Impact of harm reduction practice on the use of non-prescribed performance- and image-enhancing drugs

The PUSH! Audit

CPD

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Background and objective
We describe the different performance- and image-enhancing drugs (PIEDs) in Australia. This study examined the impact of harm reduction practice in the PIEDs UserS' Health (PUSH!) Audit.

Method
The PUSH! Audit was a cross-sectional study performed from May 2019 to May 2021. With each audit submitted, general practitioners (GPs) were asked about the impact of their engagement with their patients.

Results
In all, 144 audit responses were collected, with 81.6% of audits showing a change in behaviour. The changes noted were better monitoring (71.3%), treatment of adverse effects (64.4%), modified use (44.4%) and stopped use (12.2%).

Discussion
This study asking GPs about outcomes with each of their patients using non-prescribed PIEDs has shown significant changes in behaviour. There has been no previous work done to evaluate the potential impact of such engagement. The findings of this exploratory study of the PUSH! Audit suggest harm reduction for people who use non-prescribed PIEDs when engaged with GP clinics.

PERFORMANCE- AND IMAGE-ENHANCING DRUGS (PIEDs) comprise a wide variety of substances, including anabolic androgenic steroids (AAS), peptides and hormones. PIEDs are used for a range of non-medical purposes, including to enhance strength, increase muscle mass and to change physical appearance.[1] Historically, the non-medical use of PIEDs was largely confined to elite athletes and bodybuilders, with the aim of enhancing physical performance. However, there has been a significant shift in the epidemiology of PIEDs use over the past three decades in Australia, with an increasing number of people from the general population using non-prescribed PIEDs for non-medical purposes. Over the past 10 years, the use of PIEDs in the general population in Australia has increased steadily. According to the National Drug Strategy Household Survey,[2] in 2019, 0.8% of Australians were estimated to have used PIEDs in their lifetime, compared with 0.4% in 2010.

The non-prescribed use of PIEDs in Australia is also reported in data from the Australian Secondary Schools Alcohol and Drugs (ASSAD) survey[3] (2–3% among secondary school students), the Australian Crime Commission report[4] and the Needle and Syringe Programs Report.[5] The global estimate of lifetime prevalence of PIEDs use in men is 6.4%,[6] but there are no comparable prevalence estimates for Australia.

Commonly reported adverse effects of PIEDs include cardiovascular, haematological, hormonal, metabolic and psychological effects.[7] For many people who use non-prescribed PIEDs, prolonged unmonitored use may increase their risk of an adverse event.

To date, the limited published data on adverse events from PIEDs use have been restricted to either case reports of sometimes severe events resulting in hospital presentation[8,9] or analyses of cohort data from a population of self-identified people who use PIEDs.[10] There are no data available about the use of PIEDs in the community.

Harm reduction practice in the area of illegal substance use is broadly supported in the Australian context. At the time of writing, there were no legal requirements in Australia for mandatory reporting of patients

using PIEDs. Doctors should not prescribe any medications that are not for medical indications. The situation with the use of PIEDs in elite sports is more complicated: doctors could risk being considered as assisting sports doping. Doctors involved in the in the PIEDs UserS Health (PUSH!) Audit were educated about the adverse effects of PIEDs use and that monitoring the health of people using PIEDs may reduce some harm, but not eliminate the potential harms.

People who use non-prescribed PIEDs for non-medical purposes are often reluctant to disclose their use to their general practitioner (GP) during medical care. There are a number of contributing factors that may lead to non-disclosure, including experiences of stigma and discrimination, as well as fears of the legal consequences of disclosing the use of a prohibited substance.[11,12] This non-disclosure of PIEDs use acts as a barrier to the provision of appropriate care, including the identification of related sequelae and the monitoring of potential adverse effects. Ensuring that GPs are providing non-judgemental and non-stigmatising care is therefore critical to facilitating harm reduction behaviours among people who use non-prescribed PIEDs. Doctors participating in this study (the PUSH! Audit) were encouraged to enquire about PIEDs use, rather than waiting for it to be disclosed.

A recent publication from the Sydney North Health Network provides some guidance for health practitioners, as well as details of harm reduction practice, for GPs with patients using non-prescribed AAS and other PIEDs.[13] The PUSH! Audit also aims to publish data about the adverse effects of PIEDs use, but this article focuses on the harm reduction aspects of this study.

Using data from the PUSH! Audit, we aimed to measure the harm reduction impact of GP engagement related to the use of non-prescribed PIEDs and to identify factors that impact behaviour change or outcome.

Methods

Ethics approval was provided by The Royal Australian College of General Practictioners National Research and Evaluation Ethics Committee (Protocol approval no. 18-012).

Study design and setting

The PUSH! Audit is a cross-sectional study of people who use PIEDs presenting to nine participating general practices across Australia in five major cities (Melbourne, Sydney, Brisbane, Canberra and Perth). Data were collected between May 2019 and May 2021 and included demographic characteristics (at initial recruitment), type of PIEDs used, adverse health events, blood pressure readings, pathology results, pre-existing medical conditions and the impact of GP involvement on behaviours and outcomes related to the use of PIEDs. In the practices, clients who used PIEDs were identified through GP consultations and searches of the practice patient management systems. Study data were extracted from patient records; questions were answered by the doctors and the data were entered into a research database. Study data were collected and managed using the data capture system Research Electronic Data Capture (REDCap; Vanderbilt University, Nashville, TN, USA), which was hosted at the Burnet Institute.

For this analysis, we used data pertaining to individuals who reported using non-prescribed PIEDs for non-medical purposes. The data collected did not include any information that identified the participants, which protected their confidentiality. To be eligible for inclusion, patients had to have presented during the recruitment period, had to be either currently using or used non-prescribed PIEDs within the preceding two years and had to be aged ≥18 years. There were no other exclusion criteria. If patients only had one visit, the doctor would decide whether, at the time of data collection, it was an unknown outcome (eg if the data were collected at or soon after the first consultation) or no change (eg if the patient had not returned for a long period of time and was not receptive to any advice given at their consultation). The term 'modified use' indicated a reduction in use, either in the number of substances, the amount of substances or the frequency of use. Due to the complexity of this practice (in regards to all the variables involved, with unknown substances used for different time periods at different quantitites), it was not possible to quantify modified use. If patients had reverted to a different pattern of use at a later point, their data would reflect this in the final analysis if the information was entered into the database. Any current mental health diagnoses were also noted in the audit.

Harm reduction and behaviour change related to PIEDs use

Prior to site enrolment, education sessions were provided to clinicians from the nine participating general practices about the potential health impacts and adverse health outcomes related to the use of PIEDs, prevalence of use and strategies for monitoring and managing patients' health, including harm reduction strategies and the importance of non-judgemental and non-stigmatising care. The education was provided in different forums to clinics and organizations that had expressed interest in this topic. The nine clinics that were recruited to the audit were clinics that had agreed to be involved after being presented with details of the proposed audit during the education sessions. The forums used were individual clinic meetings, dinner meetings with groups of GPs, a hospital education meeting with GPs and other interested parties and an Australia Society of HIV and Hepatitis Medicine (ASHM) education meeting, presented live and on a virtual platform to ASHM members. The lead author (BE) of this paper provided these education sessions, which consisted of the same topics as described above and ranged in length from 30 to 45 minutes.[14]

Harm reduction recommendations were guided by key dimensions of person-centred care and outlined strategies for monitoring the health of patients and supporting them to manage adverse effects related their use of PIEDs.

The outcomes of the harm reduction practice were recorded in the patient record notes, and were subsequently recorded in the REDCap database. Behaviour or outcome change was defined

as a binary variable, and was recorded as 'yes' where a patient had indicated to the reporting clinician that they would modify or had modified their use of PIEDs in response to the harm reduction information they had received or the doctor had determined that they had better monitoring for adverse effects or had adverse effects treated. For patients for whom a behaviour or outcome change was recorded, data on the type of behaviour or outcome change were also recorded. These included: ongoing plans to increase/improve the monitoring of potential adverse effects; the treatment of any adverse effects; modifying the dose, variety and frequency of PIEDs use; and stopping PIEDs use entirely. The answers to these questions were entered either soon after a consultation or later. The time when the data had to be recorded was not specified in the study.

The information collected about current mental health diagnoses and medications prescribed was used to extract data about anxiety and depression.

Table 1. Baseline sociodemographic and clinical characteristics of individuals using non-prescribed performance- and image-enhancing drugs (n=141)

Characteristics	No. individuals (%)
Gender	
Male	139 (98.6)
Female	1 (0.7)
Unknown	1 (0.7)
Age group (years)	
18–29	32 (22.7)
30–39	64 (45.4)
40–49	29 (20.6)
≥50	16 (11.4)
Gay or bisexual	
Yes	74 (46.1)
No	65 (52.5)
Unknown	2 (1.4)
Recorded anxiety or depression	
Yes	44 (31.2)
No	97 (68.8)
Recorded adverse health outcome	
Yes	107 (75.9)
No	34 (24.1)

Covariates

Demographic covariates included gender (male, female), age categories (18–29, 30–39, 40–49, ≥50 years) and a binary variable for sexuality (gay or bisexual, heterosexual). Clinical covariates included whether individuals had a record of anxiety or depression (yes/no) and whether individuals had a record of adverse health outcomes related to their use of PIEDs (yes/no). An individual was recorded as having an adverse health outcome related to PIEDs use if their patient record included evidence of polycythaemia, hypertension, abnormal liver function, gynaecomastia, testicular shrinkage or hair loss/baldness. Gender and age information was thought to be important to understand this population better. Sexuality was recorded because there was expected to be a high proportion of gay and bisexual men among the participants because of the clinics involved in the audit, and although this was not likely to alter any findings, the authors felt it was appropriate to have this information recorded. There were several clinical covariates recorded (mental health, cardiovascular diagnoses, liver function abnormalities), but the two covariates discussed were those that showed a difference in outcomes.

Data analysis

Descriptive statistics were used to show the frequency and proportion of individuals who reported behaviour change or had changes in outcomes following an interaction with a clinician, and the type of behaviour change. A generalised linear model was used to estimate prevalence ratios investigating the association between sociodemographic and clinical covariates and behaviour or outcome change.

Analyses were performed using Stata version 15.1 for Windows (StataCorp, College Station, TX, USA).

Results

Study sample

Data were recorded for 172 individuals (Table 1). Of these, 141 individuals who used non-prescribed PIEDs had sufficient data and were included in the analysis. Almost the entire sample was male (99%), and the median age was 36 years (interquartile range 30–43 years). Approximately half of the sample (46%) was gay or bisexual. Approximately one in three individuals had a diagnosis of anxiety or depression recorded in their electronic medical record, and approximately three in four individuals had a recorded adverse health outcome related to PIEDs use.

Behaviour/outcome change

Self-reported behaviour change (question (Q) 3 and Q4; Table 2) or change in outcome (Q1 and Q2; Table 3) related to the use of PIEDs was recorded for 81.6% (115/141) of individuals (Table 3). Among these individuals, 71% (82/115) had improved monitoring of their PIEDs use and 64% (74/115) had treatment for any adverse effects related to their PIEDs use. Behaviour changes regarding PIEDs use were less common, with 44% (44/115) of participants reporting modifying their PIEDs use and 12% (14/115) reporting stopping their PIEDs use entirely.

In the generalised linear models, behaviour change or outcome change was lower among individuals who had a record of anxiety or depression (Table 4; probability ratio (PR) 0.78; 95% CI: 0.63, 0.97) and higher among individuals with a record of an adverse health outcome related to their use of PIEDs (PR 1.34; 95% CI: 1.04, 1.74; Table 5).

Discussion

The PUSH! Audit shows that there may be significant positive outcomes in harm reduction that can be achieved by engaging people who use PIEDs in general

practice. In the present study, GPs felt that 81.6% of patients had an improved outcome, with 12.2% of those patients ceasing PIEDs use as a result of their engagement. This study also identified some positive and negative predictors of the success of these harm reduction measures, as discussed below.

This study measured harm reduction outcomes by asking doctors two questions about their own impact of engagement on each patient. In general, outcomes of harm reduction strategies can be very difficult to evaluate. There are no standard methods of evaluating harm reduction outcomes[15] and different methods have been used for different substances. In the present study, the first question was direct as to whether there was a perceived change in outcome observed by the GP. As indicated in Table 2, 81.6% of patients had a change in outcome through engagement with the GP, suggesting that in most cases opening the discussion around the use of PIEDs may be beneficial in bringing what is otherwise a hidden practice or behaviour to the consultation.

Although prone to bias, the second question asking the doctors to detail their reasoning as to the specific impact they had gives clarification and moves toward better justification of their role in managing these patients. Of the 115 patients for whom a behaviour or outcome change was recorded, 71.3% had better monitoring for adverse events, 64.4% had adverse events treated and 44.4% had modified their PIEDs use to improve safety. This suggests that engaging with patients about their PIEDs use resulted in 50% (of 150 in total) or more of the adverse events to be detected and/or treated. These adverse events included liver function abnormalities, hypertension, polycythaemia, mental health disorders, acne and hair loss (Table 5).

Finally, and perhaps most importantly, to the best of our knowledge it has never been shown whether engagement of PIEDs use in the context of a GP practice can actually stop PIEDs use. In this study, 9.9% (of 141 in total) of patients reported ceasing PIEDs use; although this may be a small number, given the global lifetime prevalence rate of PIEDs use in men of 6.4%, it has a significant impact and improves a serious global public health problem.

In terms of predicting change in behaviour, the data presented in Table 4 suggest behaviour change is less likely in men with anxiety or depression, but more likely in those who experience adverse effects from their use of PIEDs. This provides some further insight into how behaviour change can be affected in this group and whether addressing the link between the lack of behaviour change in those with depression and anxiety with ongoing PIEDs use could improve outcomes.

In terms of study limitations, although the doctors felt that most patient outcomes were improved, unblinded data collection means the study is prone to bias. A move towards reducing this bias was by requesting clarification and reasons for the response. In addition, the data collected about behaviour outcome could have been better specified. This may have accounted for the 9% of responses being 'unknown', because it was likely to be too early to tell whether any changes had occurred. The data collected are also based on self-reported information from patients. The cross-sectional nature of this audit also means that there were no useful data collected over time. Any positive self-reported behaviour change could have been reversed over time but, similarly, any lack of self-reported change could have been reversed over time. Another limitation of the study is its small sample size, which means it could be prone to sampling bias. However, this study was a multicentre study across nine clinics in five states and territories.

A key strength of this study is that the data collected are from a non-selected sample from the community that would visit a GP clinic rather than a sample that gets referred to a tertiary or specialist centre. This makes this study unique in that it is more representative of PIEDs users in the community than previous studies thus far. The sample included patients who may not have presented with any issues about their PIEDs use but, by being engaged by their GP about this issue, a substantial proportion would benefit in terms of reportedly avoiding adverse events, treating adverse events or even modifying or ceasing PIEDs use. This suggests that the benefits of engaging with patients regarding PIEDs use may be seen across multiple communities and GP practices across the country. There is controversy around the appropriateness of using harm reduction principles in PIEDs users, and this study supports a role for the GP in demonstrating benefit from engagement.

Table 2. Changes in patient-reported behaviour/outcome related to the use of performance- and image-enhancing drugs (n = 141)

Behaviour/outcome change	No. individuals (%)
Yes	115 (81.6)
No	26 (18.4)

Table 3. Type of behaviour/outcome change reported by clinicians* (n = 115)

Type of behaviour/outcome change	No. responses (%)
Better monitoring of PIEDs use	82 (71.3)
Treatment of adverse effects	74 (64.4)
Modified PIEDs use	51 (44.4)
Stopped PIEDs use	14 (12.2)
No change	26/141 (18.4)

*Multiple responses allowed per individual. PIEDs, performance- and image-enhancing drugs.

Table 4. Characteristics associated with planned behaviour/outcome change following harm reduction education with a general practitioner (n=138)

Characteristic	No. individuals	Planned behaviour change, n (%)	Probability ratio	95% CI
Age group (years)				
18–29	32	27 (84.4)	Reference	
30–39	62	52 (83.9)	1.00	0.83, 1.2
40–49	29	23 (79.3)	0.94	0.74, 1.19
≥50	15	11 (73.3)	0.81	0.57, 1.17
Gay or bisexual				
No	64	51 (79.7)	Reference	
Yes	74	62 (83.8)	1.05	0.89, 1.23
Recorded anxiety or depression				
No	94	83 (88.3)	Reference	
Yes	44	30 (68.2)	0.78	0.63, 0.97
Recorded adverse health outcome				
No	33	21 (63.6)	Reference	
Yes	105	92 (87.6)	1.34	1.04, 1.74

Table 5. Adverse events recorded in the PUSH! Audit

Frequency of adverse events	Reported and measured AEs in people using non-prescribed PIEDs (from the PUSH! Audit)
Extremely common (≥1/10)	Abnormal liver function, hypertension, gynaecomastia, hyperlipidaemia, testosterone suppression, depression
Common (≥1/100 to <1/10)	Polycythaemia, acne, balding, testicular shrinkage, aggression, injection site infection or abscess
Uncommon (≥1/1000 to <1/100)	Infertility concerns

AEs, adverse events; PIEDs, performance- and image-enhancing drugs; PUSH!, PIEDs UserS' Health.

Conclusion

This exploratory study supports GP involvement as an important part of harm reduction for people who use non-prescribed PIEDs because of the potential for several beneficial outcomes.

In the PUSH! Audit of data collected from nine clinics, GP involvement in the health of people using non-prescribed PIEDs resulted in positive self-reported outcomes for 81.6% of those engaged, with benefits including better monitoring and treatment of adverse events, as well as reduced, and even cessation of, PIEDs use (12.2%).

The diagnosis of anxiety and depression is a negative predictor of change, whereas the identification of adverse outcomes is a positive predictor of change.

These findings, if reflective of the broader population, suggest potential for significant improvement in health outcomes and reduced health costs. Further research and education is warranted given the prevalence of use of non-prescribed PIEDs.

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References

1. Kanayama G, Hudson JI, Pope HG Jr. Illicit anabolic-androgenic steroid use. Horm Behav 2010;58(1):111–21. doi: 10.1016/j.yhbeh.2009.09.006.
2. Australian Institute of Health and Welfare (AIHW). National drug strategy household survey 2019. Canberra: AIHW, 2020.
3. Guerin N, White V. ASSAD 2017 statistics & trends: Australian secondary students' use of tobacco, alcohol, over-the-counter drugs, and illicit substances. 2nd edn. Melbourne: Cancer Council Victoria, 2020.
4. Australian Crime Commission. Illicit drug data report 2019–20. Canberra: Commonwealth of Australia – ACIC, 2021. Available at www.acic.gov.au/publications/illicit-drug-data-report/illicit-drug-data-report-2019-20 [Accessed 1 March 2023].
5. Heard S, Iversen J, Maher L. Australian needle syringe program survey national data report 2016–2020: Prevalence of HIV, HCV and injecting and sexual behaviour among NSP attendees. Sydney: Kirby Institute, UNSW Sydney, 2021.
6. Sagoe D, Molde H, Andreassen CS, Torsheim T, Pallesen S. The global epidemiology of anabolic-androgenic steroid use: A meta-

analysis and meta-regression analysis. Ann Epidemiol 2014;24(5):383–98. doi: 10.1016/j.annepidem.2014.01.009.

7. Pope HG Jr, Wood RI, Rogol A, Nyberg F, Bowers L, Bhasin S. Adverse health consequences of performance-enhancing drugs: An Endocrine Society scientific statement. Endocr Rev 2014;35(3):341–75. doi: 10.1210/er.2013-1058.
8. Stergiopoulos K, Brennan JJ, Mathews R, Setaro JF, Kort S. Anabolic steroids, acute myocardial infarction and polycythemia: A case report and review of the literature. Vasc Health Risk Manag 2008;4(6):1475–80. doi: 10.2147/vhrm.s4261.
9. Hernández-Guerra AI, Tapia J, Menéndez-Quintanal LM, Lucena JS. Sudden cardiac death in anabolic androgenic steroids abuse: Case report and literature review. Forensic Sci Res 2019;4(3):267–73. doi: 10.1080/20961790.2019.1595350.
10. Smit DL, de Hon O, Venhuis BJ, den Heijer M, de Ronde W. Baseline characteristics of the HAARLEM study: 100 male amateur athletes using anabolic androgenic steroids. Scand J Med Sci Sports 2020;30(3):531–39. doi: 10.1111/sms.13592.
11. Dunn M, Henshaw R, McKay FH. Do performance and image enhancing drug users in regional Queensland experience difficulty accessing health services? Drug Alcohol Rev 2016;35(4):377–82. doi: 10.1111/dar.12363.
12. Jacka B, Larance B, Copeland J, et al. Health care engagement behaviors of men who use performance- and image-enhancing drugs in Australia. Subst Abus 2020;41(1):139–45. doi: 10.1080/08897077.2019.1635954.
13. van de Ven K, Eu B, Jackson E, Han E, Gouda N, Simmonds P, Parsons C. GP guide to harm minimisation for patients using non-prescribed anabolic-androgenic steroids (AAS) and other performance and image enhancing drugs (PIEDs). Sydney: Sydney North Health Network, 2020.
14. Penington Institute. Reducing harms for people who use performance and image-enhancing drugs. YouTube, 2022. Available at www.youtube.com/watch?v=1NvKG6-E-Ew [Accessed 28 February 2023].
15. Harm Reduction International. What is harm reduction? London: Harm Reduction International, 2022. Available at www.hri.global/what-is-harm-reduction [Accessed 27 February 2023].

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