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Key Points

- The current study employed the Illicit Drug Reporting System methodology to conduct a rapid assessment of performance and image enhancing drugs (PIEDs) use in New South Wales.

Current trends

- PIEDs users maintain a high level of social and occupational functioning compared with other groups of injecting drug users.
- Anabolic-androgenic steroids (AAS) remain the most popular PIEDs used for non-medical purposes, although users reported increased diversification in the range of other PIEDs used alongside AAS (particularly anti-oestrogens, clenbuterol, stimulants, human growth hormone, human chorionic gonadotrophin, insulin and diuretics).
- There has been a possible shift away from veterinarian AAS products towards human AAS and other 'prohormones' such as dehydroepiandrosterone (DHEA) and androstenedione.
- Prior to 2000, AAS were more widely available, cheaper, and believed to be more frequently 'genuine' human or veterinarian products. There has been a possible increase in the number of fakes/counterfeits and emergence of new products such as 'Dianabol paper products' and 'homebake'.
- Despite 71% of PIEDs users reporting they obtained clean needles and syringes from an NSP, only 7% sought information from these services, preferring to rely on more anonymous sources of information such as the internet and personal networks.

Key recommendations for harm reduction and intervention

- There is a need for objective, accessible and targeted harm reduction resources/interventions for users, NSP workers and other health professionals, including information on dose, cycling, blood-borne viruses, safer injecting techniques, sex risk behaviour, and insulin use.
- Resources need to cater for different groups (e.g. young men, professional and enthusiast bodybuilders, gay/bisexual men), and could utilise different formats (e.g. website, leaflet, helplines, etc).

Future monitoring

- The current study found recruitment of the PIEDs user sample time-consuming and challenging.
- PIEDs user surveys conducted every 3-5 years in the larger jurisdictions (such as NSW, VIC, SA and QLD) would be useful in monitoring trends in market characteristics, patterns of use and harms. Key expert (KE) interviews and indicator data might be collated on a more regular basis.

Performance and image enhancing drugs (PIEDs): Current trends and future monitoring

What are PIEDs?

Performance and image enhancing drugs (PIEDs) refer to substances that are typically used to enhance muscle growth ('anabolic' effects) or to reduce body fat ('catabolic' effects). The expected benefits of using these substances can include: increasing the size and definition of muscles; reducing water retention and body fat; and increasing physical strength and endurance[1, 2]. PIEDs are usually illicitly obtained pharmaceuticals and/or banned substances in sport.

The major substances of concern are human and veterinary anabolic-androgenic steroids (AAS), growth hormones, anti-oestrogens, diuretics, stimulants, beta-2 agonists (i.e. clenbuterol) and hormones such as insulin and thyroxine[3]. The most widely used and investigated PIEDs are AAS. There is very little scientific literature on the non-medical use, effects and harms of the other PIEDs.

Many PIEDs are prescription-only medications that have been diverted to the blackmarket. Use often occurs without medical supervision and in amounts that greatly exceed recommended therapeutic doses. Assessing the health risks can be difficult as users may take complex combinations of drugs.

2005 rapid assessment of PIEDs use in New South Wales

Background

In a report to the Ministerial Council on Drug Strategy (MCDS) in 2004, the Working Party on Performance and Image Enhancing Drugs recommended that ongoing surveillance of non-sporting use of PIEDs was needed to provide the evidence-base for targeted demand and harm reduction programs[3]. Following the MCDS recommendations, the Australian Government Department of Health and Ageing (AGDH&A) funded a study to assess the feasibility of a rapid assessment of PIEDs trends in one jurisdiction (New South Wales), with a view to extending data collection to other jurisdictions.

Methodology

The rapid assessment's methodology was based on the Illicit Drug Reporting System (IDRS). The IDRS is a national program of research that monitors drug trends (such as price, purity and availability) for the main illicit drug types in Australia (namely heroin, methamphetamine, cocaine and cannabis). The IDRS has collected annual, comparable data in NSW since 1996, and has collected these data across all Australian jurisdictions since 2000 [see 4, for the most recent IDRS findings].

The rapid assessment triangulated the following data sources:

- Face-to-face interviews with PIEDs users (N=60 men) recruited in Sydney;
- Telephone interviews with key experts (KEs) (N=24) including people working in the fitness industry, needle and syringe program workers, doctors, pharmacists and law enforcement personnel; and
- Indicator data such as domestic and border seizures of AAS, calls to drug information lines, and health data.

Aims of the 2005 Rapid Assessment

The two aims of the New South Wales Rapid Assessment were to:

1. Triangulate the three data sources to provide an indication of emerging trends in PIEDs use and markets;
2. Examine the feasibility of the IDRS methodology as an ongoing monitoring system for PIEDs.

The findings of the 2005 New South Wales Rapid Assessment were compared with a similar study of AAS users conducted by Peters and colleagues in 1997[5] to give a broad indication of emerging trends. The 1997 study interviewed 100 AAS users in NSW and ACT.

Results

(i) Patterns of use and harms

PIEDs use in the general Australian population

The 2004 National Drug Strategy Household Survey estimated that 0.3% of Australians aged 12 years and older had 'ever used' AAS for non-medical reasons, and that a negligible number had used recently[6]. Other studies have found higher rates of prevalence among specific groups such as regular gym goers, gay men, and adolescents. For example, the 2002 Australian Secondary Students Alcohol and Drug Survey (ASSADS) found that among 12 to 17 year olds (n=23,417), 3.6% of males and 2.2% of females had ever used AAS 'without a doctor's prescription in an attempt to improve sporting ability, increase muscle size or improve appearance'[7]. Most surveys (in Australia and internationally) have found that PIEDs users are predominantly male.

Characteristics of the PIEDs user sample

The present study interviewed a sentinel sample of 60 men who had recently used PIEDs (in the six months prior to interview). The PIEDs user sample was diverse, including young men aged 17 to 25 years (33%), gay/bisexual men (30%), HIV positive gay men (12%), and older men (aged 40 years and older; 23%).

Consistent with KE reports, the majority of the sample were employed (79%) and 42% of the sample were in a stable relationship. Seventy-seven percent of participants reported having used an illicit drug in the six months prior to interview (most commonly ecstasy, methamphetamine, cocaine and cannabis); 38% reported recent tobacco use; and although 22% of sample 'rarely' or 'never' drank alcohol, over half (55%) reported drinking weekly or more and 10% of the sample drank daily.

Patterns of use

Most participants reported using PIEDs in cycles with rest periods equivalent to the cycle length (see Table 1 below). A small proportion of PIEDs users were using PIEDs 52 weeks a year without a break.

Table 1: Cycle frequency and duration

2005 PIEDs use sample (N=60)	Median	Range
No. of cycles in the last 12 months	2	1-4
Usual cycle duration (weeks)	10	2-52
Usual rest period between cycles (weeks)	11	0-52
Longest cycle duration (weeks)	12	4-72
Shortest cycle duration (weeks)	6	1-52

Nandrolone and its esters (such as Deca-durabolin®, Durabolin®, 'Deca50', Deca100'), Sustanon®, stanazolol, and methandrostenolone (Dianabol®) were the AAS most commonly used by participants in their most recent cycles. There appears to have been a slight shift away from veterinarian AAS towards human AAS and other 'prohormones' (such as DHEA and androstenedione) since the late 1990s. The study also found increased diversification in the range of other PIEDs used alongside AAS (specifically, the use of anti-oestrogens, clenbuterol, stimulants, human growth hormone, human chorionic gonadotrophin, insulin and diuretics) compared with the 1997 study of Australian users[5]. KE reports indicate that PIEDs use is generally seasonal, increasing over spring and summer months.

Physical health

The majority (97%) of PIEDs users had experienced at least one minor physical symptom from their cycles, most commonly increased sex drive (72%), increased appetite (72%), water retention (62%), acne (50%), sleeplessness (50%), reduced teste size (55%), sore or

swollen injection sites (45%), increased body hair (42%), and gynaecomastia (growth of breast tissue; 30%).

Smaller proportions reported experiencing more serious symptoms such as liver problems (10%), reproductive problems (10%) and heart problems (10%). Of concern was that 5% of the sample had experienced hypoglycaemia (a potentially life-threatening condition) from non-medical insulin use.

No PIEDs-related deaths were identified in databases that record drug-related deaths in Australia.

Psychological health

The majority of participants (87%) had experienced some changes in their mood or behaviour when using PIEDs. The positive effects included increased motivation, satisfaction with body image, increased confidence, and increased sex drive. The negative effects included irritability and aggression.

Twenty-three percent of participants reported having been involved in an incident involving aggression or violence in the six months prior to interview.

One-quarter (27%) of the sample reported experiencing mental health concerns in the six months prior to interview, most commonly depression and anxiety.

The vast majority of the sample (95%) endorsed at least one symptom of dependence, most commonly withdrawal symptoms (83%) and 'continued use despite negative consequences' (45%). The withdrawal symptoms most frequently reported by the sample included desire for more steroids, dissatisfaction with body image, general lack of interest, depression and fatigue after stopping a cycle.

Injecting behaviour

The majority of the sample had (ever) injected PIEDs (93%) and 68% had injected in the past month. The mean age of first injection was 25.5 years (SD 6.4, Range: 17-43). Despite low rates of needle sharing among the group, participants did report other risky injection practices (see Table 2 below). The majority of participants (73%) reported injecting themselves in their most recent cycle.

Most commonly, the sample reported injecting larger muscle groups such as the buttocks, thighs/quadriceps and shoulders/deltoids. Seven percent of the 2005 sample, however, reported the risky practice of targeting smaller muscle groups (e.g. injecting into calves, latissimus and triceps and other small muscle groups) in the belief that localised injection will lead to localised growth of 'problem' areas. Injecting small muscle groups carries the risk of damaging nerves or blood vessels.

Table 2: Summary of self-reported injecting risk

2005 sample (N=60)	%
Injected by another person (in most recent cycle)	27
Ever shared needles	5*
Shared needles in last month	2
Ever reused needles	12
Ever injected from a shared vial/bladder/container	27
Ever injected illicit drugs (other than PIEDs)	25
Ever injected insulin	12

** All 3 participants who reported ever sharing needles injected other illicit drugs*

Three percent of the sample reported being hepatitis B positive, 5% reported being hepatitis C positive and 12% reported being HIV positive. All HIV positive participants identified as gay or bisexual.

The majority of participants who injected (98%) reported having no problems obtaining clean injecting equipment (only one participant reported difficulties). Most commonly, participants obtained needles and syringes from Needle and Syringe Programs (NSPs; 71%), followed by a chemist/pharmacy (14%), doctor (11%), friend (2%) and others (2%).

Information and help-seeking

The PIEDs user sample frequently sought information about PIEDs: 17% of participants sought information daily, 27% weekly or more, and 26% fortnightly or monthly. The most common sources of information were internet sites, friends, doctor and contacts at the gym. With the exception of doctors, PIEDs users did not commonly seek information or advice from other health services, preferring to rely on more anonymous methods or personal networks.

Although doctors working in general practice may have some contact with individual PIEDs users, the services that are likely to have regular contact with a larger proportion of PIEDs users are NSPs. However, PIEDs users rarely seek information regarding PIEDs from these services (only 7% of participants reported seeking information from an NSP, despite 71% of participants accessing NSPs for injecting equipment). Some alcohol and other drug services (such as NSPs and treatment agencies) provide limited services to the group. KEs consistently reported that PIEDs users do not identify with messages and services targeting recreational (or other illicit) drug users.

There is a need for objective, accessible harm reduction resources/interventions for users, NSPs and health professionals that reflect current research (BBVI awareness, safer injecting techniques, sex risk behaviour, insulin use, etc). These need to cater for different groups (e.g. young men, professional and enthusiast bodybuilders, gay/bisexual men), and could utilise different formats (e.g. website, leaflet, helpline, etc).

(ii) Characteristics of the PIEDs market

Price

This study is the first to collate price data for PIEDs in Australia.

PIEDs users were most often able to comment on the prices of AAS, clenbuterol and anti-oestrogens, and the results are presented in Table 3 below. Human growth hormone prices and knowledge, in particular, were variable and less reliable (with only one participant being able to talk from recent experience).

Table 3: Reports of current price by 2005 PIEDs user sample

Type of PIEDs	Price range
AAS	
Injectable veterinary AAS	$2 to $15 per ml
Injectable human AAS	$20 to $40 per ml
Oral human AAS	$0.80 to $3.50 per tablet
Other PIEDs	
Human Growth Hormone^	$450 to $500 per week for a 4 to 6 week 'cycle'*
Clenbuterol (gel or powder)	$150 to $200 per tub
Clenbuterol tablets^	$2 to $7 per tablet
Anti-oestrogen tablets^	$2.50 to $10 per tablet

** Participants were unable to describe a 'cycle' in detail – unknown dosage, quantity or frequency of use*
^ Interpret these prices with caution – very small numbers (n<10)

Purity (and counterfeits)

As most PIEDs are usually diverted pharmaceuticals, discussions of purity are less relevant than for illicitly manufactured drugs. In addition, purity data (such as that collected from other illicit drug seizures) is not routinely collected by forensic agencies for PIEDs. There is currently no objective measure of the purity of street-level PIEDs available in Australia, although it is widely accepted that street PIEDs may be affected by contaminants or be counterfeit (and contain no active ingredients). Counterfeit PIEDs are likely to be unsterile, increasing the potential for infection or poisoning (particularly where injected). Thirty-five percent of the sample reported having been sold counterfeit AAS.

General comments from the 2005 sample indicated that, prior to 2000, AAS were more widely available, cheaper, and believed to be more frequently 'genuine' human or veterinarian products. Both PIEDs users and KEs reported that, in the years following 2000, there has been an increase in the number of fakes/counterfeits and new products such as 'Dianabol paper products' and 'homebake'.

Availability

Most PIEDs users (73%) rated changes in the availability of AAS in the six months prior to interview, but their responses were highly variable. Ten percent of the sample reported that AAS availability 'fluctuated', 20% reported that AAS were 'more difficult to obtain', 29% reported that availability had remained 'stable' and 13% reported that AAS were 'more easy to obtain'. These responses probably reflect the reliability of personal supply networks, rather than general availability of AAS.

Just over half the participants (55%) indicated that their supplier was someone they knew either 'quite well/a friend' or 'extremely well/a close friend'. Eighty-three percent of participants indicated that there was a high degree of trust between themselves and their supplier. When participants were asked whether their supplier's stocks dictated what they used, 63% responded 'yes'. One-third of the 2005 PIEDs user sample (32%) reported having ever sold PIEDs. Among this group, the majority (94%) sold to either 'acquaintances' or 'friends'.

KE comments further reinforced the group's reliance on personal networks of trusted suppliers. The most commonly reported source of PIEDs (according to KEs) was through friends and the gym. One KE described the market as involving large numbers of individuals who supply PIEDs on a small scale. The other sources of PIEDs were reported to be diversion of AAS from medical settings; prescription by a doctor for non-medical purposes; diversion of veterinarian AAS; internet sources and importing PIEDs from overseas.

Is it feasible to monitor PIEDs markets using the IDRS methodology?

Why monitor PIEDs trends?

The non-medical use of PIEDs is an under-researched area in Australia, and PIEDs users are often described as a 'hidden' group. It is known from medical applications of PIEDs (and clinical trials) that there are unwanted side effects and potential harms. Transferring the use of these substances to non-medical, naturalistic (i.e. real life) settings is likely to see these risks increase. Given that most PIEDs are diverted pharmaceuticals, it is necessary to monitor trends and patterns of use.

The patterns of PIEDs use documented by the present study were, on the whole, very similar to those found in the 1997 study. Although the 2005 PIEDs user sample reported negative physical and psychological effects, the harms experienced were less acute than those observed in other groups of injecting drugs users. The present study did not identify any deaths attributed to the use of PIEDs in the routine data sources. The self-reports of PIEDs users were corroborated by KE reports, indicating that PIEDs users rarely present at services seeking help. The majority of PIEDs users believed the benefits of use outweighed the possible risks.

It is possible that, as new substances appear on the market or larger numbers of PIEDs users utilise a wider range of pharmaceuticals in their cycles, new harms may emerge.

PIEDs user surveys

The 2005 study found very similar group characteristics, patterns of use, and experiences of harms to the 1997 study[5], indicating that the two studies had accessed similar sentinel groups of PIEDs users.

The 2005 study found that face-to-face recruitment of this group was time-consuming and the 60 PIEDs user interviews took 8 months to complete.

Given the challenges in accessing PIEDs user samples within short timeframes across all jurisdictions, it may not be practical or necessary to conduct annual face-to-face interviews with a sentinel group of users. To continue monitoring trends, a realistic timeframe for PIEDs users surveys is every 3-5 years, rather than annually. We consider that these surveys could be conducted in the larger jurisdictions only (e.g. NSW, VIC, SA and QLD). Future surveys of PIEDs users could make use of multiple formats to ensure flexibility for a group who are often employed, concerned about anonymity, and engaging in highly stigmatised activities. Internet surveys and phone surveys would be a useful adjunct to face-to-face interviews.

Key expert (KE) interviews

The present study identified and interviewed 24 key experts within the given timeframes. The 2005 KEs had detailed knowledge of the groups' characteristics and the PIEDs market. KE interviews could be conducted annually across all jurisdictions, in a shorter timeframe than a survey of a sentinel group of PIEDs users.

Indicator data

The present study identified and evaluated a range of indicator data sources that could be collated regularly, including:

- Helpline calls (e.g. Alcohol and Drug Information Service, Steroid Peer Education Project in Victoria)
- NSP surveys ('last drug injected')
- Coronial and toxicology data (e.g. National Coroners Information System, Department of Analytical Laboratories)
- Population surveys (e.g. National Drug Strategy Household Survey, Australian Secondary Schools Alcohol and other Drugs Survey)
- Gay community surveys (e.g. Health in Men, Gay Community Periodic Survey)
- Seizures of attempted imports (e.g. Customs)
- Domestic seizures (e.g. Australian Federal Police and State/Territory Police)
- Sales of human and veterinarian AAS (e.g. Australian Pesticides and Veterinarian Medicines Authority figures)
- AAS-related arrests (e.g. Australian Federal Police and State/Territory Police)
- Prescription data (e.g. Pharmaceutical Benefits Scheme aggregated expenditure from Health Insurance Commission); and
- Pharmaceutical investigations (e.g. NSW Health Pharmaceutical Services Branch)

Where possible, indicator data sources could collect breakdowns of different PIEDs (e.g. anabolic-androgenic steroids, androstenedione, DHEA, somatotrophins, gonadotrophins, somatorelins; anti-oestrogens, etc), rather than reporting global categories such as 'steroids' or 'hormones'.

Future monitoring

The present study did not find many changes since the 1997 study suggesting that the PIEDs market may not be particularly dynamic. Given that PIEDs use in Australia remains stable, and does not appear to be an increasing problem, we recommend that large-scale surveys of users are not conducted annually. Surveys conducted every 3-5 years in the larger jurisdictions (such as NSW, VIC, SA and QLD) would be useful in monitoring trends in market characteristics, patterns of use and harms.

FULL REPORT:

Larance, B., Degenhardt, L., Dillon, P., &. (Copeland, J 2005) *Rapid assessment of performance and image enhancing drugs (PIEDs) in New South Wales: Feasibility study*. Sydney, Australia: National Drug and Alcohol Research Centre, Technical Report No. 239.

To download an executive summary of the full report:
http://ndarc.med.unsw.edu.au/ndarc.nsf/website/Publications.reports

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