutive negative tests); 4th test positive: $0, reward schedule is reset; 5th test negative: $0; 6th test negative: $0; 7th test negative: $0; 8th test negative: $2; 9th test negative: $4 etc. Voucher earnings can be redeemed for goods selected by the adolescent (e.g., movie passes, hobby equipment, items of clothing) but not for cash.

Psychosocial treatments

Psychosocial treatments for AUD and their effectiveness are summarised in Table G.1.5. *Brief interventions* are popular because of their short duration (from a few minutes to a few sessions) and appropriate in adolescents – in whom alcohol use is often not severe or entrenched. Short interventions are recommended in primary care settings or hospital emergency departments for individuals whose presenting complaint is not primarily an alcohol problem, although it may be alcohol-related such as a car accident (*opportunistic intervention*).

Youth and AA

There is particular interest and growing research on electronic options for the delivery of treatment for AUD. Internet and cellular phone-based treatments have features highly valued by teenagers (convenience, privacy, minimise stigma, use a medium in which young people feel comfortable) and governments (cheaper than face-to-face or group treatments, can reach many people); the issue is whether they are effective. Although evidence is still limited, it would appear that programs that among other features provide individualised feedback are effective in reducing excessive drinking and alcohol-related problems. That is, individualised feedback is a key element in effective programs.

According to Deas and Clark (2011), *contingency management therapies*, which are based on operant conditioning principles, may be a useful intervention. Contingency management provides incentives for initiating treatment and maintaining abstinence with vouchers for monetary and other rewards (appropriate to the socioeconomic conditions of the country and family but attractive enough to generate significant motivation in most adolescents); optimally, it requires the active involvement of the family. A key ingredient is an easy to use, reliable and objective measure of abstinence such as a negative breathalyser result.

AA initially attracted severely impaired middle-aged and older individuals. More recently, AA has begun to attract increasing numbers of young people and has begun to publish youth-specific literature. Younger patients with SUD differ from adults in that they are often less motivated for treatment, less likely to seek abstinence, and have less severe alcohol use, which makes their engagement with 12-step programs more difficult. However, adolescents do attend AA and positive outcomes appear to be associated with attendance (Kelly & Yeterian, 2011).

Is naltrexone effective for alcoholism?

Click on picture to watch David Sack MD discuss this issue.

Pharmacological treatments

Psychosocial interventions are the mainstay of AUD treatment in young people. The persistence of long-term craving in alcoholics, even after prolonged abstinence, often triggers a relapse. Craving is thought to be maintained by neuronal changes in addicted individuals, these changes may be amenable to

Table G.1.6. Pharmacological agents used to treat AUD.

Medication (dose*)	Comments
Disulfiram (start with 125mg/day, gradually increase to a maximum of 500mg/day)	An alcohol-sensitizing drug that has been available for a long time and may be a deterrent for drinking in patients willing to take it. If patients drink alcohol, the drug produces an unpleasant reaction.
Naltrexone (start at 25 mg/day for two days and increase to 50 mg per day)	Helps to prevent relapse among abstinent alcohol dependent individuals who are simultaneously undergoing psychosocial therapy. Naltrexone is only effective if taken on a regular basis. There is an extended-release preparation available in some countries requiring one monthly injection (watch for reaction at the injection site). Conduct liver function tests before prescribing as naltrexone can impair liver function tests; if liver function results are more than five times normal limits, proceed cautiously. Opioids should not be consumed while taking naltrexone.
Acamprosate (666 mg three times daily)	In one study, more than twice as many alcohol dependent individuals receiving acamprosate remained abstinent up to 1 year compared with participants receiving psychosocial treatment alone. Side effects include diarrhoea, dizziness, flatulence, loss of appetite, nausea, and trouble sleeping.
Other	Other promising agents currently being researched include *topiramate*, *ondansetron*, *baclofen*, and the *SSRIs*.

*These are the recommended doses for adults.

pharmacological intervention and have become a focus of intense research. So far, there is very limited data on adolescents, results being extrapolated from adult populations with all the limitations this entails. For example, there is little information about optimal dosage in adolescents.

The first proviso in the pharmacological management is that medication is effective only if administered as part of a comprehensive, multimodal treatment package and once the patient has stopped drinking. The second is that many factors need to be taken into consideration when prescribing for adolescents, weighing the potential risks and benefits of medication in a developing brain against the hazards of continuous alcohol use. Finally, medication is indicated only in addicted individuals, typically those who show craving, tolerance or withdrawal symptoms.

Pharmacological agents used to treat AUD are summarised in Table G.1.6. *Disulfiram* has been around for a long time and can be helpful especially when there is supervised dosing and the person is motivated. It is an aversive treatment that produces an unpleasant reaction if the individual taking it consumes alcohol. Disulfiram blocks the enzyme acetaldehyde dehydrogenase resulting in high concentrations of acetaldehyde in the blood. The person experiences flushing of the face, headache, low blood pressure, palpitations, dizziness, nausea and vomiting. All the other medications listed seek to reduce craving. Medications are effective only if taken regularly, so that patients' adherence and cooperation are essential. For more information see Johnson (2011).

Click on the picture to access a variety of resources from the NIAAA's *Helping Patients Who Drink Too Much: A Clinician's Guide and Related Professional Support Resources* site (some are also available in Spanish).

PREVENTION

The amount of alcohol-related harm in a society and the proportion of people who consume hazardous levels of alcohol are closely related to the overall or per capita consumption. However, most alcohol-related harm takes place not in the heaviest drinkers but in those whose consumption is at lesser levels. Though the evidence in favour of *universal* preventative measures that reduce overall

A car crash on Jagtvej in Copenhagen, Denmark. Source: Wikimedia Commons

Drink driving

There is considerable evidence that drink-driving accidents and fatalities can be reduced by:

- Lowering the legal concentration of alcohol in the blood while driving
- Systematic random breath-testing (when police regularly stop drivers to check BAC through breath testing)
- For repeat drink drivers, mandatory treatment and the use of an ignition interlock (mechanical device that does not allow a car to be driven by a driver who is over the legal alcohol limit).

(Source: Anderson et al, 2009)

alcohol consumption is compelling, whether it is better to concentrate on universal interventions or to target specific groups at high risk of harm (*targeted prevention*) remains contentious. The two approaches can and should be combined. Legislative measures illustrate the former while preventive programs in schools illustrate the latter.

LEGISLATIVE MEASURES

Most societies seek to manage or prevent the harm resulting from alcohol use through a variety of policies that range from total prohibition to a range of restrictions. Legislative strategies include laws that regulate minimum drinking age, driving under the influence of alcohol (drink driving), price of alcoholic beverages, availability of alcohol (alcohol outlets, their concentration, days and hours of sale), and marketing and advertising.

Minimum drinking age laws

Minimum drinking age laws stipulate who can purchase or consume alcoholic beverages. The legal drinking age usually refers to the minimum age at which alcohol can be consumed in licensed premises (bars, restaurants), which may be the same or different from the minimum age at which alcohol can be purchased. These laws do not usually apply to consumption at home. The minimum drinking age in most countries is 18 years (21 in the US). A few countries do not have minimum drinking age laws (e.g., Albania, Armenia, Azerbaijan, Fiji, Ghana, Jamaica, Kyrgyzstan, Morocco, Togo, Tonga, Vietnam).

Drink driving laws

In 1936, Norway passed the world's first law making an offense to drive with more than a specified amount of alcohol in the blood. Nowadays almost all countries outlaw driving a motor vehicle with BAC above specified levels, which vary according to country (e.g., 0.08/100ml in the US, Canada and the

UK; 0.05/100ml in Australia, France and Germany; 0.04/100ml in Lithuania; 0.03/100ml in Russia; 0.02/100ml in China, Norway and Sweden; 0.0/100ml in Brazil, Iran and Saudi Arabia).

All the measures that reduce alcohol consumption contribute to a greater or lesser extent to reduce alcohol-related road traffic accidents, particularly in young people. The risk of being involved in a crash is greater for the young at all BAC levels. Among US drivers with a BAC level of 0.08% or higher involved in fatal crashes in 2008, more than one third were between 21 and 24 years of age.

Designated driver programs seek to reduce alcohol-related accidents by providing a safe transportation for those who have been drinking. It is still unclear whether they lead to a reduction in drink driving or AUDs

Pricing policies

Minimum pricing means that alcoholic beverages cannot be sold for less than a set amount per unit of alcohol contained. Young people who drink and those who drink harmful amounts tend to choose cheaper beverages when prices increase. Establishing a minimum price per unit of alcohol would limit the ability of these groups to trade down to cheaper products.

A rise in alcohol price leads to less alcohol consumption and less alcohol-related harm, and vice versa. Young drinkers are very sensitive to price increases. Price rises:

- Delay the age when young people start drinking
- Reduce the number of drinking bouts
- Reduce the amount of alcohol consumed on each occasion
- Slow progression towards drinking larger amounts.

Availability of alcohol

There is good evidence that legislation to control the number of alcohol outlets, their concentration, and days and hours of sale influence alcohol related problems.

Marketing and advertising

Marketing and advertising of alcoholic beverages has become increasingly sophisticated and is globally worth many billions of dollars annually. It often targets young people through linking alcohol brands to sports and cultural activities, sponsorships and product placement. Restrictions placed on alcohol marketing and advertising reduce this effect, and data suggest that children and young people should be protected as much as possible. Thus restrictions are placed on, for example, sport sponsorship, and bans on television advertising at times when children and young people are more likely to watch or during children's programs.

PREVENTON PROGRAMS

Exposure to alcohol during early adolescence is associated with poorer outcomes in adulthood. However, many of the adolescents who use alcohol early also have a history of other problems (e.g., behaviour problems), which raises the question of whether early exposure to alcohol leads by itself to poorer outcomes or whether this only happens in adolescents who are already at risk through their pre-existing difficulties. Research evidence shows that early consumption of alcohol

Supervised drinking

There is a widespread belief particularly in *wet* countries that allowing adolescents to drink under adult supervision at family gatherings is a way of teaching them responsible drinking. Research has shown this not to be the case: adult-supervised drinking results in higher levels of harmful alcohol use in adolescents (McMorris et al, 2011). The later adolescents start drinking alcohol the better. Certainly they should not start before the age of 15 years.

ESPAD (Hibell et al, 2009) reports that among 16 year old European students, binge drinking is most prevalent (60%) in Denmark and the Isle of Man. Malta, Portugal, Estonia, Latvia and the UK also display high rates (around 55%). On average, binge drinking is more frequent among boys than girls (47% versus 39%) but in Iceland and Norway more girls than boys report binge drinking. ESPAD shows a clear increase (9%) in binge drinking from 1995 to 2007, mostly due to increasing rates among girls.

In the US, binge drinking among 12th graders peaked in 1979 (at about the same time as overall illicit drug use). Subsequently, it remained steady for a few years before declining substantially (from 41% in 1983 to a low of 28% in 1992). In 2010, 28% reported having been drunk in the past 30 days. Disapproval of binge drinking has also increased (Johnston et al. 2011).

by itself leads to worse adult outcomes (Boden & Fergusson, 2011; Odgers et al, 2008). Thus, interventions that delay the age of onset of drinking, reduce the amount of alcohol consumed and risky drinking patterns (e.g., binge drinking), will lessen the harm of alcohol.

School-age alcohol use is widespread in most western countries. So, it is not surprising that governments and communities seek to prevent or reduce alcohol consumption among students. Also, schools are optimal settings for the delivery of alcohol prevention programs because: (a) most individuals begin using alcohol during their school years; (b) schools provide an efficient way of reaching almost all young people; and (c) schools can implement a broad range of educational and disciplinary measures (Rey & Saltz, 2011).

Prevention programs can be *specific* (i.e., focus on alcohol) or *generic* (deal with a variety of behaviours and substances such as tobacco, alcohol, cannabis etc.). According to a recent review (Foxcroft & Tsertsvadze, 2011), generic programs based on psychosocial or developmental approaches are more likely to report longer term benefits than other interventions. Thus generic programs should be preferred over alcohol-specific ones. Those with better evidence of effectiveness are currently the *Unplugged* program (Caria et al, 2011), and the *Good Behaviour Game*. All require training.

To be successful schools need to adopt a sophisticated approach to prevention that includes universal, selective and indicated approaches (see Chapter A.8). Prevention programs, apart from being tailored to the circumstances of the specific age group, need to:

- Increase knowledge of the harm alcohol use can cause, physically, mentally and socially (including legal consequences)
- Provide opportunities to explore attitudes to and perceptions of alcohol use
- Help students develop decision-making, assertiveness, coping and expressive skills
- Increase awareness of how the media, marketing, role models as well as the views of parents, peers and society can influence alcohol use
- Provide personalized feedback.

A *whole school* approach (i.e., involving staff, parents and pupils) to alcohol is likely to be the most successful. In addition, schools should offer parents information about where they can get help to develop their parenting skills.

Schools also need to have in place mechanisms to identify students who are drinking or drinking excessively, to offer them brief, individual, evidence-based interventions by appropriately trained personnel or referral to external services. Violations of school alcohol policies may result in attending mandatory education or treatment programs. Medical amnesty (*Good Samaritan*) policies may lessen the risk of harm in case of alcohol poisoning.

Good Samaritan laws seek to protect from liability individuals who help others who are injured or ill, to reduce bystanders' hesitation to assist. In this context, they are policies protecting students from disciplinary action regarding alcohol and drug use if they seek medical help (also known as *Medical Amnesty Policies*).

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