

INSTRUCTIONAL DESIGN AND ASSESSMENT

An Advanced Pharmacy Practice Experience in Sports Pharmacy

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Objective. To establish and evaluate an advanced pharmacy practice experience (APPE) in sports pharmacy.

Design. Students actively participated in a variety of activities for this new 6-week elective APPE, including drug-testing collections, delivering presentations, and providing drug information. Students also learned about assays, compounding, and dispensing medications specifically for athletes, and visited various athletic medical facilities. Student were given written and practical certification examinations for drug-testing collections, and their specimen measurements were compared to those obtained by the testing laboratory for validation; satisfaction surveys were obtained from testing sites; and presentation evaluations were obtained from audience participants.

Assessment. Students were able to accurately measure pH and specific gravity of urine samples and all students passed the certification examination. Students rated the APPE very high. Also, students received high satisfaction ratings on surveys administered to the officials of the schools where they tested and members of the groups to whom they gave presentations.

Conclusion. Students gained experience and insight into the various roles of pharmacists in sports pharmacy and developed confidence in their ability to conduct drug-testing collections.

Keywords: advanced pharmacy practice experience, athletics, doping control, sports pharmacy

INTRODUCTION

Over the past 2 decades, emerging roles for pharmacists in sports medicine and doping control have been described.¹⁻⁸ *Sports pharmacy* encompasses the use of drugs in athletics, whether for therapeutics or for performance enhancement. Both aspects can be subspecialties themselves, but a degree of expertise in both is ideal. Further, both necessitate the need for pharmacists to provide drug education, information, and counseling to athletes, parents, physicians, coaches, athletic trainers, and the public, at all levels of competition. Many pharmacists have integrated sports pharmacy into their current practice to varying degrees while others have chosen to specialize in sports pharmacy as their primary practice.

Sports medicine has long been recognized as a therapeutic specialty. Pharmacists can use their expertise in drug selection and dosing to meet the unique needs of athletes for treatment and preventative care. In addition to the treatment and prevention of injuries and conditions such as exercise-induced asthma, team sports render ath-

letes susceptible to contagious diseases such as measles, mumps, and methacillin-resistant *Staphylococcus aureus* infections. Athletes also need pharmacy services tailored for them with respect to dispensing, drug delivery, and record keeping. Pharmacists who care for athletes have to consider inventory control of medications stocked in training rooms, team physician offices, and medical kits. Medication use must be in compliance with all applicable regulatory requirements, including security, inventory control, the Health Insurance Portability and Accountability Act of 1996 (HIPAA), medication reconciliation, record keeping, stability, packaging, labeling, and insurance issues. Specially compounded medications and delivery systems can also be provided by pharmacists who cater to the needs of athletes.⁹

Pharmacists dispensing, consulting, or prescribing to athletes who are subject to drug testing must take responsibility for knowing what substances are banned, permitted, or restricted by the athlete's specific sports-governing agency (or agencies), and prevent them from inadvertently taking medications that are not permitted during competition or even out of competition. Banned substance lists can be complicated and are not universal or standardized; they often vary significantly, depending on which organizations are sanctioning and governing the sporting events, and there may or may not be a process

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for obtaining medical exceptions for a particular drug. Knowledge of pertinent banned-substances lists and adequate record keeping are essential, and pharmacists are in prime position to take responsibility for this. Although there are numerous examples to support this, one of the most compelling is the unfortunate incident that occurred at the 2000 Olympic Games in Sydney, Australia, where a teenage Romanian gymnast was stripped of her gold medal after she tested positive for the banned substance pseudoephedrine, which was given to her by the team physician to treat her cold symptoms.¹⁰ At the time, pseudoephedrine was banned by the International Olympic Committee (IOC) as a stimulant, though it was not universally banned by all sports-governing organizations. To further illustrate the complexity of the problem, pseudoephedrine was removed from the banned substance list enforced by the IOC in 2004.⁸ Another example is the use of β -adrenergic agonists to prevent exercise-induced asthma: inhaled agents may be permitted, while oral or injectable forms of the same drug may be banned.⁸

Pharmacists are a good resource to athletes who seek dietary supplements and nonprescription medications, since many of these products contain substances banned by sports-governing organizations.⁸ Further, athletes who have abused performance-enhancing substances may suffer adverse effects from those substances, and pharmacists can use their expertise to monitor and treat such medical problems.

Another component of sports pharmacy is doping control. Pharmacists can participate in a host of activities to prevent and detect the use of banned substances in sports. Such activities include formulary development and consulting, drug-testing collections, providing drug information services, and providing education to those involved at all levels of sport and competition.

In September 2005, the International Pharmaceutical Federation approved a Statement of Standards for The Role of the Pharmacist in the Fight Against Doping in Sport.¹¹ This document outlines recommendations for governments, pharmaceutical associations, pharmacists, and pharmaceutical manufacturers regarding their role in doping control (Appendix 1). This supports the need for training pharmacists in this field.

The Center for the Advancement of Pharmaceutical Education encouraged the development of curricula that would result in educational outcomes in patient-centered and population-based pharmaceutical care, systems management, and public health.¹² Educational outcomes in all 3 major categories are within the arena of sports pharmacy. However, although the need for pharmacy services has become more apparent, there are few opportunities for pharmacy students to get trained in sports pharmacy and few

role models. The purpose of this manuscript is to describe a unique advanced pharmacy practice experience (APPE) in sports pharmacy. The goals of this unique experience were to expose and train pharmacy students in various aspects of sports pharmacy, and to foster their creativity to conceive additional roles for pharmacists in this field.

The University of California, San Francisco (UCSF), has 5 off-campus APPE programs throughout the state, in addition to APPEs in the San Francisco area. Approximately 20 students are assigned to the APPE program in the Los Angeles/Orange County region, where they are assigned 2 acute care APPEs, 2 ambulatory care APPEs, 1 community practice APPE, and 3 elective APPEs. All APPEs in this program are full time for 6 weeks. The Program Director (preceptor) has been involved with the drug testing and education program of the National Collegiate Athletic Association (NCAA) since 1986, and was the first pharmacist to serve as a drug-testing crew chief for the NCAA. The preceptor was a certified drug-testing collector for the National Center for Drug Free Sport, Inc (DFS), which is the official administrator of the drug-testing program for the NCAA. In addition, he has served as a doping control officer at the XXVI Olympiad (Atlanta, GA, 1996) and the XXVII Olympiad (Sydney, Australia, 2000). In the previous 2 years, the instructor was asked to provide guest lectures to a physiology class for pharmacy and physical therapy students on the "physiological effects of performance-enhancing drugs" as a clinical correlate for the students to appreciate the relevance of the course material, and to an elective course that featured innovative/emerging pharmacy practices. Due to this exposure, pharmacy students at UCSF and students and faculty at other US schools of pharmacy encouraged the development of a sports pharmacy APPE.

DESIGN

A sports pharmacy APPE was proposed to the requisite committees at UCSF and approved in early 2006. Approval was obtained from the Committee on Human Research at UCSF to conduct an assessment of this new APPE and publish the findings. The application included a *Disclosure of Investigators' Financial Interests* since the instructor receives honoraria for his work involving NCAA drug testing.

A variety of activities were developed to expose the students to multiple experiences in sports pharmacy. Six senior pharmacy students from UCSF and 1 from the University of Southern California elected to take the sports pharmacy APPE in the fall of 2006. This time period was selected for this pilot experience due to the availability of the preceptor and the volume of drug testing that was anticipated for NCAA sports. The group of students

contained males and females, which was fortunate since drug-testing collections required both genders. Since the instructor served as the Director of the Clinical Pharmacokinetics service at Long Beach Memorial Medical Center (Long Beach, Calif), the sports pharmacy students were based at this facility. They had access to the medical library, the resources in the Drug Information Service, and conference rooms to work and to meet with the preceptor as a group.

The objectives of the APPE are listed in Table 1. Four core activities to accomplish these objectives included drug-testing collections, student presentations, providing drug information, and meetings/visits at facilities associated with sports pharmacy. Each of these activities were interrelated and complementary in many regards, eg, students researched and provided drug information on dietary supplements to determine whether they were banned or permitted, discussed such substances in their presentations, and participated in drug-testing events at which the substances were tested for. The students were given a schedule for the entire 6-week experience on the first day of the APPE. For the most part, students were expected to participate for at least 8 hours each day; however, the exact hours fluctuated since some activities required travel. Most student presentations were done in the evenings, and drug-testing collections were often done very early in the morning. Each of the core experiences occurred throughout the 6-week experience, as opposed to progressing from 1 experience to the next, as information learned from each activity overlapped with the others. Each day would include multiple activities (described below), rather than focusing on 1 particular activity each day. Key articles and other written informa-

tion were provided to the students to supplement lectures and discussions by the preceptor. Further, the students were required to find additional published information on their own, and such materials were shared with the group and included in a binder for future students.

Doping Control/Drug Testing

DFS confidentially assigned drug-testing collections in advance to the preceptor, to occur at NCAA-affiliated schools in the greater Los Angeles and Orange County areas during the 6-week APPE. Because schools are only notified 24-48 hours in advance of an NCAA drug test, to maintain confidentiality, the students were not told the location of the testing event until the schools were notified; their APPE schedule only noted that a drug-testing event was to take place on a particular day. DFS paid honoraria for drug-testing collections; however, students are not permitted to receive payment for work done as a component of their curriculum and for which they are receiving course credit. Therefore, the funds were used to pay for travel and other expenses for the students to participate. Students were required to sign a confidentiality agreement for DFS and to document vaccination or immunity to mumps. Students were also notified in advance that they could potentially be required to have a criminal background check before they were allowed to participate in the APPE, but DFS did not require it at this time. Further, students were required to abide by all rules and regulations specified by DFS (eg, dress code) in order for them to participate in drug-testing events. These policies were discussed with the students at the beginning of the APPE.

Students learned about the NCAA's drug education and testing programs via a videotape and written

Table 1. Learning Objectives for APPE in Sports Pharmacy

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1. Demonstrate three ways that pharmacists can participate in doping control or drug education programs in sports.
 2. Explain and defend the two primary purposes of doping control in sports to mixed audiences.
 3. List and describe five classes of drugs that are commonly used by athletes as ergogenic aids.
 4. Counsel athletes on why banned drug lists can be problematic for them if they compete for more than one sports-governing organization.
 5. Explain three reasons to athletes why dietary supplements are a particular concern for them since they are subject to drug testing.
 6. Obtain relevant medication histories from athletes during a drug-testing event.
 7. Conduct sample collections, describing in detail the proper procedures and techniques for drug testing.
 8. Select appropriate assay procedures commonly employed in doping control, and compare and contrast the advantages and disadvantages of each.
 9. Given a list of medications, determine if each is banned, restricted or permitted by a specific sports-governing agency (eg, NCAA, USADA, NFL, etc) and advise athletes accordingly.
 10. Present a topic relevant to sports pharmacy to instructor and fellow students and/or other audiences (eg, high school students, college athletes, athletic trainers).
 11. Prepare a monograph on a drug or dietary supplement on its use or abuse in sports, suitable for publication.
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NCAA = National Collegiate Athletic Association, USADA = United States Anti-Doping Agency, NFL = National Football League

materials provided by the NCAA and DFS, and from presentations by the instructor. Students were then trained to conduct NCAA drug-testing (urine) collections by reading DFS's Sports Drug-Testing Collector Standard Operating Procedure Manual, from presentations, and by actual demonstration. This included learning all the policies and procedures involved, and learning how to use a hand-held computer device and SCAN[®] (Secure Collection Automated Network) software developed by DFS. During the first few weeks of the APPE, students practiced several times a day as they took turns role playing as the collector and the athlete, while the other students would point out mistakes or omissions. This allowed the students to get a significant amount of practice without requiring direct supervision, and also gave the students the responsibility of teaching each other. After the students were able to properly conduct a mock testing event, they were then given scenarios on different aspects of the collection process that required a greater knowledge of the policies and procedures of the NCAA drug-testing collection protocol (eg, a college athlete produced multiple dilute or alkaline specimens). The scenarios were developed and used by DFS for training and certifying their drug-testing crew chiefs. The exercises taught the students the nuances of following the NCAA drug-testing protocol.

After the training, the students participated in 3 NCAA drug-testing events, which the instructor arranged in advance with DFS. NCAA drug-testing collections are conducted around the student-athletes' class schedules, and were often done early in the morning (eg, 6:00 AM) or in the late afternoon, at the schools' choice. The students conducted all aspects of the sample collection process including verifying the identity of the athletes; entering athletes' data into the handheld computer using SCAN; coding and assigning collection beakers; validating (witnessing) the specimen collection; testing the acceptability of the specimen by determining pH and specific gravity; pouring aliquots and splitting the samples; blinding the samples from laboratory personnel using bar codes; explaining the NCAA protocol to each athlete; processing the specimens for shipment to the laboratory; and obtaining all relevant signatures (athlete, school official, validator, and drug-testing collector) before releasing the athlete from the collection room. Processing the specimens entailed affixing a tamper-evident seal on bottled specimens and their transport containers to protect the chain of custody. The seal also contained a uniquely numbered bar code to blind the laboratory from the identity of the athlete.

Colorimetric pH strips were used for pH measurements, and specific gravity was determined by using a re-

fractometer (calibrated by the students). This is required to assure that a specimen is adequate to be tested because alkaline specimens hinder the urinary excretion of sympathomimetic amines (eg, amphetamine), and dilute specimens may not contain a sufficient concentration of a drug for it to be detected.³ If an athlete produced an alkaline (pH > 7.5) or dilute (sg < 1.005) specimen, the collection process was repeated until an acceptable specimen was obtained per NCAA protocol. To evaluate the accuracy and ability of the students to perform these tasks during actual drug-testing events, a comparison was done between the values they obtained for pH and specific gravity and those obtained and reported by the laboratory. This quality assurance measure was routinely done by DFS to provide feedback to the drug-testing crew chief. Male and female athletes were tested and validating was done by an APPE student of the same sex as the athlete being tested, as per NCAA protocol. The students received supervision and on-the-spot feedback from the instructor during the entire process, since these were official collections and following NCAA protocol exactly was imperative. The collection process typically takes 2 to 6 hours, depending on the number of athletes tested at a particular school and the ability of the athletes to provide an adequate volume of urine (≥ 85 mL) within the acceptable ranges for pH and specific gravity.

Student Presentations

To give the students experience with educating athletes and others on performance-enhancing substances, arrangements were made with 3 local universities to have the sports pharmacy students give presentations. This also provided another opportunity for the students to teach themselves as they were researching the subject and developing and practicing their presentations. The topics included performance-enhancing drugs in sports, dietary supplements and nutritional ergogenic aides, and basic principles of drug testing. The students also rotated the topics they each presented so that they obtained experience presenting different topics. Ample time was allowed after each presentation for a question and answer session, and the instructor attended and provided input and insight when necessary. Microsoft PowerPoint was used to give the presentations and handouts of the slides were provided to the audiences. In addition, information cards supplied by DFS about the Resource Exchange Center (REC) were given to the participants. The REC is a confidential service provided by DFS to athletes of subscribing organizations via the telephone or the Internet to answer questions about the banned or permitted status of drugs and supplements.

At each of the presentations given by the students, audience members were asked to complete an evaluation

form. Participants were informed of the intent to use the evaluations for quality assessment and educational research and were provided written information about the study on the back page of the evaluation form, as approved by the Committee on Human Research. Presentation evaluation forms were distributed to all audience participants, who were instructed not to complete the form if they did not agree/consent to participate; turning in a completed evaluation form constituted consent.

Drug Information

Arrangements were made with the REC to have the students help research and answer questions that required a literature search. As mentioned above, the REC is a service provided by DFS to subscribing institutions and organizations (eg, NCAA, the National Football League, Major League Baseball's Minor League) to provide athletes and athletic personnel with confidential information on drugs and dietary supplements with regard to their status as being banned or permitted. In addition, DFS requested monographs on several substances that they could use for education and training. Arrangements were also made with SportPharm (Torrance, Calif), a local pharmacy that provides prescription medication and consultation services for athletes and athletic organizations (see below). Students provided monographs to SportPharm on a number of compounded medications for their use in educating and counseling athlete-patients.

Each student wrote 2 monographs that were reviewed and approved by the instructor and provided to DFS or SportPharm. The monographs required the students to research the literature for pertinent and updated information. Examples of such monographs included the effects of marijuana on athletic performance, and nitric oxide supplements (which were the current rage). Questions received by the REC that required in-depth research were forwarded to the instructor, who then assigned the questions to students. The students provided written responses to the questions, including references. The responses were reviewed by the instructor and then forwarded back to the REC to use in replying to the inquirer. This allowed the REC to maintain the confidentiality of the inquirer and to review and approve the information provided. The students shared the questions and their responses with the group so they could all see the type of questions involved and how the answers were obtained.

Meetings/Visits/Tours

Students spent a day at the UCLA Olympic Analytical Laboratory at the University of California, Los Angeles, which is the sole laboratory utilized by the NCAA for their drug-testing program. The laboratory

also conducts drug-testing analyses for Olympic athletes, professional sports organizations, and others. The students were hosted by the Medical Director and Associate Director, who gave them a tour of the facility and the equipment, and they gave presentations to the students on doping, drug testing, the discovery and saga of tetrahydrogestrinone, and the BALCO doping scandal, as well as other topics.¹³

Realizing that the preceptor's primary focus is on drug testing and doping control, arrangements were made for the students to see and experience other aspects of sports pharmacy. Students visited and toured SportPharm and learned about the dispensing and therapeutics side of sports pharmacy. The President of SportPharm took the students on a tour of the US Olympic Committee training facility in Chula Vista, where they learned about the collaborative efforts between the physicians, athletic trainers, and pharmacists to meet the unique medical needs of elite athletes. Specifically, they learned about inventory control, security, dispensing practices, and documentation in the provision of pharmacy services to athletes.

Evaluation Methods

Several methods were used to evaluate and assess the students' mastery of the skills taught, and the students' perceptions of the experience. The instructor obtained permission from DFS to administer the current DFS certification examination, normally given to drug-testing crew chiefs, to the pharmacy students to test their mastery of the skills. The written examination consisted of multiple choice and true/false questions. The examination was administered to all the students at the same time and was proctored by the instructor. Each student was then given a practical examination administered by the instructor, with the instructor portraying an athlete being tested. Answer keys were provided by DFS, including all the required steps to be taken during the practical examination.

At the end of the APPE, the pharmacy students were asked to evaluate the experience. In order to make the evaluation more meaningful, the standard UCSF APPE evaluation form was modified slightly to include specific activities for them to assess. This form was also approved by the Committee on Human Research. The students were informed that the evaluations would be anonymous, participation was voluntary, and that submitting an evaluation form constituted consent to participate in the research of this APPE.

ASSESSMENT

All 7 students successfully passed the written and practical examinations, with scores ranging from 87%-100% and 92%-100%, respectively.

Of the 42 specimens collected by the students as acceptable specimens and sent to the UCLA Olympic laboratory, 40 (95%) were confirmed by the laboratory to have an acceptable pH, all 42 were confirmed to have an acceptable specific gravity, and the laboratory confirmed that the chain of custody had remained intact for all specimens. The laboratory reported that 2 of the specimens had elevated pH measurements outside of the acceptable range (>7.5); these samples were measured by 2 different students, and it is possible that the differences in pH measurements were due to bacterial growth or urine decomposition.¹⁴

DFS also collects Collection Crew Evaluations from representatives of the schools who supervise and observe the sample collections and processing. Based on an assessment of *satisfactory* or *unsatisfactory*, all of the following performance measures were rated as *satisfactory* by the representative from each of the 3 schools with regard to the performance of the drug-testing crews: communication, punctuality, efficiency, adherence to protocol, knowledge of job, and rapport with athletes. In addition, all comments were favorable and complimentary.

Table 2 contains the tabulated results of the presentation evaluations. Mean scores for all attributes and for all presentations were between very good and excellent, using a Likert-type scale.

Table 3 displays the results of the APPE evaluations from rankings on a 5-point Likert scale, and demonstrates high satisfaction with the experience. All 7 students rated their confidence in properly conducting a drug-testing event as excellent. Suggestions for improvement included having additional drug-testing events and presentations, participating in drug-testing collections for other sports-governing agencies, and having more discussion on common sports injuries and their treatment.

DISCUSSION

APPE evaluations completed by students revealed high satisfaction, and all participating students rated their confidence in conducting drug-testing collections as excellent. Future plans include providing a new book to the students that was recently published on sports pharmacy, as well as other books to be identified. The books will be purchased with the funds earned from drug-testing collections and provided free to the students. Additionally, arrangements have been made for the sports pharmacy students to give a presentation to athletic trainer students at another local university, and the faculty member in charge offered to teach sports nutrition to the pharmacy students in return. Other such win-win opportunities will

Table 2. Audience Evaluations of Pharmacy Student Presentations Given as Part of an Advanced Pharmacy Practice Experience in Sports Pharmacy

Audience, Topics and Area Evaluated	Mean Rating ^a
Athletic Trainer Students	
Topic: Performance-enhancing drugs in sports (n = 15)	
Organization/quality of Presentation	4.4
Knowledge gained	4.3
Relevance of topic	4.4
Topic: Dietary supplements and nutritional ergogenic aids (n = 12)	
Organization/quality of Presentation	4.9
Knowledge gained	4.6
Relevance of topic	4.8
Topic: Principles of drug testing (n = 11)	
Organization/quality of Presentation	4.8
Knowledge gained	4.6
Relevance of topic	4.9
Kinesiology Class	
Topic: Performance-enhancing drugs and dietary supplements (n = 26)	
Organization/quality of Presentation	4.6
Knowledge gained	4.6
Relevance of topic	4.6
College Athletes	
Topic: Performance-enhancing drugs and dietary supplements (n = 64)	
Organization/quality of Presentation	4.5
Knowledge gained	4.3
Relevance of topic	4.4

^aAbove responses are mean values based on Likert scale: 1 = poor; 2 = fair; 3 = good; 4 = very good; 5 = excellent

be incorporated as they develop. In addition, opportunities for students to receive more experience in therapeutics and to participate in drug-testing collections for additional sports-governing agencies (eg, the United States Anti-Doping Agency and Major League Baseball) will be explored. Finally, the sports pharmacy APPE will likely be offered more frequently than once a year in the future, and arrangements have been made to accommodate students from a third pharmacy school (at their request) for the next academic year.

Athletes require pharmacy services that are tailored to their unique needs, including the need to prevent them from inadvertently taking banned substances when they are subject to drug testing. Hence, more training opportunities for pharmacists and pharmacy students need to be developed to meet this need. It is hoped that the description of this experience will assist faculty members (paid or volunteer) from other pharmacy schools in developing

Table 3. Pharmacy Students' Evaluation of a Sports Pharmacy APPE (N = 7)

Assessment Rating*	Mean ^{a,b}
1. The objectives of the APPE were clear.	4.9
2. The APPE objectives were addressed successfully.	4.9
3. The contribution of this APPE experience to my professional goals was beneficial.	4.7
4. The amount of contact I had with athletes during the APPE was appropriate.	4.7
5. This experience added significantly to my knowledge of the field.	4.9
6. The supervision I received from the preceptor was adequate.	5.0
7. How would you rate the following experiences:	
a. Participation in drug testing collections.	4.9
b. Giving presentations to athletes, athletic training students, etc.	5.0
c. Answering questions posed to the Resource Exchange Center.	4.3 ^c
d. Tour of UCLA Olympic Laboratory.	5.0
e. Preparing a drug or supplement monograph.	4.7
8. What is your overall satisfaction with this APPE.	5.0
9. Rate your confidence in properly conducting a drug testing event.	5.0

^aItems 1-6 were rated based on the following Likert scale: 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree

^bItems 7-9 were based on the following Likert scale: 1=poor; 2=fair; 3=good; 4=very good; 5=excellent

^cn=4

additional APPEs and coursework in the field of sports pharmacy.

SUMMARY

This APPE exposed and trained pharmacy students in various aspects of sports pharmacy, including doping control, counseling of athletes, providing drug information, and the unique drug distribution practices and record keeping required for this patient population. All aspects of the experience were considered successful, based on the high evaluation scores and the fact that all participating students were successful in passing written and practical certification examinations for drug-testing collections.

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Appendix 1. Excerpt from the International Pharmaceutical Federation's Statement of Standards for the Role of the Pharmacist in the Fight Against Doping in Sport. Reprinted with permission from the International Pharmaceutical Federation.¹¹

Excerpt from **The Statement of Standards
for the Role of the Pharmacist
in the Fight Against Doping in Sport**

Pharmaceutical associations should

- request the bodies responsible for national administration of individual sports to ensure that their affiliated bodies advise individual participants that, when they present a prescription for dispensing, or they wish to purchase a non-prescription medicine, they should inform the pharmacist that they participate in competitive sport.
- participate, in co-operation with national anti-doping agencies, national Olympics Committees and appropriate government departments, in awareness campaigns on the dangers of doping.
- promote the provision to pharmacists of educational materials on doping designed to meet the needs of those involved in sports.
- ensure that basic and continuing education of pharmacists includes information on substances and processes used for doping in sport and the associated health risks.
- ensure that continuing education material for pharmacists includes information on the WADA (World Anti-Doping Agency) Code.

Pharmacists should

- keep up-to-date on the contents of the WADA Code.
- promote the benefits to health of exercise, including participation in sporting activities, not least for those suffering from specific medical conditions.
- remain vigilant to differentiate between the justified use of medication and illegitimate practice.
- when circumstances permit, refuse to supply a medicine when it is clearly intended to be used to improve performance illegitimately.
- when informed that a person participates in competitive sport, enter that information in the individual's medication record.
- provide information to those identified as being involved in a competitive sport, to help them to recognise which medicines contain a substance included in the lists in the WADA Code.
- provide information to those involved in athletic sports on the benefits of nutritional supplements and the risks associated with using them.

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