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COMMISSION NEW ZEALAND

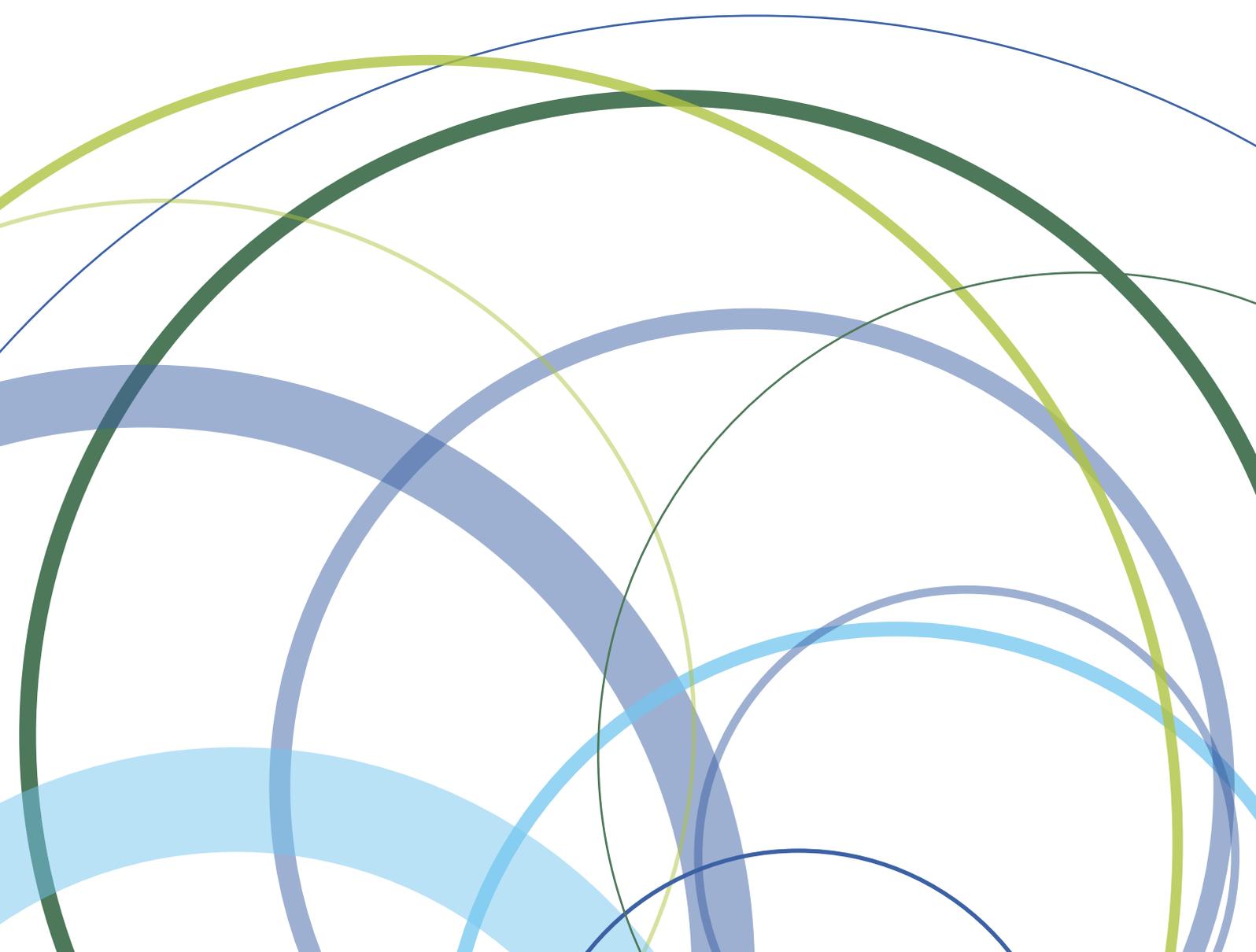
Kupu Taurangi Hauora o Aotearoa



**Child and Youth
Mortality Review
Committee**

Special Report:
Unintentional deaths
from poisoning in young people

August 2013



This report was written for the Child and Youth Mortality Review Committee by Nick Baker, executive clinical director and community paediatrician, Nelson Marlborough District Health Board.

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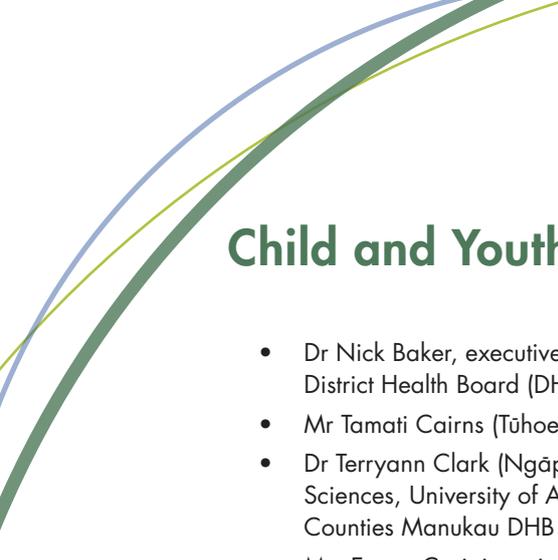
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 - the Pharmaceutical Management Agency (PHARMAC).

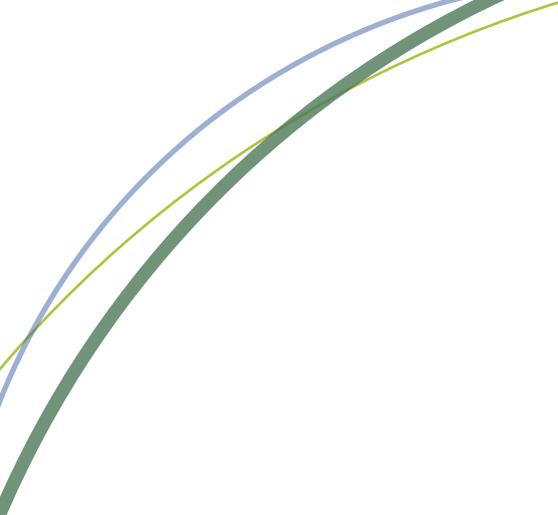


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Foreword

The Health Quality & Safety Commission (the Commission) is pleased to release the *Special Report: Unintentional deaths from poisoning in young people* by the Child and Youth Mortality Review Committee (CYMRC).

Poisoning is the second¹ most common cause of unintentional injury death for young people. Many of these are deaths due to risk-taking behaviour where the young person intended to ingest the poison, but did not intend to die.

Patterns of substance abuse by young people in New Zealand are similar to patterns found overseas; the abuse of gases and volatile liquids (eg, butane inhalation) is more common among younger adolescents, while the use of controlled or regulated substances (meaning prescription medicines or drugs such as heroin, cannabis oil, psilocybin and ecstasy) is more common among older teenagers and young adults. The recommendations in this report address both types of substance abuse.

The local child and youth mortality review groups have carefully examined the life story of each young person who died by unintentional poisoning during the years covered in this report. No family is entirely immune from tragic deaths of this kind, but the local reviews found that they often occur in young people who are not well connected to support systems. Common themes in their life stories included poor attachment to caregivers; emotional, verbal, physical or sexual abuse; neglect; brain damage from exposure to alcohol before birth; and family struggles related to parental instability, drug and alcohol abuse, mental illness, incarceration or domestic violence. For these young people, substance abuse was often part of a lifestyle that involved risk taking in a number of settings.

The CYMRC has made eight thoughtful recommendations in this report, all of which have the full support of the Commission. Collectively, the recommendations stress the importance of families, communities and service providers working together to provide a chain of care and support throughout the entire life of a child, from before birth into early adulthood. Health plays a key role in this chain of care, and health services must be organised to work together to improve outcomes. The Commission encourages district health boards, in particular, to develop clinical pathways across mental health services, emergency services and primary care so joined-up collaborative care becomes routine.

The issues raised by the CYMRC in this report resonate with many current government programmes, including Whānau Ora, the Children's Action Plan² and Improving Youth Mental Health in New Zealand.³

The CYMRC worked with many different government agencies, non-profit organisations, researchers and health care experts to develop the recommendations in this report. I am pleased to note that the recommendations received considerable support throughout this process and that progress towards implementation has already occurred for some.

Professor Alan Merry, ONZM *Chair, Health Quality & Safety Commission*

1 Transport-related deaths are by far the most common injury death in young people, and drowning is the third most common. See the CYMRC's *Fifth Report to the Minister of Health*, Chapter 3: The Risk Taking Years – Unintentional Injury in Young People (CYMRC 2009).

2 <http://www.childrensactionplan.govt.nz/>

3 <http://www.health.govt.nz/our-work/mental-health-and-addictions/youth-mental-health-project>



Chair's introduction

The detailed analysis of unintentional deaths from poisoning contained in this report was triggered by previous work showing that poisoning deaths in young people were the second most common cause of unintentional injury death. In a few cases, death by poisoning follows accidents or an unfortunate combination of circumstances; however, most of the harm documented in this report follows a deliberate action without intent to die. It seems the real risks have not been appreciated by the victims or those around them. It is alarming how easily some lethal agents can be obtained as retail products or medicines diverted from their original purpose. It is very pleasing that no young (less than eight years of age) children died in the time periods studied; however, there is a major burden of harm and hospital care from poisoning amongst young children.

The linked information available to the Child and Youth Mortality Review Committee (CYMRC) and its local groups after death provides insights into the life course before death and highlights where missed opportunities to intervene exist. Too often, a pattern emerges where problems started very early in life or even before birth followed by accumulating adversity, creating a life trajectory that ends abruptly in death from poisoning. The CYMRC has previously documented the impact of accumulating adversity and deprivation in detailed reports for other types of deaths including suicide, risk taking, alcohol-related deaths and sudden unexpected death in infancy. All these deaths represent the tip of an iceberg of harm that results from the impact of adverse childhood experiences over the life course.

Three government initiatives are, therefore, particularly exciting as they offer opportunities to alter outcomes by major changes in the way children, families and young people are supported with evidence-based early prevention and interventions from collaborating, multi-sector teams.

First, the Children's Action Plan aims to identify, support and protect vulnerable children and has great potential to improve the conditions for healthy child and adolescent development, with early identification of need followed by support and interventions. It is hoped that, as a result, fewer children and young people will suffer adverse childhood experiences, leading to a reduction in deaths from poisoning and other intentional and unintentional injuries.

Second, the Drivers of Crime initiative⁴ aims to address the underlying causes of criminal offending and victims' experiences. The underlying drivers of crime are inter-related, with risk factors within family, community and educational environments. A shared responsibility across a range of government agencies and service providers rather than a focus on single issues is planned, with improved value for money through better coordinated, better targeted and more effective services and programmes.

Third, Improving Youth Mental Health in New Zealand, the Prime Minister's project on mental health and wellbeing for young people, seeks to prevent mental health problems from developing and improve access to appropriate services.

A crucial ingredient for the success of all these initiatives will be linked information management that occurs before death to support the provision of the right services, at the right time, to the people most in need of them, with a focus on what is most effective for Māori.

⁴ For more about Drivers of Crime, see <http://www.justice.govt.nz/justice-sector/drivers-of-crime>. Many of the Drivers of Crime initiatives are covered in the Government's Better Public Service targets, 10 challenging results established in 2012 for the public sector to achieve over the following five years. See <http://www.ssc.govt.nz/bps-results-for-nzers>.

Developing this report and gathering a clear understanding of the issues has taken over 18 months, but much of this time has been spent working with others and starting to implement the recommendations. I am deeply grateful for the dedication and exceptional efforts of so many who helped collect, analyse and initiate change so that we may honour the dead as we learn from their tragedy.

A handwritten signature in black ink, appearing to read 'N Baker', with a long, sweeping underline that extends to the left and then curves back under the signature.

Dr Nick Baker *Chair, Child and Youth Mortality Review Committee*

Key messages

A portfolio of actions is needed to reduce the attractiveness of, demand for and access to substances of abuse, while also screening for use and having effective interventions to support those affected. The actions will work best if there is a clear lead agency (see recommendation 3 on page 35). While all the issues on pages 28–32 are important, the following issues and recommendations are of specific concern and require urgent consideration:

1. Reduce attractiveness and demand

- a. **Education and intervention programmes** – Develop resources containing information on products, warning signs and risk factors around abuse for parents, teachers and community agencies. Develop occupation-specific education resources and toolkits for staff in frontline agencies such as police, ambulance, health services and retailers. All health education resources must be carefully designed and tested to ensure they do not lead to unforeseen results.

2. Reduce access

- a. **Safe prescribing, dispensing and disposal of medicines** – Primary health organisations (PHOs), district health boards (DHBs), pharmacies and palliative care services should work with others to ensure communities have well-advertised systems that encourage the safe disposal of prescription medicine. Information gained about the wastage should be collated and used to guide prescribing and dispensing practices and systems of care in a community as well as at a national level.
- b. **Active surveillance linked to intervention** – Legally prescribed medicines represent the major source of dangerous medicines that can be diverted for recreational use. Current information and strategies for prevention need to be shared with prescribers and dispensers so quick action follows identified issues.
- c. **Legislation change** – The ease with which children and young people are able to acquire volatile solvents for abuse needs to be urgently addressed. Legislation change and enforcement can prevent the sale of solvents to minors and restrict access to solvents within retail premises. Legislation should be considered, at least for the most commonly used and most lethal compounds such as butane. A number of countries, including Australia, the UK and Scotland, have already put legislation in place to restrict the supply of butane and solvents, and volatile inhalants to children under the age of 18 years (Office of the Chief Coroner 2012).
- d. **Voluntary schemes for retailers** – Retailers should be encouraged to exercise their right to refuse the sale of goods where they consider abuse to be a risk, while providing secure storage for butane products. Such actions would help to minimise theft and ensure that anyone purchasing the product has to request the product. This would provide retailers with an additional opportunity to assess the purchaser prior to sale.

3. Screening and intervention

- a. **Improving first aid support from peers** – ‘peer responsibility’ – More training systems and programmes should be developed to increase the awareness for all young people about what to do and when to seek help if they are with someone suffering an altered state of consciousness. In particular, it is important to teach young people to recognise peers who are intoxicated to the point of becoming unconscious and unable to breathe adequately and to provide immediate first aid and call for help.
- b. **Early intervention and support** – Encourage a proactive approach to earlier intervention for substance abusers across agencies (Beasley et al 2006). This should include routine needs assessments through approaches like universal HEEADSSS⁵ screening followed by effective interventions by high-quality youth services.

5 A systematic approach, as recommended by Dr Sue Bagshaw, is available on the Best Practice Advocacy Centre website: <http://www.bpac.org.nz/magazine/2012/february/substanceMisuse.asp#heeadsss>.

- c. **Better integration of community services**, with clear referral pathways (known to schools, parents and GPs) available for users of volatile and other substances; nationally consistent, enhanced youth alcohol and other drug (AOD) services; community-based treatment for offenders with AOD problems; and training and workforce development (Ministry of Justice 2012).

Community messages

1. For products that alter alertness, there is a very fine line between drowsiness and death.
 - a. Every time you engage in huffing or sniffing of solvents, they may kill you.
2. Be aware of the risks for young people close to you, give clear support, notice the warning signs of substance use and get help.⁶ Know and use the local pathways that can provide specific help for recreational substance use among children and youth.
3. Learn how to recognise people who are at risk of not breathing and know what to do.
 - a. If someone does not respond, they may be at risk of death. Get help early. Do not just assume they will 'sleep it off' – if in doubt, call an ambulance.
4. Do not pick up prescriptions if you are not going to use them and do not keep medicine 'just in case'. Safely dispose of all medicine that is not in use.
 - a. Just because a medicine came from a doctor or pharmacist, do not automatically assume it is 'safe'. Medicines must be treated like any other poison – safely get rid of medicine as soon as you no longer need it.
 - b. Return unused prescribed medicines, or medicines past their expiry date, to your pharmacist for safe disposal.⁷
5. Substances prepared by yourself, or those bought on the street, have no safeguards about strength or quality; they can poison and kill unexpectedly.
6. Risks are always greater if you take more than one substance.
7. Volatile solvents are so dangerous that no level of use is safe. Families and others around young people need to know where and how to seek help for any user.
8. If you discover dangerous information about substance use on the internet, report it to NetSafe and the website owner.⁸
9. The dose of methadone or other opioids that is acceptable for one person can easily kill another person.
 - a. There can be a very fine line between sleep and death.
10. Maintain vigilance for poisoning in young children:
 - a. Remember 'out of sight and locked up tight'.⁹
 - b. Request child-resistant closures.
 - c. Be especially alert when away from usual places as there might be hidden risks; this includes visiting others and going on holiday. Breaks from the usual routine may be times when caregivers are distracted and accidents happen.
 - d. Every child needs a sober caregiver.

6 For more information on warning signs of substance use and volatile substance abuse (VSA), see: http://www.welltrust.co.nz/The_Early_Warning_Signs and <http://volatilesubstances.org.nz/>.

7 Information for consumers on the safe use and disposal of medicines can be found on the Medsafe website: <http://www.medsafe.govt.nz/consumers/safe.asp>.

8 More information on NetSafe can be found at: <http://www.netsafe.org.nz/>.

9 Safekids New Zealand has a collection of resources to help prevent poisoning in young children – see <http://www.safekids.org.nz/index.php/page/45>.

Introduction

Poisoning has been defined as injury to, and destruction of, bodily cells through the ingestion, inhalation, injection or absorption of toxic substances (World Health Organization 2008). In Western countries there are two demographic peaks of poisoning activity and deaths. The first is unintentional¹⁰ exploratory poisonings, where children younger than six years of age (but typically between two and three years of age) ingest toxic substances. In these unintentional exploratory poisonings, there is no intent to self-harm, and substances ingested typically include household items such as cleaning agents, toiletries, medicines and plant materials. These poisonings account for a large number of health advice calls and medical consultations with significant numbers of hospital admissions, but very few deaths. As a result of education, identification of hazards and strategic interventions, the trend across developed countries has been a gradual decline in these poisoning deaths.

The second demographic peak increases from adolescence onwards to young adulthood and is related to risk-taking behaviour, recreational drug use and suicidal intent.¹¹ Opioid drug use and alcohol account for significant numbers of deaths among New Zealand youth, while volatile substance abuse (VSA) has been the cause of most unintentional deaths. This issue was highlighted in the recent report from the Office of the Chief Coroner, in which 55 of the 63 deaths from recreational inhalation of volatile substances between 2000 and 2012 were young people under 24 years (Office of the Chief Coroner 2012).

What is volatile substance abuse?

VSA is also known as sniffing, huffing and bagging. It is the deliberate, recreational inhalation of volatile hydrocarbons, nitrous oxide and alkyl nitrite compounds to achieve an altered mental state. These compounds are often easily accessible and cheap. The volatile substances most commonly abused in New Zealand contain either propane and butane, or butane alone¹² (Office of the Chief Coroner 2012).

This type of recreational drug use occurs in the most deprived sectors of the community, and there is high prevalence among Māori youth. The estimated lifetime prevalence of VSA in New Zealanders aged 15–45 was 2.1 percent in 2001 (New Zealand Drug Foundation 2007). From the New Zealand Alcohol and Drug Use Survey, the estimated age-standardised lifetime prevalence of recreational inhalant use among New Zealanders aged 16–64 years was 2.5 percent in 2007–08 (Ministry of Health 2010).

VSA causes euphoria, hallucinations, drowsiness, confusion, aggression, disinhibition, loss of coordination, slurred speech, vomiting and blurred vision. Once inhaled, the substance quickly crosses from the air in the lungs into the bloodstream (as it is lipid soluble), then into the brain and nervous system, interfering with nerve function. An alarming number of deaths occur in first-time users. Deaths also occur in experienced users.

Death from volatile solvents can take the form of a 'sudden huffing death', where the toxin sensitises the heart to adrenaline so that events (such as fear from a hallucination or shortage of oxygen) can trigger a fatal cardiac arrhythmia. Severe and fatal burns can also occur, as these solvents are highly flammable.

Death can also result directly from asphyxia, as the inhaled compound can directly freeze or occlude the airway. In other deaths, a combination of events occurs, including asphyxia because of lack of oxygen due to displacement of air or from rebreathing. Because of the anaesthetic-like properties of the inhaled substance, the victim is not able to help themselves.

¹⁰ In this report, the term 'unintentional' is used to describe those deaths from poisoning that were not planned in advance. These deaths are also referred to as 'accidental'. They include deaths where the initial ingestion of the poison itself was intentional.

¹¹ It should be noted that the number of deaths recorded as alcohol poisoning substantially underestimates the overall impact of alcohol on youth mortality, as deaths due to traffic accidents, falls and drowning are not included. The CYMRC's 2011 special report on alcohol-related mortality contains further information (CYMRC 2011).

¹² Based on calls received by the National Poisons Centre in New Zealand.

The root causes of VSA are complex and involve social, cultural and economic factors. Recurrent themes are that VSA occurs across all sectors of society but is most common in those living in disadvantaged situations. It is common amongst indigenous people (Midford et al 2010; Cairney and Dingwell 2010; Baydala 2010). For volatile substance abusers, there appears to be a high level of familial and peer group acceptance of alcohol and drug use. Another association is risk-taking behaviour, which is an attribute prevalent in adolescence, as discussed in the CYMRC's *Fifth Report to the Minister of Health* (CYMRC 2009).

Most of the substances used are household items, so access to the substances cannot easily be controlled. The age of VSA deaths is much younger than for other recreational drugs, and deaths frequently occur among those who have no previous history of VSA. A review from the UK showed that, for just over half (56 percent) of all VSA deaths in 2008, there was no evidence of a previous history of solvent abuse (Ghodse et al 2010).

Most drug research in New Zealand has centred around illicit drugs and very little on VSA. Long-term VSA is associated with chronic headaches, sinusitis, frequent coughing, ringing in the ears, angina, nosebleeds, lack of energy, red and watery eyes, depression, shortness of breath, psychosis, cerebral white matter degeneration with permanent impairment of cognitive function, gross lack of coordination of muscle movements and progression to dementia (Midford et al 2010).

There are no reliable data on the relative lethality of various inhalants; however, butane is consistently associated with the majority of VSA deaths around the world and in New Zealand (Office of the Chief Coroner 2012).

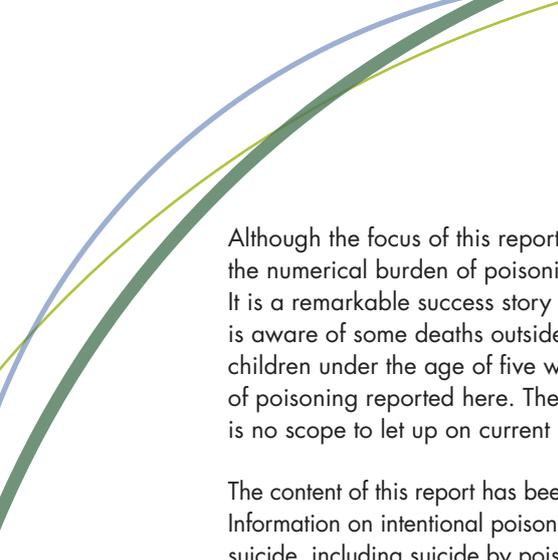
New Zealand's overall poisoning mortality statistics are in line with international findings (Belanger et al 2008; Beasley and Reith 2005; Hoppe-Roberts et al 2000), except that New Zealand has fewer cases of death under age five, with no unintentional poisoning deaths in New Zealand between 2002 and 2008 in this age group. This suggests that countrywide initiatives to decrease infant deaths by unintentional poisoning over the last 20 years have had a positive impact. Internationally, the highest fatality rate from unintentional poisonings is found in infants and preschool children, with a further peak around 15 years of age (World Health Organization 2008).

Over the last two decades, campaigns to increase parental awareness of storing household hazardous substances have had a positive impact. An increased responsiveness from the National Poisons Centre to emergency medical care, together with improved industry standards for packaging and sealing hazardous substances (eg, child-resistant lids and blister packs), have likely helped to contribute to a decline in infant poisoning deaths. Despite this, infants and children up to three years of age still remain one of the greatest risk groups when it comes to unintentional poisoning. Figures released by the New Zealand Accident Compensation Corporation (ACC) show that 60 percent of all new poisoning claims lodged with ACC were for injuries to children three years of age and under, accounting for approximately 34 percent of total ACC poisoning-related costs between 2002 and 2009.¹³

New Zealand, like many other comparable OECD countries, faces the problem of extreme risk-taking behaviours, including substance abuse, in children and young people. International trends suggest patterns of substance abuse differ by age. Solvent and hydrocarbon abuse (eg, glue sniffing and butane inhalation) are prevalent in young adolescents, whereas alcohol abuse and the use of controlled or regulated substances (eg, prescription medicines or Class A and Class B drugs, such as heroin, cannabis oil, psilocybin and MDMA¹⁴) are more common in older teenagers and young adults (Beasley and Reith 2005; Hoppe-Roberts et al 2000; Reith et al 2005; McDowell et al 2005; Doogue and Barclay 2005; Pan et al 2006). Issues related to risk-taking were reviewed in the CYMRC's *Fifth Report to the Minister of Health* (CYMRC 2009).

¹³ ACC poisoning claims 2002–09.

¹⁴ MDMA, or methylenedioxymethamphetamine, is also known as ecstasy.



Although the focus of this report is poisoning mortality in young people, it is important to remember that the numerical burden of poisoning morbidity and hospitalisation sits with children under the age of five. It is a remarkable success story that no children died in this age group over this time period, but the CYMRC is aware of some deaths outside this time period and a substantial number of hospitalised cases – 2041 children under the age of five were discharged from hospital over the same time period as the fatal cases of poisoning reported here. There must be continuing work to reduce the number of these cases, and there is no scope to let up on current initiatives.

The content of this report has been limited to unintentional poisoning deaths and those of undetermined intent.¹⁵ Information on intentional poisoning deaths in New Zealand is contained as part of an extensive review of youth suicide, including suicide by poisoning, in the CYMRC's *Fifth Report to the Minister of Health* (CYMRC 2009) and in the 2012 analysis of all-ages suicide deaths by poisoning (Gallagher et al 2012). The methodology used in this report misses harm done to the developing foetus through alcohol, tobacco and other substances. The harm is significant, contributes to poisoning deaths later and supports a recurring cycle.

The analyses in this report identify patterns and trends in deaths due to unintentional poisoning and poisoning of undetermined intent in New Zealand during 2002–08, setting them in context and attempting to identify ways to reduce the toll. This report is focused on young people, with most of the analyses presented showing poisonings in young people aged 15–24 years.

Deaths due to poisoning were the second most common cause of unintentional deaths and deaths of undetermined intent in the period 2002–08 for young people between the ages of 14 and 25, accounting for 6.8 percent of total unintentional injury deaths in New Zealand¹⁶ (CYMRC 2009). A recent World Health Organization investigation reported poisoning as the fourth biggest unintentional injury killer worldwide – after road traffic injuries, fires and drowning. This study noted that 13 percent of all unintentional poisoning deaths occurred in those aged under 20 (World Health Organization 2008).

¹⁵ Undetermined intent refers to deaths occurring where it is recognised that the actions undertaken voluntarily were highly dangerous but it is unclear if the victim intended a lethal outcome.

¹⁶ The leading causes of injury death during 2002–08 in 14–25-year-olds were transport (75.8 percent), poisoning (6.8 percent), drowning (6.3 percent) and suffocation (3.9 percent) (CYMRC 2009).

Methods

Cause(s) of death and sample selection

A. Underlying cause of death as assigned in the national Mortality Collection

In the national Mortality Collection, all deaths are assigned a single underlying cause of death (classified in ICD-10-AM), plus as many contributory causes (ICD-10-AM) as required. The analyses in this section include only cases with an underlying cause of death in the ranges outlined below. This means that each individual is allocated a single cause, and that the totals in tables and graphs sum to 100 percent.

The main analyses include all young people aged 15 years to less than 25 years who died in New Zealand between 1 January 2002 and 31 December 2008 and whose underlying cause of death, as identified in the Mortality Collection, was in the following ICD-10-AM range:

- Mental and behavioural disorders due to psychoactive substance use: F100–F190
- Accidental poisoning by and exposure to noxious substances: X40–X49
- Intentional self-poisoning: X60–X69
- Poisoning of undetermined intent: Y10–Y19

Deaths were then allocated to the following subgroups:

Gases and volatile liquids

- F181 Mental and behavioural disorders due to use of volatile solvents, harmful use
- F182 Mental and behavioural disorders due to use of volatile solvents, dependence syndrome
- X46 Accidental poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapours
- X47 Accidental poisoning by and exposure to other gases and vapours
- X471 Accidental poisoning by and exposure to liquefied petroleum gas (LPG)
- X478 Accidental poisoning by and exposure to other specified gases and vapours
- Y17 Poisoning by and exposure to other gases and vapours, undetermined intent

Opioids

- F110 Mental and behavioural disorders due to use of opioids, acute intoxication
- F112 Mental and behavioural disorders due to use of opioids, dependence syndrome
- X42 Accidental poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified¹⁷
- Y12 Poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified, undetermined intent

Other

- X45 Accidental poisoning by and exposure to alcohol
- F100 Mental and behavioural disorders due to use of alcohol, acute intoxication
- F102 Mental and behavioural disorders due to use of alcohol, dependence syndrome
- X40 Accidental poisoning by and exposure to non-opioid analgesics, antipyretics and antirheumatics
- X41 Accidental poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified
- X44 Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances

¹⁷ Cases with an ICD-10-AM code in this range were manually allocated a substance group. As most of the cases with this code were poisoned by or exposed to an opioid, this category also includes accidental poisoning by/exposure to narcotic and psychodysleptics that are not opioids, such as cannabis.

- X49 Accidental poisoning by and exposure to other and unspecified chemicals and noxious substances
- Y11 Poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified, undetermined intent
- Y14 Poisoning by and exposure to other and unspecified drugs, medicaments and biological substances, undetermined intent

Intentional self-poisoning was only considered briefly in order to provide an overall context for poisoning mortality, with the body of the analysis focusing on unintentional/accidental poisonings and poisonings of undetermined intent. The data were extracted from the live New Zealand Mortality Review Database on 1 July 2010.

B. More detailed cause of death groupings based on review of additional information from the New Zealand Mortality Review Database

In addition to official ICD-10-AM cause of death data derived from the Mortality Collection, the New Zealand Mortality Review Database contains additional information from a variety of other sources, many of which can be used to assign more specific cause(s) of death. These sources are, in order of priority for this report, coronial findings, post-mortem findings (including toxicology reports) and findings from the process of local review. These findings were reviewed from the live database. Where it was not possible to determine the intent of the death using the above information sources, the intent was recorded as 'undetermined'.

Because of this information, for most cases, it was possible to determine the substance causing death. Using the above information sources, a main substance causing death was assigned to each case. Where more than one substance was ingested, the one thought to be the main cause of death was used. Substances were grouped as follows:

<i>Gases and volatile liquids</i>	Butane, LPG and other hydrocarbons Other gases and volatile liquids
<i>Opioids</i>	Morphine Methadone Codeine
<i>Other/Not stated</i>	Alcohol Antidepressants and antipsychotic drugs Other prescription drugs Recreational drugs Other

Additional notes on interpretation

Issues around cause of death coding

In some of the cases in this series, there was a number of substances that may have contributed to the young person's death. In most situations, there was evidence of one substance being the most likely cause of death. This was usually ascertained through toxicology reports stating the substance that was at a level known to be fatal and also the substances that were at therapeutic levels. However, for particular drugs, it should be remembered that the effects of the drug were probably potentiated by the presence of another drug. Common main drugs when this was the case were morphine and methadone, with common potentiating drugs being alcohol, recreational drugs and antidepressants and antipsychotics.

Ethnicity classifications were undertaken using a prioritised classification.¹⁸

¹⁸ The CYMRC ethnicity protocol can be found on the New Zealand Mortality Review Database website: <https://secure-www.otago.ac.nz/nzmr/dg/reports.html>.

Analysis of data from the national Mortality Collection

This section uses the underlying cause of death (ICD-10-AM), as assigned in the national Mortality Collection, to review deaths from poisoning in New Zealand children and young people aged 15 years to less than 25 years during 1 January 2002 to 31 December 2008.

There were 202 poisoning deaths in young people aged 15–24 years in New Zealand during that time. This equates to 29 per year on average, with a rate for the 2002–08 period of 4.8 per 100,000 (Table 1).

Poisoning by intent

Table 1 and Figure 1 summarise all deaths in young people aged 15–24 years recorded during 2002–08 where the underlying cause of death as identified in the Mortality Collection was poisoning. The table includes all intentional deaths (suicides and assaults), as well as unintentional deaths and deaths where the intent was undetermined.

During 2002–08, 56 percent of all poisoning deaths of young people in New Zealand involved intent to harm (including suicides and assault), 35 percent were unintentional in nature, while the remaining 9 percent were classified as being of undetermined intent.

Table 1: Deaths due to poisoning by intent in young people aged 15–24 years, New Zealand, 2002–08 (n=202)

ICD-10 INTENT	2002	2003	2004	2005	2006	2007	2008	Total	Total (%)	Rate per 100,000 2002–08
Suicide	18	16	20	13	15	10	19	111	55.0	2.62
Unintentional	9	15	6	12	10	8	11	71	35.1	1.68
Undetermined	3	4	7	2	1	1	1	19	9.4	0.45
Assault		1						1	0.5	s
Total	30	36	33	27	26	19	31	202	100.0	4.77

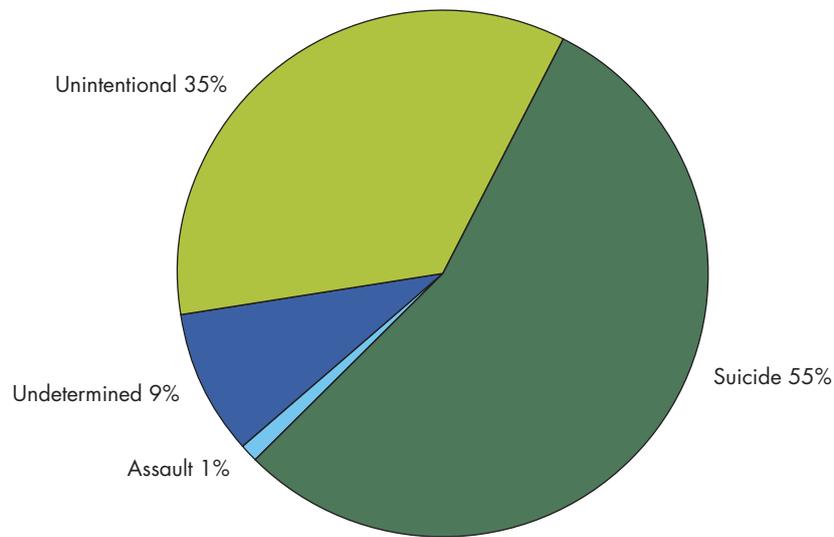
's' indicates rate suppressed due to small numbers.

Source:

Numerator: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

Denominator: Statistics New Zealand Estimated Resident Population 2006.

Figure 1: Deaths due to poisoning by intent in young people aged 15–24 years, New Zealand, 2002–08 (n=202)



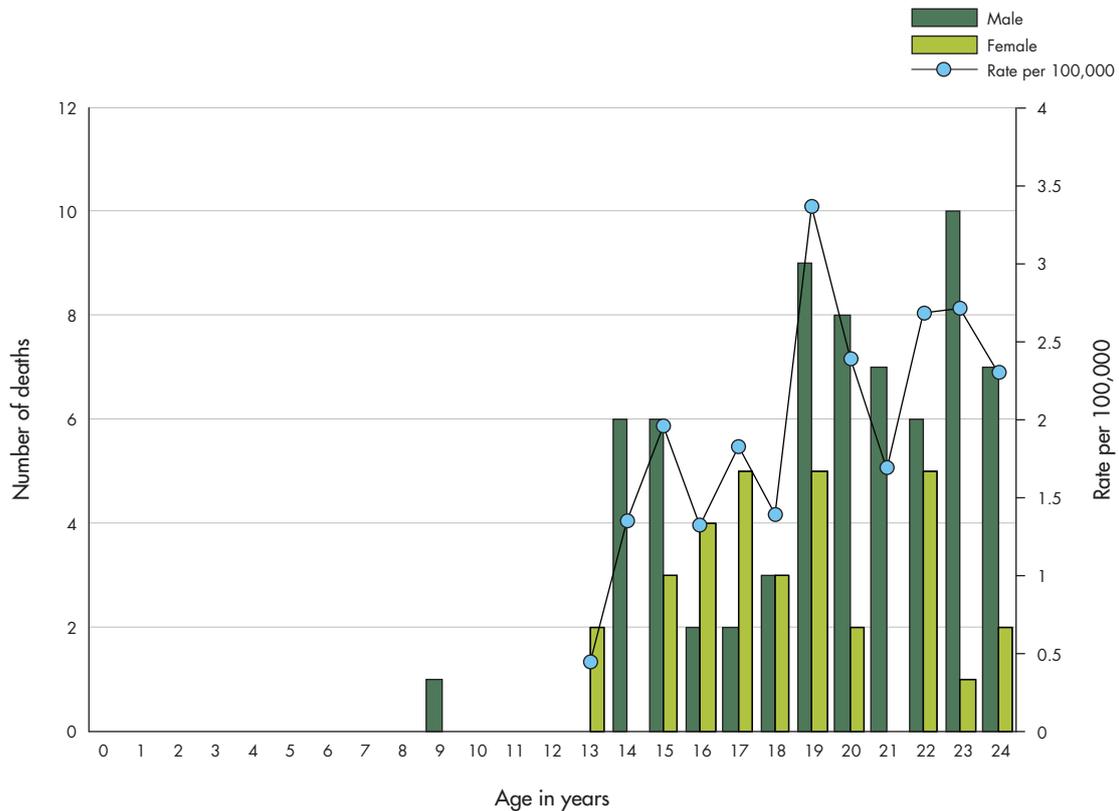
Source: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

While intentional harm is an important cause of poisoning mortality in New Zealand's young people, it has been excluded from the analyses in the remainder of this report. The following sections focus on unintentional poisoning and poisoning arising from undetermined intent. The undetermined intent subset also includes a small number of cases where intentional self-harm may be included in the differential diagnosis, but these cases have been retained in order to ensure the sampling frame preserves continuity with official statistics.

Unintentional deaths from poisoning by age and gender

Of the 90 unintentional poisoning deaths in young people aged 15–24 years during 2002–08, 60 deaths (67 percent) occurred in males and 30 deaths (33 percent) in females. Rates by year of age were similar in young people, but peaked at 19 years of age at 3.4 per 100,000 (Figure 2).

Figure 2: Poisoning deaths (unintentional and undetermined intent) by age in children and young people aged 0–24 years, New Zealand, 2002–08 (n=99)



Source:
 Numerator: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.
 Denominator: Statistics New Zealand Estimated Resident Population 2006.

Poisoning in children younger than 15 years of age

Deaths under age 15 are excluded from the statistical analysis but included in some graphics to show the full picture.

There were nine deaths in children aged younger than 15 years. Most of the nine deaths occurred among children aged 14 years (Figure 2).

All but two of the deaths were from butane, LPG and other hydrocarbons. All of the deaths were of unintentional or undetermined intent (Figure 3).

Unintentional deaths from poisoning by prioritised ethnicity

In New Zealand during 2002–08, using the prioritised ethnicity classification, poisoning deaths were numerically highest among European children and young people (47 of 90 deaths). The rate of poisoning deaths in Māori young people was, however, significantly higher than the rate in European young people (rate ratio: Māori 2.89, 95% CI 1.88–4.43) (Table 2).

Table 2: Poisoning deaths (unintentional and undetermined intent) by prioritised ethnicity in young people aged 15–24 years, New Zealand, 2002–08 (n=90)

ETHNIC GROUP	2002	2003	2004	2005	2006	2007	2008	Total	Rate per 100,000 2002–08	Rate ratio	95% CI
European	5	9	8	7	6	3	9	47	1.62	1	
Māori	4	8	5	7	5	6	3	38	4.68	2.89	1.88–4.43
Pacific peoples	2	2						4	1.01	0.62	0.22–1.72
Asian	1							1	0.16	0.1	0.01–0.71
MELAA								0	-	-	-
Total	12	19	13	14	11	9	12	90	2.12		

Source:

Numerator: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

Denominator: Statistics New Zealand Estimated Resident Population 2006.

MELAA: Middle Eastern/Latin American/African.

Analysis following additional information from the New Zealand Mortality Review Database

The New Zealand Mortality Review Database will often contain additional information to that in the Mortality Collection. For the CYMRC, this information is collected by the CYMRC's network of 21 local child and youth mortality review groups.¹⁹ This information, which provides useful detail about the context of each death, is analysed in this section.

Cause of death by substance

Gases and volatile liquids were the single largest substance group causing (unintentional and undetermined) poisoning in young people in New Zealand during 2002–08, accounting for 34 percent of all deaths during this period (Table 3). Opioids accounted for 32 percent of all poisoning mortality.

Other substances, including alcohol, recreational drugs (eg, psilocybin, yohimbine, MDMA) and psychiatric medicines (mainly antidepressants, such as paroxetine, doxepin and citalopram) accounted for the remaining 33 percent of deaths during this period.

When these broader substance groups were broken down in more detail, the substances causing the greatest number of deaths were butane and butane-related hydrocarbons (such as LPG and propane); these accounted for 29 percent of all poisoning deaths. Methadone was the second leading cause, accounting for 18 percent of deaths, followed by alcohol, which accounted for 16 percent of poisoning deaths (Table 3).

¹⁹ For more information on local child and youth mortality review groups, see: <http://www.hqsc.govt.nz/our-programmes/mrc/cymrc/about-us/local-groups/>.

Table 3: Poisoning deaths (unintentional and undetermined intent) by substance group in young people aged 15–24 years, New Zealand, 2002–08 (n=90)

SUBSTANCE GROUP	2002	2003	2004	2005	2006	2007	2008	Total	Rate per 100,000 2002–08	Deaths in category (%)	Total (%)
Gases and volatile liquids											
Butane, LPG and other hydrocarbons	2	7	3	2	4	4	4	26	0.61	83.9	28.9
Other gases and volatile liquids			3				2	5	0.12	16.1	5.6
Total	2	7	6	2	4	4	6	31	0.73	100.0	34.4
Opioids											
Methadone	6	4	1	2	1		2	16	0.38	55.2	17.8
Morphine	1	3	1	3	3	1		12	0.28	41.4	13.3
Codeine						1		1	0.02	3.4	1.1
Total	7	7	2	5	4	2	2	29	0.69	100.0	32.2
Other/Not stated											
Alcohol	2	2	4	3		1	2	14	0.33	46.7	15.6
Antidepressant and antipsychotic drugs		1		2		1		4	0.09	13.3	4.4
Recreational drugs	1		1	1	2	1		6	0.14	20.0	6.7
All others		2		1	1		2	6	0.14	20.0	6.7
Total	3	5	5	7	3	3	4	30	0.71	100.0	33.3
Grand total	12	19	13	14	11	9	12	90	2.13		100.0

Source:

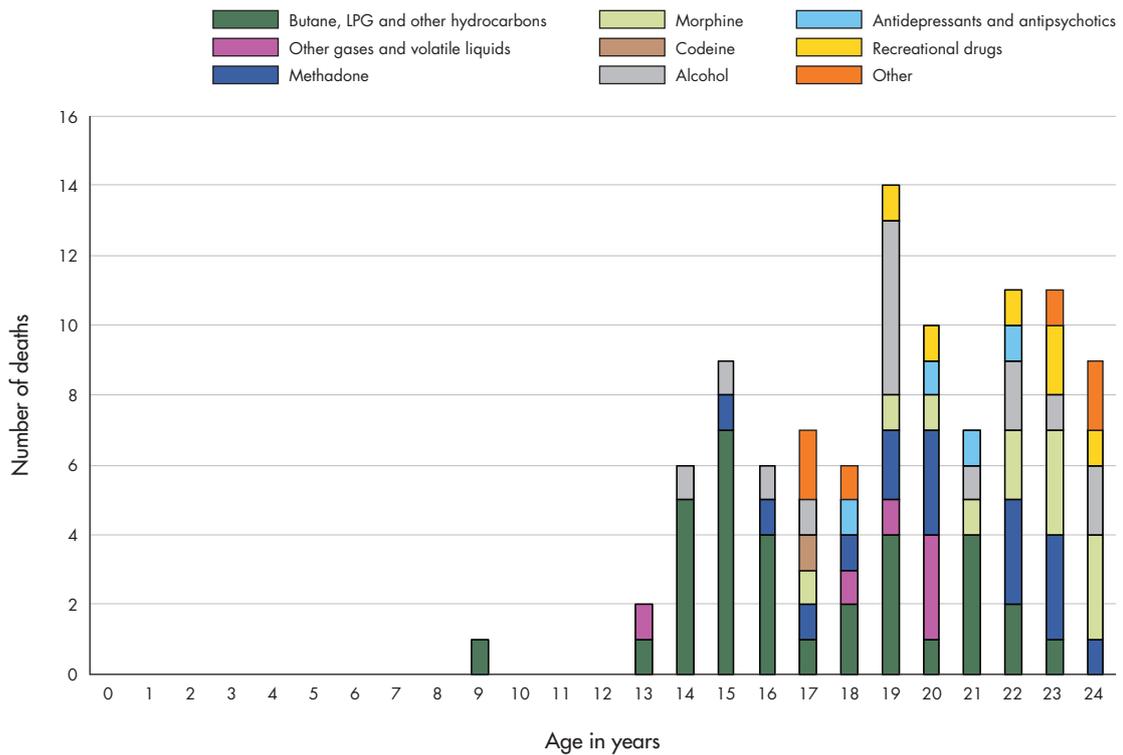
Numerator: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

Denominator: Statistics New Zealand Estimated Resident Population 2006.

Cause of death by substance and age

When poisoning deaths were broken down by age, poisoning by gases and volatile liquids (eg, butane, LPG and other hydrocarbons) was most prominent among those in their teens and very early 20s, with these substances being the leading cause of unintentional and undetermined intent poisoning in those aged 14–18 years. In contrast, alcohol, methadone, morphine, prescribed medicines (eg, antidepressants and antipsychotics) and recreational drugs were more prominent among those in their late teens and early 20s (Figure 3).

Figure 3: Poisoning deaths (unintentional and undetermined intent) by substance and age in children and young people aged 0–24 years, New Zealand, 2002–08 (n=99)

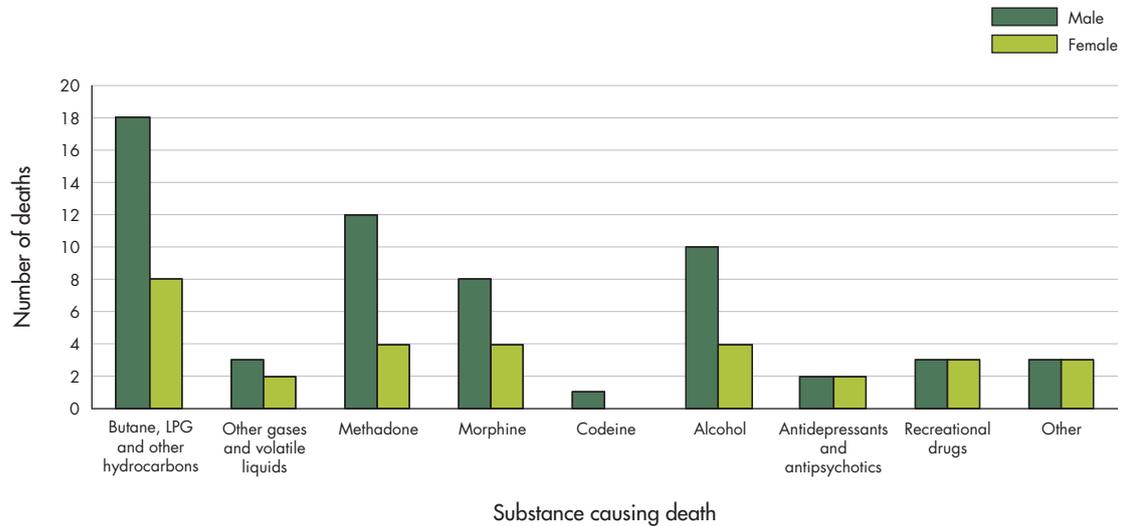


Source: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

Cause of death by substance and gender

A male predominance was evident among the poisoning deaths from a range of substances including butane, LPG and other hydrocarbons, alcohol, morphine, codeine and methadone (Figure 4).

Figure 4: Poisoning deaths (unintentional and undetermined intent) by substance group and gender in young people aged 15–24 years, New Zealand, 2002–08 (n=90)



Source: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

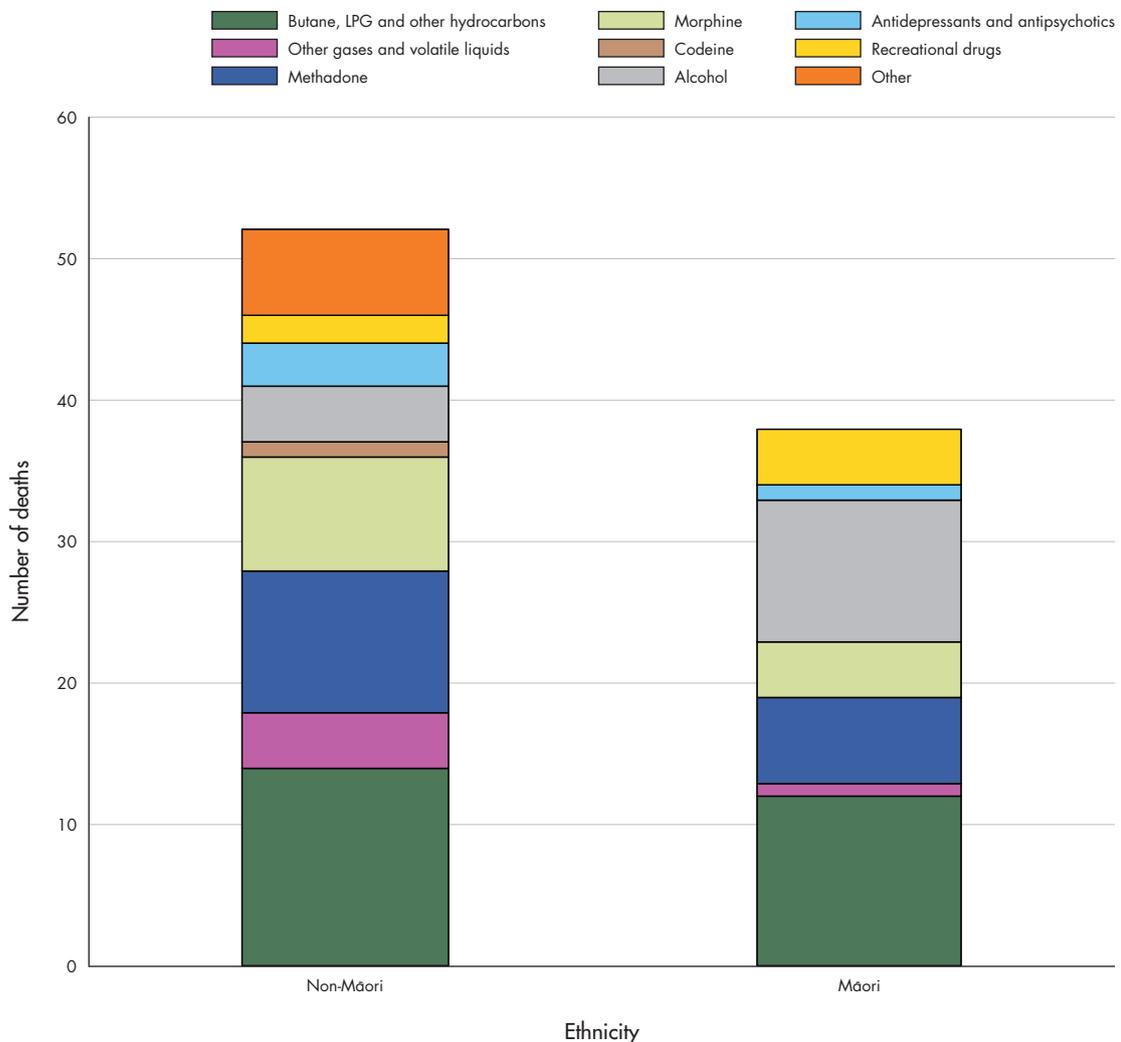
Note: The butane, LPG and other hydrocarbons column does not include seven cases of children under 15 years of age.

Cause of death by substance and ethnicity

Due to small numbers, Figure 5 and Table 4 are restricted to an analysis of poisoning deaths by substance group for Māori and non-Māori young people during 2002–08. Once broken down by substance group, mortality from butane, LPG and other hydrocarbon poisonings was significantly higher for young Māori aged 15–24 years than for non-Māori (rate ratio: Māori 3.61, 95% CI 1.67–7.80), as were poisoning deaths from alcohol (rate ratio Māori: non-Māori 10.53, 95% CI 3.30–33.56). In terms of their absolute contributions, however, butane, LPG and other hydrocarbons were the leading cause of mortality for young Māori, while opioids (morphine, methadone and codeine) were the leading causes for non-Māori.

The majority of deaths, 75 out of 90 young people (83 percent), arose in the context of recreational substances, drugs or alcohol. There were 10 cases in which people died of poisoning from their own prescription medicines (11 percent).

Figure 5: Poisoning deaths (unintentional and undetermined intent) for Māori and non-Māori young people aged 15–24 years by substance, New Zealand, 2002–08 (n=90)



Source: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

Table 4: Poisoning deaths (unintentional and undetermined intent) for Māori and non-Māori young people aged 15–24 years by substance, New Zealand, 2002–08 (n=90)

SUBSTANCE CAUSING DEATH	Māori		Non-Māori		Rate ratio	95% CI
	No of deaths (%)	Rate per 100,000	No of deaths (%)	Rate per 100,000		
Butane, LPG and other hydrocarbons	12 (31.6)	1.48	14 (26.9)	0.41	3.61	1.67–7.80
Other gases and volatile liquids	1 (2.6)	s	4 (7.7)	0.12	-	-
Methadone	6 (15.8)	0.74	10 (19.2)	0.29	2.53	0.92–6.95
Morphine	4 (10.5)	0.49	8 (15.4)	0.23	2.11	0.63–6.99
Codeine	0	-	1 (1.9)	s	-	-
Alcohol	10 (26.3)	1.23	4 (7.7)	0.12	10.53	3.30–33.56
Antidepressants and antipsychotic drugs	1 (2.6)	s	3 (5.8)	0.09	-	-
Recreational drugs	4 (10.5)	0.49	2 (3.8)	s	-	-
Other	0	-	6 (11.5)	0.18	-	-
Total	38 (100.0)	4.68	52 (100.0)	1.52	3.08	2.02–4.67

's' indicates rates suppressed due to small numbers.

Source:

Numerator: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

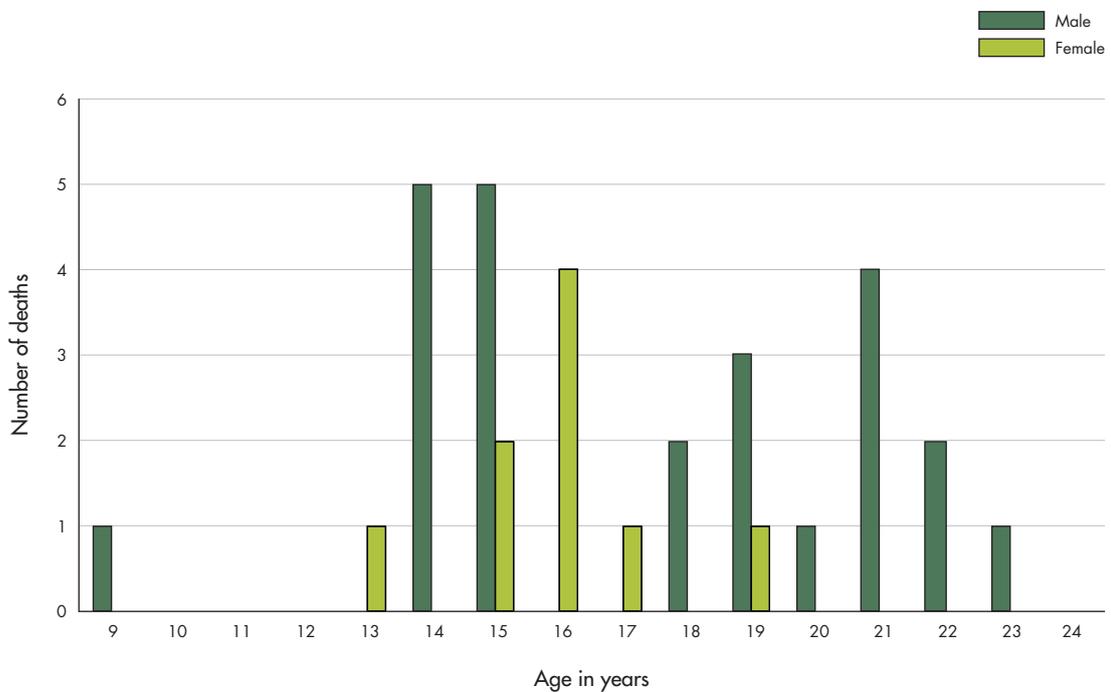
Denominator: Statistics New Zealand Estimated Resident Population 2006.

Volatile substance abuse (VSA): butane, LPG and other hydrocarbons

Deaths caused by VSA – that is, deaths from the recreational use of butane, LPG and other hydrocarbons – make up a very high proportion of all poisoning deaths. During 2002–08, on average, four young people aged 15–24 years died per year as a result of poisoning from VSA, with numbers remaining relatively constant during this period (Table 3). A male predominance was evident at nearly every year of age (Figure 6). Seven deaths from VSA poisoning (representing 21 percent of all deaths under 25 years) occurred in children under 15 years of age, with five cases in children aged 14 years, one case in children aged 13 years and one case in a nine-year-old.

There was a trend for VSA deaths to appear earlier compared to poisoning deaths from other substances (Figure 3). In those under age 17 years, VSA was overwhelmingly the most common cause of poisoning mortality. After 17 years, VSA makes up a smaller proportion of deaths, with the increasing appearance of deaths from other substances (Figure 6 and Figure 7).

Figure 6: Mortality from butane, LPG and other hydrocarbons by gender and age in children and young people aged 9–24 years, New Zealand, 2002–08 (n=33)

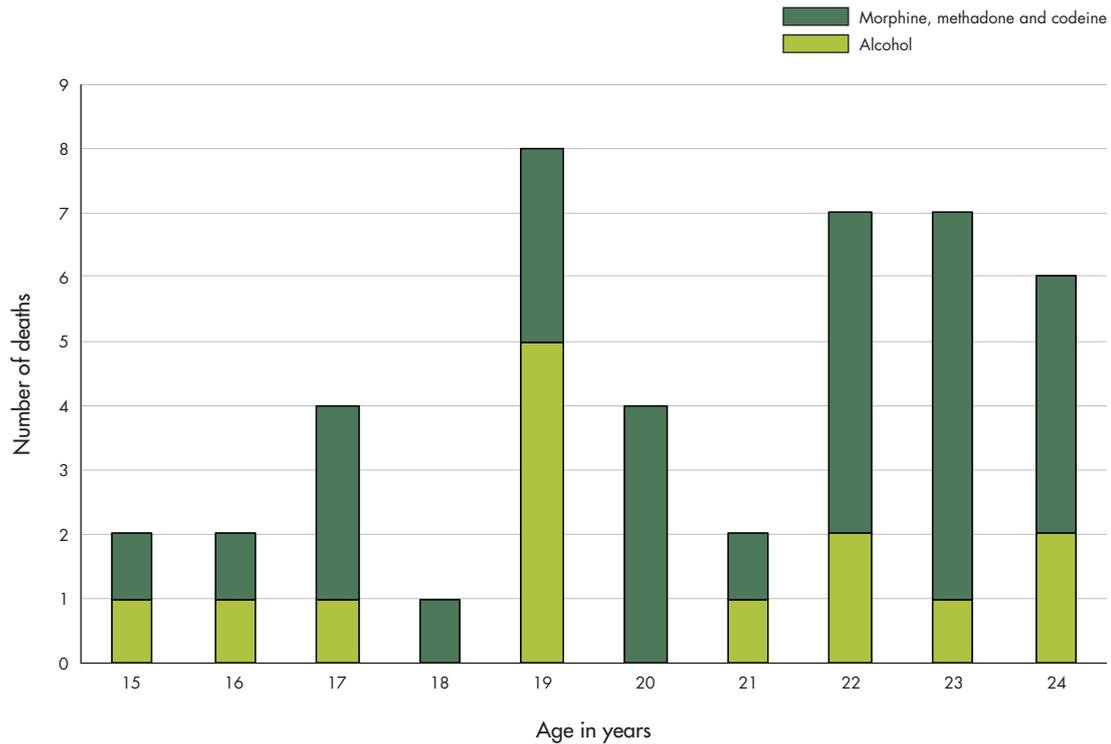


Source: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

Alcohol and opioids

There were 43 deaths among young people aged 15–24 years that were due to alcohol and opioids (morphine, methadone and codeine) (Figure 7). Almost one-third of these deaths (14 in total) were due to poisoning from alcohol. Of the 29 deaths from opioids, only one arose from an overdose of their own prescribed medicine. Twenty-seven of the deaths from opioids occurred as a result of recreational drug use. For one case, there was insufficient information to determine whether the opioids were prescribed.

Figure 7: Mortality from alcohol and opioids in young people aged 15–24 years, New Zealand, 2002–08 (n=43)



Source: CYMRC cases by ICD-10-AM underlying cause of death as assigned in the Mortality Collection.

Use of multiple substances

In 46 (51 percent) of the deaths, there was some evidence of more than one substance being used in the time prior to the death. These were frequently alcohol and cannabis; however, in those whose death was attributed to opioids or antidepressants and antipsychotics, the other drugs used were commonly other opioids and/or antidepressants and antipsychotics, and recreational drugs. The additive effects of a combination of drugs, which all have the effect of depressing brain function, could not be predicted easily, and a number of young people died while apparently 'sleeping it off'.

Poisoning deaths and co-existing mental health diagnoses

In New Zealand during 2002–08, 57 percent (n=51) of young people who died from unintentional or undetermined poisoning had a mental health diagnosis documented in the Mortality Review Database. Twenty-nine (57 percent) of these had more than one diagnosis. The most frequent were diagnoses relating to mental and behavioural disorders due to the use of various substances, such as alcohol, opioids, cannabinoids, sedatives or hypnotics, other stimulants, hallucinogens, volatile solvents and mental and behavioural disorders due to multiple drug use, and use of other psychoactive substances (n=45). The next most frequent diagnoses were a depressive disorder (n=6) and adjustment disorder (n=6), followed by post-traumatic stress disorder (n=4), schizophrenia (n=3), psychosis (n=3) and personality disorder (n=3). Other disorders included anxiety, phobias, other mood disorders and conduct disorders.

Place of event leading to death and activity prior to death

In 53 of the poisoning deaths (59 percent), the event leading to death occurred at the young person's home, with a further 19 (21 percent) occurring at another residence. Fifteen deaths (17 percent) occurred in a public place (including in cars, parks, camping grounds, the street, sports clubs, bars and the roadside). For four deaths, there were insufficient details about location of the event leading to death.

There was some evidence that the place of death may have varied with the duration of use, with first-time users often engaging in recreational use in a public place with friends, whereas habitual users were likely to have used the substance at home.

It is important to remember that this report only includes deaths clearly attributable to unintentional poisoning. Previous reports from the CYMRC have highlighted the important contribution of alcohol and other substances in deaths related to risk-taking behaviour and from suicide. For instance, a young person who dies as a pedestrian or by suicide may have been substantially impaired by alcohol or other substances to the point of being 'poisoned' in terms of having a major harmful influence, but the death will not be included in this report.

Issues and themes from the local child and youth mortality review groups

In addition to the issues highlighted in this report, the individual case reviews of poisoning deaths, conducted by the local child and youth mortality review groups, have identified a number of issues and key themes to consider.

- 1. Deprivation and disadvantage** – It was very common for the young people who died from poisoning to have suffered multiple disadvantages and exposure to adverse childhood experiences. These include: verbal, physical or sexual abuse; neglect; brain damage from exposure to alcohol before birth; head injury; and family dysfunction (eg, an incarcerated, mentally ill or substance-abusing family member, domestic violence and absence of a parent because of divorce or separation). The use of substances was often part of a lifestyle that involved risk-taking in a number of settings.
- 2. Motivation** – Death by poisoning is usually described in three categories: intentional poisoning (not included in this study),²⁰ unintentional and undetermined intent. It is always hard to determine intent once someone has died, but the review groups noted that, in the vast majority of cases reported, the ingestion of the substance(s) that caused death was deliberate but death was not intentional. This suggests that a significant gap exists between the perceived risk of the action and the actual risk. This was particularly apparent with regard to the use of opioids, especially if associated with the use of other sedating substances, such as alcohol, and in cases of volatile solvent use.
- 3. First aid** – In many situations, the deceased was with other people at the time of death. In a number of cases, the events leading up to death were witnessed, and a decreased level of consciousness was noted. The person was thought to be ‘sleeping it off’, so the seriousness of the situation was not appreciated, even when people were concerned enough to place the victim in the recovery position before death. Careful observation did not occur, and ambulance services were not called until death was obvious or inevitable. In other cases, the death was witnessed, and resuscitation attempts, even when started immediately, failed. The need for improved awareness and definitive action by other people was apparent. Similar observations were made in the CYMRC alcohol report, and reference was made to the Red Cross save-a-mate campaign²¹ and ALAC²² resources (CYMRC 2011). The key message is: ‘If in doubt, call an ambulance’.
- 4. Peer influence** – In many cases, and particularly for deaths from volatile solvents, the young person was not alone at the time of death but was engaged in recreational substance use with a friend or group of friends. There was some evidence that the presence of friends may have varied by duration of substance use, with first-time users often experimenting with the substances in the presence of peers, while habitual users were more likely to use substances alone.
- 5. Combined effects of poisons** – The use of complex mixtures of substances, leading to additive effects and unpredictable actions, was a common theme in many deaths.
- 6. Death from own medicine** – Some cases occurred where people died because of the accumulation of their own prescribed medicine in their body. At times, this was related to reckless use of medicine with little attention to dose taken and use over time. Some patients were on very complex mixtures of medicines for long-term chronic conditions, with increased risk of accumulation, errors and complex interactions. In some cases, the concurrent use of non-prescribed drugs or alcohol was a contributing factor.
- 7. Unpredictable effects of homemade substances** – A number of cases arose where someone had prepared their own substance for use by combining other ingredients. The result of abuse was lethal due to the creation of a ‘brew’ of unknown strength and toxicity.

20 For a review of suicide by poisoning in New Zealand, see Gallagher et al (2012).

21 See Red Cross save-a-mate: <http://www.saveamate.org.au/>.

22 See the first aid fact sheet at: <http://www.alcohol.org.nz/alcohol-you/how-be-safer/first-aid>. Since July 2012, the functions of ALAC (the former Alcohol Advisory Council of New Zealand) have been carried out by the Health Promotion Agency.

8. **Opioids** – For the majority of deaths, the medicines were taken by mouth. In a number of cases, a victim took a medicine prescribed for someone else, with no appreciation that the dose used by a regular user can be fatal to a casual user. The additive effects of opioids and alcohol seemed to be particularly dangerous, causing unconsciousness and death. In some cases, the opioids involved in poisoning were obtained following the palliative care of others. Local review groups noted that systems to ensure unused medicines were retrieved from households were poorly developed.
9. **Butane** – The ease of obtaining butane and other volatile solvents in the community was noted, particularly for young people purchasing or stealing butane cans from local retailers, including corner dairies. The current design of butane canisters does not prevent abuse of this product. Concern over websites that promoted butane abuse and outlined effective techniques of inhalation were also raised. Overall, there seemed to be low levels of user knowledge as to the specific risks associated with butane abuse. Some users who died were long-term users, but those around them, including parents, were not aware of this until after their death. In some cases, the product inhaled had a clear warning label such as 'Deliberately inhaling highly flammable butane is extremely dangerous and can cause immediate death'.
10. **Magic mushrooms** – Magic mushrooms frequently caused problems for recreational users who suffered toxicity and highly undesirable effects, apparently having no knowledge of, or control over, the dose of toxin obtained from mushroom preparations. At times, magic mushrooms proved fatal in combination with other substances.
11. **Geographic transitions** – Concerns were raised regarding the coordination of services between DHBs when a patient moved to a new region. In particular, the length of time taken to transfer case information from DHB to DHB (where this information was critical to case management) was of concern because, in a number of cases, the new service providers did not yet know the patient's full history and, as a result, did not identify the seriousness of escalating risk-taking behaviour. The CYMRC identified issues surrounding transitions and service coordination in previous reports (CYMRC 2009), and recommended that the transfer of case information between DHBs should occur within a week of the patient physically relocating.
12. **Youth health care transitions** – Concerns were raised regarding planned transitions of services for young adults. When some young adults are too old for child and adolescent health services, they might still have difficulty accessing adult services.
13. **Quality improvement for mental health patients** – In a number of cases, death occurred in patients known to mental health services. It was noted that, although suicide of mental health patients can lead to sentinel event reviews, similar quality improvement activities were uncommon following unintentional death by poisoning in known substance users.
14. **Service coordination** – When young people exhibit behaviours that may be indicative of substance use and risk-taking (eg, poor motivation, sudden change in school achievement or recurrent alcohol-related injury), it was noted that consistent responses from government agencies, such as health, education and social services, did not occur. There is a need for new models of service coordination that identify and respond to warning signs and intervene where escalating patterns of harm relating to risk-taking behaviour are occurring. It is also critical that community programmes increase public understanding of the fine line between altered awareness and death from poisoning.
15. **School-based services are inconsistently provided across the country**²³ – Where these were working well, they were seen as an excellent model of health care delivery. Greatest strength arose where services such as school counsellors, school-based services, community providers and more specialised services like the Child and Adolescent Mental Health Service and youth alcohol and other drug services worked together to support young people and each other. The issues and recommendations described in chapter 4 of the *Fifth Report to the Minister of Health*²⁴ (CYMRC 2009) related to suicide remain highly relevant.

23 A survey published by the Education Review Office in August 2013 (<http://ero.govt.nz/National-Reports/Guidance-and-Counselling-in-Schools-Survey-Findings-July-2013>) highlights similar concerns to those raised by the CYMRC in chapter 4 of its *Fifth Report to the Minister of Health*, which looks at suicide.

24 <http://www.hqsc.govt.nz/assets/CYMRC/Publications/cymrc-5th-report-cpt4-youth-suicide.pdf>

Issues identified by the CYMRC

Characteristics of those who die

Recreational drug use is more common among marginalised young people who are experiencing social disadvantage and family dysfunction.²⁵ Recreational drug-taking can be a way of relieving boredom, blocking hunger pains, coping with emotional distress or having a mind-altering experience. In some groups, it can become a sign of group identity.

Exposure to maternally ingested, poisonous substances before birth (eg, alcohol), environmental tobacco smoke and disrupted parenting associated with parental substance use have all been implicated as early risk factors for progression to harmful drug use (Toumbourou et al 2007). Efforts to reduce prebirth drug use, environmental tobacco use and substance-impaired parenting have been associated with less youth substance use and fewer mental health problems.

This report shows a significantly higher risk of poisoning death among Māori. In addition, 56 percent of all cases had a history of a mental health diagnosis, mostly related to substance use. These risk factors provide guidance as to where targeted community or individual interventions should be aimed. It is critical that these interventions are most effective for Māori if the current inequity is to be reduced.

Three government initiatives are particularly exciting as they offer opportunities to alter outcomes by major changes in the way children, families and young people are supported with evidence-based early prevention and interventions from collaborating multi-sector teams.

The Children's Action Plan²⁶ aims to identify, support and protect vulnerable children and has great potential to improve the conditions for healthy child and adolescent development, with early identification of need followed by support and interventions. It is hoped that, as a result, fewer children and young people will suffer adverse childhood experiences, leading to a reduction in deaths from poisoning and other intentional and unintentional injuries.

The Drivers of Crime initiative aims to address the underlying causes of criminal offending and victims' experiences. The underlying drivers of crime are inter-related with risk factors within family, community and educational environments. A shared responsibility across a range of government agencies and service providers rather than a focus on single issues is planned, with improved value for money through better coordinated, better targeted and more effective services and programmes.

Improving Youth Mental Health in New Zealand²⁷ – the Prime Minister's project for improved mental health and wellbeing for young people.

25 The nature of poisoning is such that some cases are also seen where, tragically, a moment's brief experiment can cause death in settings where these additional risk factors are not present.

26 <http://www.childrensactionplan.govt.nz/>.

27 <http://www.health.govt.nz/our-work/mental-health-and-addictions/youth-mental-health-project>.

The role of mental health services and quality improvement systems

Over half of the deaths in this report occurred in young people with a mental health diagnosis often related to known substance abuse problems. While some excess mortality is probably inevitable in this group, it is not clear from this study where efforts at service and system improvement should be targeted. The Prime Minister's project for improved mental health and wellbeing for young people is therefore seen as being very important, especially the elements related to substance use and coordinated care with enhanced links between mental health services, community services and the education sector.

In the past, unintentional poisoning deaths have not featured in nationally notified sentinel events. Since December 2012, an alternative process has been in place for mental health patients who suffer serious incidents,²⁸ which can lead to a formal coordinated quality improvement process. It is therefore hoped that better systematic review of the context and circumstances around these deaths will lead to the identification of themes for prevention, with a view to system improvement both locally and nationally. The local child and youth mortality review groups could be a partner in this process. Reviews can only occur if the DHB serious incident review process becomes aware of the death.

The impact of media on VSA

For many types of injury deaths (eg, drowning or slow speed run over), the impact of media coverage and reporting almost universally serves the public good and helps with prevention. Extreme caution needs to be used with regard to the reporting of suicide and unintentional poisoning, however, because inappropriate media coverage, including in social media and on the internet, can serve to inform and misguide vulnerable individuals. This can inadvertently increase the death toll.

With regard to suicide, a Ministry of Health suicide reporting resource²⁹ and coronial legislation are in place in New Zealand to reduce harm. No such clarity exists with regard to the reporting of poisoning.

Australia's National Inhalants Information Service reports that the Senate Select Committee on Volatile Fumes (1985) suggested that media be guided by the following when reporting on poisoning:

- The products subject to abuse should not be named and the methods used not be described nor be depicted.
- Reports of inhalant abuse deaths should be factual and not sensationalised or glamorised.
- Articles on casualties of volatile substance abuse should not be superficial; reliable organisations should be contacted for information.
- Stories should include a local contact telephone number or source organisation for further information.³⁰

The Chief Coroner has recommended that this guidance be followed by media in New Zealand (Office of the Chief Coroner 2012). The CYMRC supports this recommendation, as this media guidance remains relevant to New Zealand today. There is concern that details about poisoning deaths spread quickly via the internet and other social media outlets as well, so it is important that efforts to control or correct misinformation are encouraged across all media formats. The CYMRC believes that up-to-date New Zealand guidance should be developed that will be relevant to radio, television and newspapers as well as the newer digital media. Such guidance will need to be actively promoted and used so there is an increase in awareness for working journalists and internet editors of the issues in this area and the impacts of their reporting and internet systems.

Those who provide information to the media (eg, police, coroners and health professionals) have a duty to also guide the media about the safe use of the information.

28 <http://www.hqsc.govt.nz/publications-and-resources/publication/747/>.

29 <http://www.health.govt.nz/publication/reporting-suicide-resource-media>.

30 For more information, see: <http://www.inhalantsinfo.org.au/media.php>.

Prevention of poisoning

VSA prevention

Butane – the most commonly abused volatile solvent in New Zealand – is readily and cheaply available from corner dairies, hardware stores and large chain retailers, and butane products can also be purchased via the internet, despite its extreme toxicity. Butane can cost as little as NZ\$4.99 and can be displayed in ways that allow or even support theft. Butane is most commonly found in the form of gas canisters or cigarette lighter fluid. Butane is also found as a propellant in other aerosols. In short, butane is easily accessible and cheap.

New Zealand does not yet have a well-organised approach to VSA. The following quote from Midford et al (2010), describing the situation in Australia, indicates that change is possible with increased commitment of resources, long-term VSA prevention programmes and a VSA policy framework. They write:

‘Until about ten years ago government responses to VSA were largely uncoordinated and not that successful. Typically responses occurred in reaction to a media-driven crisis, and involved one off grants to non-government agencies dealing directly with users. Few interventions were strategic in nature or well evaluated, and the corporate sector had little involvement in preventing the misuse of products they manufactured or marketed. In the last decade this had changed substantially.’ (Midford et al 2010, p15)

Major governmental reviews have recently been completed in the UK and Australia (d’Abbs and Maclean 2008; Ghodse et al 2010). In New Zealand, a review of the evidence on VSA, best practices for prevention and recommendations for action has also been completed by the New Zealand Drug Foundation (2007). To address VSA, it is important to consider the full Spectrum of Prevention for poisoning (see Appendix 1), including public health and personal health interventions to address the proximal and distal determinants.

The development of a nationwide VSA prevention strategy must be evidence based and seek to:

- reduce attractiveness and demand
- reduce access to VSAs
- improve screening and intervention for youth at risk
- raise awareness amongst peers, family and community (see below).

Interventions to prevent VSA-related poisoning should consider the following:

A. Reduce attractiveness and demand

- a. Universal** interventions for whole communities to build risk competence and to prevent onset of harm, including experimentation, which may include:
 - i. school curriculum – information for all young people and parents, which needs to be carefully designed and tested to ensure it achieves the desired goal, rather than promote experimentation
 - ii. warning labels – but must use caution, as the use of warning labels may risk promoting substances to use
 - iii. media control – to promote wider awareness of harm, but with care to not encourage use.
- b. Targeted** interventions for individuals, families, schools and communities where increased risk exists, to prevent onset of harm. These interventions may include:
 - i. all of the above-mentioned universal interventions but developed at a community level and delivered with greater intensity for at-risk youth and communities
 - ii. community programmes to support and encourage alternative activities. ‘Redirection’ might include recreation, creative pursuits, arts and culture or employment.

B. Reduce access

a. Product modification

- i. Use of alternative products – Leading spray-paint manufacturers in Australia, for example, have removed hydrocarbons that produce the 'drug high' from their paints, thereby reducing demand. A change was also made in petrol composition in the Northern Territory of Australia so the new fuel did not contain sufficient volatile substances to cause intoxication. This change has shown a reduction in the prevalence of petrol sniffing from 8.4 percent to 1.3 percent.
- ii. Redesign of products – Developing devices, for example, that make inhalation difficult while dispensing the product. As of yet, there is no successful design for such a device. Another design would be the addition of smell or strong odour added to substances to make inhalation less attractive. Trials of strong odour, such as ethyl mercaptan, have been successful in making substances less desirable.

b. Restricted availability

- i. Increasing cost – The young age of users may make this successful but, without other controls, increasing cost may just increase theft.
- ii. Legislation to control display and purchase age.
- iii. Strengthening retailer responsibility – Retailer knowledge of the products likely to be abused may result in more responsible displays that reduce theft and sales of volatile substances. Enhancing retailer responsibility could be supported by training and education using the VSA resources developed specifically for retailers by the New Zealand Drug Foundation.

C. Screening and intervention to detect and support current substance users

- i. Increased awareness of signs – Offer training and tools, such as the VSA resources developed by the New Zealand Drug Foundation, for teachers, school councillors, parents and health professionals.
- ii. Screening at youth health services with tools such as HEEADSSS and CRAFT assessments. The HEEADSSS assessment is a series of open-ended psychosocial questions, determined by the interviewer, on the patient's Home, Education/employment, Eating, Activities, Drugs, Sexuality, Suicide/depression and Safety.
- iii. Interventions for known users tailored to the level of risk. Brief interventions for alcohol and cannabis but referral as per local pathways for high-risk actions like VSA or accumulating alcohol-related harm.
- iv. Mental health services – Offered via accessible youth services, including alcohol and other drugs, with effective quality improvement systems and linked to wider community supports.

D. Increased peer awareness so they can recognise warning signs and offer safe care and first aid. Emphasise the message: 'If in doubt, call an ambulance'.

Raising community awareness of VSA is an important aspect of preventing deaths and minimising harm. Information about the fine line between altered awareness and death may help promote a better community understanding of risks.

Additional efforts should be focused on at-risk communities, especially on developing effective solutions with Māori communities where the prevalence of dangerous substance use is high. Best results follow strong community resolve and leadership, and programmes are best developed locally to suit specific contexts. Programmes work best when the community is engaged and has the ability to make decisions and act cohesively on agreed strategies. Targeted interventions should be monitored to measure success. Planned campaigns have been successful in changing attitudes and culture around smoking and drink-driving.

The need for community resolve and engagement to address the whole of the problem is highlighted by the following example from Australia during the 1980s (d'Abbs and Maclean 2008). Four indigenous communities added ethyl mercaptan, which has a strong offensive smell, to petrol, but the strategy proved unsuccessful. In one community, the residents objected to the smell; in the second, parents were distressed by their children vomiting; in the third, there was no community support for the intervention; and in the fourth, chronic sniffers continued to sniff the petrol containing the additive after discovering that the ethyl mercaptan would evaporate if the petrol was left in the open.

The New Zealand Drug Foundation has recently developed a number of **free resources** to raise awareness and help prevent VSA in New Zealand.³¹ Specific resources, in a range of different media, are available for **parents, teachers, retailers and community workers**.³² A volatile substance guide is also available for retailers, to support the responsible display and sale of volatile substances.³³

The CYMRC has been pleased to see **increasing awareness of the hazards amongst retailers** such that some retailers have voluntarily introduced access and sale restrictions for young people. Through funding from contracts with the Ministry of Health's Public Health Group, the New Zealand Drug Foundation has recently set up a free online resource to help inform retailers on how to better manage the sale of volatile substances. Retailers can access evidence-based information and also print out free resources to support staff training on the sale of volatile substances.

It is possible that **alternative methods of packaging butane products and mechanisms of delivery** can make abuse harder. Product modification such as unpleasant but non-toxic additives to reduce the appeal of gas and vapour inhalation should be considered. Relationships between industrial and research organisations need to be fostered, possibly with the provision of incentives to encourage investigation of possible solutions and alternative safer products.

The ease with which children and young people are able to acquire volatile solvents for abuse needs to be urgently addressed. **Legislation to prevent the purchase** of products containing dangerous substances currently exists in the UK, Western Australia and Texas (Taskforce on Butane Misuse 2006), although the benefits and successes of these legislative approaches are equivocal (Office of the Chief Coroner 2012). In New Zealand, sections 14a and 14b of the Summary Offences Act³⁴ contain legislation that controls the sale of spray-paint to people under 18 years of age and also controls access to spray cans in shops so that customers can only access the cans with the help of a shop assistant. This legislation and the legislation that restricts the sale of alcohol to minors are both highly relevant to restricting access of volatile solvents for young people.

31 To access the VSA resources, visit the New Zealand Drug Foundation's webpage on volatile substances: <https://www.drugfoundation.org.nz/resources/volatile-substances>.

32 <http://volatilesubstances.org.nz/>

33 The volatile substances guide for retailers can be found at: <http://volatilesubstances.org.nz/retailers-guide/>

34 The Summary Offences Act 1981 can be found at: <http://www.legislation.govt.nz/act/public/1981/0113/latest/DLM53348.html>.

This report highlights that 20 deaths from VSA occurred in people under 18 years of age, and we are also aware that significant abuse and non-lethal harm also occurs in those aged under 18 years. While there are challenges to legislative reform, because of the large number of products used for VSA, we believe legislation targeting the most used and most lethal substances should be considered for New Zealand. We acknowledge that such legislation needs to be carefully considered to prevent the transfer of substance abuse to other readily available products.

Finally, **further research** is needed to understand the prevalence of VSA in New Zealand, particularly among child and youth populations. In addition to better understand the root causes, there is a need to evaluate treatment regimens and the effectiveness of community interventions as well as a need to investigate ways of making volatile solvents impractical for abuse. There is also a need to examine the effectiveness of strategies that limit VSA-related mortality.

Preventing poisoning from prescription medicines

Opioids, particularly methadone, continue to cause a large number of deaths, despite extensive legislation to control access and limit supply. This report shows that most deaths are caused by drugs that were legally prescribed and dispensed originally but were subsequently redirected to a person who was never intended to take them. In most cases, the methodology used in this report does not allow us to gain further information about how this occurred. Our findings are, however, in agreement with those of the National Drug Intelligence Bureau, which stated in its 2012 annual report:

‘The opioid market in New Zealand continues to mainly be sustained by the abuse of licit pharmaceuticals and their diversion onto the illicit market.’ (National Drug Intelligence Bureau 2012)

The report then goes on to add:

‘The misuse of prescription drugs (opioid or otherwise) has been noted as an increasing problem worldwide. The scale of this activity is extremely difficult to quantify, but there is evidence that the misuse of pharmaceutical drugs exceeds that of illicit drugs (except cannabis) in some countries, including Australia.’ (Ibid.)

While this report only reviews unintentional poisoning deaths, it is important to note that prescribed medicines are also an important contributor to substance abuse and intentional poisoning deaths. Over a five-year period, 153 cases of fatal intentional self-poisoning across all age groups have been reported (Gallagher et al 2012). Some of the strategies below have also been recommended as ways of reducing suicide deaths.

The 2012 serious and sentinel events report from the Health Quality & Safety Commission (Health Quality & Safety Commission 2012) shows that there were 96 recorded ‘medication events’ during 2007–12, which equates to 19 medication events per year on average – most of which were not lethal.

It is very important to include the full spectrum of medicine-related harm, including intentional poisonings, substance abuse, suicides and medication events, in all prevention work. This is a complex area with many organisations potentially involved, for instance, Medicines Control (Ministry of Health),³⁵ National Drug Intelligence Bureau (New Zealand Police), National Poisons Centre, PHARMAC, Medsafe, the Health Quality & Safety Commission’s Medication Safety team, ACC, local police districts, New Zealand Drug Foundation, DHB quality teams, PHOs, Medicines Adverse Reactions Committee and New Zealand Pharmacovigilance Centre (including the Centre on Adverse Reactions to Medications (CARM)).

It is important that data held by these groups are shared and converted into information outlining themes and issues, which are shared effectively with all those who have the ability to achieve systems improvement and practice change. For instance, we are aware that New Zealand Police put considerable effort into tracking and attempting to prevent opioid diversion. Police knowledge of current trends around abuse in a district could be shared with health professionals who are prescribing medicines. Health professionals also need to be supported by information about how to prevent drug diversion, avoid prescribing practices that may support abuse and support the use of less toxic or less easily abused products. Aberrant prescribing practices are followed up by Medicines Control in the Ministry of Health.

35 Medicines Control (Ministry of Health): <http://www.health.govt.nz/our-work/regulation-health-and-disability-system/medicines-control>.

To reduce poisoning from prescription medicines, a variety of strategies can be used, including:

1. Ensure the user of the medicine is well informed and health literacy is supported with regard to risks related to the medicine's use, dosage, side effects and warning signs. Also issues related to safe disposal and storage – keep the medicine out of reach of children and away from others who might engage in abuse.
2. Prescribe less hazardous medicines (ie, non-opioids), in accordance with guidelines and best practice, where an alternative exists.
3. Limit the amount of medicine prescribed and dispensed to reduce the amount available for unintentional poisoning (eg, size of paracetamol suspension bottles) and reduce the quantity of prescription medicines available for diversion to illegal drug markets.
4. Develop systems to retrieve prescription medicines that are unfinished and no longer needed. DUMP³⁶ programmes, for example, have been run in a number of regions in New Zealand, retrieving large volumes of dangerous and expensive medicines from households and informing local medicine management. These programmes do not occur in all parts of New Zealand. After the death of a palliative care patient, there are no consistent systems in place to ensure medicines are retrieved and disposed of safely. Some local groups have attempted to address this problem by working with local and national services.
5. Develop a nationwide education campaign on the safe recovery and disposal of unwanted, unused medicines, targeting those areas in health care where the risk of accumulating unused medicines are greatest (eg, retrieving opioids after palliative care, mental health).
6. Ensure medicines that are dangerous to children under five are always dispensed in containers with child-resistant closures, as specified by the PHARMAC Schedule (Section G: Safety Cap Medicines)³⁷ and stored in a child-safe manner.
7. Take special care of those patients who are more at risk of poisoning, including known substance users, patients with co-existing mental health conditions and individuals on complex regimes.
8. Share information about sources and types of medicines that are later diverted to illicit use to a greater extent with those who can control availability. Such information can help health professionals provide good information to patients and avoid prescribing and dispensing practices that support poisoning or abuse.

³⁶ DUMP – Disposal of Unused/Unwanted Medicines Programme.

³⁷ The New Zealand Pharmaceutical Schedule, April 2013, can be accessed at: <http://www.pharmac.govt.nz/2013/04/03/Sched.pdf>.

Progress on the CYMRC's previous recommendations on the need for a developmentally focused approach to injury prevention in young people

Young people have a natural desire to push boundaries and test limits during their development. In many circumstances, this is a healthy and natural part of growing up. Tragedies occur when this normal developmental process leads young people into circumstances where they fail to correctly assess the true risk to themselves or others, leading to death or serious injury. The CYMRC's *Fifth Report to the Minister of Health* contains a chapter called 'The Risk Taking Years' (CYMRC 2009). The issues and recommendations highlighted in that chapter remain highly relevant to the prevention of death by poisoning.

In the *Fifth Report to the Minister of Health*, the CYMRC noted:

'It appears that existing injury control programs focus on specific policy areas, eg, transport, water, sport, workplace, school. Less effort is put into an approach that focuses on understanding the developmental context in which risk taking occurs.' (CYMRC 2009, p34)

As a result, the CYMRC recommended that policymakers:

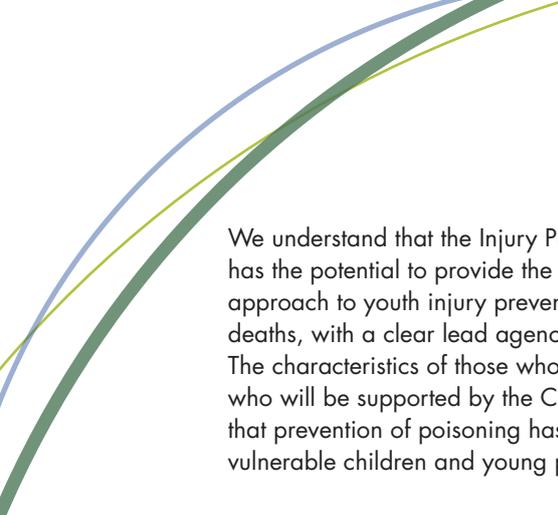
'Recognise injury as one of the most important health threats for young people and include it in the health policy agenda, including specific elements related to risk taking.' (Ibid, p35)

A multi-sectoral approach should occur aiming to build risk competence, life skills and resilience in young people while specifically working to make the environment less hazardous for young people.

To date, little progress is apparent with regard to implementing this recommendation. During the preparation of this report, we consulted with other groups engaged in preventive media work and worked with the Chief Coroner during the preparation of the case study on butane (Office of the Chief Coroner 2012). We have also been very grateful for the lead shown with regard to VSA by the New Zealand Drug Foundation. We acknowledge the work done by others on parts of the issue (eg, National Poisons Centre, SafeKids New Zealand, Pharmacy Self Care, Plunket, ACC, Health Promotion Agency, Ministry of Health and Alcohol Drug Association of New Zealand). However, it remains unclear who actually has overall responsibility for leading the whole domain of issues related to poisoning in young people.

Given the clustering of different types of injury in the same group of young people, poisoning prevention work could fit well as a workstream within a developmentally focused approach to youth injury. Telling young people of risks is a poor mechanism to alter youth behaviour. Young people require a focus that supports them in learning how to manage complex and hazardous situations and avoid harm, while developing emotional, social and cognitive resilience. The goal should be to improve young people's perception and assessment of risks, coping with hazardous situations and risk competence.

Within the New Zealand Injury Prevention Strategy (NZIPS), the special needs of children aged 0–14 years are recognised with a focus on prevention for the age group rather than the specific types of injury. This workstream is led by the Ministry of Social Development. Given the extent to which the risk of injury of many different types cluster in individual young people, a 'cross-cutting' focus on youth injury is needed. Such a system could also ensure young people's needs are addressed rather than being lost in the bigger picture of injury within an all-ages approach. One option would be to extend the focus of the 0–14 cross-cutting approach by the NZIPS to young people, or a specific organisation could lead a focus on 15–19 or 25-year-olds.



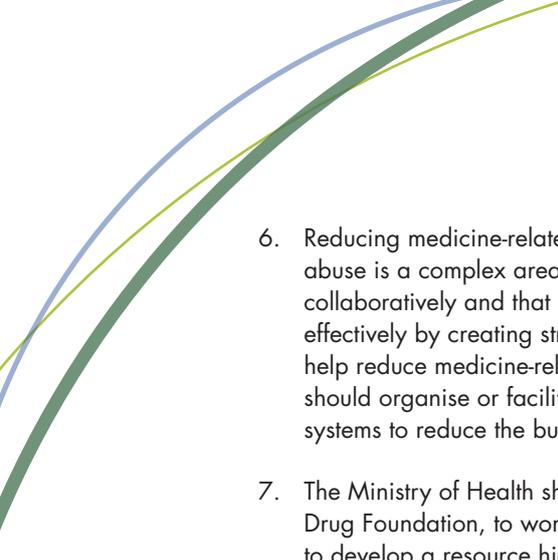
We understand that the Injury Prevention Action Plan, currently being developed and led by the ACC, has the potential to provide the cross-governmental leadership needed for a developmentally focused approach to youth injury prevention. Within this plan, a specific focus should be placed on poisoning deaths, with a clear lead agency in place to link and lead work across the whole spectrum of prevention. The characteristics of those who die by poisoning are the same as the group of children and young people who will be supported by the Children's Action Plan and Drivers of Crime initiative. This overlap means that prevention of poisoning has strong natural links to the other work programmes being set up to support vulnerable children and young people in New Zealand.

CYMRC recommendations

The CYMRC observes that the majority of poisoning deaths, both unintentional and those from undetermined intent, in children and young people in New Zealand in 2002–08 were associated with recreational substance use, and most of these were preventable. The CYMRC thus recommends a range of measures to reduce the mortality associated with unintentional poisoning in this age group, with a number of key initiatives being outlined below. A number of specific issues for urgent consideration are also listed in the key messages at the beginning of this report (pages 4–5).

1. The Ministry of Health and the Ministry of Social Development should sustain the current focus on the Children’s Action Plan. These actions, as well as directly supporting vulnerable children, will, in the long term, reduce deaths from poisoning³⁸ (CYMRC 2012). Areas of importance with regard to upstream actions to reduce poisoning include:
 - a. support for tobacco and alcohol control, especially for young women before conception and antenatally
 - b. family violence screening
 - c. support for women and families exposed to multiple disadvantages, including the strengthening of their connections with community supports
 - d. support for young women in having control of their fertility
 - e. developing interventions that are most effective for Māori to reduce the inequalities.
2. The New Zealand Injury Prevention Action Plan, currently being developed and led by ACC, should include a specific cross-government priority area on youth injury prevention. This youth injury prevention priority area should take a wide prevention approach with a focus on youth injury from a developmental perspective, including strong links to and support of the actions within the Children’s Action Plan and the Drivers of Crime initiative to reduce duplication of effort. Specific actions on poisoning deaths deserve attention in keeping with their importance as the second most common cause of injury death in young people.
3. The lead youth injury prevention agency, appointed under the New Zealand Injury Prevention Action Plan, should lead a portfolio of actions (see key messages on pages 4–5) around youth substance abuse and its legislation, in order to:
 - a. reduce the attractiveness and demand
 - b. reduce access to substances, especially butane
 - c. provide effective screening and intervention to support harm minimisation for those affected.
4. The Health Quality & Safety Commission, in conjunction with mental health services, should ensure the new serious incident review process is working for patients known to mental health service providers who die from poisoning. Such processes will require improved prospective surveillance, so services are aware of deaths, as well as the collection, thematic analysis and sharing of information in ways that lead systems improvement both locally and nationally.
5. DHBs should consider the needs of their community and services available and then develop clinical pathways and plans that describe how care joins up, including brief interventions, primary mental health care, community providers, alcohol and other drug services, mental health services and school-based services. Such care pathways and plans must make it easy for young people, families, schools and GPs to know when to seek and get the right care or support to prevent or minimise harm from substance use.

³⁸ While poisoning is the focus of this report, these same interventions are likely to have major benefits for a large number of other death categories, including sudden unexpected death in infancy, injury deaths, some medical conditions and suicide, as well as substantial benefits in reducing inequity and improving many other functions in society, including a reduction in crime.

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6. Reducing medicine-related harm in all settings from unintentional poisoning, suicide and substance abuse is a complex area with many organisations potentially involved.³⁹ It is important that they work collaboratively and that data held by these organisations are converted into information and shared effectively by creating strong feedback loops with prescribers and dispensers about practices that help reduce medicine-related harm. The Medication Safety Expert Advisory Group or the CYMRC should organise or facilitate a meeting to bring these groups together, aiming to develop better systems to reduce the burden of poisoning in young people from prescribed medicines.
 7. The Ministry of Health should consider contracting a national organisation, such as the New Zealand Drug Foundation, to work in partnership with media organisations (including digital media providers) to develop a resource highlighting good practice with regard to the media coverage of poisoning. Until such time as this resource is developed, guidance from the Australian 1985 Senate Select Committee on Volatile Fumes should be followed. All those who provide information on poisonings to the media (eg, police, coroners and health professionals) should guide the media about the safe use of such information and use the Australian guidance until New Zealand guidance is available.
 8. Government departments and agencies should consider funding more research around the areas of poisoning and substance use highlighted in this report. This would further enhance understanding of the issues for those affected and also enable more New Zealand-specific responses to be developed.

³⁹ Medicines Control (Ministry of Health), National Drug Intelligence Bureau (New Zealand Police), National Poisons Centre, PHARMAC, Medsafe, the Health Quality & Safety Commission's Medication Safety team, ACC, Best Practice Advisory Centre New Zealand, local police districts, New Zealand Drug Foundation, DHB quality teams, primary health organisations (PHOs), Medicines Adverse Reactions Committee and New Zealand Pharmacovigilance Centre (including CARM).

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Appendix 1: Spectrum of Prevention for poisoning⁴⁰

	Influencing policy and legislation <ul style="list-style-type: none">• Control legal access to volatile substances through age-restricted sales• Require warning labels
	Mobilising neighbourhoods and communities <ul style="list-style-type: none">• Recognise abusers• Reduce sales and access• Motivate communities for change
	Changing organisational practices <ul style="list-style-type: none">• Change dispensing and prescribing practices• Voluntary control of volatile substances by retailers• Put warning labels on products• Add offensive odours, tastes and colouring• Use alternate products and safer storage systems
	Fostering coalitions and networks <ul style="list-style-type: none">• Nominate a lead agency to develop coalitions (eg, feedback loops to prescribers)
	Educating providers <ul style="list-style-type: none">• Screen and support young people after risk-taking-related harm
	Promoting community education <ul style="list-style-type: none">• For schools, retailers, parents, caregivers and health professionals
	Strengthening individual knowledge and skills <ul style="list-style-type: none">• Develop strategies to build risk competence, resilience and health literacy• Connect young people to supports
	Assuring access to quality health care <ul style="list-style-type: none">• Identify users and connect to health services• Ensure transitions between districts and services• All deaths trigger quality improvement action

⁴⁰ This table draws heavily on Australian and Canadian research as well as the findings and coroners' recommendations in the New Zealand Chief Coroners' case study of butane (Office of the Chief Coroner 2012; Midford et al 2010; Toumbourou et al 2007; Baydala 2010).



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