

Dissertation: M Phil Sports Medicine

Anabolic-androgenic steroids:

Knowledge, attitudes, ethical dilemmas and review for
Primary Care Physicians

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1. **Research article.** Knowledge and attitudes of medical practitioners on the prescription of anabolic androgenic steroids.

Submitted for publication to the South African Medical Journal.

2. **Review article.** Anabolic androgenic steroids: Overview and ethical dilemmas for the Primary Care Physician.

Submitted for publication to The Physician and Sports Medicine Journal.

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AAS refers Anabolic-androgenic steroids

PCP refers Primary Care Physician

Abstract

Aims:

The primary aim is to assess the knowledge and attitudes of medical practitioners with regard to the use and prescription of AAS in sports as determined in article 1. The secondary aim is to provide PCP's with a global overview on all aspects of AAS, including ethical issues and finally make recommendations to PCP's in dealing with patients/athletes requesting AAS. Chapter 4 provides a guideline in developing a modular "tool-kit" to assist PCP's worldwide in dealing with all aspects of AAS use and prescription.

Methods:

To determine the knowledge and attitudes of medical practitioners with regards to use and prescription of AAS, an anonymous questionnaire was distributed to medical practitioners attending the 11th Annual General Practitioners Convention held in 1998 in Sun City, South Africa.

Results:

Article 1 confirms that some medical practitioners in South Africa lack sufficient knowledge on all aspects of AAS use. In assessing medical practitioners' knowledge of AAS, it was found that 67% of respondents indicated that they did not feel confident of their knowledge when dealing with AAS, although 23% of medical practitioners knew of patients who had used AAS in the past year and 29% of medical practitioners had received requests for AAS from patients in the past year. In assessing medical practitioners' attitude, 82% of medical practitioners indicated that athletes should not be allowed to use AAS under any circumstances. The study also demonstrated that 92% of medical practitioners were of the opinion that AAS should remain banned and 94% felt that AAS provided an unfair advantage to athletes.

Article 2 demonstrates that the prescription of AAS has diverse ramifications. In the absence of internationally formulated guidelines regarding the non-therapeutic use of AAS, Article 2 makes recommendations using algorithms to assist physicians in dealing with patients/athletes requesting AAS.

Conclusion:

In developing prevention strategies to deal with AAS use, an education and information campaign involving not only patients/athletes but also PCP's should be considered. PCP's should become knowledgeable on all aspects of AAS and have current and updated guidelines to assist them in dealing with patients requesting AAS. PCP's may need to reconsider their personal, cultural and medical views to assist the patient/athlete. PCP's should create and maintain a patient-centered pathway of communication. While there are no easy solutions, PCP's commitment to their patient requires that they seek such a path.

Chapter 1

Introduction

The end of apartheid in South Africa has resulted in the end of international sanctions and isolation from international sporting competition allowing South African athletes to compete globally with other athletes. However, the global sports arena is not “perfect and fair”. The constant and highly publicized incidents of doping and corruption at the highest level involving Olympic athletes and officials had made the public cynical about the “fairness” in sports. Even in an era void of AAS abuse, the perceived danger of acquiring “enormous muscles” was noted in 1893 by George Frank Lydston, who states in the Journal of American Medical Association (Muscle building as illustrated by the modern Samson, Sandow. JAMA.1893; 21:419-22); “*Athletics for health should be the motto of the man who trains. Athletics for big muscles and competitive feats of strength and endurance are pernicious, illogical, and dangerous*”.

The high entertainment value of sports in modern society with large monetary stakes demand excellence from competitors; hence individuals/athletes may consider using ergogenic aids including AAS to achieve their goals. Therefore sporting organizations should develop educational programs to assist primary care physicians (PCP's) in dealing with patients requesting ergogenic aids. Because primary care differs from country to country, international sporting / medical bodies such as the International Olympic Committee (IOC) and WHO (World Health Organization) should formulate guidelines for PCP's dealing with athletes/patients requesting AAS. These guidelines should facilitate the

diagnoses and management of athletes/patients using AAS by improving the knowledge and skill of the PCP. The guideline should be patient-centered, physician-friendly and adaptable to physicians practicing in any country but maintaining "fairness" in sports and abiding by international and national rules. The guideline may be in the form of a modular 'tool-kit'.

Primary-care physicians (PCP's) are the gatekeepers of the health-care system and the entry-level for patients and athletes to seek medical attention. PCP's should adopt a holistic approach in dealing with athletes/patients. The holistic approach recognizes that the whole is greater than the sum of the parts and takes into account the patients physical, cultural, emotional and spiritual needs. PCP's are also responsible for promoting emotional well-being in the individual patient, athletes, families and communities. It is this favorable and unique key situation that demands that PCP's should have sufficient knowledge and skills to provide adequate and safe advice to patients/athletes requesting AAS. The following articles demonstrate that the physician's task in dealing with patients requesting the prescription of AAS is not simple and clear-cut but complicated by social, medical, legal and ethical issues.

As a PCP I was interested in determining the knowledge and attitude of my colleagues with regard to the prescription of AAS to athletes/patients. My initial expectation was confirmed in article 1 which demonstrated that medical practitioners in South Africa lack important knowledge on all aspects of AAS use. Although medical practitioners knew of patients who had used AAS and had received requests for AAS from patients in the past year many of the medical practitioners failed to identify important issues related to the use of AAS and

the penalty of prescribing AAS for non-medical reasons. The study also demonstrated that two thirds of medical practitioners were not confident of their knowledge on the effects of anabolic androgenic steroids. Many medical practitioners could not distinguish between AAS and corticosteroids. Therefore prevention strategies and intervention programs in dealing with athletes /patients using AAS should include "education and information" for PCP's.

However, the attitude of the majority of medical practitioners was that AAS should not be allowed under any circumstances for athletes. This opinion is an important message for international sporting organizations when formulating guidelines on the use of AAS. The study also found that most medical practitioners felt that AAS should remain banned and that it provided an unfair advantage to athletes.

Article 2 deals with a global overview of important issues related to the non-therapeutic use and prescription of AAS and also deals with the ethical dilemmas facing the PCP when approached by athletes and non-athletes alike. After identifying the serious lack of knowledge of PCP's on all aspects related to AAS in article 1 a practical approach in dealing with AAS has been formulated in article 2. A clinician-friendly step-by-step approach (algorithm) has been included in article 2 for PCP's dealing with athletes/patients requesting AAS.

It is the writer's intention to conduct similar surveys in Canada and compare the knowledge and attitudes of PCP's in Canada to those in South Africa. The long-term goal is to develop a 'tool-kit' in a modular form on all aspects of AAS to which PCP's can refer to for the latest and up-to-date information to assist them in dealing with patients/athletes requesting AAS. Some suggestions and ideas on developing such a 'tool-kit' is presented in chapter 4.

Chapter 2

Article 1

Research Article

**Knowledge and attitudes of medical practitioners on the prescription of
Anabolic-androgenic steroids (AAS)**

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**Knowledge and attitudes of medical practitioners on the prescription of
anabolic-androgenic steroids**

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ABSTRACT

Objective: To assess the knowledge and attitude of medical practitioners with regard to the use and prescription of anabolic-androgenic steroids (AAS) in sport.

Design: Cross-sectional survey

Setting: Medical practitioners attending the 11th Annual General Practitioners Convention held in 1998 in Sun City, South Africa

Outcome measures: Responses to a questionnaire

Results: One hundred and twelve questionnaires (93% of the sample) were included in the analysis of data. The mean (SD) age of respondents was 43.4 (9.0) years (males 43.5 (8.0); females 43.0 (9.7) years). Although 88% of medical practitioners had seen patients for sports-related problems in the last year, 30% had requests from patients for AAS in the last year and 23% knew of patients using AAS in the last year. In assessing medical practitioners' knowledge of AAS, it was found that 67% of respondents indicated that they did not feel confident of their own knowledge when dealing with AAS, only 21% of respondents correctly identified the schedule of AAS, only 2% of respondents knew of the penalty for inappropriate possession or prescription of AAS, with 29% responding that there was no penalty. Many medical practitioners (54%) incorrectly identified corticosteroids as AAS and incorrectly indicated that AAS could be used for intra-articular injections and for treating arthritis. In assessing medical practitioners' attitude, 82% of respondents indicated that athletes should not be allowed to use AAS under any circumstances. Majority (92%) of the respondents were of the opinion that AAS should remain banned and 94% of the respondents felt that AAS provided an unfair advantage to athletes.

Conclusion: Medical practitioners in South Africa are not well informed about AAS. In developing prevention strategies to deal with AAS use, a more comprehensive education and information campaign involving not only athletes but also primary care medical practitioners should be considered.

Key words: anabolic-androgenic steroids, medical practitioners, general knowledge

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Introduction

Anecdotal evidence suggests that the misuse of anabolic-androgenic steroids (AAS) is an increasing medical and public health problem¹. The uncontrolled use of these agents has been associated with numerous negative side effects^{2,3}. The possibility of substantial financial gains to athletes who excel in sport has created the demand for prescription and administration of AAS by medical practitioners⁹. Medical practitioners are also confronted by patients presenting with medical complications caused by the abuse of AAS.

It has been shown that the level of general knowledge about AAS amongst matric pupils in the Western Cape was “very poor” and suggested that education on factors to improve sport performance, such as nutrition and training, may reduce the use of AAS in sport⁴. The family medical practitioner may be able to assist in educating pupils and athletes on the use of AAS. However, medical practitioners also need education on AAS^{1,5}. The emphasis on educating medical practitioners is also shared by Van der Merwe and Kruger⁶ who further state that there has been no decline in the use of banned substances in South Africa. A survey conducted among First Team schoolboy rugby players in South Africa showed that doctors and pharmacists were the main source of supply for anabolic steroids and stimulants⁷. Similar findings of medical practitioners being the primary suppliers of AAS have been found in the USA^{8,9,10}.

Whilst some athletes and medical practitioners are aware of the physiological

effects of anabolic steroid use, many are ignorant of the potential for habituation and dependence through the chronic use of AAS^{11,12}. The negative psychological effects of AAS may result in serious public health problems, which may present as simple irritability to aggression and severe psychosis^{11,14}. The victims of this erratic and aggressive behaviour are not only the athletes but also their family and close associates too^{10,14}.

Physiological dependence on AAS can result in withdrawal depression^{10,15,16}. In addition, many medical practitioners and athletes are unaware of the medico-legal aspects relating to the possession and prescription of AAS for purposes other than their recommended medicinal use¹³. Therefore, medical practitioners have an important responsibility in addressing the problem of AAS in sport.

Methodology

The study design was a survey conducted by means of an anonymous questionnaire which was distributed to medical practitioners who attended the 4-day 11th Annual Conference of Family Practice / Primary Care in Sun City from the 17th to 20th of August, 1998. A pilot study involving twenty medical practitioners who would not be attending the conference was conducted to test the questionnaire for errors, ambiguities and overall clarity. Problem questions were identified and modified. Completed questionnaires from the pilot test were reviewed and minor revisions made in the wording of the questions and instructions. The questionnaire was then translated into Afrikaans and back into English again by a third party to ensure correct translation. The bilingual nature of the questionnaire was used because medical training in South Africa is through the language medium of English and/or Afrikaans. The front page of the questionnaire explained the purpose of the questionnaire and instructed delegates not to include their names on the questionnaire.

Ethical clearance to conduct the study was received from the Ethics and Research Committee of the University of Cape Town's Medical School. Permission to hand out the questionnaire at the congress was granted by the Chairperson of the congress.

Copies of the questionnaire were given to all the delegates who attended the plenary session on the second day of the congress. The morning plenary

session was regarded as the best time to hand out the questionnaires as no other sessions were being held at that time. This ensured that delegates would not be attending any other session. A table was set up at the entrance of the venue and the questionnaires were handed to the delegates as they entered the room. Hence, the handing out of the questionnaire at the plenary session provided a captive audience creating examination-type conditions, reducing the possibility of delegates discussing the answers. It would also not be possible for the delegates to search for the answers to the general knowledge questions.

The Chairperson of the morning plenary session made an announcement encouraging delegates to complete the questionnaire immediately after the session, and mentioning that handing in the questionnaire made them eligible for a prize. Two large receiving boxes were set up at the exits where delegates could deposit their questionnaires and receive a ticket for the prize draw. With the aid of assistants, every person exiting the auditorium was monitored to try and ensure that they deposited a questionnaire in the receiving box.

The questionnaires were collected and the data transferred to a spreadsheet. Statistical analysis was performed using the Statistica 6 statistical software (Statsoft, Inc, Tulsa Oklahoma, USA). All data are presented as mean (SD). The Student's t-test was used to determine differences between groups. A Chi-square test was used to determine differences in the responses in the questionnaire between sub-groups. Statistical significance was accepted

when $P < 0.05$.

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RESULTS

Population characteristics

There were 189 delegates registered by the second day of the 4-day congress. Of these delegates, 121 (64%) attended the plenary session.

Although 121 questionnaires were handed out, only 112 (93%) questionnaires were used in the final analysis. Nine of the questionnaires were excluded for the following reasons:

- (a) Two questionnaires were handed to overseas guest speakers who did not complete or hand in their questionnaires.
- (b) One female delegate indicated that she did not complete her questionnaire because she was the wife of one of the delegates.
- (c) Four male delegates left the auditorium without handing in their questionnaires.
- (d) Two questionnaires were not used due to incomplete information being provided during printing.

The general characteristics of the study population are shown in Table I. The total population group was stratified for gender (male 78% and female 22%). The mean (SD) ages of males and females delegates were similar (males 43.5 (8.0) years; females 43.0 (9.7) years). The mean (SD) number of years that males and female delegates had been in active medical practice was also similar (males 18.4 (8.9) years; females 17.7 (9.7) years). Almost all (99%) of the medical practitioners in the study were still practising medicine. Most (88%) of the respondents had graduated from South African medical schools, with the rest (12%) graduating from foreign medical schools (Table II). The

majority of medical practitioners were graduates from the largest medical schools in South Africa (Pretoria 20%, Cape Town 15%, Witwatersrand 14% and Natal 13%).

Approximately a quarter (23%) of medical practitioners knew of patients who had used AAS in the past year. Most (65%) of these medical practitioners were not sure as to how often they had seen patients who had used AAS, but 9 (8%) medical practitioners had seen these patients monthly. Of these 9 medical practitioners, 5 saw one patient per month using AAS, 2 saw two patients per month, 1 saw five patients per month and 1 medical practitioner saw six patients per month using AAS. Of the 26 medical practitioners who knew of patients using AAS in the past year, the majority (12%) indicated that their patients had obtained the AAS from other medical practitioners. The others respondents indicated that patients obtained AAS from coaches (5%), team mates (4%) and gym mates (7%).

Twenty-nine percent of medical practitioners had requests for AAS from patients in the past year. Of these medical practitioners who had patients requesting AAS, 60% were not sure as to how many patients and how frequently they had requested AAS. However, 40% of medical practitioners had monthly requests for AAS.

A large proportion (88%) of medical practitioners in the study had seen patients for sports-related problems. The most common sports being rugby (38%), athletics (38%), and soccer (31%). When medical practitioners were

questioned as to who requested AAS for their patients, 9% of medical practitioners indicated that team mates had requested the AAS on behalf of their patients, 7% indicated that friends made the request for AAS, and 4% indicated that parents requested AAS for their children.

Knowledge of medical practitioners regarding AAS

The responses of medical practitioners to questions testing their knowledge of the types, schedule, penalty, forms of administration, indicated medical use and possible adverse effects of AAS are shown in Tables III and IV. One-fifth (21%) of medical practitioners knew the correct scheduling of AAS. Only two (2%) medical practitioners correctly identified the penalty for possessing AAS without a valid medical reason, and 29% of medical practitioners thought that there was no penalty for using AAS without a prescription. The majority (67%) of medical practitioners were not confident of their knowledge on the effects of AAS. However, a significant difference ($P = 0.02$) was found between two groups with different numbers of years in practice. The group that was longer in practice (mean = 21.1 years) was more confident than the group that had been in practice for a shorter period of time (mean = 16.7 years). No significant difference was found between males and females on the confidence of their own knowledge on the adverse effects of AAS. Most medical practitioners correctly identified injectable (92%) and oral (65%) forms of AAS but very few were aware of the transdermal (6%) and sublingual (3%) forms of AAS. Table III shows that many physicians incorrectly identified prednisone, betamethasone, depo-medrol and solumedrol as AAS. Many medical practitioners were also not aware of the recommended therapeutic

uses of AAS and many incorrectly thought that AAS could be used for treating arthritis and for intra-articular injections. Table IV shows medical practitioners' knowledge with regard to the possible negative adverse effects of AAS. Only about a third (31%) of medical practitioners were aware of the risk of psychological dependence with the use of AAS. Table IV also shows that a maximum of two-thirds of the respondents answered any one question correctly.

Attitudes of medical practitioners regarding the use of AAS

Most medical practitioners (82%) felt that athletes should not be allowed to use AAS under any circumstances. However, some medical practitioners (10%) felt that athletes should be allowed to use AAS under medical supervision. Only one respondent felt that athletes should be allowed to use AAS without any supervision. Non-medical supervision by coaches was not favoured by any of the respondents. The majority (94%) of medical practitioners felt that AAS provided an unfair advantage, and 91% of medical practitioners believed that AAS should remain banned. Although most medical practitioners (93%) would not prescribe or administer AAS for improving sports performance or increasing body size, some (21%) would administer AAS for medical reasons. Almost two-thirds (67%) of medical practitioners were not confident of their knowledge on the adverse effects of AAS.

DISCUSSION

The primary aim of this study was to determine the knowledge and attitudes of medical practitioners on the use of AAS in sports. The methods of data collection have already been described. It is possible that the delegates who attended the convention may not accurately represent the knowledge and attitudes of all South African physicians. It may also be argued that there may be selection bias, as these delegates may have been more "enthusiastic" about CME (continued medical education) than the "average" medical practitioner. However, at the time that this convention had taken place, "mandatory" continued medical education was not required to maintain licensure in South Africa.

Furthermore, the delegates and the areas from which they came could be considered representative of South Africa, as many lived a long distance from where the convention took place.

The validity of this study is further strengthened by the response rate. Of the 121 questionnaires handed out, only 4 (3.3%) were not voluntarily completed. The mean (SD) age of males (43.5 (8.0) years) and females (43.0 (9.7) years) was similar and so were the mean (SD) years of practice between males (18.4 (8.9) years) and females (17.7 (9.7) years). South African graduates were represented from all South African medical schools. Only one medical practitioner was not practising medicine at the time of the study. It appears that 73% of medical practitioners did not know of any patients using AAS in the last year. Because of the design of the study, it was not possible to

investigate more thoroughly the reasons why 88% of medical practitioners had seen patients for sports-related problems but only 23% knew of patients using AAS in the last year and 29% had requests for AAS. Some of the reasons might include personal attitude and a lack of knowledge of AAS on the part of the medical practitioner, and failure to enquire about high-risk behaviour in patients. This can be regarded as confirmed because 67% of medical practitioners admitted to lacking in confidence of their own knowledge of the effects of AAS. However, it seems that medical practitioners who were longer in practice and probably more experienced felt more confident of their knowledge on the adverse effects of AAS.

The most common sports-related problems that the medical practitioners had encountered were in the popular sports of rugby, athletics and soccer, with least common sports being basketball, ice-skating and golf. This is probably representative of the common sports played in South Africa and the high-impact contact sports most likely to result in injury. In determining medical practitioners' attitudes, it is very clear that they were not in favour of athletes using AAS to enhance performance especially if athletes were using AAS without medical supervision. Medical practitioners were almost unanimous in their attitude with regard to banning and the question of the "fairness" of using AAS in sports. This study showed that 92% of medical practitioners felt that AAS should remain banned and 94% felt that AAS provided an unfair advantage to athletes.

It was disconcerting that only 23% of medical practitioners knew to which

schedule of drugs AAS belongs. Furthermore, in assessing their knowledge of AAS, only 2% were aware of the serious penalty for possession of anabolic steroids without a doctor's prescription in South Africa. Also, more than a quarter of medical practitioners (29%) thought that there was no penalty for the illegal possession of AAS. Infringements of Schedule 5 drugs to which AAS belong, carry a severe penalty of up to 10 years imprisonment and/or a R40 000 fine ¹⁷. Also of concern was that parents approached medical practitioners to prescribe AAS to their children. It has been reported that 26% of inquiries for AAS for adolescents in the USA was instituted by parents ¹⁸. It can be speculated as to the reasons for parents requesting AAS for their children as "winning" brings money, fame, fortune, respect, contracts and scholarships. Teammates and friends together were the most common group who requested medical practitioners to prescribe AAS. This emphasises the importance of peer pressure in the decision to use AAS.

Although the most common forms of AAS used are in the oral and injectable forms, recently transdermal patches, buccal tablets and nasal spray have been introduced ³. Most medical practitioners were only aware of the oral and injectable forms. Of concern was that medical practitioners incorrectly identified prednisone, depo-medrol, betamethasone and solumedrol as AAS, and some medical practitioners thought that AAS could be used for treating arthritis and be administered as intra-articular injections. Furthermore, many medical practitioners did not know of the possible adverse effects of AAS (Table IV).

The results of this study indicate that a proportion of South African medical practitioners lack important knowledge on all aspects of AAS use. Prevention strategies and intervention programs to prevent the inappropriate use of AAS should include “education and information” for primary care medical practitioners.

Conclusion

The objective of this study was thus not only to gauge the knowledge of medical practitioners and determine attitudes towards the use of anabolic steroids, but that it has identified weaknesses in the ability of the health care worker to recognise AAS use in their patients and the penalties thereof. The role of all medical practitioners dealing with AAS abuse/use should be no different from dealing with any health problem, provided that the medical practitioner demonstrates sufficient knowledge and skill to provide adequate and safe advice to his patient/athlete.

AAS abuse is not restricted to elite athletes but has extended to use by non-athletes and adolescents to decrease body fat and contour their bodies in the quest of achieving the “ideal” form³. Medical practitioners who are responsible for the medical care of these individuals with high-risk behaviour should enquire about possible AAS use as part of their patient assessment. To be able to diagnose possible AAS use by patients, medical practitioners must be suspicious of AAS abuse. For example, if a male adolescent presents to the medical practitioner for treatment of acne, the patient should be questioned about possible AAS use. Medical practitioners should adopt a

holistic approach in dealing with individuals using AAS. A holistic approach recognises that the whole is greater than the sum of the parts and takes into account the physical, cultural, emotional and spiritual aspects of the individual's decision to use AAS. Medical practitioners are also responsible for promoting emotional well being and in the building of self-esteem in individuals, athletes, families and communities.

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Table I: Characteristics of the medical practitioners in the study (Data are shown as mean (SD)).

	Males (n=87)	Females (n=25)	Total (n=112)
Age (years)	43.5 (8)	43.0 (9.7)	43.4 (9.0)
Years of practising medicine after graduation (years)	18.4 (8.9)	17.7 (9.7)	
Physicians in active practice (%)	86 (77)	25 (22)	111 (99)

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Table II: Medical schools and countries from which medical practitioners graduated (n=112).

	% of medical practitioners
(a) University of Natal	13
(b) University of Medunsa	8
(c) University of Pretoria	20
(d) University of Stellenbosch	9
(e) University of Cape Town	15
(f) University of Witwatersrand	14
(g) University of Orange Free State	8
(h) University of Makerere	1
(i) Rhodesia (Zimbabwe)	1
(j) University of Colombo (Sri Lanka)	2
(k) University of Catania (Italy)	1
(l) University of Lagos (Nigeria)	2
(m) University of Peradeniya (Sri Lanka)	1
(n) University of Rijeka (Yugoslavia)	1
(o) India	2
(p) Poland	1
(q) University of Khartoum	1
(r) Unknown	1

Table III: The knowledge of medical practitioners on AAS (% of medical practitioners).

Question (correct answer)	Answered correctly	Answered incorrectly	Don't know	No data
1. Which schedule of drugs do AAS belong to?				
(i) Correct answer	21			
(ii) Incorrect answer		35		
(iii) Don't know			44	
2. What is the penalty for possessing AAS without a doctor's prescription?				
(i) Correct answer *	2			
(ii) Incorrect answer		42		
(iii) Don't know			56	
3. What forms of AAS are available?				
(i) Tablets (correct answer)	65			
(ii) Injectables (correct answer)	92			
(iii) Sublingual (correct answer)	4			
(iv) Transdermal (correct answer)	6			
(v) Transrectal		5		
(vi) Don't know			1	

4. Which of the following are AAS?				
(i) anapolon 50 (correct answer)	46			
(ii) prednisone		12		
(iii) proviron (correct answer)	29			
(iv) sustanon (correct answer)	33			
(v) deca-durabolin (correct answer)	73			
(vi) depo-medrol		19		
(vii) betamethasone		10		
(viii) solumedrol		13		
(ix) Don't know			1	
5. Which of the following are the indicated uses of AAS ?				
(i) aplastic anaemia (correct answer)	24	10	65	1
(ii) certain disseminated breast cancer (correct answer)	33	14	51	2
(iii) conditions requiring increased protein synthesis (correct answer) *	50	3	47	
(iv) arthritis	24	28	46	3
(v) intra-articular injection	27	19	53	2

* $p < 0.001$. correct vs incorrect

- **Table IV:** Knowledge of medical practitioners regarding the possible adverse effects of AAS (% of medical practitioners).

Possible adverse effects	Answered correctly	Answered incorrectly	Not sure	No data	P*
GENERAL					
Risk of psychological dependence	31	22	43	4	N/S
Severe mood swings	63	7	29		P<0.001
Aggressive tendencies	67	15	16	2	P<0.001
Depression	54	8	37	1	P<0.001
Reports of suicide	38	11	49	3	P<0.001
Acne	61	4	34	2	P<0.001
MALES					
Abnormal spermatogenesis	66	7	27		P<0.001
Infertility	53	7	39	1	P<0.001
Testicular atrophy	59	8	32	1	P<0.001
Gynaecomastia	43	12	44	2	P<0.001
FEMALES					
Abnormal menses	63	2	35	1	P<0.001
Clitoral enlargement	53	3	45		P<0.001
Deepened voice	58	2	40		P<0.001

* correct vs incorrect

Chapter 3

Article 2

Review Article

Anabolic androgenic steroids: Overview and ethical dilemmas for the Primary Care Physician.

University of Cape Town

Anabolic-androgenic steroids:

Overview and ethical dilemmas for the Primary Care Physician

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Abstract

This paper examines anabolic androgenic steroid (AAS) use in athletes and non-athletes from an ethical standpoint and briefly reviews the history, epidemiology, pharmacology, efficacy and adverse effects of AAS. Prescription of AAS has medical, moral, legal and ethical consequences for both physician and patient. In this review physicians are presented with three scenarios in dealing with patients requesting AAS. i.e. competitive /elite athlete, non-competitive athlete and team physician. Although, no consistent internationally accepted opinion or guidelines exist regarding the non-therapeutic use of AAS, recommendations are made using an algorithm to assist physicians when approaching the problem of non-therapeutic use of AAS and the prevention strategies thereof.

Key words: prescription of anabolic androgenic steroids, moral, legal, ethical issues

Introduction

Primary care physicians are faced with individual patients and athletes striving to achieve their maximum potential. To achieve this they may consider using ergogenic aids including anabolic androgenic steroids (AAS) to enhance their athletic performance. The aim of this article is to provide primary care physicians with background information and a global overview of important issues related to the non-therapeutic use and prescription of androgenic anabolic steroids (AAS). Emphasis will be placed on ethical dilemmas facing physicians when approached by athletes and non-athletes alike. If "fairness" in sports refers to individuals competing on "equal" terms, then the use of other performance enhancing methods such as highly sophisticated equipment and training facilities under the supervision of skilled sports medicine specialist, which is not available to all, may be contrary to the "true" sports spirit. Hence, the fine line of what is unfair and unethical may be blurred for some and easily crossed.

It is beyond the scope of this article to provide a detailed and comprehensive account of all aspects of AAS use, as this information can be obtained by referring to reviews on AAS^{1,2,3,4}. Furthermore, an attempt will be made to make primary care physicians aware of the social, medical, legal and ethical issues involved with the non-therapeutic use of AAS. Finally, recommendations will be made to assist physicians with the problem of non-therapeutic use of AAS and prevention strategies thereof.

Overview of AAS

Definition of AAS

AAS as a group of drugs are termed androgens. Anabolic refers to the “tissue building” and androgenic to the “masculinizing” effects of AAS. AAS are synthetic derivatives of the male sex hormone testosterone. Physiologically the androgenic and anabolic effects of AAS are inseparable^{2,3}. Efforts to develop a “pure” anabolic steroid have been unsuccessful^{3,4,5,6}. For convenience, AAS are referred to as “anabolic steroids” or just “steroids” in the lay press³.

History and Epidemiology of AAS

The following is not a comprehensive history of AAS but is rather intended to emphasize important historical and epidemiological information, in a chronological order, of events since the discovery of AAS.

1935 - Testosterone was first synthesized by Ruzica and Weltstein^{3,4,7}

1939 - Boje suggested that male sex hormones might enhance athletic performance^{4,7}.

1954 – The first documented use of anabolic steroids was by a Russian weight lifting team at a weight lifting championship in Vienna^{2,4}.

1954 - Dr John Ziegler, physician for the US weight lifting team learned of the Russian weight lifting team using anabolic steroids from the Russian team physician. It is probable that American athletes also started using anabolic steroids at this time^{2,8}.

1964 - Anabolic steroid use thought to be widespread at the Olympic Games

².

1968 – International Olympic Committee (IOC) introduce formal drug testing for the first time in sports at the Olympic games in Mexico ⁴.

1972 – Sixty eight percent of athletes participating in field events, sprints and middle distance running at the Olympics reported having used anabolic steroids ^{2,3}. Sixty one percent admitted to having used anabolic steroids within six months of the Games ³.

1975 - IOC includes AAS to their list of banned substance ⁹.

1976 - Anabolic steroids were added to the list of banned substance at the Montreal Olympics¹⁰.

1987 – A study of anabolic steroids in a USA high school showed that 6.6% of male high school seniors reported having used anabolic steroids and that 35% of the users were not involved in organized athletics ¹¹.

1988 - Extensive media attention was given to anabolic steroids when Ben Johnson, a Canadian sprinter was disqualified at the Seoul Olympics after testing positive for AAS^{2,12}. Over \$2 million was spent on drug testing at summer Olympics in Seoul ⁴.

1991 – The National Household Survey on Drug Abuse (NHSDA) in the USA reported that 2.5% of high school seniors had used AAS ^{3,8}.

1994 - National survey of 12th grade males in the USA showed that 2.4% admitted to using AAS ¹³.

Pharmacology of AAS

AAS are available in oral or injectable forms ^{2,5}. Recently transdermal

patches, buccal tablets and a nasal spray have been introduced to the market³. AAS administered orally are alkylated at their 17-alpha position to decrease hepatic metabolism^{2,3,5,7,8,14}. AAS administered via intramuscular injections have their 17-beta- hydroxyl group esterified to decrease their polarity and reduce their release into the circulation^{2,3,8}. Injectable AAS are suspended in oil to enable them to remain in the body for longer periods, hence they are detectable for weeks to months in the blood^{3,4,6,8}.

Physiological effects of AAS

Anabolic effects of AAS resulting in increase muscle strength and muscle mass are due to the factors as shown in Table 1^{2,4,5,15}.

Recommended therapeutic use of AAS^{4,6,14}.

- (a) Weight gain for chronic nutritional deficiencies and catabolic states such as Human immunodeficiency virus (HIV) associated wasting syndrome, major surgery, burns, cachexia of various origins.
- (b) Relief of bone pain in osteoporosis.
- (c) Corticosteroid induced catabolism.
- (d) Severe anaemia due to hypo- and aplastic anaemia, renal anaemia, haemolytic anaemia, lymphoma and leukemia.
- (e) Hereditary angioedema.
- (f) Metastatic breast cancer in females.
- (g) Hormone deficiencies leading to stunted growth.
- (h) Hormone deficiencies in males

Non-therapeutic use of AAS

Non-therapeutic use of AAS is not restricted only to elite athletes but has also become part of most bodybuilding and weight lifting subcultures^{3,8}.

Adolescent and adult non-athletes also use AAS to decrease their body fat and contour their bodies^{3,8}. The general opinion is that AAS use in conjunction with a high protein diet and exercises, such as strength training and bodybuilding do facilitate an increase in body mass and strength more than training alone^{2,3,6,8,15}. Athletes trying to obtain the desired effect whilst using AAS may exceed the therapeutic dose by at least 10-fold to 100-fold and in some instances 1000-fold together with combining multiple drugs^{2,3,5,6,8}. AAS are used by individual athletes and non-athletes in polypharmaceutic megadoses for the following desired effects^{3,4,6}.

- (a) increase muscle strength and muscle size
- (b) contour body shape
- (c) decrease percentage body fat
- (d) decrease fatigue during training
- (e) induce a feeling of euphoria
- (f) enhance performance

Adverse effects and contraindications of AAS

Data on serious adverse side effects are gleaned from catastrophic events and case reports following uncontrolled high dose polypharmaceutic self administration of AAS^{16,17,18}. Physicians considering complications of AAS in their patients should remember that the adverse effects experienced by individual patients might differ because AAS abuse by patients differ with the

type, frequency, dose, duration and route of AAS administration ^{3,5}.

Furthermore, short-term effects are better documented than long-term effects that are still unknown ^{3,5}. Although AAS have some recommended medical uses, there are contraindications to its recognized medical use such as prostate cancer, mammary cancer, cardio-renal failure and liver disease with impaired bilirubin excretion ¹⁴. Some of the adverse effects can be categorized into general categories as shown in Table 2. However details of adverse effects can be obtained by referring to standard text and review articles on AAS ^{1,2,4,5}.

Patterns of abuse and “common” terms used by athletes.

Athletes often do not get the answers they want to hear about AAS from “legitimate” sources and therefore they often turn to publications compiled from the personal experiences of users of AAS¹⁶. Henceforth, dosages are recommended by trial and error, anecdotal evidence and personal experiences that may be dangerous and not medically proven ^{2,15,16,17}. Table 3 refers to common terms used by athletes ^{2,3,4,5,15,19}.

Ethical issues and dilemmas

The non-therapeutic use of AAS is increasing and is not limited to elite athletes^{3,5}. In the USA alone there are over 1 million users of AAS ^{3,12,20}. This situation is not limited to the USA but is a growing international problem ^{3,21}. Physicians should be prepared because they may be approached by athletes and non-athletes to prescribe, administer and/or monitor the adverse effects of AAS when their patients have been using AAS to enhance their athletic performance or to contour their body. Physicians will be faced with medical,

moral, ethical and legal dilemmas when deciding on their approach to such a request by a patient. There is no consistent international opinion or guideline in this regard and some physicians are polarized in their views whilst others feel that many “shades-of-grey” exist when dealing with such a situation. Some physicians are not prepared to prescribe AAS whereas others may be willing to monitor for adverse effects but would not prescribe or administer AAS. There are also physicians who feel that they would prescribe, administer and monitor AAS creating a “controlled” environment in an attempt to discourage the use of black market AAS use. These physicians also believe that this would minimize the rate of adverse effects if “safe” drugs and dosages are used²⁰.

At present there are no clear or complete ethical guidelines on AAS. Two South African sports physicians' letters to the editor of the South African Medical Journal, highlight some important and difficult ethical, moral, medical and legal issues. St Clair Gibson believed that a “more balanced, less condemnatory attitude” to AAS use should be adopted¹⁸. His views were contested by Constantinou who believed that this approach to AAS use was a “little short sighted”²². This ethical dilemma is not limited to the South African physicians, but similar contradictions in attitudes exist among Australian physicians. For example, Tony Millar, a prominent figure in the field of sports medicine in Australia, with an Order of the British Empire for his contribution to his profession and also the Australian teams chief medical officer from 1974 to 1986 openly admits prescribing AAS to athletes that have requested them^{20, 23}. His views have been challenged on national television by his

colleague, Ken Fitch, a member of the IOC medical commission at the time²³.

Monitoring the health status of patients using AAS may have a positive primary and a negative secondary effect²⁴. The primary effect of good intent, would be to use this, in conjunction with preventive expertise, as an opportunity to counsel and educate patients on the pros and cons of AAS use. The negative secondary effect is that it may give the patient a false sense of security that he is not causing any harm to himself. Patients may wish to ignore the limitations of present "screening" tests such as blood pressure checks, lipid profiles and liver function tests. It is the proportion between the positive primary effects and the negative secondary effects, together with the individual patient circumstances and personality that will determine the ethical legitimacy and outcome of the encounter between physician and patient²⁴. It is beyond the scope of this article to discuss the detail principles of biomedical ethics, but an attempt will be made to assist the reader in realizing the importance of applying and considering these principles when faced with ethical dilemmas. Ethical, moral, and societal values are fluid and non-static and hence neither should their solution. Ethical issues have many facets that will impact not only the individual but society at large. Physicians have to balance and apply the four principles of biomedical ethics - justice, beneficence, nonmaleficence, and autonomy- that is both socially and individually orientated to enable them to deal with complex ethical issues in daily clinical practice. Some ethical issues may require consultation and assistance from national medical and sporting governing bodies, hospital administration, and attorneys. Successful outcomes do not necessarily involve

a definite outcome or solution. It is the process of incorporating these principles in a patient-centered approach that forms the core of primary care.

Proposed approach to patients requesting AAS

Physicians should apply general principles of primary, secondary and tertiary prevention when dealing with individual patients who are using AAS or who plan to use AAS. This approach in classifying patients may assist physicians to formulate a guideline in managing their patients.

(a) Primary prevention refers to the group of patients that have not started using AAS but are at risk of doing so in the future, e.g. body builders, adolescents, especially males.

(b) Secondary prevention accepts the fact that the individual has already started using AAS, but attempts are made to reduce the severity of the impact of the AAS e.g. monitoring blood pressure, cholesterol, mental status.

(c) Tertiary prevention refers to reducing the consequences of the effects of AAS after they have already occurred e.g. preventing scarring from acne, rehabilitation following a myocardial infarction or stroke ¹⁹.

The above approach should involve all support and medical providers involved in the care of the individual i.e. parents, peers, coaches, physicians and psychologist.

Physician- non competitive patient

As previously mentioned AAS use is not limited to elite athletes but extends to non-athletes in the pursuit of changing their body image and contour.

Physicians and other health care professionals should prepare themselves to

deal with such a request. Physicians should ask themselves the following rhetorical questions:

- (a) Is there a recognized medical condition that justifies the use of AAS?
- (b) Would the benefits of using AAS outweigh the negative health risk?
- (c) Would withholding the AAS cause harm to the patient?
- (d) Is the patient aware of the potential adverse effects of using AAS?
- (e) Is the patient aware of safe alternative methods to achieve his/her goals?

If the answer to any or all of the above questions is NO then the ethical and responsible reaction would be to decline the prescription of AAS. However, the physician may, in addition to refusing to prescribe the drug, counsel the patient on the potential adverse effects of AAS and the moral, legal and ethical consequences of using AAS. The physician should provide to the patient information and education on safe alternatives, proper nutrition and training techniques to achieve the patient's goals. If the physician lacks sufficient "knowledge and skill" to provide safe and adequate advice on AAS to the patient he/she should refer the patient to the appropriate specialist such as a sports medicine physician. Furthermore, South African physicians may face a penalty of up to USD \$5000 and/or 10-year imprisonment for prescribing AAS other than for its recommended medical use²¹.

Physician – elite/competitive athletic patient

When dealing with elite athletes requesting AAS, physicians may have to deal with more than one individual. These may include parents, coaches, peers, and teammates. In the quest for Olympic gold and fame rewarded with

contracts and money many elite athletes may believe that the “end justifies the means”; hence physicians may be pressurized in prescribing AAS. In addition to the above questions the following questions needs to be addressed

- (a) Who is requesting the AAS on behalf of the patient?
- (b) What prompted the athlete to request AAS?
- (c) If the athlete had failed to notice improvements in performance, is there another reason for the failure to progress e.g. training techniques, nutrition, emotional problems and external stressors.
- (d) Is the athlete aware of the penalties imposed by the specific sporting organization if tested positive for a banned substance?

Dealing with elite athletes who are requesting AAS may be more complex than when dealing with non-athletes.

Team physician

Although team physicians may still pose the questions mentioned in both sections above they may not ethically prescribe substances banned by the sporting body governing the particular sport.

Proposed algorithms to assist physicians in decision-making when approached by athletes to prescribe AAS

Physicians who are faced with the challenging task of dealing with patients requesting AAS may be overwhelmed with the decision making of whether to prescribe or not to prescribe AAS and the moral, legal and ethical consequences of their decision. The following algorithms may assist physicians with decision-making process and enable physicians to

have a systematic approach when dealing with patients requesting AAS.

Summary and Conclusion

The obsession with “excellence” and the mentality of “winning at all cost” in modern society has created a demand for numerous methods to achieve the “perfect body” and “Olympic gold”^{2,4}. A high achieving event attracts fame, fortune, respect and money that are economically, politically and socially marketable. To achieve these goals individuals will use any resources available such as special diets, plastic surgery, ergogenic aids and AAS, confirming that the unfair and unethical practices in sports is not limited to sports and neither should the solutions¹². The onus also lies among sporting authorities, policy makers, politicians, parents, coaches and health care providers dealing with these individuals to “control” this quest for excellence.

Additional research needs to investigate the long term effects of AAS used in megadoses, as research in this area is still deficient^{2,3,6}. Unsubstantiated and anecdotal information indicates that athletes continue to use AAS despite the known adverse side effects because “they believe that the risks are worth taking for the potential benefits”²⁵. Objective data obtained may assist in convincing individuals that short term gains from using AAS may not be “profitable” in the long term, allowing individuals to make a more informed decision.

When approached by a patient using AAS or planning to use AAS, the physician should indicate to the patient his or her own viewpoint on AAS

without discouraging the patient to discuss issues related to AAS use. It is the opinion of the writers that physicians should deal with ethical dilemmas of AAS use as they would any other medical problem in their practice, such as alcohol abuse, drug abuse and domestic violence.

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Figure 1. Approach to a patient where AAS prescription is considered for legitimate medical reasons.

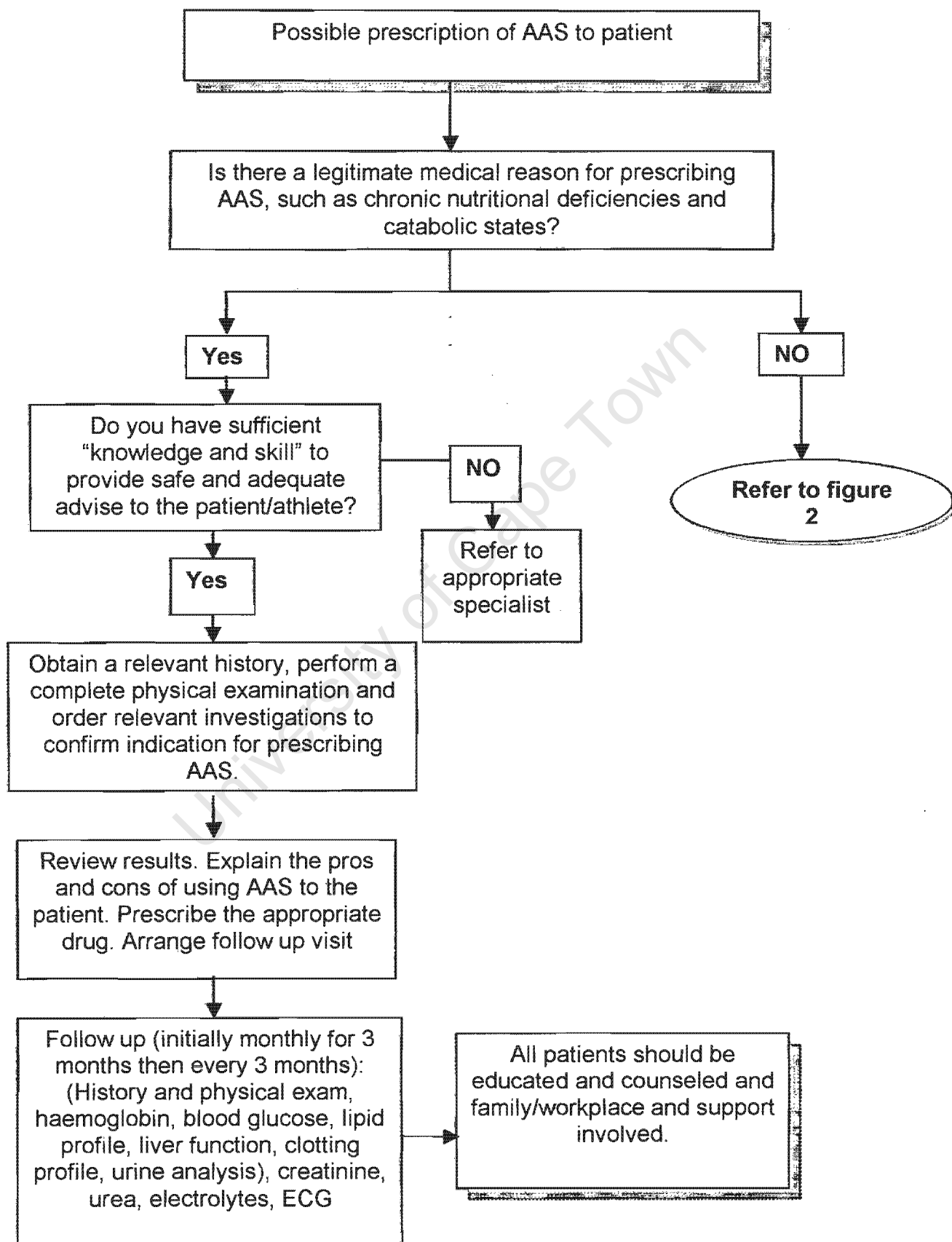


Figure 2. Approach to patients requesting AAS for reasons other than for its legitimate medical use.

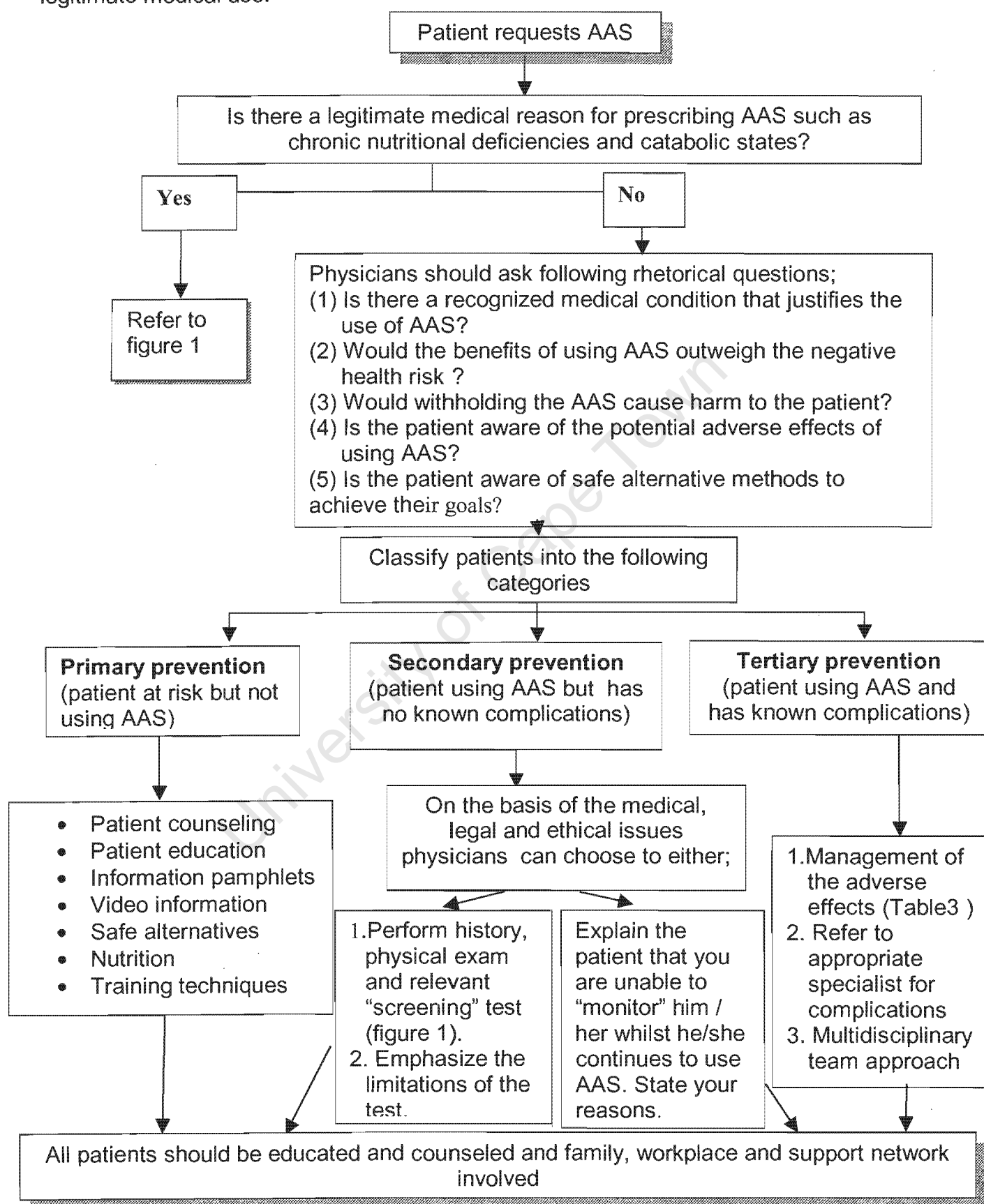


Table 1. Physiological effects of AAS ^{2, 4, 5, 15}.

- (a) Increase protein synthesis via messenger RNA
- (b) Enhancing positive nitrogen balance
- (c) Inhibition of catabolic effects in skeletal muscle
- (d) Inhibition of protein breakdown
- (e) Stimulation of bone formation
- (f) Stimulation of erythropoiesis
- (g) Psychological effect resulting in increase aggressiveness, decrease sense of fatigue and euphoria, hence leading to increase training frequency and intensity

Table 2. General categories of adverse effects of AAS ^{2,3,7,8}.

- (1) effects on secondary sexual characteristics
- (2) effects on somatic tissue including hematological effects
- (3) tumor production
- (4) Infections from sharing needles and syringes and local complications of injections e.g. HIV, hepatitis and localized furunculosis
- (5) effects on behavior and mental health
- (6) Physiological and psychological dependence
- (7) subjective effects

Table 3. Common terms used by individuals using AAS.

- (a) "stacking" - refers to using oral and injectable AAS simultaneously.
- (b) "cycles" - refers to using AAS for periods lasting 6 to 12 weeks or more after which they may stop using AAS for short periods lasting 4 to 8 weeks or switch to another form of AAS.
- (c) "pyramid" - refers to starting with a low dose at the beginning of the cycle, progressing to a higher dose and then tapering down the dosage at the end of the cycle.
- (d) "array" - refers to polypharmacy where other drugs are used as adjuncts to AAS in an effort to "counteract" the side effects of AAS. These may include anti-estrogens (tamoxifen) for gynaecomastia, human chorionic gonadotrophins to stimulate testosterone production and anti-acne (roaccutane) for acne.
- (e) "plateau" - refers to the state when no further increase size or strength is being perceived to occur, resulting in a decision to add, change, stop or increase the dosage of AAS.
- (f) "thermogenic effect" - refers to increased fat metabolism whilst consuming a high calorie diet; e.g. thyroid hormones and caffeine.

Chapter 4

Discussion

The preceding two articles examine the knowledge, attitudes and ethical dilemmas for PCP's when dealing with patients/athletes requesting AAS. The articles demonstrate that the systematic and holistic approach to AAS use is complex involving medical, economic, political, social and ideological issues. Therefore PCP's need to play a key role in a multidisciplinary team involved in the development and application of detection and educational strategies designed to deal with AAS use.

As we enter the new millennium with breakthrough discoveries daily many new opportunities will unfold for athletes creating new struggles and challenges for all involved in sport. PCP's will have to be prepared and adaptable to the changing demands of the present time and prepare for future challenges. Previous experience with the use of AAS in patients has been plagued by secrecy, myth, mistrust and lack of communication between the medical fraternity and sporting community. This has led to patients/athletes to turn to publications such as "Underground Steroid Handbook" authorized by weight lifters who make recommendations on AAS use from their own personal experience with AAS. In future the medical community should be more proactive and seize the opportunity to be the information center for all individuals requiring information on all aspects of AAS use.

The objective is to develop educational programs, which will be applicable in different cultures and settings and will provide state-of-the-art reference and information materials to increase awareness of AAS use and improve their management. An important part of the project such as national and international training programs should be developed and the

guidelines adapted to the different countries, allowing worldwide application and distribution. The guideline may be in the form of a color-coded modular “tool-kit”.

This modular “tool kit” should allow for addition and deletion of information according to the changing needs of the athletes, society and nation. Physicians can select and adapt those elements of the kit that are most relevant to their practices. The development of this “tool-kit” should involve international and the national sporting/medical organizations in providing their ideas and concerns on the use of AAS.

The following is a suggestion of the contents of a color-coded “tool kit”.

1. Algorithms, checklists and flowcharts.

The use of algorithms and checklist to assist PCP's in the assessment of patients requesting AAS as shown in article 2. Screening questions have been included in algorithm to assist PCP's in identifying the reason for the athletes/patients requesting AAS.

2. Information/“quick” reference cards for PCP's.

The “quick” reference cards should provide brief and concise information regarding all aspects of AAS

- definition of AAS
- pharmacology of AAS
- physiological actions and clinical effects of AAS
- types of AAS including the generic and trade names of AAS
- recommended therapeutic use of AAS
- adverse effects and contraindications of AAS
- patterns of abuse of AAS and common terms used by athletes

3. Patient information leaflets

The patient information leaflets should be simple and patient orientated to provide accurate and simple information on all aspects of AAS use. They should also provide alternative suggestions such as proper nutrition and training to assist athletes/patients to improve sport performance. The following information should be included in the information leaflet:

- What are AAS?
- Effects of AAS
- Safe Alternatives to AAS
- Identify triggers / lifestyle causes promoting the use of AAS
- Dealing with AAS use
- Keeping a record if you have started using AAS
- How to overcome use of AAS (useful hints and strategies)
- Planning for your goals

4. Patient Questionnaires

A questionnaire should be formulated to assist physicians in screening for AAS use in patients/athletes. It should also allow the PCP to monitor the patient's progress if a patient has started using AAS.

5. When to consider referral to a sports medicine specialist.

PCP's should be given guidelines when they should consider referral to a sports medicine specialist. some e.g.

- -PCP does not possess sufficient knowledge and skill to advise the patients/athletes on all aspects of AAS use.
- -PCP does not possess the knowledge to provide information on safe alternatives, nutrition and training techniques to allow the athletes / patient to achieve their desired goal.
- -patient has already started using AAS and presents with complications that the PCP is unable to manage.
- -management of the patient requires intensive and expert treatment beyond the scope and skill of the PCP.
- presence of co morbid mental or physical disabilities.

6. A list / network of sports medicine organizations/ specialist

A list with addresses, telephone numbers and website details of sporting authorities, medical regulating bodies and sports medicine specialist should be made available to PCP for quick reference e.g.

- IOC (International Olympic Committee)
- WHO (World Health Organization)
- Sports medicine regulating bodies (local and international)
- Sporting regulating bodies (local and international)
- List of sports medicine specialist
- websites for sports medicine/sports information
- help lines
- suggested reading
- community resources

7. Position Statements on AAS use by local and International Regulatory bodies.

E.g. [a] ACSM (American College of Sports Medicine) Position Stand on the use of AAS in sports.

[b] CPSO (College of Physician and Surgeons of Ontario) Canada, Policy Statement #3-00 on Anabolic Steroids

8. PCP questionnaires and responds.

PCP should be encouraged to actively participate in the development and review of the "tool-kit". The modular form of the "tool-kit" should allow for these recommendations to be constantly reviewed, modified and incorporated in the kit. PCP's should be made aware that the main objective of the educational initiative is to extend their expertise to their patient/athlete.

It is the writer's opinion that in dealing with athletes/patients requesting AAS and formulating guidelines a patient-centered approach recognizing the patient's ideas, concern, expectations and level of knowledge should be adopted to achieve a successful outcome.

Chapter 5

Annexure

Copy of Anonymous Questionnaire

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