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issuing **forth**

Modelling cannabis diversion in Australia: A systems approach

edspace

I have been giving presentations across the country for many years. As an ex-school teacher I have a particular interest in working with school communities in delivering good quality and accurate information to parents, teachers and students alike. Many years ago it was extremely difficult to speak about alcohol issues to these audiences. Due to sensational media coverage, the general public was obsessed with illicit drugs – if I tried to raise concerns about alcohol I would often be asked to stop and start talking about 'real drugs'. However, this is beginning to change. Somewhere along the line our attitude towards alcohol has altered and people are beginning to realize that there are some significant problems associated with its use.

Of course, the way the media has framed it makes it appear as though our most serious problems are related to the way young people consume the drug. Binge drinking, teenage parties and alcohol-fuelled car accidents are the issues that we so often see in the headlines, but it is important to remember that this is a community-wide problem. Although many people who drink, do so responsibly, alcohol has the potential to cause much harm, and is second only to tobacco as a cause of drug-related deaths and hospitalisations, causing almost 3,300 deaths and 50,000 hospital episodes each year in Australia.

Our young people learn their behaviour from watching those around them. The close association that many Australians make between alcohol, sport and celebration sends very powerful messages to our children about how we regard the drug. It is great to see the shift that we appear to be going through at the moment. We are beginning to acknowledge that alcohol can be problematic and that we need to examine its place in our culture, however change will not occur unless we consider all sections of society, not just our young people.

Paul Dillon, Editor

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National Cannabis Prevention and Information Centre

It is hardly surprising that many community members may be confused about the harms associated with cannabis use with media headlines and commentary frequently lurching from one sensational story to the next. Even those working in research and clinical services dealing with cannabis-related problems often struggle to keep up with the scientific literature and developments in cannabis related interventions.

The Australian Government has brought focus to the increasing problems associated with cannabis use by creating this new Centre. The work of the National Cannabis Prevention and Information Centre (NCPIC) will be directed to the reduction of the demand for cannabis by preventing uptake and minimising the harms associated with its use in the Australian community. This will be achieved by providing the community with high quality, evidence-based information on cannabis use, and building the capacity of service providers to respond to the intervention needs of cannabis users and their families.

NDARC has successfully tendered as the lead agency for this innovative Centre to be located on the Randwick campus of the University of NSW. The NCPIC has a budget of around twelve million dollars over four years, whereupon it will be reviewed. It will be supported by a highly skilled Advisory Committee from a diverse range of health, law enforcement, public service and multi-disciplinary academic backgrounds that is to be chaired by Ms Trish Worth, formerly the Parliamentary Secretary responsible for the National Drug Strategy.

NDARC has brought together six excellent partners to the NCPIC, all of whom also sit on the Advisory Committee. Their functions and activities are to provide information on:

- effective preventive and culturally appropriate responses (NDRI);
- workforce development issues (NCETA);
- cannabis use and criminal justice (AIC);
- mental health and substance abuse (ORYGEN);
- adolescent treatment responses (TNF); and
- high quality telephone information, support and intervention (Lifeline).

The new Centre will educate cannabis users, their families and the community generally by the provision of high quality information to reduce uptake and continuation of cannabis use. In addition, it will provide increased access to high quality, evidence-based interventions by the development of new interventions, improved access to current interventions and high quality training and support for those providing cannabis related treatment to reduce harms associated with cannabis use and to assess effectiveness.

The NCPIC will engage with health, education, and police and with senior decision-makers to maximise relevance and reach. There are a broad range of activities planned including an interactive website, 1800 CANNABIS telephone support and information service with a social marketing strategy for the widest possible national dissemination of the key messages and interventions. NCPIC will be culturally-sensitive, responsive and reflective.

The current environment for the new Centre means that there are some good news stories about cannabis, such as the very marked reduction in recent cannabis use among Australian secondary school students from 32% in 1996[1] to 14% in 2004[2]. This is reinforced by the reduction in lifetime use of cannabis among 14-19 year olds in the National Drugs Strategy's Household Surveys over a similar period from 45% in 1998 to 25.5% in 2004[3]. These developments suggest that the prevention messages in schools and the community are being taken up by young people.

This positive news is tempered by the finding that 79,700 14-19 year olds are still reporting having smoked cannabis in the past week and 8.8% of current smokers in that age group reporting having smoked cannabis daily[4]. The recent report on the health and wellbeing of young Australians reported that cannabis dependence and harmful use was the 8th leading cause of burden of disease and injury among 15-24 year olds[5]. There is much the NCPIC can assist with in addressing these issues. In 2007-8 the Centre will be developing community information resources and evidence-based training materials and workshops on motivational interventions among adolescent cannabis smokers in 2007-8[6].

Among adults, the greatest risks from regular cannabis use are dependence, mental health problems, respiratory effects, and reduced birth weight for the babies of pregnant smokers[4]. Increases in rates of cannabis treatment seeking currently are being observed in Australia and internationally. This need for greater treatment provision will be further driven by the ageing of the cannabis smoking cohort. The 30-39 year age group is now reporting the highest levels of daily cannabis smoking and is likely to be experiencing significant physical and psychological harms as a result of their long-term, regular use[3]. For clinicians and policy makers the increasing rates of cannabis use in Aboriginal and Torres Strait Islander communities is also an emerging issue. The NCPIC consortium partners will be working on the development of clinical guidelines for the management of cannabis use disorders in the first year of operation. In parallel the major consortium partner, the National Drug Research Institute, will be working on the development of similar guidelines appropriate for Aboriginal and Torres Strait Islander communities in primary health care settings.

The draft Strategic Plan will be circulated during August so please let us know if you would like to make a comment on the Centre's strategic directions for 2007-2011. The position of Director is currently being advertised and the work of the Centre will commence upon acceptance of the Strategic Plan by the funding body.

NDARC and our consortium partners will translate research into practice and move forward with a range of exciting new projects to reduce the harms associated with cannabis use in Australia.

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Jan Copeland (Acting Director, NCPIC) and Richard P. Mattick (Director, NDARC)

Modelling cannabis diversion in Australia: A systems approach

Caitlin Hughes

How can we provide new insights into the merits of drug diversion systems?

Providing education and treatment interventions instead of criminal justice responses is a popular policy intervention used for responding to illicit drug users in Australia. The number and range of diversion programs has expanded considerably since 1999 when the Council of Australian Governments introduced the Illicit Drug Diversion Initiative, a national agreement to divert minor drug users to education and treatment[1]. Accordingly, diversion programs are offered throughout all states and territories and at multiple stages of the criminal justice system. The expansion of such programs has had a considerable impact on how the criminal justice system responds to illicit drug users, particularly cannabis users, and increased interest into the impacts and outcomes from drug diversion.

It has become clear that while drug diversion programs offer the potential to reduce future drug use and crime, reduce costs and increase the efficiency of the criminal justice system the capacity to achieve this goal is dependent upon how diversion is put into practice. There are few outcome evaluations of drug diversion in Australia and those that do exist tend to be of poor methodological quality[2-4]. Nevertheless, evaluators tend to concur that results, while positive, tend to be less than expected[4-7]. This has been attributed to difficulties in implementing best practice diversion.

The major challenge to applying drug diversion is that poor application could negate or even increase drug use, cost or inefficiency. A number of studies have demonstrated that drug diversion can result in net-widening whereby the application of drug diversion increases the likelihood of or consequences from criminal justice intervention[4, 8]. For example Baker and Goh[9] demonstrated that following the introduction of the NSW Cannabis Cautioning Program the overall number of charges decreased, but the total number of legal processes increased. In other words the system widened the net on cannabis users. Net-widening may result if:

- Drug diversion is applied to more offenders than would otherwise have been subject to formal CJS intervention (wider nets).
- Drug diversion programs require a greater form of intervention e.g. by putting someone under intensive program conditions they may be more likely to be caught for breach of conditions and hence result in harsher sentence (deeper nets).

By funneling more drug users into the criminal justice system net-widening may waste resources, thereby reducing the cost-effectiveness of diversion. Moreover, it may increase the potential for future drug use or crime.

Numerous suggestions have been made as to how to improve the implementation of drug diversion programs. These include increasing the speed of assessment and education/treatment, changing eligibility criteria, introducing minimum program requirements or targeting dependent drug users (as opposed to occasional drug users)[5, 9]. Yet, for such knowledge to be translated into practice there is a clear need to demonstrate that adopting such measures would be beneficial. Moreover, from the perspective of policy makers there is a need to demonstrate what measure(s) would be most cost-effective and the likely impact(s) of adopting such measure(s) upon the drug diversion system. Would for example there be flow on impacts on the level of recidivism or ratio of dependent to occasional users? Such questions are very difficult to answer using traditional research methodologies, yet they are critical to provide useful advice to policy makers.

The benefits of systems modelling

Like many complex systems the criminal justice system is difficult to understand and control. Drug diversion is one part of this broader system. Systems theorists argue that to maximise understanding and the potential for control there is a need to examine the system in its entirety: the basis through which it operates, its feedbacks and the areas which impede system change[10].

For example, expanding eligibility criteria for diversion programs may increase the inflow of drug users. This may have a short-term beneficial impact on the criminal justice system through increasing the rate of education and treatment and hence the outflow of drug users. However, the system may then reach a point at which the capacity to provide education and treatment stabilizes. This may reduce the long-term benefits or even enhance the rate of recidivism.

A systems model can be used to describe and analyse the behaviour of complex systems. Models are "simplified descriptions of a system or phenomena"[11]. They are based upon reality or a simplified version of reality and describe key system components and how components are connected. They can be generated using qualitative or quantitative methods (parametised where possible using real world data).

There are multiple benefits to building systems models. These include that they are relatively simple to build and "risk free"[12]. Most importantly they can provide tools and insights for policy makers and researchers. They can be used to increase understanding of the broader system and potential system interactions e.g. show how change in one part of the system is likely to impact upon the rest of the system, what parts of systems may impede intervention and hence reduce the effectiveness, and what parts may facilitate intervention. Moreover, they can be designed to test or answer policy makers hypotheses or questions, even comparing multiple scenarios[13]. This is particularly beneficial in the drug field where proposed solutions may be based upon ideology. Demonstrating the likely impacts, both positive and negative, from a range of scenarios may facilitate more informed decision making. Finally, systems models can force researchers to make their assumptions explicit, identify strengths and weaknesses in data and highlight areas for future research or data collection.

Systems modelling has had limited application to date to the field of drug addiction. Yet, studies that have utilised systems models have demonstrated useful research and policy insights into for example the effectiveness of smoking interventions[14], interventions with illicit drug users (injectors and non-injectors)[15] and the optimum means of reducing the NSW prison population[16].

The current research: Modelling cannabis diversion

In light of the continuing questions raised by policy makers and researchers into the impacts of drug diversion programs the Drug Policy Modelling Program (DPMP) is adopting a systems approach. It seeks to model the criminal justice response to cannabis users, through both cannabis diversion and traditional court responses. The focus on cannabis diversion, rather than drug diversion is driven by the observation that 90% of diversion in Australia has been for cannabis diversion[5], and the knowledge that the risk of harmful or wasteful use of diversion is greatest when applied to cannabis users.

Given that 33.6% of Australians have ever used cannabis, there are large number of cannabis users in Australia (5.5 million in 2004)[17]. Responding to cannabis users is a significant issue for police since cannabis offences consistently account for the majority of illicit drug offences (74% in 2004)[18]. However, the vast majority of cannabis users are deemed occasional or recreational users, who are likely to give up using without any formal intervention. For such users formal criminal justice intervention is potentially counter-productive and probably unwarranted. The application of a criminal record reduces chances of retaining or obtaining employment, stable housing, family support and in turn increases the chance of future offending[19, 20]. Equally importantly intensive intervention in the form of treatment is

also unwarranted. The preferred response for occasional cannabis use is therefore to minimise formal intervention, and to instead provide a warning or formal caution (often with educational brochures on cannabis) instead of criminal charges. For the minority of cannabis users who are drug dependent, formal intervention does appear warranted. However, education or treatment offers a potentially better response than the application of criminal charges alone, particularly to prevent cannabis users from progressing to other forms of illicit drug use or offending.

Understanding the different rationales for diverting cannabis users is important for maximising the effectiveness of cannabis diversion. However, the criminal justice system does not in practice distinguish between these two types of offenders. Because diversion may be counter-productive for occasional cannabis users there is considerable potential for net-widening.

From a systems perspective there is a need to examine the effects of different levels of occasional and dependent cannabis users. Are occasional cannabis users in fact being diverted out of the system? If so, is there the potential to improve this outflow? If not, what is impeding their diversion and what are the consequences of keeping them in the system?

DPMP is building a systems model to clarify the process and impacts of cannabis diversion programs upon the criminal justice system. This model is being generated for the archetypal Australian system, and hence includes diversionary options through both police and courts. The aims of the project are fourfold:

- To provide a conceptual map of the Australian diversionary response to detected cannabis users.
- To examine the impact of diversion upon the rate of recidivism, prevalence of cannabis use and cost.
- To provide a tool for policy makers to explore the impact of changing system variables such as the type of intervention, speed of response, eligibility criteria and level of net widening.
- To highlight new areas for future research.

It is expected that the first stage of the model and scenario generation will be completed soon. Systems modelling of the impact on the criminal justice system may offer insight into how current and alternate approaches to using cannabis diversion may impact upon the outcomes from cannabis diversion and ultimately enhance the capacity for evidence-based decisions on the future implementation of cannabis diversion. For further information please see the DPMP website: http://www.dpmp.unsw.edu.au.

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project **notes**

CLIMATE Schools: Alcohol and Cannabis Module – The development and evaluation of an interactive computer based prevention program for Alcohol and Cannabis

Nicola Newton, Laura Vogl, Maree Teesson, Gavin Andrews, Paul Dillon, Greg Martin, Wendy Swift and Alys Havard

Alcohol and cannabis use are extremely common in adolescents. High risk alcohol and cannabis use are risk factors for the common forms of mental ill health, such as anxiety and depression. Anxiety, depressive and substance use disorders account for three quarters of the disability attributed to mental disorders. The peak of this disability occurs in those 15-24 years old and corresponds with the typical period of onset of these problems. To reduce the occurrence and cost of such disorders, preventative interventions need to begin early, before the problems begin to cause disability, and vocational, educational and social harm.

While prevention strategies exist, it seems that few block the earliest signs or integrate responses to risk, and none are universally feasible. When implementation does occur, insufficient ongoing teacher training, inadequate resources and problems with adherence to existing guidelines often compromise program efficacy. CLIMATE Schools addresses these limitations as it represents a utility that is acceptable, fits within the school syllabus, is effective, and is scaleable to meet the needs of all schools in Australia.

A CLIMATE Schools: Alcohol module for Year 8 students has been developed and evaluated.

Results from the evaluation of this module show positive effects in reducing average alcohol consumption, bingeing, alcohol related harms and other risk factors predictive of increased consumption and harm.

The current project aims to develop a further prevention initiative to compliment the outcomes from the Year 8 Alcohol module. This is in the form of a 'booster' module for the prevention of alcohol and cannabis use called CLIMATE Schools: Alcohol and Cannabis. It is a novel computer delivered curriculum for students in early high school to teach resistance skills and to prevent alcohol and cannabis misuse and harms.

The material in CLIMATE Schools: Alcohol and Cannabis has been developed in collaboration with teachers, students and health professionals to fit with the Year 7 – 10 PDHPE curriculum and fall in line with state and national health and education recommendations. Similar to the CLIMATE Schools: Alcohol module, the CLIMATE Schools: Alcohol and Cannabis module consists of 6 lessons (40 minutes each) to be run in Year 8. Again, it is intended to be delivered as part of Personal Development/Health for Year 8 since it has been developed to address learning outcomes from the NSW PDHPE syllabus for Stage 4.

A cluster randomized control trial (RCT) with 10 schools is currently underway to evaluate the effectiveness of the CLIMATE Schools: Alcohol and Cannabis module. Each school was randomly allocated to one of two groups. The intervention group received the CLIMATE Schools: Alcohol module in Term 1 of 2007, and will receive the CLIMATE Schools: Alcohol and Cannabis module in Term 4 of 2007. The control group receives their usual PDHPE classes over the year. Surveys are used to assess knowledge, attitudes and use of alcohol and cannabis, as well as related harms, at the beginning and end of each module, and at 6 and 12 months follow-up to look for lasting effects.

We hope to find out whether preventative health education programs, which are normally delivered by teachers, can be delivered effectively by an interactive computer program.

A comprehensive review of the health and psychological consequences of ecstasy use

Louisa Degenhardt, Edmund Silins and Natasha Sindicich

There has been increasing media and community attention devoted to the use and potential harms of ecstasy (MDMA). Despite this, there has never been a comprehensive synthetic review of the existing literature on the characteristics, use and harms related to this drug. This is probably for a number of reasons: the use of ecstasy is relatively recent compared to other illicit drugs such as heroin, cannabis and cocaine; there was traditionally little research conducted on ecstasy; and ecstasy was considered by some to be a relatively benign drug. More recently, however, we have seen the establishment of ecstasy as an illicit drug in many developed countries worldwide; a dramatic increase in the amount of research examining the drug; and increasing claims of the drug's harmful effects.

This review examines a range of issues that constitute a repeated source of debate in the community which include: the effects of MDMA; the role of uncertain purity and contents of "ecstasy" tablets; patterns of ecstasy use worldwide; correlates of ecstasy use; the acute and long term effects of the drug; the potential neurotoxicity of MDMA; the issues of ecstasy "dependence"; potential effects upon physical and cognitive functioning; and evidence on the association between ecstasy use and mental health. The review will provide an authoritative and comprehensive synthesis of the literature to date and also provide a basis upon which future research in this area might be undertaken. Collaborators include Wayne Hall (University of Queensland; School of Population Health), Iain McGregor (University of Sydney; School of Psychology, Department of Pharmacology), Libby Topp (The National Centre in HIV Epidemiology and Clinical Research; University of New South Wales) and Raimondo Bruno (University of Tasmania; School of Pharmacology and Psychology). This project received funding from the Australian Government Department of Health and Ageing.

Opioid Pharmacotherapy Review

Alison Ritter, Jenny Chalmers, Nick Lintzeris, Alex Wodak, Richard Mattick and Bob Batey

The Australian National Council on Drugs has commissioned the Drug Policy Modelling Program to undertake a project to determine whether the availability, accessibility and affordability of Australia's pharmacotherapy programs for the treatment of opioid dependence meet demand. The project is due for completion in mid 2008. Currently, methadone is the most widely prescribed pharmacotherapy (71%), followed by buprenorphine alone, then buprenorphine-naloxone (which comprised about 5% in 2005/06).

The centrepiece of the project is the development of a model of the supply of and demand for pharmacotherapy, which allows supply and demand to interact with each other as time progresses – a dynamic systems model. This model will help policy makers to evaluate the dynamic consequences of policy changes. We have compiled an issues paper, identifying key concerns in relation to the provision of pharmacotherapy in Australia. These concerns are informing the development of the model. Issues were initially identified by the research team. Consultations occurred with consumer representatives in each jurisdiction. Current prescribers and dispensers of pharmacotherapies and government officials are being provided with a draft for comment.

The basis of the dynamic systems model is the representation of the pathways through the service delivery system that patients follow once they enter treatment for the first time. One of the complications is that pharmacotherapy treatment is supplied in different ways across the Australian jurisdictions in terms of the location of the pharmacotherapy prescriber and dispenser. Some states have private clinics, others do not. In some states the majority of pharmacotherapy service provision occurs in general practice while in others public clinics service most patients. Differences in service provision are complemented by differences in regulatory arrangements and structures. For example the regulations around take-away dosing vary between jurisdictions.

Another complication is that patients tend to cycle between episodes of care or treatment. It is unusual for a patient to commence pharmacotherapy treatment and stay in treatment for an extended period of time. Rather, patients tend to cease their first episode of treatment reasonably rapidly. Nonetheless the majority come back into treatment and cycle in and out of treatment for some years before settling into continuous treatment. The model allows for this cycling behaviour and lets patients move between different combinations of prescriber and dispenser. Since the relative costs borne by the federal government, state government and patient can differ markedly with the prescriber-dispenser combination these costs are also an important component of the model. The variation in patient accessibility to treatment under each of the combinations is also incorporated. Patient accessibility and costs feed into demand for treatment.

When completed, the model will allow policy makers to compare the impact of a range of scenarios on three main output variables; the total number in treatment, the numbers being prescribed and dispensed in the different locations, and the costs borne by the two arms of government and the patient. For example, the model could illustrate the implications of; the closure of one large public clinic, or indeed all public clinics; prescribers being at capacity; an increase in the duration of treatment episodes; and variations in patient retention between service delivery models. **cl**

abstracts

Mortality related to pharmacotherapies for opioid dependence: A comparative analysis of coronial records

Drug and Alcohol Review 26, 405 – 410

Amy Gibson and Louisa Degenhardt

Introduction and Aims: The aim of this study was to compare the mortality associated with oral naltrexone, methadone and buprenorphine in opioid dependence treatment, employing a retrospective data analysis using coronial and prescription data.

Design and Methods: The number of deaths were identified through national coronial data and number of treatment recipients were estimated from 2000 to 2003 prescriptions and restricted medications data. Mortality rates were expressed as deaths per number of treatment episodes and per person-years at high and low risk of fatal opioid overdose. Results. Thirty-two oral naltrexone, one buprenorphine and 282 methadone-related deaths were identified. Mortality rates in the highest risk period in deaths per 100 person-years were 22.1 (14.6 – 32.2) for oral naltrexone following treatment cessation and 3.0 (2.3 – 3.9) for methadone during treatment induction. Rates in the lowest risk period in deaths per 100 person-years were 1.0 (0.3 – 2.2) during oral naltrexone treatment and 0.34 (0.3 – 0.4) during post-induction methadone treatment. The relative risk of death for oral naltrexone subjects was 7.4 times (high-risk period, p50.0001) or 2.8 times (low-risk period, p?0.055) that of methadone subjects.

Discussion and Conclusions: This is the first comparison of mortality associated with these three pharmacotherapies for opioid dependence. The risk of death related to oral naltrexone appears higher than that related to methadone treatment.

Methamphetamine and cardiovascular pathology: A review of the evidence

Addiction 102, 1204-1211

Sharlene Kaye, Rebecca McKetin, Johan Duflou and Shane Darke

Aims: To examine the literature pertaining to the cardiovascular effects of methamphetamine and discuss the implications for methamphetamine users.

Methods: Relevant literature was identified through comprehensive MEDLINE and EMBASE searches.

Findings and conclusions: There is sufficient clinical and experimental evidence to suggest that methamphetamine can have adverse and potentially fatal effects on the cardiovascular system. The existing literature suggests that: (1) methamphetamine users are at elevated risk of cardiac pathology; (2) risk is not likely to be limited to the duration of their methamphetamine use, because of the chronic pathology associated with methamphetamine use; (3) the risk of cardiac pathology is greatest among chronic methamphetamine users; (4) pre-existing cardiac pathology, due to methamphetamine use or other factors, increases the risk of an acute cardiac event; and (5) methamphetamine use is likely to exacerbate the risk of cardiac pathology from other causes, and may therefore lead to premature mortality.

Assessing cannabis dependence in community surveys: Methodological issues

International Journal of Methods in Psychiatric Research 16, 43–51

Louisa Degenhardt, Hui Cheng and James Anthony

Drug-related social role impairments and social maladaptation are referenced explicitly in the case defi nitions for drug dependence within DSM-IV-TR. Nonetheless, cases of drug dependence without this type of secondary consequence have been observed in recent epidemiological studies. When an 'impairment/maladaptation gating' approach has been taken during recent large-scale psychiatric surveys (for example, to reduce participant fatigue or burden), the net effect may include (a) a reduced number of identified drug dependence cases and (b) biases in the estimates of association linked to the occurrence of drug dependence. In this report, we probe these issues with respect to cannabis dependence, making use of data from the cross-sectional United States National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a household survey of 43,093 adults aged 18 years and over. In this process, we shed light on actual impact of the gating approach mentioned above. Specifically, when we simulated a social impairment/maladaptation 'gated' assessment of cannabis dependence, the end result was a very modest reduction in the estimated prevalence of cannabis dependence. It suggested that for every 10 000 general population survey respondents there would be no more than 12 cases of cannabis dependence without the above-referenced impairments/maladaptations. Patterns of association linking suspected background characteristics to the prevalence of cannabis dependence were not appreciably different when the 'gated' and 'ungated' approaches were applied. In summary, there are reasons to take the ungated approach in detailed research on cannabis use and dependence. Nevertheless, in panoramic mental health surveys, the inefficiency of an 'ungated' approach must be balanced against the anticipated yield of cannabis dependence cases who lack social role impairments or socially maladaptive behaviours.

Qualitative review of serotonin syndrome, ecstasy (MDMA) and the use of other serotonergic substances: Hierarchy of risk

Australian and New Zealand Journal of Psychiatry 41, 649-655

Ed Silins, Jan Copeland and Paul Dillon

Growth of the antidepressant market and widespread use of the illicit drug ecstasy (methylenedioxymethamphetamine; MDMA) creates a need to delineate the potential harms associated with the concomitant use of ecstasy and serotonergic pharmaceutical drugs. One such harm is serotonin syndrome. The study aimed to synthesize the risk of serotonin syndrome associated with the concomitant use of ecstasy and other serotonergic substances in a clinically relevant hierarchy for psychiatrists and other medical practitioners. An extensive online database search was carried out of the literature on serotonin syndrome, in relation to illicit drugs and simultaneous use of other substances. Numerous licit and illicit substances implicated in serotonin syndrome, when used with ecstasy, have potential for increased toxicity and are presented in a resulting hierarchy of risk. Substances that inhibit serotonin re-uptake are less likely to lead to life-threatening elevations in serotonin when used with ecstasy. High doses or repeated use of stimulants such as methamphetamine and cocaine with ecstasy increase the risk of serotonin syndrome; as does the use of pharmaceutical amphetamine and ecstasy. Serotonin precursors also influence the course of serotonin syndrome when used with ecstasy. Substances that inhibit monoamine oxidase are most likely to lead to serious increases in serotonin when used with ecstasy. Findings highlight the importance of screening for the use of ecstasy and other serotonergic substances when prescribing antidepressant drugs. **cl**

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