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On-site ecstasy pill testing - a consideration of the issues from a policing perspective

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Executive Summary

Australasian policing has a long history of supporting a range of initiatives, such as methadone programs and needle and syringe provision services, that reduce illicit drug- related harm. These programs have been supported because the evidence base pointed to the benefits of doing so. It is therefore appropriate that the same evidence-based tests be applied to the issue of ecstasy pill testing. In doing so, it is important to remain cognisant that both the (Australian) Ministerial Council on Drug Strategy and the Intergovernmental Committee on Drugs have rejected pill testing as an appropriate harm minimisation practice.

In considering the broad issue of ecstasy use, it is important to be careful in the use of terminology. In this paper the term *ecstasy* is used to describe the illicit tablets that are purported to contain 3,4-methylenedioxymethamphetamine (MDMA). In the same way, the paper uses the term *MDMA* when referring specifically to that substance.

It is also important to differentiate between the overall objective of reducing the harm associated with ecstasy (and other similar drug) use, and one particular method that seeks to achieve this outcome, namely on-site pill testing. In this way, the key issue is not whether all reasonable measures should be introduced to reduce the (albeit rare) death and injury associated with ecstasy use, but rather whether on-site pill testing is the best, or even a useful, way of achieving this outcome.

Ecstasy is unusual in that the setting in which the drug is taken and the subsequent behaviour of the user, have a very large impact upon the level of harm that stems from that use. In particular, when ecstasy is taken in environments with a high ambient temperature and where a high level of vigorous activity is undertaken by the user, this substantially adds to the risks associated with the use of the drug.

Another critically important factor in the majority of serious adverse outcomes stemming from ecstasy use, is the concurrent use of alcohol or other drugs. The overwhelming majority of ecstasy users who become ill after taking ecstasy have also used alcohol and/or other illicit drugs concurrently. It also appears that those who use these other substances also have more serous outcomes than do users of ecstasy alone. In this way, most serious adverse outcomes from ecstasy use might, most accurately, be regarded as stemming from the combined use of ecstasy and other drugs.

In the four years 2001 to 2004, there were 112 ecstasy-related deaths in Australia. Ecstasy was, however, deemed to be the primary contributor to death in 51 (46%) of these cases. Ecstasy made a secondary contribution to a further 16 (14%) of these deaths and a tertiary contribution to the remaining 45 deaths (40%). MDMA was the sole drug present in the body of the deceased in only 6 (5%) of the deaths. Deaths in which ecstasy made a primary contribution mainly involved drug toxicity, overdose or physical collapse. Deaths in which ecstasy made a secondary contribution involved similar proximate causes, although other drugs (e.g., opiates) were deemed to have made the primary contribution to the death. Finally, deaths in which ecstasy made a tertiary contribution involved motor vehicle crashes, fatal violence, falls and suicide by non-drug means. In these deaths, ecstasy was detected in the deceased but with no direct contribution to the death. Of the 112 ecstasy-related deaths, 31% occurred as a result of a road traffic crash. Forty nine percent of the deaths were as a result of drug toxicity/ overdose and MDMA was rarely the only drug involved in these deaths (3 out of 45 deaths). In none of the 5 overdose-related deaths, was MDMA the only drug present.

These data show that deaths as a result of ecstasy use (or indeed MDMA use) *on its own* are very rare in Australia and the overwhelming majority of ecstasy-related deaths involve the use of other drugs as well. As is evident, pill testing would have no effect on the concurrent use of alcohol or other drugs. Also of importance, is that almost a third of ecstasy-related deaths occur as a result of a motor vehicle crash.

It is important to emphasise that the use of MDMA on its own can be dangerous. There are two aspects to this. The first, is that some individuals appear to be very sensitive to the drug and adverse outcomes can occur after the ingestion of relatively low doses. Second, the relationship between MDMA dose and blood concentration may not be linear, in that small increases in dosage may produce disproportionate increases in effects, possibly contributing to toxicity. Therefore, just because pill testing demonstrates that a drug contains only MDMA, this cannot lead to the conclusion that taking the drug is without risk.

There are a number of factors that appear to contribute to the precipitation of serious adverse outcomes following ecstasy use. These include:

- whether or not alcohol or other drugs were used at the same time as ecstasy;
- the ambient temperature of the environment in which the ecstasy was taken;
- the level of physical activity that the user engaged in after taking the drug;
- the extent of fluid re-hydration after ecstasy use;
- the dosage taken and whether the person has a particular sensitivity to MDMA or to another substance contained in the ecstasy tablet; and
- whether the ecstasy taken contained MDMA and/or other substances.

As is evident, any pill testing program would only impact upon one of these factors, namely whether the ecstasy taken contains MDMA and/or other substances.

Broadly there are three methods used to attempt to draw conclusions about the content of ecstasy pills. These are:

(1) *Laboratory based drug testing*

This involves the use of complex equipment, to conduct chromatography tests. Some of these techniques provide information concerning the substances that are present in the pills, while others also provide information about the *quantity* of those substances that are contained in the tablet. Assuming that the analytical processes used by the laboratory are sound, this kind of pill testing has a well-established history of accuracy in determining the content of pills. If it is deemed desirable to accurately determine the content and quantity of substances present in ecstasy pills as part of a harm reduction approach, then these are the 'gold standard' approaches that should be used.

(2) *Pill identification*

This method involves weighing and measuring pills and noting the branding and colour of pills. These data are then compared with listings of previously analysed pills with known content. Conclusions are then drawn about the likely contents of the pills. One problem with this approach is that just because pills have similar appearances does not necessarily imply that they have identical or even similar constituents.

(3) *Reagent-based pill testing*

This method involves the use of testing kits available at testing venues or over the internet. These testing kits utilise reagents which are fluids that change colour in response to the presence of certain chemicals. In practical terms, this involves scraping off a small amount of the pill, applying the reagent to the scraping, and observing the resultant colour change. The colour change is then compared with colour charts, and this purportedly provides information about the psychoactive substances that are (or are not) contained in the pill. There is a range of well-documented problems associated with the use of reagent testing kits. Specifically, these test kits:

- are not able to identify the presence of a particular drug;
- when used under optimum conditions may provide only an indication of a compound or drug class, which may be present;
- provide no information on the non-drug components which may be present in a sample;
- give misleading results where drug mixtures are concerned (a common occurrence in illicit drugs);
- do not provide information on drug dosages or purity;
- give results that are open to subjective interpretation; and
- contain hazardous chemicals (concentrated acids) that would cause irritation, injury and damage upon contact with person (skin) or other surfaces.

The lack of precision associated with this process and the legal difficulties inherent in it, strongly suggest that this is not an approach that police should be supporting. Neither, for similar reasons, is the evidence base sufficiently ambiguous that it warrants the application of any particular degree of tolerance to this practice.

There is mixed evidence about the influence of pill testing on the behaviour of ecstasy users. In addition, all of the evidence comes from outside Australasia and therefore must be viewed with some caution.

Some research (Benschop, Rabes & Korf, 2002) suggests that pill testing raises the profile of the safety issues surrounding ecstasy and provides a potentially valuable means by which service providers can contact ecstasy users. The research found that ecstasy users who had tested their pills at least once in the past, were more frequent users of ecstasy. On the other hand, the *frequency* of past pill testing appeared to be related to safer party behaviour and using ecstasy less often. It could be the case, however, that those who were inclined to test their ecstasy more frequently in the past, were inherently more cautious and temperate in their use of the drug. This research did not show that pill testing leads to an increase in ecstasy use, but nor did it demonstrate dramatic behaviour changes towards safer ecstasy use that were demonstrably associated with pill testing itself.

Other researchers, Wijngaart, Braam, De Bruin, Fris, Maalste, & Verbraeck (1999) and Winstock, Wolff, & Ramsay (2001), found that pill testing would have little effect, or possibly an adverse effect, on the safer use of ecstasy.

One factor which makes it difficult to isolate the potential impact of on-site pill testing programs, is that existing pill testing programs occur in the context of broader-based dance party harm reduction programs. Therefore, it is difficult to know what the impact of pill testing regimes *over and above existing dance party harm reduction programs* would be on the patterns of ecstasy use in Australasia. The key issue is whether the process of pill testing itself provides any greater 'carrot' to attract ecstasy users than do other existing harm reduction services designed to meet the needs of ecstasy users. There is no conclusive evidence about this either way. The overseas research does not, however, point to pill testing per se as being a major advance in the reduction of ecstasy-related harms. Nor, on the other hand does the evidence suggest that it encourages ecstasy use.

There are also a number of legal issues surrounding the use of testing kits. In most jurisdictions, third parties involved in the use of pill testing kits are committing the offence of possession and/or supply. Most jurisdictions also have a 'no tolerance' policy towards pill testing. The issues surrounding legal liability that may attach to manufacturers and suppliers of pill testing, or to organisations that facilitate drug testing, are yet to be clarified.

In considering the issue of pill testing, it is important for policing to see this as broader than the use of reagent-based testing at dance parties. In keeping with the policy position of The Netherlands, the results obtained from on-site reagent-based pill testing are simply too unreliable to be regarded as making a useful contribution to reducing the harm associated with the use of this drug. There may, however, be other more scientifically sound and legally appropriate ways of getting information to ecstasy users about the contents of ecstasy pills, particularly when the pills are very dangerous. This does not necessarily imply, however, that this testing should involve ecstasy users submitting their tablets for testing and, in the absence of adverse findings, having the pills returned to them.

Despite the lack of strong evidence to support the efficacy of pill testing programs, if a decision is made to support the implementation such programs in Australasia, then it is possible to identify a number of characteristics that such an approach should incorporate.

First, while police may have a role in facilitating efforts in this area, it would be necessary for the health sector to bear the financial burden of any costs associated with such programs. This is much like the health sector pays for needle and syringe provision programs which take place with the support of police. Equally, it would be essential that a high degree of quality control be exerted over the whole process of pill testing, the dissemination of

the results, and the provision of relevant harm reduction messages. Pill testing programs, whether on-site or off-site, should therefore be carried out by appropriately qualified, officially approved health personnel. It should also take place in the context of a legislative structure and/or clear guidelines about the appropriate use of policing discretion, that are designed to facilitate this. The involvement of well intentioned, voluntary groups operating in a legislatively grey area (or clearly in breach of the law) is not an approach to be encouraged.

The testing of pills should also be carried out using quality certified chromatography techniques (or similar scientifically sound techniques) by health sector staff who are qualified and legally approved to do so. Appropriate measures would also need to be in place to ensure the security of any drug samples and the witnessed destruction of those samples at the end of the testing process.

The dissemination of information about the results of pill testing also warrants careful consideration. For example, there would be merit in information about dangerous pills being widely disseminated. On the other hand, information should not be openly disseminated that indicates that certain pills would be associated with a low risk to most users. Such an approach could send the message that certain pills are regarded as safe, or at least low risk, even though no such guarantees can be given. In addition, it could lead to illicit drug manufacturers producing 'copy cat' pills which mimic the appearance of pills identified as being of low risk. The analysis of pills should also be timely and the results disseminated quickly.

The methods that could be used to obtain pills for testing would require careful consideration. Some possibilities include:

- the routine analysis of all pills (or samples of batches of pills) seized by police in the course of general or drug-focussed operations;
- the analysis of pills placed in amnesty bins, or discarded at dance venues; or
- the use of authorised covert pill purchasing operations for the purpose of analysis.

The results of such an enhanced pill identification and testing process could then be uploaded onto a database such as the National Illicit Tablet Database. It is likely that the use of the Database in this way would necessitate significant changes, given that its focus would change from it being primarily a forensic tool to an early warning system. These changes would include the need for timely chemical testing, identification and placement of seized pills on the database; and the routine sharing of selected parts of the database (e.g., identified dangerous pills) with colleagues from the health sector. As is evident, this would involve a substantial gearing up of the existing pill-testing and database infrastructure, which, given the health-oriented outcomes from such a process, would require funding from sources outside of police departments.

In summary, the evidence base is sufficiently strong to adopt a position opposing existing approaches to on-site pill testing at dance parties. Nevertheless, it is possible that there could be approaches to the identification of particularly dangerous pills that warrant further consideration.

While it does not relate to pill testing, there is a significant issue that may warrant closer policing attention in relation to reducing ecstasy-related harms. A very significant proportion of ecstasy-associated deaths stem from motor vehicle crashes that occur while the user is under the influence of the drug. Indeed, this accounted for 31 of the 112 ecstasy-associated deaths in Australia between 2001 and 2004. In this way, it is probable that the most significant contribution that policing could make to reducing deaths (and presumably injuries) associated with ecstasy use, is not associated with a role in supporting pill testing programs. Rather, this contribution could most effectively be made by the implementation of strategies that target driving while under the influence of ecstasy and ecstasy and other drugs. The recent introduction of random drug screening in some jurisdictions is likely to be of significant benefit in this regard.

Introduction

Australasian policing has a long history of supporting initiatives that enhance public health outcomes as far as illicit drug use is concerned. Policing services have supported such strategies as needle and syringe provision services and methadone/buprenorphine programs because of the strong evidence base that suggests that they lead to reductions in the risks associated with illicit drug use. The support for these public health outcomes has often been associated with the use of policing discretion in seeking to achieve positive outcomes for illicit drug users and for the community. In this way, policing has shown that it is sufficiently flexible to respond appropriately to these problems if the evidence points to the appropriateness of doing so.

A currently topical potential harm reduction strategy which warrants consideration by policing is that of on-site pill testing. This strategy involves the testing at dance parties of small quantities of illicit drugs (predominantly 3,4-methylenedioxymethamphetamine, [MDMA], ecstasy – or

at least substances purported to be ecstasy) to determine the extent to which taking these drugs would be likely to lead to adverse outcomes for the illicit drug user. The proponents of this approach suggest that this allows the illicit drug users to make informed decisions concerning whether or not to take the drug concerned. On the other hand, the (Australian) Ministerial Council on Drug Strategy and the Intergovernmental Committee on Drugs have both rejected pill testing as an appropriate harm minimisation practice.

In much the same way as policing has used an evidence-based approach to determine its response to other illicit drug related issues, it is appropriate to apply the same evidence- based criteria to determine what the position of policing should be in relation to on-site pill testing.

In considering the issue of pill testing, it is important to differentiate between the overall objective of reducing the harm associated with ecstasy (and other similar drug) use, and one particular method that seeks to achieve this outcome, namely on-site pill testing. Given the policing mandate to protect life, it is hard to argue against measures that would reduce death and injury associated with ecstasy use. As such, the key issue is not whether measures to reduce the (albeit rare) death and injury associated with ecstasy use should be supported, but instead whether on-site pill testing is the best, or even a useful way of achieving this outcome.

Legal issues surrounding pill testing

As Henry-Edwards (2001) pointed out, there are a number of legal issues surrounding pill testing that warrant consideration. These include:

- Whether the possession of the test kits is an offence;
- The legal implications of a person being in possession of an illicit drug for the purposes of testing that drug;
- Legal liability that could attach to manufacturers, distributors and marketers of test kits; and
- The current level of discretion exercised by police in tolerating the use of test kits.

Each of these is discussed in turn.

Whether the possession of the test kits is an offence

The manufacture, importation, sale or possession of ecstasy testing kits is not in itself illegal in any jurisdiction in Australia. The kits are not listed as prohibited imports under Customs legislation and they are not prohibited by virtue of being related to or encouraging drug use. The kits consist of readily available chemicals which are used for a wide range of industrial and scientific purposes. Even if the kits were declared illegal it is unlikely to be feasible to ban the reagents or the chemicals from which they are made, as this would cause considerable difficulty to other users of the substances.

Henry-Edwards (2001) reported that in NSW, there are offences for inciting or encouraging the commission of crimes and the printing of articles which do so. This suggests that an offence may be committed if the kits are promoted in such a way as to encourage drug use. This may have legal implications for the marketing and distribution of the test kits in that jurisdiction.

The legal implications of a person being in possession of an illicit drug for the purposes of testing that drug

In Queensland, the Australian Capital Territory, Tasmania, the Northern Territory, Victoria and South Australia, the person bringing the tablets to be tested is committing an offence (possession) and by handing the tablet to a tester is committing the offence of supply. Similarly, when the tester accepts the tablet for testing, the offence of possession is committed and the offence of supply is committed when handing the tablet back. In addition, in Tasmania it could be argued that, since the user is committing an offence by possessing the drug, a person testing the drug to facilitate its use could be aiding and abetting the offence.

Henry-Edwards (2001) reported that the situation is not so clear cut in NSW and that the question of criminality associated with the use of testing kits would depend on the circumstances. In that jurisdiction, a pill tester would not be committing the offence of possession because the charge requires that the person has knowledge of the substance being an illicit drug, and has physical control over the substance. In this way, a tester would not know what the substance was until after the test was performed and it is likely that holding the drug for long enough to perform a test would not constitute control.

Henry Edwards (2001) reported that NSW Police Service also considered it unlikely that a person who provides a testing facility could be found guilty of the offence of aiding or abetting the possession or use of a prohibited

drug. For a person to be aiding and abetting the offence they must be 'linked in purpose' with the drug user and engaging in some action or encouragement which makes the offence more likely to occur. On the other hand, a person who was testing a drug for the purposes of facilitating the sale or purchase of a quantity of drugs could be committing the offence of being knowingly concerned in the supply of a quantity of drugs.

Current level of tolerance to testing kits

Henry-Edwards (2001) reported that most police organisations indicated that they do not support the use of drug testing kits because of their inherent limitations. NSW indicated that it has developed guidelines on areas of discretion in relation to other harm reduction activities including methadone clinics, needle and syringe programs, non-fatal drug overdose and medically supervised injecting centres. These could be adapted to the circumstances of drug testing kits if they were recognised as an appropriate harm reduction strategy.

Legal liability that could attach to manufacturers, distributors and marketers of test kits

As Henry-Edwards (2001) pointed out an issue that warrants consideration is whether those involved in the manufacture, distribution and use of pill testing kits could be open to the threat of civil liability proceedings in the event of adverse reactions occurring after consumption of tablets which have been tested. Also of concern, is whether a police department which agreed to testing kits being used as a harm reduction strategy, would also incur liability. It is likely that the resolution of these issues would only occur once such a case has been before the courts and decided.

In summary therefore, any consideration of pill testing must begin from the premise that in most jurisdictions, third parties involved in the use of pill testing kits are committing the offence of possession and/or supply. Equally, most jurisdictions currently have a 'no tolerance' policy towards pill testing. The issues surrounding legal liability that may attach to manufacturers and suppliers of pill testing, or to organisations that facilitate drug testing, are, however, yet to be clarified.

What is ecstasy and how does it exert its effects?

This paper will use the term ecstasy to describe illicit tablets that are purported to contain MDMA. In doing so, it is important to be cognisant that these tablets may or may not contain MDMA as well as other psychoactive or non-psychoactive substances. In the same way, the paper will use the term MDMA when referring specifically to that substance.

As Gowing, Henry-Edwards, Irvine and Ali (2001) reported, the use of MDMA makes users feel sensations of tactility, empathy and it has both stimulant and hallucinogenic effects. It is rapidly absorbed from the gut and its effects become apparent approximately 20 minutes after oral administration and last approximately four hours. MDMA acts to increase the activity of the neurotransmitters serotonin and dopamine. Initially, MDMA promotes the release of serotonin, but this eventually leads to the depletion of this neurotransmitter and to a subsequent decrease in serotonin levels (Gowing et al. 2001).

Gowing et al. (2001) also noted that the primary positive effects of MDMA are an elevated mood encompassing feelings of energy, euphoria, intimacy and closeness to other people. Negative psychological effects include paranoia, anxiety and depression. The authors reported that tolerance[1] to MDMA appears to develop rapidly, and users commonly report a decrease in positive effects and an increase in negative effects with increasing dosages. As Gowing, Henry-Edwards, Irvine and Ali (2002) reported, the relationship between MDMA dose and blood concentration may not be linear. In this way, small increases in dosage may produce disproportionate increases in effect, possibly contributing to toxicity. In addition, some of the break-down products of MDMA could also give rise to toxic effects. Therefore, it is important to emphasise that MDMA on its own can produce toxic reactions in sensitive individuals and presumably in all individuals if given a sufficiently high dose.

[1] Tolerance refers to the need to have a larger dose of the drug in order to maintain the desired effects.

The importance of the setting in which MDMA (and ecstasy) is taken

One unusual characteristic of MDMA (and of ecstasy more broadly) is the considerable degree of influence that the physical characteristics of the setting in which the drug is taken, has on the degree of harm that stems from that use. For example, there was substantial use of MDMA in the 1970s and 1980s, and MDMA gained a legitimate reputation as a useful adjunct to psychotherapy in California during that time (Fowler, Kinnear & Krenske, in press). The first reports of deaths involving the use of this substance did not appear until around 1987. A subsequent surge in the case reports of deaths and other significant adverse events, appears to have been associated with a change of setting in which the drug was most commonly used. That is, in the 1970s, the drug was predominantly used in the clinical psychotherapy setting rather in the dance party setting. The dance party setting is associated with high levels of physical activity and potentially high ambient temperatures (Gowing et al. 2002), which contribute significantly to the harms associated with its use. Another obvious difference between the psychotherapeutic use of MDMA and illicit use of ecstasy, is that the MDMA used in the clinical setting was of pharmaceutical quality compared with the less pure forms of ecstasy available on the illicit market. Nevertheless, there is little doubt that the setting in which ecstasy is currently used, is a significant contributing factor to the harms that stem from that use. This will be discussed in more detail later.

Serious adverse effects of ecstasy use

Before it is possible to assess the utility of on-site pill testing as far as preventing ecstasy-related harms is concerned, it is first necessary to define the harms that this strategy would seek to address. Broadly, there are two clusters of harms that are associated with ecstasy use. The first of these relates to some sort of misadventure (such as a motor vehicle crash, drowning or interpersonal violence) that occurs while under the influence of ecstasy. This is a substantial cause of ecstasy-related deaths and this will be touched upon later in this paper, but is not specifically the focus of the paper.

The second cluster is related to the more toxic effects that occur as a result of ecstasy use. As Gowing et al. (2001) reported, there are two groups of toxic effects that appear to arise from the use of ecstasy. The first of these relates to the gradual, apparently irreversible destruction of the neurotransmitter pathways of the brain associated with repeated (although not necessarily extensive) ecstasy use. This appears to be associated with the development of short term memory impairment, emotional disorientation and depression in some users (Henry-Edwards, 2001). It should be noted that there is not universal acceptance within the scientific community of the existence of this decline in cognitive functioning associated with ecstasy use. Lyvers (2006), for example, points to a number of methodological problems associated with many studies that have drawn conclusions about the harmfulness of ecstasy consumption. Since pill testing does not seek to address this potential pattern of ecstasy-related harms, it is not considered in further detail in this paper. Nevertheless, it is worth bearing in mind that even though ecstasy users may not experience the serious acute toxic effects of ecstasy described below, this does not mean that the use of the drug is without the risk of longer-term impairments in brain function.

The second pattern of toxic effects that arise from ecstasy use referred to by Gowing et al. (2001) is the acute and sometimes fatal toxicity that can occur within hours of taking the tablet. It is this kind of event that pill testing endeavours to address and, as a result, this pattern of ecstasy-related harm is discussed in some detail.

It important to be mindful, that such serious, acute events following ecstasy use occur very infrequently (Gowing et al. 2002). This is particularly evident when compared with the number of occasions on which ecstasy is taken. As these authors pointed out, it is the unpredictability of these adverse events and the risk of death or serious injury in young people, rather than the frequency with which this occurs, that makes this pattern of drug-related harm significant.

Ecstasy deaths

Fowler et al. (in press) reported that data from the National Coronial Information System (NCIS) showed that in the four years 2001 to 2004, there were 112 ecstasy-related deaths in Australia. To put this into context, however, ecstasy was deemed to be the primary contributor to death in 51 (46%) of these cases. Ecstasy made a secondary contribution to a further 16 (14%) of these deaths and made a tertiary contribution to the remaining 45 deaths (40%). Interestingly, MDMA was the sole drug present in the body of the deceased in only 6 (5%) of deaths.

As Fowler et al. (in press) reported, deaths in which ecstasy made a primary contribution mainly involved drug toxicity, overdose or physical collapse. Deaths in which ecstasy made a secondary contribution involved similar

proximate causes, although other drugs (e.g., opiates) were deemed to have made the primary contribution to the death. Finally, deaths in which ecstasy made a tertiary contribution involved motor vehicle crashes, fatal violence, falls and suicide by non-drug means. In these deaths, ecstasy was detected in the deceased but with no direct contribution to the death.

Of the 112 ecstasy-related deaths, 31% occurred as a result of a road traffic crash. Forty nine percent of the deaths were as a result of drug toxicity/overdose and MDMA was rarely the only drug involved in these deaths (3 out of 45 deaths). In none of the 5 overdose-related deaths, was MDMA the only drug present.

Three key issues arise from these data. First, deaths as a result of ecstasy use (or indeed MDMA use) on its own are very rare in Australia. Second, the overwhelming majority of ecstasy-related deaths involve the use of other drugs as well. Third, almost one third of ecstasy-related deaths occur as a result of a motor vehicle crash.

The physiological mechanisms involved in deaths or serious adverse events associated with ecstasy use

As Gowing et al. (2002) identified, there are three physiological mechanisms that lead to serious acute adverse events (including deaths) stemming from ecstasy use. The first of these involves hyperthermia[2]. Ecstasy affects the body's ability to regulate internal temperature and, as a result, hyperthermia is one of the key symptoms of an acute adverse reaction to ecstasy. There appears to be a relationship between the maximum temperature reached by those experiencing an adverse reaction to ecstasy and the likelihood of a fatal outcome. For example, Gowing et al. (2002) found that in approximately two thirds of cases in which the temperature of ecstasy users exceeded 41.5 degrees Celsius, death was the ultimate outcome. The authors also reported that ecstasy, if taken on its own in sufficient quantities can induce hyperthermia. Gowing et al. (2002) noted that serious ecstasy-induced hyperthermia is typically accompanied by a number of other problems including seizures, disseminated intravascular coagulation[3], rhabdomyolysis[4], and kidney or liver impairment.

[2] Hyperthermia refers to a situation in which a person's body temperature reaches at least 38 degrees celsius.

[3] As Jones (1998) reported, disseminated intravascular coagulation involves the inappropriate formation of small blood clots across a wide area of the body's blood vessels. This means that the components of the blood that are usually involved in blood clotting are used up faster than they can be produced, causing a depletion of these clotting factors in the blood. As a result, the ecstasy user can spontaneously bleed from the nose, mouth, and gastrointestinal tract and, in severe cases, will bleed to death.

[4] Rhabdomyolysis refers to the break down of muscle tissue that results in the release of toxic materials into the blood stream.

The second mechanism that leads to serious adverse ecstasy-related events described by Gowing et al. (2002) concerns imbalances in salt and water concentrations in the body. Typically, this results from excessive consumption of water while under the influence of ecstasy. This excessive consumption of water is especially problematic in the context that one of the effects of MDMA is a reduction in the body's ability to excrete urine. This leads to a chemical imbalance in the body and can result in death.

The third mechanism is a grouping of other problems such as: seizures (in the absence of hyperthermia, or chemical imbalances); heart problems (typically in people with pre-existing cardiac conditions); cerebral haemorrhage (particularly where there is an underlying weakness in the wall of an artery); and respiratory problems

What causes these severe reactions?

Identifying precisely what causes these severe reactions to ecstasy is not a straightforward task. There are, however, a number of factors that appear to contribute to the precipitation of these severe events. These include:

- whether or not alcohol or other drugs were used at the same time as ecstasy;
- the ambient temperature of the environment in which the ecstasy was taken;
- the level of physical activity that the user engaged in after taking the drug;
- the extent of fluid re-hydration after ecstasy use;
- the dosage taken and whether the person has a particular sensitivity to MDMA or to another substance contained in the ecstasy tablet; and
- whether the ecstasy taken contained MDMA and/or other substances.

These factors and their implications for pill testing will be discussed in further detail later in this paper.

The significance of the logo found on most ecstasy tablets

As Winstock, Wolff and Ramsey (2001) pointed out, an unusual characteristic of ecstasy is that unlike other illicit substances, it is typically sold as a tablet (pill) and is usually marked with a graphical logo. This logo is essentially a brand mark that aims to give the suggestion of consistency of content between all pills carrying that logo. As Winstock et al. (2001) noted, however, the presence of a specific logo on a series of pills does not necessarily imply commonality of manufacture or content. Indeed, Cole, Bailey Sumnall, Wagstaff and King (2002) found substantial differences in MDMA concentrations in similarly branded tablets in the United Kingdom. This makes it impossible to draw positive conclusions about the content of pills, based on their physical appearance. This is significant in relation to the issue of pill testing, because it makes it impossible to extrapolate definitive conclusions about the content of a particular ecstasy tablet, based on it having a similar appearance and logo as another tablet.

What is pill testing?

Broadly, there are three methods used to attempt to draw conclusions about the content of ecstasy pills. These are laboratory based testing, pill identification and reagent-based testing. In the Australian context, (although not necessarily in other countries in which mobile laboratories may be employed) on-site pill testing involves the use of reagent-based tests and/or pill identification.

These three methods of pill testing are discussed in turn.

Laboratory-based drug testing

Laboratory-based drug testing involves the use of complex equipment, to conduct chromatography tests. There are several different forms of chromatography namely:

- liquid chromatography (LC);
- high performance liquid chromatography (HPLC);
- thin layer chromatography (TLC);
- gas chromatography (GC); and
- gas chromatography and mass spectrometry (GC + MS).

Some of these techniques (such as TLC) provide information concerning the substances that are present in the pills. Other techniques (such as GC) also provide information on the *quantity* of those substances that are contained in the tablet (Niesink, 2006). Assuming that the analytical processes used by the laboratory are sound, this kind of pill testing has a well-established history of accuracy in determining the content of pills. If it is deemed desirable to accurately determine the content and quantity of substances present in ecstasy pills as part of a harm reduction approach, then these are the 'gold standard' approaches that should be used.

A further method of laboratory-based testing is immunological testing, which involves testing urine for the presence of certain antibodies. This process is not as reliable as the various forms of chromatography (Benschop, Rabes & Korf, 2002).

Pill identification

As Benschop et al. (2002) pointed out, this method involves weighing and measuring pills and noting the branding and colour of pills. These data are then compared with listings of previously analysed pills with known content. Conclusions are then drawn about the likely contents of the pills. As was discussed earlier, however, just because pills have similar appearances does not necessarily imply that they have identical or even similar constituents.

Reagent-based pill testing

Reagent based pill testing is the primary focus of this paper, and as such, this is considered in some detail.

Methods of reagent based pill testing

Reagent based pill testing involves the use of drug testing kits, available at testing venues or over the internet. In the Australian context, these kits cost between $25 and $40. The testing kits involve the use of reagents, which are fluids that change colour in response to the presence of certain chemicals. In practical terms, this involves scraping off a small amount of the pill, applying the reagent to the scraping and observing the resultant colour change. The colour change is then compared with colour charts and this purportedly provides information about the psychoactive substances that are (or are not) contained in the pill. The proponents of pill testing suggest that pills which contain MDMA are far less likely to contain dangerous adulterants. Conversely, they argue that pills with other substances or unknown contents, are associated with the highest risk of containing harmful contaminants (Enlighten, 2006).

A number of different testing kits are available (for examples see Ez-test, 2006). These are:

A. The marquis reagent. This test consists of sulphuric acid and formaldehyde (at times mixed with methanol to slow down the reaction process). The marquis reagent reportedly turns purple/black in the presence of an MDMA-like substance, orange/brown in the presence of amphetamine, yellow/green in the presence of 2C-B (4-bromo-2,5-dimethoxyphenethylamine), or DOB (4-bromo-2,5-dimethoxyamphetamine) (Ez-test, 2006).

B. The mandelin reagent. This test consists of ammonium vanadate and concentrated sulphuric acid (US National Institute of Justice, [NIJ], 2000). The mandelin reagent also reportedly turns purple/black in the presence of an MDMA-like substance, dark green in the presence of amphetamine and orange/brown in the presence of ketamine (Ez-test, 2006).

C. The mecke reagent. This contains selenious acid and concentrated sulphuric acid. This test turns purple/black in the presence of an MDMA-like substance, yellow in the presence of DXM (dextromethorphan), and yellow, orange, red, purple in the presence of 2-C-T-xx family (Ez-test, 2006). The mecke reagent also turns deep blue/green in the presence of heroin (NIJ, 2000).

As ecstasy is commonly taken at dance parties, these parties are the venues at which the testing of these drugs takes place. Some organisations (for example, Enlighten, in Australia) have, at least in the past, offered a pill testing service at dance parties.

Even the proponents of reagent-based pill testing are at pains to highlight their shortcomings and limitations (for example see Enlighten, 2006). This is with good reason.

Limitations of reagent-based pill testing

This description of the limitations of reagent-based pill testing draws heavily on information provided by Quinn (2006, Victoria Forensic Science Centre, pers comm.,15 May). As was discussed earlier, many compounds, including drugs, produce a distinctive colour when they come into contact with various chemical reagents. The colour produced by this reaction may be specific for a particular compound. More commonly, however, the colour that arises can be produced by a number of compounds from a given class of substances. Indeed, similar colours can be produced by the reaction between the reagent and non-related compounds. In a number of instances, the reaction between the reagent and the substance is related to particular aspects of the compound's chemical structure. However, this can not fully explain the phenomena of colour reaction, as many anomalous responses have been documented. In this way, the specificity of colour reactions is extremely poor and can not be relied upon for accurate identification of a particular compound.

The interpretation of these tests is also surrounded with difficulties. The most obvious of these is the subjectivity associated with describing the resultant colour with any degree of accuracy. In addition, to have any degree of consistency in the colours produced by the reagent/substance reaction, it is necessary to have a high degree of consistency in the conditions under which the test is takes place. The ambient temperature of the environment or the temperature of the reagents, for example, can influence the outcome of tests. A further factor that complicates the interpretation of the reagent test results is the colour variation that is evident in colour reference charts produced by the manufacturers of the test kits. The accuracy of the tests becomes even more suspect when it is considered that the sample itself may also be coloured (e.g., a green or blue tablet). In this way, the colour present in the sample is likely to affect the resultant colour of the reagent/drug reaction.

Another issue that complicates the use of reagent-based test kits, is the chemical form of the particular substance that is being tested. Reference colours (the colours that are used to compare the colour of the reagent reaction) are usually obtained as a result of the reaction of a drug in a particular form. For example, the reference colours could be developed using the drug in a free base form, as an acid or as a salt. In the context of the variable quality of processes associated with the illicit production of drugs, drug compounds could (for example) exist in a variety of these forms as well as having variations between the forms. This range of variation leads to significant difficulties associated with the interpretation of test results.

The reagent colour tests were essentially designed for use on single compounds not, as is likely to be the case with illicitly manufactured drugs, multiple compounds. This is significant, because the degree of consistency in the colours resulting from reagent/compound reactions is dependent on the chemical reaction between the reagent and a specific compound. When the reagent is presented with several compounds with which it may react, it can then produce a colour (or a variety of colours) which leads to unclear and potentially misleading results.

Another factor that impacts on the reliability of reagent-based drug testing, is that the test requires approximately 1mg of the compound to be present in order for it to be detected. In the case of pill testing, when a scraping is taken from the pill for testing, approximately 1-2 mg of the pill is taken. Given that the illicit pills do not contain pure substances, it is unlikely if not impossible, for the scraping to contain 1mg of a specific compound to be tested.

Quinn (pers. comm., 2006) reported that laboratory tests have been carried out using the marquis and mandelin test kits. When pure samples were tested, the kits responded in the manner expected, within the limitations mentioned above. When illicit street samples, containing mixtures of compounds including various drugs were tested, the interpretation of the results became more complicated. This is because, as was described above, the tests are not capable of separating the compounds present in the illicit drugs. In addition, as expected, the test kits were not able to differentiate between high and low levels of compounds, between tablets containing only one drug type and tablets containing numerous drugs. Further, no information regarding the non-drug content of the tablet could be provided by these kits.

These reagent tests do have a place in forensic or field investigation settings where they have value as a simple indication test. In these contexts, the reagent testing process is the initial part of determining the possible presence/absence of a class of drug. Colour test results are, however, *never* utilised in these settings to identify a drug type or to provide any determination of the purity of the drug within the sample.

In summary, reagent test kits:

- are not able to identify the presence of a particular drug;
- when used under optimum conditions may provide an indication of a compound or drug class, which may be present;
- provide no information on the non-drug components which may be present in a sample;
- give misleading results where drug mixtures are concerned (a common occurrence in illicit drugs);
- do not provide information on drug dosages or purity;
- give results which are open to subjective interpretation; and
- contain hazardous chemicals (concentrated acids) that would cause irritation, injury and damage upon contact with person (skin) or other surfaces.

The ability of reagent testing kits and other drug testing processes to impact on the factors that increase the likelihood of severe adverse reactions to ecstasy

Earlier, a number of factors were identified which appear to increase the likelihood of users of ecstasy experiencing serious acute adverse outcomes. Each of these factors and their implications for the utility of pill testing are now considered in turn.

A. Whether or not alcohol or other drugs were used at the same time as ecstasy

Poly drug use is relatively common among users of ecstasy who experience significant adverse outcomes from their ecstasy use. This is evident from the NCIS data discussed earlier. Further evidence comes from a sample of 48 ecstasy users attending an accident and emergency department in the United Kingdom. Half of the ecstasy users had concurrently taken other illicit substances, typically amphetamines or cocaine. Two thirds of the sample had taken either other illicit drugs and/or alcohol. Moreover, the most serious complications occurred exclusively in the subgroup of ecstasy users who had also taken alcohol and/or other illicit drugs as well (Williams, Dratcu, Taylor, Roberts & Oyefeso, 1998). Liechti, Kunz and Kupferschmidt (2005) came to similar conclusions in their study of unwell ecstasy users attending a Zurich emergency department. Approximately 52% of attendees had also consumed alcohol and 71% of the sample had used other illicit drugs. Indeed, only 9% of the sample had used only ecstasy.

In this way, the most serious adverse outcomes of ecstasy use might, most accurately, be conceived as stemming from the combined use of ecstasy and other drugs.

No kind of pill testing would alleviate this contributor to serious ecstasy-related outcomes. Although pill testing *might* shed some light on what a particular ecstasy pill contains, it would not provide information on what other substances the user intended to take, or had already taken, or how these might interact with the compounds contained in the ecstasy tablet.

B. The ambient temperature of the environment in which the ecstasy was taken

When ecstasy is taken in an environment which has a high ambient temperature, this adds to the hyperthermic effect of the ecstasy itself (Gowing et al. 2002). A key way of reducing the harms from ecstasy use is by ensuring

that the ambient temperature is sufficiently low at dance parties and other venues in which ecstasy is commonly taken. Also important in this regard are 'chill-out rooms' which provide a cool environment to facilitate more rapid reductions in body heat. As is evident, pill testing would have no impact on this risk factor.

C. The level of physical activity engaged in by the user

As described above, if ecstasy is taken in environments that are associated with considerable amounts of physical activity, there is an increased risk of hyperthermia. Pill testing would not impact on this risk factor.

D. The extent of re-hydration after ecstasy use

Adequate (but not excessive) re-hydration is an important component of reducing ecstasy-related harms. This is particularly the case in situations where the user is involved in high levels of physical activity. Pill testing would also not impact on this risk factor.

E. The dosage of MDMA taken / individual sensitivities to MDMA

It would be safe to assume that for all individuals, there would be a dosage of MDMA that would be associated with toxicity. The dosage of MDMA taken, however, is not necessarily predictive of the severity of the outcome. Gowing et al. (2002) reported on 21 cases of acute adverse effects following ecstasy use in which MDMA *was the only drug* detected in the subjects' bodies. For cases with a fatal outcome, serum levels of MDMA ranged from 0.4mg/litre to 6.5mg/litre. Equally, for cases with a non-fatal outcome, serum levels varied from 0.24mg/litre to 7.0 mg/litre. These wide variations point to individual sensitivities to MDMA, rather than it being the effect of the dose of MDMA that led to the adverse outcome. It could be argued that the likelihood of an adverse outcome could be related to impurities in the ecstasy being taken, however, this individual variation occurs even when MDMA is the *only* substance detected. In this way, it seems to be the extent to which the individual is sensitive to the effects of MDMA, rather the amount of MDMA contained in a tablet, that is the critical factor in determining the likelihood of an adverse outcome.

Reagent-based pill testing provides no insight into the levels of MDMA which are present in pills. As was discussed earlier, pill testing using gas chromatography can provide an insight into the quantity of MDMA (or other substances) in pills. However, given the lack of correlation between MDMA dosage and the severity of the outcome of the adverse events (with the obvious exception of pills containing very high doses of MDMA), the value of having information about the dosage of MDMA contained within ecstasy tablets is not as obvious as it first appears.

In this way, reagent-based pill testing has little to offer in terms of reducing this contributor to ecstasy-related adverse events. Gas chromatography might be of some use in the case of detecting pills with exceptionally high doses of MDMA.

F. Whether the ecstasy taken contains MDMA and/or other substances

As is evident, the fact that an ecstasy tablet contains only MDMA does not necessarily mean that taking it is safe, in terms of acute or more chronic levels of harm. There are, however, other risks. Henry-Edwards (2001) reported that forensic examination of ecstasy tablets has revealed that there is a range of substances other than MDMA that may be present. These substances may include:

- Gamma-hydroxy-butyrate (GHB), a dangerous anaesthetic drug (particularly when used with alcohol) with sedative properties;
- Ketamine, an injectable veterinary anaesthetic;
- Methamphetamine;
- Lysergic Acid Diethylamide (LSD);
- 4-bromo-2, 5-dimethoxyphenethylamine (2CB), an amphetamine type stimulant; and
- Paramethoxyamphetamine (PMA), a highly toxic hallucinogen that has led to at least 12 deaths in Australia (Australian Crime Commission, 2005).

All of these substances (and many others) have the potential to be associated with an acute adverse outcome for users of ecstasy. These adverse outcomes could result from taking a dose that would lead to toxic effects in most people. However, it could also result from taking a much smaller dose in the case of individuals who are particularly sensitive to the effects of the substances. The effect of these substances becomes even more difficult to predict when they are combined with other legal and illegal substances the person may have taken.

There is, however, little doubt that there would be benefit in being able to detect the presence of certain substances, such as GHB, ketamine, PMA or very high doses of MDMA in ecstasy tablets. It is likely that the ability to warn potential users of the drug about the presence of these substances in specific ecstasy tablets, would lead to a reduction in the proportion of deaths associated with ecstasy overdose or toxicity. Given the limitations of reagent-based testing described earlier, it is unlikely

that this process could contribute much, if anything to this outcome. More complex forms of pill testing could, however, have some utility in this regard.

As is evident, pill testing would only impact on one or two of the several factors that increase the risk of serious adverse events occurring following ecstasy use. The contribution that reagent-based pill testing could make to reducing this risk factor is highly questionable, but this does not necessarily rule out other approaches.

What do we know about the likely impact of pill testing on the patterns of use and harms associated with ecstasy?

No research evidence is available that sheds light on this issue from an Australasian perspective and, naturally, research conducted elsewhere needs to be viewed with some caution. In the European Union, Benschop et al. (2002) conducted a large scale study involving 702 dance party attendees in Amsterdam (The Netherlands), Hanover (Germany) and Vienna (Austria). It should be noted that these three cites utilised varying models of pill testing. Specifically, Amsterdam used both reagent-based testing (quick testing) and laboratory-based testing. This testing is not carried out at dance parties, because of the belief by the Dutch authorities that available mobile testing procedures do not yield sufficiently reliable information for users. Hanover offered party-based and off-site reagent-based pill testing, accompanied by pill identification. Vienna had liquid chromatograph testing (which provides qualitative and quantitative analysis of the pills), and this service is offered only at dance parties.

The respondents were divided into three groups, namely:

- Testers (those who had taken ecstasy at least once in the past 12 months and had used a testing service once in their lives);
- Non-testers (those who had taken ecstasy at least once in the past 12 months, but who had never used a pill testing service); and
- Non-users.

In examining the findings from the research it is worth remaining cognisant that an association between variables (such as whether or not the subjects had their pills tested) does not necessarily imply causation. Key findings of the research were as follows:

- The most common reason for the testers to participate in pill testing was curiosity about the pill contents, followed by warnings about dangerous pills and health concerns.
- The most common reason for non-testers to not use the testing service was that they trusted their dealer.
- Most of the partygoers got most of their information about ecstasy from their ecstasy- using peers. The mass media played little role in this regard.
- Four out of ten users believed (incorrectly) that a reagent test can be used to determine the quantity of substances in ecstasy pills.
- There was no difference between the usual number of pills taken on any one occasion by testers and non-testers, however, testers were more frequent users of ecstasy.
- The more often the testers had their pills tested in the past, the less frequently they were likely to use ecstasy.
- When provided with a test result that showed that their pill contained a low dose of MDMA, testers stated that they would take more pills, presumably in order to get the same effect. They would not buy more, but they would tell their dealer about the low dose and/or go to another dealer, or on-sell the pill.
- When provided with a test result that showed a high dose of MDMA, testers stated that they would buy more pills, (presumably to stockpile them) but use fewer pills and warn their friends.
- When the test showed that their pill contained amphetamines they would either: not use the substance or take fewer pills; tell their friends and dealer; and/or go to another dealer.
- When the test showed the presence of a suspicious substance, they would not use the pill, or take fewer pills. They would not buy more, they would warn their friends and tell their dealer and/or go to another dealer. They would also enquire about the potential risks.
- Testers had more accurate knowledge about ecstasy than non-testers and non-users.
- Testers and non-testers in equal measure believed incorrect information about ecstasy.
- No immediate differences were found in the extent to which testers and non-testers exhibited safe party conduct.

- There was a high level of awareness that the logo on the ecstasy pill does not provide any information about the contents of the pill. This was particularly the case among testers.
- Safer party behaviour was seen among the testers who had tested most frequently in the past.
- Pill testing programs appeared to be able to reach ecstasy users who are not reached by the drug treatment system.
- There appeared to be a group of non-users who were waiting for the right opportunity to use ecstasy. It was unclear whether pill testing would diminish or enhance reservations about commencing ecstasy use.
- There was a group of non-users for whom pill testing had a role in preventing the onset of use of ecstasy.
- Testers appeared to have a higher level of awareness about dosages and effects of ecstasy compared with non-testers or non-users.

In summary, one interpretation of this research into pill testing is that it heightens the profile of the safety issues surrounding ecstasy and provides a potentially valuable means by which service providers can contact ecstasy users. The frequency of past pill testing appeared to be related to safer party behaviour and using ecstasy less frequently. It could be the case, however, that those who were more inclined to test their ecstasy in the past, were inherently more cautious and more inclined to find out more about the potential effects of ecstasy. The study does not, however, show that pill testing leads to an increase in ecstasy use, but nor does it demonstrate dramatic behaviour changes that are demonstrably associated with pill testing.

Equally, in a study of Dutch dance party attendees, Wijngaart, Braam, De Bruin, Fris, Maalste and Verbraeck (1999) found that for 84% of the attendees, the presence of pill testing (and related services) at dance parties would have no effect on their ecstasy use. Of the 16% who indicated that pill testing did influence their drug use, most indicated that they felt safer knowing what they were taking, or that they would choose not to take a pill or to take it in a safer manner if the pill was found to be "bad".

In their study of over 1000 dance club attendees in the United Kingdom, Winstock, Griffiths and Stewart (2000, as cited in Winstock, et al. 2001), asked subjects about how the quality of ecstasy pills would influence the amount of the drug they consumed. The subjects indicated that if the quality of pills was thought to become worse, then more than 20% of the group would take more, just over a third would take less and 40% reported that this would have no impact on their ecstasy use. Conversely, and perhaps of greater concern, if the quality of pills was thought to improve, 40% reported that they would take more, just over 10% indicated that they would take less, and the remaining half reported that it would make no difference to their use.

One factor which makes it difficult to isolate the potential impact of on-site pill testing programs, is that existing pill testing programs occur in the context of broader-based dance party harm reduction programs. These programs include the provision of information about avoiding over-heating, the importance of adequate hydration and rest, and not combining ecstasy use with the use of alcohol and other drugs. Therefore, it is very difficult to know what contribution the addition of some form of pill testing would make to dance party harm reduction programs that provide this information to ecstasy users.

In the absence of research conducted in the Australasian context, it is difficult to know what the impact of pill testing regimes *over and above existing dance party harm reduction programs* would be on the patterns of ecstasy use in Australasia. The overseas research does not, however, point to pill testing being a major advance in this area.

What do we know about the perspectives of police and other government authorities in those countries in which pill testing has been adopted? What do we know about the value of pill testing as a means of enhancing the quality of ecstasy available?

Benschop et al. (2002) interviewed three key drug experts from each of the Netherlands, Germany and Austria about the value of pill testing generally and about the value of pill testing as a mechanism to monitor the ecstasy market. These experts were drawn from three areas, namely: national level drug or health policy coordination; local level drug or health professionals with coordinating tasks; and police. While this is obviously a limited sample of those with expertise in this area from each country, it does provide some insight into the perspectives of experts from countries actually involved in pill testing. The findings from these interviews are summarised overleaf.

Fields of expertise	Netherlands -Amsterdam	Germany - Hanover	Austria - Vienna
National-level drug or health policy coordination			
Pill testing	Approved of pill testing	Ambivalent	Approved of pill testing
Useful means of market monitoring and analysis?	Yes	Yes	Yes
Local-level drug or health professionals with coordinating tasks			
Pill testing	At parties, no At other venues, yes	Approval under certain conditions	Approved of pill testing
Useful means of market monitoring and analysis?	No	Yes	No
Police			
Pill testing	Mostly negative	Mostly negative	Approval
Useful means of market monitoring and analysis?	No	No	No

From Benschop et al. (2002) page 82.

As is evident, among those working in national drug or health policy environments in the three countries, there was a large measure of support for pill testing and a belief in the value of pill testing as a valuable means of market analysis. As is also clear, there was significantly less support for this approach among local level health professionals and among police. As Beschop et al. (2002) reported, most of the experts were inclined to scepticism about the value of pill testing as an instrument for the continuous monitoring and analysis of drug markets. The authors made the point that the lack of a comprehensive endorsement of pill testing as a means of undertaking ecstasy market analysis could be an artefact of the limited extent to which this has been implemented in the respective countries.

Nevertheless, this does not appear as a ringing endorsement of pill testing from policing colleagues and other experts in those countries where it is actually taking place.

As Henry-Edwards (2001) reported, there is little evidence regarding the impact of regular testing on the ecstasy market and the evidence available is conflicting. She reported that data from France, the Netherlands and Austria suggests that regular testing may lead to reductions in the number of adulterated and 'fake' tablets appearing in the market. On the other hand, Henry-Edwards reported that information from the DanceSafe website suggests that, in the US, the proportion of 'fake' or adulterated pills identified in their laboratory analysis program is increasing, suggesting that testing has not always had a positive impact on the market.

A summary of issues surrounding on-site reagent-based pill testing

As is evident, there is a range of problems associated with reagent-based pill testing at dance parties. These revolve around the accuracy, reliability and consistency of the tests, whether the results of the tests actually lead to a significant reduction in the risk associated with the use of the drug, and a number of unresolved legal issues. In keeping with the position taken by the Dutch government, there appears to be little to recommend this approach.

Different models of pill testing

As was mentioned earlier, reagent based pill testing at dance parties is a subset of pill testing programs. Just because this approach is demonstrably unsuitable, does not rule out other possibilities.

Ramsey, Butcher, Murphy, Lee, Johnston and Holt (2001) described a pill testing program that was implemented in a London dance venue in the year up to February 1999. The researchers tested drugs that were retrieved from an amnesty bin into which attendees were required to place illicit drugs, and into which security guards placed substances found during searches. This research was undertaken with a licence provided by the British Home Office and with the assistance of police. The drugs were first analysed using a simple reagent test, followed by gas chromatography and mass spectrometry to determine their contents. The researchers reported that the regular testing

of these bins would reflect the drugs that are currently available and would allow health professionals to better formulate advice to ecstasy users on avoiding injury.

Australia currently has a National Illicit Tablet Database (NITD) which stores standardised information about the size, colour, and shape of pills seized by police. The database is maintained by the Victoria Forensic Science Centre and is supported by the Australian Federal Police. The database contains high quality photographs of these pills, and is an invaluable source of information for law enforcement agencies, forensic scientists, and other key agencies throughout Australia. The information contained on the database is accessible to authorised personnel via the National Institute of Forensic Science website. The database does not currently contain information about the content of the pills seized by police. An appropriately funded expansion of the existing database to include the timely chromatographic testing of samples of all pills seized by police nationally, and the placement of this information of the Database, could achieve many of the outcomes sought by existing pill-testing programs. This would facilitate the provision of early warnings to health agencies and peer educators within the ecstasy using community.

If some form of pill testing were to be introduced, how should information about the results of the testing be disseminated?

There are a number of possibilities in this regard. At one extreme, there are publicly accessible websites onto which individuals or organisations place photos and data concerning tablets that have been tested. As Henry-Edwards (2001) pointed out these websites have a number of disadvantages, namely:

- This could lead to a false sense of security which could arise from a belief that the sites and content are accurate, up to date and reliable.
- A lack of knowledge of users about 'copy cat' pills. Naïve users in particular, may believe that pills that are similar in appearance contain identical drugs.
- The websites can be open to abuse by individuals who may provide false information about pills.

It is of particular concern that some websites that provide photographs (generally of very poor quality) and information about ecstasy tablets, are showing tablets that were tested up to two years ago. Perhaps the major draw back of this approach is that it does not facilitate the contact between ecstasy users and health and welfare professionals which would encourage more broad-based harm reduction behaviours.

At the other extreme, are databases such as the NITD. In some ways, this is similar to the model adopted in the Netherlands. In that country, the results from laboratory testing are placed into a pictorial 'determination table'. The table consists of tablets that have been tested in the past eight weeks. Tablets with identical characteristics need to be tested three times before they are described as coming from the one batch. The determination table is not available to the public, but only to the workers who interact with ecstasy users. This methodology ensures that illicit drug producers cannot produce counterfeit pills that have the same appearance as pills determined by the pill testing process to be low risk.

In summary, if it is seen as desirable to test pills in order to find out more about their contents, then careful consideration needs to be given about how the results are to be disseminated and indeed, which results are to be disseminated.

Summary and implications for police

Compared with other drugs, such as alcohol and heroin, the use of ecstasy on its own is not a major contributor to drug-related mortality and morbidity in Australasia. Nevertheless, any measures that may reduce the existing levels of harm warrant consideration.

Ecstasy is unusual in that a range of factors, other than the characteristics of the drug itself, significantly impact upon the likelihood of a serious adverse outcome stemming from its use. Many of these factors concern the environment in which the drug is taken; the drugs that are taken in addition to ecstasy; the activities engaged in by the user subsequent to taking ecstasy; and individual sensitivities to the contents of ecstasy tablets (including MDMA itself). Pill testing seeks to address one risk factor associated with ecstasy use, namely whether ecstasy pills contain substances (such as PMA) which are known to be associated with adverse outcomes for most people. In this way, any form of pill testing should be only one of a raft of strategies to reduce the harm associated with ecstasy use in Australasia. Indeed, there is a lack of direct evidence to suggest that the implementation of pill testing, *over and above the existing dance party harm reduction measures*, would lead to a reduction in deaths or serious adverse

events associated with the use of this drug. Nevertheless, where there is even a possibility of such a reduction, this justifies keeping an open mind on the issue.

In considering the issue of pill testing, it is important for policing to see this as broader than the use of reagent-based testing at dance parties. In keeping with the policy position of The Netherlands, the results obtained from on-site reagent-based pill testing are simply too unreliable to be regarded as making a useful contribution to reducing the harm associated with the use of this drug. The lack of precision associated with this process and the legal difficulties inherent in it, strongly suggest that this is not an approach that police should be supporting. Neither, for similar reasons, is the evidence base such that it warrants the application of any particular degree of tolerance to this practice.

There may, however, be other more scientifically sound and legally appropriate ways of getting information to ecstasy users about the contents of ecstasy tablets, particularly when the content of the tablets is very dangerous for whatever reason. This is not an entirely new concept to police. For example, police have shown a preparedness to share intelligence with health agencies about particularly bad or potent batches of heroin and other illicit drugs that come onto the market, so as to prevent overdoses and other harm associated with the use of those drugs.

There could be some potential value in enhancing the *health focussed* government-based infrastructure designed to find out more about the content of pills sold as ecstasy. While police may have some role in facilitating such a program, given its essentially health-related nature, it, like needle and syringe provision programs, should be funded by that sector.

The potential value of such an approach lies in two areas. Firstly, it could facilitate the ability to detect the presence on the market of ecstasy pills which are so dangerous that they are likely to lead to serious adverse outcomes for a significant number of users. Secondly, the ability to provide information about pills which are potentially very harmful, could provide a focus on the safety issues associated with ecstasy use. Likewise, having this information available to disseminate, could provide an opportunity for health authorities to access a group of illicit drug users which is difficult to access using other means. This group of users could then be appropriately targeted with information about the safety issues associated with ecstasy use.

The key issue is whether the process of pill testing itself provides any greater 'carrot' to attract ecstasy users than do existing harm reduction services designed to meet the needs of ecstasy users. There is no conclusive evidence about this either way.

Nevertheless, if it is determined that there would be value in enhancing the mechanisms through which ecstasy users could be warned about the entry of particularly dangerous batches of drugs onto the market, this would naturally involve the development of mechanisms to test pills. It does not necessarily imply, however, that this testing should involve ecstasy users submitting their tablets for testing and, in the absence of adverse findings, having the pills returned to them.

The issue that arises therefore, is to determine the best way for the health sector to obtain and disseminate this information about dangerous ecstasy tablets to actual or potential users, without incurring the pitfalls associated with more ad hoc approaches to pill testing. It is possible to identify a number of characteristics that such an approach should incorporate. For example, it is important that any pill testing program does have the capacity to accurately identify dangerous drugs. It is also important that the opportunity to target ecstasy users with safety information about drug use, is fully utilised. Therefore, it is essential that a high degree of quality control is exerted over the whole process of pill testing, the dissemination of the results, and the provision of relevant harm reduction messages.

In this way, if they are to occur, pill testing programs should be carried out by appropriately qualified, officially approved health personnel - they should also take place in the context of a legislative structure and/or clear guidelines about the appropriate use of policing discretion, that are designed to facilitate this. The involvement of well intentioned voluntary groups operating in a legislatively grey area (or clearly in breach of the law) is not an approach to be encouraged.

The testing of pills should also be carried out using quality certified chromatography techniques (or similar scientifically sound techniques) by staff who are qualified and legally approved to do so. Appropriate measures would need to be in place to ensure the security of any drug samples and appropriate destruction of those samples at the end of the testing process.

The dissemination of information about the results of pill testing also warrants careful consideration. If pill testing aims to identify those pills which could be associated with serious adverse outcomes for ecstasy users (either because of the presence of very high doses of MDMA or the presence of other drugs or adulterants), then it is

appropriate that information should only be disseminated about the pills that are identified as posing such a risk. In this way, information should not be openly disseminated that indicates that certain pills are associated with a low risk to users. This is to avoid the problem of pill testing giving "..an artificial shine of safety to a diverse group of drugs that remain both illicit and potentially harmful" (Winstock et al. 2001). It would also avoid the problem of illicit drug manufacturers producing counterfeit pills, which are made to appear like pills that have been identified as posing a low risk of harm.

In the context of a more stringent approach to pill testing, the obtaining of samples is likely to be more problematic in Australasia than it is in the European situation. The major reason for this, is that there is a significant cost differential between the retail cost of ecstasy pills in Australasia and in Europe. Ecstasy pills cost approximately $35 in Australia, (with a range from $15-80) (Stafford et al. 2006), $60 in New Zealand (Wilkins & Sweetsur, 2005), but only 3.5 euros ($A6) (range 1-7.5 euros) in the Netherlands (Verdurmen & Ooyen, 2005).

Presumably, this would mean that Australasian ecstasy users would be less willing to surrender their pills for testing (in the knowledge that they would not be returned) than would their European counterparts. The voluntary surrender of pills that do not appear on the Dutch Government's determination list as having been chromatographically tested, is a feature of pill testing in the Netherlands, for example. As such, other approaches would need to be adopted. These could include:

- the routine analysis, by appropriately funded and authorised health authorities, of all pills (or samples of batches of pills) seized by police in the course of general or drug-focussed operations;
- the analysis of pills placed in amnesty bins, or discarded at dance venues; or
- the use of authorised covert pill purchasing operations for the purpose of analysis.

The results of such an enhanced pill identification and testing process could then be uploaded onto a database such as the NITD. It is likely that the use of the Database in this way would necessitate some changes, given that its focus would change from it being primarily a forensic tool, to an early warning system. These changes would include the need for timely testing, identification and placement of seized pills on the database; and the routine sharing of selected parts of the database (e.g., identified dangerous pills) with colleagues from the health sector. As is evident, this would involve a substantial gearing up of the existing pill-testing and Database infrastructure, which would also require funding from sources outside of police departments.

In summary, the evidence base is sufficiently strong to adopt a position opposing existing reagent based approaches to on-site pill testing at dance parties. Nevertheless, it is possible that there could be approaches to the accurate identification of particularly dangerous pills that could bring with them tangible benefits.

While it is not directly related to pill testing, there is a significant issue that may warrant closer policing attention in relation to reducing ecstasy-related harms. As was discussed, a significant level of ecstasy-related harms stem from motor vehicle crashes that occur while the user is under the influence of the drug. This accounted for 31 of the 112 ecstasy-associated deaths in Australia between 2001 and 2004. In this way, it is probable that the most significant contribution that policing could make to reducing deaths (and presumably injuries) associated with ecstasy use, is not associated with pill testing programs. Rather, this contribution could most effectively be made by the implementation of strategies that target driving while under the influence of ecstasy and ecstasy and other drugs. The recent introduction of random drug screening in some jurisdictions is likely to be of significant benefit in this regard.

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