# The role of drugs in road safety

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## Summary

**Drug use is increasingly associated with road accidents. While alcohol and illicit substances dominate, a number of prescription drugs contribute to injury and death. Most drugs do not significantly increase the risks of accidents if they are taken as prescribed, however a number of commonly used drugs can impair the ability to drive safely. Awareness that some drugs affect driving will help to reduce their potential impact on road safety.**

Key words: benzodiazepines, drug abuse, road trauma.

*(Aust Prescr 2008;31:33–5)*

## Introduction

Western countries, including Australia, have seen a substantial increase in the availability and use of drugs over the last 30 years. This applies to both medicines and illicit substances. Their use and their increasing prevalence in road trauma have been subject to considerable debate. This debate comes on top of the perennial battle to reduce the road trauma caused by alcohol.

## Driving skills

Drugs can affect a number of brain functions that adversely influence the ability to drive safely (see box). These can be best categorised as psychomotor and cognitive functions. Psychomotor skills include reaction times and hand-eye coordination while the ability to make appropriate decisions relates to cognitive skills. Foremost among the skills required for safe driving are vigilance, and the ability to interpret traffic situations and to divide attention between tasks.[1] The driver's behaviour and attitude also contribute to the risk of having an accident.

A large range of substances are known to impair the cognitive or psychomotor skills required for safe driving. Any drug acting on the central nervous system has the potential to adversely affect driving skills. Central nervous system depressants reduce vigilance, increase reaction times and increase errors associated with decision making and speed control in a very similar manner to alcohol. Drugs that affect behaviour may exaggerate adverse behavioural traits and risk-taking behaviour.

## Alcohol and illicit drugs

Alcohol continues to be the most prevalent drug causing road trauma. In Australia, its prevalence in road fatalities is 25–30% depending on the jurisdiction. The average blood alcohol concentration in fatal accidents is over 0.15%.

Cannabis (marijuana) is the second most common drug (found in about 15% of fatalities in Victoria), followed by the amphetamine-type stimulants (4%) and opioids (4%). Illicit drugs are present in almost 20% of drivers killed in Victoria.[2] A survey of almost 500 injured drivers admitted to a major road trauma hospital found that cannabis products were present in 46%, opioid analgesics in 11% and amphetamines in 4%.[3]

During the acute phase of activity, central nervous system stimulants such as the amphetamines and cocaine tend to reduce performance on divided attention tasks, cause tunnel vision and increase risk taking. They can also cause rebound fatigue, inattention and hypersomnolence when the stimulatory effects wear off.

There is now substantial evidence to link cannabis and amphetamine use to an increased crash risk.[4] This has led to a number of states in Australia adopting countermeasures, such as random drug testing, to reduce drug-driving.

## Prescribed drugs

With the exception of benzodiazepines the evidence for the role of prescribed drugs in road trauma is uncertain. In general, most drugs tend not to be significant risk factors on the road when the drugs are used as prescribed.

Some drugs can cause impairment due to their central nervous system depressant properties, particularly early in treatment

### A selection of skills and attributes required for safe driving

Attentiveness and concentration

Vigilance

Divided attention skills (performing two or more functions simultaneously)

Visual fields and acuity

Hand-eye and foot-eye coordination

Reaction time

Tracking (ability to maintain lane control)

*Table 1*

**Medicines that may impair driving skills**

| Drug | Risk of causing impairment * |
|---|---|
| Anticonvulsants (such as carbamazepine, gabapentin, phenobarbitone, phenytoin, valproate, vigabatrin) | Moderate to high |
| Antihistamines | Moderate to high |
| – sedating (such as azatadine, chlorpheniramine, cyproheptadine, diphenhydramine, promethazine, doxylamine, trimeprazine) | |
| – less sedating (such as cetirizine, desloratidine, fexofenadine, loratidine) | Low to moderate |
| Antipsychotics (such as amisulpride, chlorpromazine, haloperidol, pericyazine, clozapine, olanzapine) | Moderate to high |
| Benzodiazepines and related compounds (such as temazepam, nitrazepam, oxazepam, alprazolam, clonazepam, diazepam, zolpidem, zopiclone) | Moderate to high |
| Drugs for diabetes | Low to moderate |
| Muscle relaxants (such as baclofen, dantrolene, orphenadrine) | Moderate |
| Opioid analgesics (such as codeine, buprenorphine, methadone, morphine, oxycodone, pethidine, tramadol) | Moderate to high |
| Serotonin, mixed reuptake inhibitors and reversible monoamine oxidase inhibitor antidepressants (such as fluoxetine, sertraline, paroxetine, citalopram, venlafaxine, moclobemide) | Low |
| Tricyclic and tetracyclic antidepressants (such as amitriptyline, clomipramine, dothiepin, doxepin, imipramine, trimipramine, mianserin, mirtazapine) | Moderate to high |
| Sympathomimetics (such as pseudoephedrine, phenylephedrine) | Low to moderate |

* These risks relate to possible situations when the drug or a member of a drug class is used incorrectly or abused. Risk of significant impairment usually only occurs early in treatment.

before the patient becomes accustomed to the drug, or when the drug is misused.[5] Table 1 shows some prescription drugs and their relative risk of causing impairment. The most common examples seen in road trauma are the anticonvulsants and the antidepressants, but their presence does not necessarily mean that they had a contribution to the crash.

In many cases two or more impairing drugs including alcohol are detected. Combinations of drugs increase the opportunity for impairment and the risk of a serious crash.

## Benzodiazepines

Benzodiazepines are well known to increase the risk of a crash.[6,7] They are found in about 4% of fatalities[4] and 16% of injured drivers taken to hospital.[3] In many of these cases benzodiazepines were either abused or used in combination with other impairing substances. When abuse occurs, the drugs may not have been prescribed to the person concerned. The illicit trade in these drugs is significant and they are often obtained by 'doctor shopping'. Medical practitioners do need to be aware of this possibility when prescribing benzodiazepines and the related hypnotics zolpidem and zopiclone. If a hypnotic is needed a shorter-acting drug is preferred. Tolerance to the sedative effects of the longer-acting benzodiazepines used in the treatment of anxiety gradually reduces their adverse impact on driving skills.

## Antidepressants

Although the antidepressants are one of the more detected drug groups in fatally-injured drivers, this tends to reflect their wide use in the community. The ability to impair is greater with sedating tricyclic antidepressants, typified by amitriptyline and dothiepin, than with the less sedating serotonin reuptake inhibitors. However, antidepressants can reduce the psychomotor and cognitive impairment caused by depression and return mood towards normal. This can improve driving performance.

## Antipsychotics

This diverse class of drugs can improve performance if substantial psychotic-related cognitive deficits are present. However, most antipsychotics are sedating and have the potential to adversely affect driving skills through blockade of central dopaminergic and other receptors. Older drugs such as

chlorpromazine are very sedating due to their additional actions on the cholinergic and histamine receptors. Some newer drugs are also sedating, such as clozapine, olanzapine and quetiapine, while others such as aripiprazole, risperidone and ziprasidone are less sedating. Sedation may be a particular problem early in treatment and at higher doses.

### *Opioids*

There is little direct evidence that opioid analgesics such as hydromorphone, morphine or oxycodone have direct effects on driving behaviour. Cognitive performance is reduced early in treatment, largely due to their sedative effects, but neuroadaptation rapidly sets in. This means that patients on a stable dose of an opioid may not have a higher risk of an accident. This includes patients on buprenorphine and methadone for their opioid dependency, providing the dose has been stabilised after some weeks and they are not abusing other impairing drugs. Driving at night may be a problem due to the persistent miotic effects of these drugs reducing peripheral vision.

### *Drugs for diabetes*

Hypoglycaemia can be a significant problem. The drugs themselves have no major effect on skills, but how well they control blood glucose will affect driving performance.

## Advice to patients

The product information of some drugs contains a precaution about driving. This caution may also be given on the label the pharmacist attaches to the prescription. For many drugs, once patients are stabilised, their potential low risk of causing significant impairment is offset by their therapeutic benefit. Nevertheless, it is necessary to appropriately warn patients about the dangers of driving a motor vehicle early in treatment and when the patient is not mentally alert possibly due to persistent drug effects. Moreover, patients driving at night or working shifts where normal sleep patterns are altered are also at an increased risk of fatigue-related crashes. Many drugs can exacerbate the effects of sleep deprivation and increase the risk of a crash. Taking drugs with alcohol increases impairment of driving skills.

## References


1. Ramaekers JG, Berghaus G, van Laar M, Drummer OH. Dose related risk of motor vehicle crashes after cannabis use. Drug Alcohol Depend 2004;73:109-19.
2. Drummer OH, Gerostamoulos J, Batziris H, Chu M, Caplehorn JR, Robertson MD, et al. The incidence of drugs in drivers killed in Australian road traffic crashes. Forensic Sci Int 2003;134:154-62.
3. Ch'ng CW, Fitzgerald M, Gerostamoulos J, Cameron P, Bui D, Drummer OH, et al. Drug use in motor vehicle drivers presenting to an Australian, adult major trauma centre. Emerg Med Australas 2007;19:359-65.
4. Drummer OH, Gerostamoulos J, Batziris H, Chu M, Caplehorn J, Robertson MD, et al. The involvement of drugs in drivers of motor vehicles killed in Australian road traffic crashes. Accid Anal Prev 2004;36:239-48.
5. Burns M, editor. Medical-legal aspects of drugs. 2nd ed. Tucson (AZ): Lawyers & Judges Publishing Company; 2007.
6. Drummer OH. Benzodiazepines – effects on human performance and behavior. Forensic Sci Rev 2002;14:1-14.
7. Bramness JG, Skurtveit S, Morland J. Testing for benzodiazepine inebriation – relationship between benzodiazepine concentration and simple clinical tests for impairment in a sample of drugged drivers. Eur J Clin Pharmacol 2003;59:593-601.


*Conflict of interest: none declared*

## Self-test questions

*The following statements are either true or false*
*(answers on page 55)*

1. Patients taking opioid analgesics for chronic pain should not drive.
2. Prescription medicines are the most common drugs found in road fatalities.

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