



MODULE 16: BLOOD ALCOHOL CONCENTRATION LIMITS

Summary:

- Alcohol consumption impairs reaction time in a dose-dependent manner: The more a person consumes, the slower his or her reaction time becomes.
- The inability to make quick decisions under the influence of alcohol increases the likelihood of involvement in road traffic crashes.
- The setting of blood alcohol (BAC) limits is an effort to prevent impairment and resulting accidents and injuries.
- Most countries around the world have legislation around blood alcohol content, ranging from 0.0 mg/ml to 0.8 mg/ml. Punitive measures for those above the set limit also vary among countries.
- In some countries, lower BAC limits are set for young, inexperienced drivers and/or for operators of commercial vehicles.
- BAC limits alone are insufficient to prevent problems; enforcement through breath and blood tests is needed to ensure compliance.
- For [EXAMPLES OF TARGETED INTERVENTIONS](#), see the Blue Book index page of www.icap.org.

Alcohol consumption is known to impair reaction time and affect an individual's ability to execute a range of motor tasks (Grant, Millar, & Kenny, 2000; Parks et al., 2002; Roldán, Frauca, & Duenas, 2003). Driving is an activity that requires precision, relying heavily on motor skills, reflexes, and the ability to make quick decisions. Reaction time of an inebriated driver may be reduced by 10%–30% as compared to a sober individual. In addition, vision is blurred and the judgment of distance, speed, and hazards is impaired (Davis, Quimby, Odero, Gururaj, & Hijar, 2003).

A person's risk of being involved in a fatal traffic crash increases with the amount of alcohol consumed (Borkenstein et al., 1964; Moskowitz, Blomberg, Burns, Fiorentino, & Peck, 2002; Moskowitz & Fiorentino, 2000; Mounce & Pendleton, 1992). There is evidence that even drivers with a blood alcohol concentration (BAC) level between 0.2 and 0.4 mg/ml are 1.4 times more likely to be involved in crashes than those who have not been drinking; for individuals whose BAC is between 1.0 and 1.4 mg/ml, the likelihood increases 48 times. Similarly, involvement in fatal crashes is 11 times more likely for drivers with BAC levels between 0.5 mg/ml and 0.9 mg/ml, compared with drivers who have not consumed alcohol (Zador, 1991; Zador, Krawchuk, & Voas, 2000).

Measures have been put in place around the world to attempt to reduce the incidence of road traffic crashes and to prevent those who are intoxicated from driving (see [MODULE 15: Drinking and Driving](#)). One of these measures, specifically targeted at drinking and driving and implemented in most countries around the world, relies on the establishment of legally defined BAC limits (International Center for Alcohol Policies, 2002; Österberg & Karlsson, 2003; World Health Organization, 2004).

Defining BAC

A person's BAC level is represented by the amount of ethanol in a given amount of blood. It is measured as either grams of ethanol per deciliter of blood (g/dl), used in the United States, or milligrams of ethanol per milliliters of blood, used in much of Europe (International Center for Alcohol Policies, 2002).

There are various means of determining an individual's BAC level, the most common and inexpensive of which is by measuring the alcohol in an exhaled sample of breath, BrAC (Jones, 1990). Law enforcement personnel can administer this test quickly on the scene where alcohol intoxication is suspected. Other tests measure alcohol content in bodily fluids and are generally carried out in clinics or laboratories. While blood samples offer a more reliable measure of alcohol content, both urine and blood samples are less practical from an enforcement point of view as they do not provide immediate results. In addition, in the time needed to reach a clinic or other testing site, an individual's BAC may drop, resulting in a lower reading.

As with alcohol's effect on the body in general, BAC levels are influenced by a number of factors that include drinking patterns (Gentry, 2000a, 2000b; International Center for Alcohol Policies, 2001; Kalant, 2000; Li et al., 2000; Thomasson, 2000). How much alcohol an individual has consumed and over what period of time determine BAC levels as a function of absorption and metabolism rates. An individual's weight, gender, health, and food intake affect the levels of blood alcohol that are reached (see [ANNEX 2: The Basics about Alcohol](#)). In general, BAC increase is less rapid with greater body weight and with food intake, and is less rapid in men than in women.

Policy considerations

International policies

Most countries around the world have taken steps to minimize the potential harm that can result from impaired driving by setting maximum legally permissible BAC levels for drivers (International Center for Alcohol Policies, 2002; Österberg & Karlsson, 2003; Stewart, 2000; World Health Organization, 2004). These levels are generally defined by governments, based on best available evidence about risk and the effects of alcohol on the ability to perform certain tasks. Other factors also play a role, including public convenience, the cultural acceptability of drinking, and the palatability of legislation measures. How information about BAC levels is communicated in different countries and how limits are enforced also differs worldwide.

Established maximum legal BAC levels range from 0.0 mg/ml—the level of “zero tolerance”—to 0.8 mg/ml. Only a handful of countries do not set a legal BAC threshold. Out of all nations reporting to a WHO survey published in 2004, 28% set their BAC limit at a “lower” level (0.0–0.3 mg/ml), 39% set limits at a “middle” level (0.4–0.6 mg/ml), and 26% have adopted a “higher” limit (0.6 mg/ml and above). Only 7% of countries did not legislate a maximum permissible BAC level (World Health Organization, 2004). **Table 16.1** offers examples of BAC levels in effect in a number of countries around the world.

Special considerations

Research shows that, for young people under the age of 21, smaller increases in BAC level raise the likelihood of more serious outcomes in terms of road traffic crashes than for older individuals (Hingson & Kenkel, 2004; Zador, 1991). As a result, in some countries a more restrictive limit for younger or less experienced drivers may be imposed (Blomberg, 1992). The countries that have applied special lower limits for younger people or other less experienced drivers include Australia, Austria, Canada, Macedonia, New Zealand, Russia, Slovenia, Spain, and the United States (International Center for Alcohol Policies, 2002; Österberg & Karlsson, 2003; Stewart, 2000).



BAC limits are not confined exclusively to drivers of automobiles. In some countries, operators of various forms of recreational vehicles, including bicycles, snowmobiles, and personal aircraft are also required to conform to BAC limits (International Center for Alcohol Policies, 2002). In many instances, special legislation or regulations set even lower BAC limits for operators of commercial vehicles, airline pilots, drivers of buses, trucks, and taxis, as well as captains of ships, who are responsible for the safety of the passengers they convey. BAC limits for these individuals may be set at the national level, but standards are also determined at the international level by specialized authorities, such as those overseeing aviation or trucking. In addition, individual airlines or transportation companies may have their own limits for BAC levels of their pilots and drivers, often at the “zero tolerance” level (International Center for Alcohol Policies, 2002).

Table 16.1 Standard BAC Limits ¹

COUNTRY	STANDARD BAC (mg/ml)	COUNTRY	STANDARD BAC (mg/ml)
Albania	0.1	Lithuania	0.4
Argentina	0.5	Luxembourg	0.8
Armenia	0	Malta	0.8
Australia	0.5	Moldova	0.3
Austria	0.5	The Netherlands	0.5
Azerbaijan	0	New Zealand	0.8
Belarus	0.5	Norway	0.2
Belgium	0.5	Peru	0.5
Bosnia and Herzegovina	0.5	Poland	0.2
Bulgaria	0.5	Portugal	0.5
Canada	0.8	Romania	0
China	0.3	Russian Federation	0.2-0.5
Croatia (Republic of)	0	Singapore	0.8
Czech Republic	0	Slovak Republic	0
Denmark	0.5	Slovenia	0.5
Estonia	0.2	South Africa	0.5
Finland	0.5	South Korea	0.5
France	0.5	Spain	0.5
Georgia	0.3	Sweden	0.2
Germany	0.5	Switzerland	0.8
Greece	0.5	Thailand	0.5
Hungary	0	Turkey	0.5
Iceland	0.5	Turkmenistan	0.3
Ireland	0.8	United Kingdom	0.8
Israel	0.5	United States	0.8
Italy	0.5	Zimbabwe	0.8
Japan	0.3		

¹ A regularly updated table listing BAC limits worldwide is available in the “Policy Issues: Drinking and Driving” section of the ICAP Web site:

<http://www.icap.org/PolicyIssues/DrinkingandDriving/BACTable/tabid/199/Default.aspx>.

Setting BAC levels

Social attitudes about drinking and driving vary considerably among countries, and are closely related to cultural views about both activities. These views influence laws on impaired driving, compliance with such laws, and their enforcement.

Due to the high social costs associated with drunk driving, there is currently a trend to make BAC levels more stringent in many countries (Assum, 2002). There is evidence that such reductions may serve to discourage more individuals from drinking and driving.

While these changes may have some influence in reducing impaired driving among the population at-large, studies show that the so-called “hard-core” drunk-drivers and recidivist drunk-drivers may be entirely indifferent to BAC level legislation. Thus, other strategies targeting this group may need to be developed (Simpson, Beirness, Robertson, Mayhew, & Hedlund, 2004; Simpson, Mayhew, & Beirness, 1996). For example, a lower permissible BAC level or even a 0.0 mg/ml level, coupled with harsher penalties, may be indicated for individuals who have been convicted of drunk driving offences (Hingson, Heeren, & Winter, 1998; The Century Council, 2004).

Prevention, enforcement, and punitive measures

BAC legislation—like any other policy measure applied by itself—cannot be expected to change behaviors and reduce harm in isolation. Research suggests that factors such as the increased enforcement of BAC laws and raised public awareness about the dangers of impaired driving are in part responsible for decreases in related offenses and can thus enhance the effectiveness of such legislation (Apsler, Char, Harding, & Klein, 1999; Bartl & Esberger, 2000; Jones & Lacey, 2001; Kruger & Vollrath, 2004; Mann et al., 2001; The Century Council, 1998). Education efforts to achieve changes in awareness and behavior are necessary adjuncts to implementing laws on BAC ([MODULE 1: Alcohol Education](#)). For example, public education campaigns that promote awareness about local BAC limits have shown positive results (Blomberg, 1992). Such campaigns have been implemented through governments, advocacy groups, traffic safety organizations, and also through the beverage alcohol industry and related organizations, such as social aspects organizations and trade associations.

Consistent and visible enforcement is another powerful deterrent to impaired driving. Enforcement exists in a number of forms—including breath testing (restricted and random), sobriety checkpoints, police patrols, and officer training (e.g., British Medical Association, 1996; Mathijssen & Wesemann, 1992; Stewart & Sweedler, 1997). Of countries that report the use of random breath tests, however, only 23% frequently rely on this measure, while 32% apply it sometimes, and 16% employ it rarely (World Health Organization, 2004). Thirty percent of countries do not use random breath tests at all to enforce BAC legislation. Further analysis shows that countries with limits in the lower and middle ranges are more likely to apply random breath testing as an enforcement measure than countries in which BAC limits are higher (0.6 mg/ml and above).

Enforcement of BAC level legislation can occur on the spot where impairment is suspected or an accident has occurred but need not be restricted to the roadside. An additional relevant location for enforcement can be the hospital emergency room. Studies point to the fact that few drivers admitted to the hospital after a traffic crash involving alcohol are actually arrested or punished even when laboratory evidence shows their BAC level exceeds the legal limit (Cydulka, Harmody, Barnoski, Fallon, & Emerman, 1998; Goldman, Harchelroad, & Knapp, 1998).



The type and severity of punishment for convicted impaired drivers also varies widely. Punitive measures range from mandatory educational programs to monetary fines—which often rise with multiple convictions or are relative to the income of the offender (Stewart, 2000)—to jail sentences and automatic license suspension. In some countries, the appropriate penalty is determined by the level of an offender’s BAC (International Center for Alcohol Policies, 2002; Österberg & Karlsson, 2003; Rehn, Room, & Edwards, 2001). License suspension is often an immediate administrative action without judicial procedures and is intended as a rapid and effective response to public danger (Apsler et al., 1999). Other approaches include visits to morgues or hospitals to view and speak with victims of drink-driving crashes or their relatives. In the case of recidivist drunk drivers, those who are repeat offenders, ignition interlock devices may be used in their automobiles, which require that a breath test be taken to start the engine (Beirness, 2001; The Century Council, 2004; Voas, Blackman, Tippetts, & Marques, 2002).

Conclusion

The establishment of maximum BAC levels and measures to ensure compliance and enforcement has been shown to reduce the incidence of crashes caused by impaired drivers. However, government commitment to the identification and implementation of country-specific solutions to deter impaired driving is a crucial factor. Without effective legislation and consistent government support these and other measures may have little long-term impact.

Setting maximum BAC levels should be perceived as a means of reducing harm associated with alcohol consumption. Laws on maximum BAC levels are an important component in a country’s overall strategy toward drinking and driving. However, there is much that can be done outside of strict legislative and punitive measures. For example, public education campaigns, implemented through a variety of channels, are useful in raising awareness about the dangers of drunk driving, as well as about BAC levels and legal limits for drivers. Without enforcement by local authorities and police and a commitment to punishing the guilty, legislation on impaired driving is virtually meaningless. Unless offenders are effectively deterred, impaired driving is not likely to decrease.

POLICY OPTIONS: Blood Alcohol Concentration (BAC) Limits

In developing policies and approaches, consideration of a number of key elements is required. While some may be necessary at a minimum and under most conditions, others may not be appropriate in all cases, or may be difficult to implement. The list below offers a menu of areas that need to be addressed, based on effective approaches that have been implemented elsewhere. Specific examples are provided in the [EXAMPLES OF TARGETED INTERVENTIONS](#) section of the *ICAP Blue Book*.

Policies

Development of **clearly defined maximum legal blood alcohol concentration (BAC)** level.

- Consideration of best available evidence on the relationship between BAC and risk for harm.
- Attention to cultural views on drinking and driving and palatability of policy measures (see also [MODULE 15: Drinking and Driving](#)).
- Internationally, BAC levels range from 0.0 mg/ml to 0.8 mg/ml.

Thresholds for **BAC may vary** depending on the type of vehicle or mode of transportation.

- Lower thresholds or a BAC limit of 0.0 mg/ml may be set for operators of commercial vehicles (e.g., buses, trucks, taxis) or for airline and ship pilots and train operators.
- BAC limits for recreational vehicle use (e.g., snowmobiles, powerboats) may be considered.

BAC levels may also vary with **drivers' age**. Legal BAC limits for young or inexperienced drivers may be set at lower levels than for the general population.

Education and prevention

Create **awareness** around drinking and driving and BAC.

- Provide information on risks of drinking and driving.
- Ensure knowledge among population of BAC limits and penalties for non-compliance.
- Engage broad range of partners in disseminating messages, including government authorities, police, retail and hospitality industry, advocacy groups, industry groups, schools.
- Special measures such as ignition interlock devices for repeat drunk drivers.

Ensure availability of **alternative transportation** or access to **designated drivers** (see also [MODULE 15: Drinking and Driving](#)).

Enforcement and punitive measures

Availability of **consistent and visible enforcement**.

- Training of police and provision of adequate resources to enforce BAC legislation.
- Use of measures including breath testing (restricted and random, depending on acceptability), sobriety checkpoints.
- Awareness of enforcement among population.
- Enforcement may be implemented on-site or elsewhere—e.g., in emergency rooms.

Implementation of **well-defined punitive measures**.

- Punishment may depend on level of BAC and degree of infraction.
- More severe penalties may apply to repeat offenders.

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