Pharmacy Services for the 2019 Fédération Internationale de Natation (FINA) World Masters Championships in Gwangju, South Korea

In Kyu Yang

Gwangju Pharmaceutical Association

Eun Ok Shin

Gwangju Pharmaceutical Association

Dong Gyun Kim

Gwangju Pharmaceutical Association

Hyun Cheol Jung

Gwangju Pharmaceutical Association

Kwang Joon Kim

Mokpo National University

Sung Hwan Ki (✉ shki@chosun.ac.kr)

Chosun University

Research Article

Keywords: Pharmacy services, FINA, Gwangju, athletes' village pharmacy

Posted Date: December 21st, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-126289/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: The role of sports pharmacists is being emphasized in international athletic events. This study aimed to describe the pharmacy services for the 2019 Fédération Internationale de Natation (FINA) World Masters Championships in Gwangju, South Korea.

Method: Research focused on athletes and coaching staff who received medications after visiting medical centers and pharmacies located in the athletes' village from July 5 to July 29, 2019. Education courses for full-time and volunteer pharmacists were provided three times. We collected daily pharmacy operation results and prescription interventions. The data were analyzed using Microsoft Excel, and were expressed as frequency (%).

Results: Throughout the tournament, 633 patients received medication at the athletes' village pharmacy (gender: 338 men [53.4%], 295 women [46.6%]; nationality: 299 Korean [47.2%], 334 foreign [52.8%]; patient class: 150 athletes [23.7%], 427 non-athletes [67.5%]). Therapy for musculoskeletal disorders was the most common (29, 19.3%), and oral NSAIDs (56, 21.9%) were the most frequently dispensed medication in athletes. Pharmacists intervened for 47 out of 491 prescriptions (9.6%), with dosage change (21, 44.7%) being the most common intervention type.

Conclusion: This study on the operation and performance of pharmacies at the FINA World Masters Championships is a useful reference for pharmacy services at international or domestic sports events.

Introduction

Sports pharmacy, an evolving specialty within pharmacy practice, encompasses the use of drugs for therapeutics or supplements for performance enhancement. Over the past decades, several sports pharmacy operations have been reported in major international athletic events [1, 2, 3, 4], and the role of pharmacists in sports medicine has been emphasized. Sports pharmacists are responsible for providing drug education, information services, and counseling on anti-doping to athletes, coaches, and the public, as well as injury management and prevention, and first aid at all levels of competition.

As most athletes seek substances or techniques to improve their performance, some try to use inappropriate methods, such as drugs or supplement abuse and taking anabolic steroids. Therefore, an expert sports pharmacist especially requires knowledge of the World Anti-Doping Agency [5] banned drugs and supplements for providing appropriate pharmacotherapeutic recommendations. Following the International Pharmaceutical Federation (FIP) Guidelines in 2014, three recommendations for sports pharmacists are included: 1) "keeping up-to-date with the contents of the WADA code," 2) "assisting athletes to recognize whether the use of a substance may be banned or restricted in their sport", and 3) "providing information to athletes about the risks and benefits of nutritional supplements [6, 7]."

FINA World Masters Championships, an international aquatics championship for adults, is organized biennially by the Fédération Internationale de Natation (FINA). The 18th FINA World Masters

Championships was held in Gwangju metropolitan city of South Korea in 2019. For 17 days from July 12 to July 28, 7,456 athletes from 91 countries competed in six sports events in five stadiums. During the competition, a pharmacy in the athletes' village medical center was operated. The purpose of the pharmacy was to ensure that athletes who required medical services during the competition were not allowed to receive drugs prohibited by WADA. In addition, prescription audits and information services were provided to prevent inappropriate drug use.

This was the first time a pharmacy was operated by a local pharmaceutical association in an international sports event, and also the first time a pharmacy service was recorded at the FINA World Masters Championships. The purpose of this study is to review the performance and experience of pharmacy operations at the 2019 FINA World Masters Championships.

Methods

Study subject and period

This study focused on athletes and coaching staff who received medication after using the medical centers and pharmacies located in the athletes' village from July 5 to July 29, 2019.

Data collection

The data for the study included the training and conference data organized by the Gwangju Pharmaceutical Association in order to establish the pharmacy. In addition, we collected daily pharmacy operation results and prescription interventions. All experimental protocols were approved by the Gwangju organizing committee of FINA World Masters Championships.

Data analysis

Data concerning the characteristics of the study group, the total number and the daily number of prescriptions, the number of prescriptions by medication classes, and the prescription interventions during the operation of the pharmacy were collected and organized. The collected data were analyzed using Microsoft Excel, and were expressed in terms of frequency (%).

Results

Recruitment of pharmacists and pre-education courses

The Gwangju Pharmaceutical Association, which was the main operator of pharmacy service for the 2019 FINA World Masters Championships, had employed three full-time pharmacists to operate the pharmacy. In addition, 33 volunteer pharmacists were recruited from all over Korea.

Pre-education courses for full-time and volunteer pharmacists were provided three times. The first training was based on a case study of a sports pharmacy operated at the 2018 Pyeongchang Winter Olympics in

South Korea. The second training focused on the pharmacy operation manual, the list of medications to be used, and the prohibited medications. Lastly, pharmacy tours were conducted by individuals.

Pharmacy handbook publication and medication list

In addition to prior training for full-time and volunteer pharmacists, a pharmacy handbook was prepared and provided to them. The pharmacy handbook contained basic information on the operation of the pharmacy, a list of medications, and WADA approval for each medication (Supplementary File 1).

The pharmacy medication list was prepared in Korean and English, with a total of 21 therapeutic categories and 113 medications. The medication list provided information on therapeutic class, ingredient name, brand name, dosage form, contraindications, and storage method, and additionally described the usage, route of administration, side effects, and WADA acceptance information for each medication (see Table 1). Narcotics were not included in the medication list.

Table 1
Medical center medication list

Therapeutic category	n (%)
Total	113 (100)
Cardiovascular	15 (13.3)
Gastro-intestinal system	12 (10.6)
Antimicrobial agents	12 (10.6)
Analgesics and anti-inflammatory	10 (8.8)
Ophthalmic	9 (8.0)
Dermatological	9 (8.0)
Respiratory system	8 (7.1)
Fluids	6 (5.3)
Autonomic nervous system	4 (3.5)
Disinfectants	4 (3.5)
Endocrine system	3 (2.7)
Hormones and antagonistic	3 (2.7)
Antihistamines	3 (2.7)
Otorhinolaryngological	3 (2.7)
Local anesthetics	3 (2.7)
Skeletal muscle relaxants	2 (1.8)
Dental	2 (1.8)
Biological	2 (1.8)
Central nervous system	1 (0.9)
Vitamins	1 (0.9)
Emergency contraceptive	1 (0.9)

Pharmacy operation and dispensing system

A pharmacy was set up in the athletes' village medical center from July 5 to July 29. The pharmacy operated from 9 am to 9 pm. One full-time pharmacist and one volunteer pharmacist worked in the pharmacy in 6 hour shifts (9am-3 pm and 3 pm-9pm).

The role of the pharmacy consisted of prescription audit, preparation of prescriptions, pharmaceutical audit, medication guidance, safe storage and management of medicines, medication use management, adverse drug reaction management, and evaluation of drug use in athletes' village. In particular, at the prescription audit stage, pharmacists must confirm the identity of the patient through open-ended questions. If the patient was an athlete, the pharmacist checked whether the prescribed medication corresponded to a prohibited substance. When dispensing a medication approved by the Therapeutic Use Exemption (TUE) Committee, the prescribing physician was asked to confirm once again, and a prohibited medication stamp was placed on the prescription prior to dispensing. Medication was limited to three days, and injections were administered to nurses, not patients. An electronic software program, PharmIT3000, supported by Korea Pharmaceutical Information Center, was used for medication dispensing.

Characteristics of study group

A total of 633 patients, including athletes and coaching staff, were issued prescriptions during the competition. Among these patients, 338 were men (53.4%) and 395 women (46.6%), 299 were Koreans (47.2%) and 334 foreigners (52.8%). Majority of the prescriptions related to internal medicine (368, 58.1%), sports medicine (128, 20.2%), ophthalmology (63, 9.9%), and emergency medicine (61, 9.6%). Athletes accounted for 150 (23.7%) of the total patients, with majority of them being musculoskeletal therapy patients (29, 19.3%) (see Table 2).

Table 2
Characteristics of study group

Category	n (%)
Total prescriptions and patients	633 (100)
Gender	338 (53.4)
Male	395 (46.6)
Female	
Countries	299 (47.2)
South Korea	334 (52.8)
Overseas players	
Patient classification	150 (23.7)
Athletes	427 (67.5)
Non-athletes	56 (8.8)
Unknown	
Number of sports events	6
Medical department	368 (58.1)
Internal medicine	128 (20.2)
Sports medicine	63 (9.9)
Eye clinic	61 (9.6)
Emergency room	7 (1.1)
Dental clinic	6 (0.9)
Unknown	

Category	n (%)
Diagnosis of athletes	150 (100)
Musculoskeletal	29 (19.3)
Gastrointestinal	16 (10.7)
Dermatology	15 (10.0)
Ophthalmology	12 (8.0)
Respiratory	9 (6.0)
Ear, Nose, Throat	9 (6.0)
Urology	4 (2.7)
Neurology	4 (2.7)
Dental	1 (0.7)
Unknown	51 (34.0)

The average number of prescriptions issued daily was 25.3. There were less than 13 cases in the first 10 days of the competition, while the number rose to 35.4 for days 11 to 24 of the competition (see Fig. 1).

As for the route of administration, oral medication accounted for the largest portion (194 cases, 76.1%), followed by external preparations (49 cases, 19.2%) and injections (12 cases, 4.7%). Furthermore, majority of the prescriptions comprised analgesic and anti-inflammatory drugs, followed by gastrointestinal drugs, respiratory drugs, and antimicrobials (see Table 3).

Table 3
Information of prescriptions dispensed to athletes

Category	n (%)
Total prescriptions of athletes	255 (100)
Route of administration	194 (76.1)
Oral (P.O.)	49 (19.2)
Topical and local*	12 (4.7)
Injection [†]	
Analgesics and anti-inflammatory agents	56 (21.9)
NSAIDs	21 (8.2)
Acetaminophen	
Gastrointestinal agents	29 (11.4)
Antiulcer	6 (2.4)
Digestive	4 (1.6)
Antidiarrheal	
Respiratory agents	23 (9.0)
Antihistamines	23 (9.0)
Antitussives	1 (0.4)
Inhalants	
Antimicrobials	21 (8.2)
Muscle relaxants	9 (3.5)
Others^{*†‡}	63 (24.7)
*Topical and local; topical NSAIDs (9), topical steroids (2), inhalants (1), antimicrobial eye drops (9), artificial tear (8), steroid eye drops (5), antihistamine eye drops (2), antimicrobial ear drops (7), antimicrobial ointment (6)	
[†] Injection; diclofenac (5), tramadol (1), ketorolac (1), ambroxol (1), bropium (1), metoclopramide (1), vaccine (1)	
[‡] Emergency contraceptives (2)	

Prescription intervention by pharmacists

Prescription interventions by pharmacists were recorded for 19 of the 25 days of the competition. Apart from 3 (0.6%) WADA-related prescription interventions, the results showed interventions for 47 (9.6%) of

the 491 prescriptions. As for the types of interventions, change in dosage (21 cases, 44.7%) accounted for the maximum interventions, followed by change in number of prescription days (9 cases, 19.1%) and administration after confirming the prescription (9 cases, 19.1%) (see Table 4).

Table 4
Prescription intervention by pharmacists (19 days)

Category	n (%)
Total prescriptions	491 (100)
Total interventions [†]	47 (9.6)
Total interventions [†] in respect of WADA [‡]	3 (0.6)
Type of medicine	47 (100)
Oral	34 (72.3)
External for skin	8 (17.0)
Injection	4 (8.5)
Ophthalmic	1 (2.1)
Type of intervention	47 (100)
Change of medicine dosage	21 (44.7)
Change of prescription days	9 (19.1)
Dispensed after confirmation of prescription	9 (19.1)
Change of medicine	3 (6.4)
Change of medicine usage	2 (4.6)
Medicine added	2 (4.6)
Report of adverse drug reaction	1 (2.1)
[†] Total duration of the FINA competition was 25 days, of which the daily record of prescription intervention had been completed only for 19 days. According to 19 days of data, the total number of prescriptions was 491.	
[‡] WADA; World Anti-Doping Agency.	

Discussion

The need for safe use and efficient management of athletes' village pharmacies continues to grow in international sports competitions. Although swimming is one of the most popular sports worldwide and presents unique medical challenges by virtue of exposing athletes to a variety of water environments and chemicals [8, 9], there is a lack of studies on pharmacy services for international swimming competitions.

In this paper, we reviewed the performance of the athletes' village pharmacy operated at the 2019 FINA World Masters Championships, Gwangju, South Korea.

Systematic preparations to run a pharmacy at the athletes' village medical center were launched four months before the start of the competition. The pharmacy in the athletes' village was run by the local pharmaceutical association. The Gwangju Pharmaceutical Association first formed a preparation team to develop a plan for the operation of a pharmacy in the athletes' village. Participating pharmacists focused their training on sports pharmacology related to WADA, International Olympic Committee (IOC) Needle Policy, and TUE through three training programs. During the operation period of the pharmacy, information related to medication was periodically collected and assessed. In particular, the full-time pharmacist reviewed daily prescriptions for details of medication use, and looked after the health of athletes and coaching staff in the athletes' village by having a system to report to officials of the Gwangju organizing committee of the FINA World Masters Championships if the use of specific drugs, such as antidiarrheal agents or antibiotics, increased rapidly.

Pharmacists play a major role in doping control programs, and can prevent athletes from inadvertently consuming banned substances [10]. A total of 633 patients used the pharmacy during the competition, of which 150 were athletes. In the course of pharmacists' dispensing, 9.6% prescription interventions were conducted in addition to three WADA-related interventions. Though compared to the Summer or Winter Olympics, the total number of participants was relatively small at the FINA World Masters Championships, the most frequently administered medications to athletes, similar to those at the Pyeongchang Winter Olympics or the London Olympics, were analgesics and anti-inflammatory agents.^{1,2}

Although international sporting events have highlighted the issue of correct medication use by participants, there are not enough guidelines for the application of the same in many international sports events, such as the Olympics or the World Swimming Championships. FINA athletes' village pharmacy prepared a cabinet for WADA-banned medications, and when such medications were prescribed, pharmacists were required to ask the medical team to prevent incorrect administration. Meanwhile, at the London Olympics, WADA-banned medications were required to be displayed in the prescription system, and passwords were required to be given on prescription. In particular, FINA athletes' village pharmacy focused on successful cases of sports pharmacies operating at the Pyeongchang Winter Olympics through prior training and shared needle policy information that was overlooked by the FINA organizing committee to prevent doping-related problems of participating athletes. In fact, there have been cases in which vitamin injections were mixed into the sap and were not given in violation of the needle policy.

Therefore, in preparing for the athletes' village pharmacy, it is important to review the past operational cases and apply them to the local situation to establish a systematic and secure medication system.

Conclusion

In this study, the activities and performance of a pharmacy were recorded during the 2019 FINA World Masters Championships, Gwangju, South Korea. To the best of my knowledge, this is the first such study on the operation and performance of pharmacies at the FINA World Masters Championships. It will be a useful reference for pharmacy operations at large international or domestic sports events.

What Are The Findings?

- ▶ A pharmacist plays a pivotal role in ensuring the safe usage of drugs by all participants, especially athletes.
- ▶ For effective pharmacy service, pre-training and pre-education related to WADA and TUE is very important.

How it impacts clinical practice in the future?

- ▶ Our experiences of pharmacy services at major swimming competitions will be useful for planning future sports pharmacy operations at major sports events.

Declarations

Ethics approval and consent to participate

All experimental protocols and collection of data were approved by Gwangju organizing committee of FINA World Masters Championships. All methods were carried out in accordance with relevant guidelines and regulations and informed consent was obtained from all subjects.

Consent for publication

Not applicable.

Availability of data and materials

The dataset used in the current study is available from the corresponding author on request.

Competing interests

The authors declare that they have no competing interests.

Funding

This research was supported by Chosun University (2020).

Author's contributions

KJK and SHK designed the study concept and involved in the implementation of the study. IKY, EOS, DGK, and HCJ collected and analyzed the data. HCJ, KJK, and SHK prepared the manuscript. KJK and SHK approved the final draft. All authors read and approved the final manuscript.

Acknowledgements

The authors appreciate the efforts and services rendered by pharmacists at FINA World Masters Championships, Gwangju 2019 in South Korea.

References

1. Stuart M., Kwon YI, Rhie SJ. Pharmacy services at the PyeongChang 2018 Olympic and Paralympic Winter Games. *Br J Sports Med*, 2019;53(17):1105–10.
<https://doi.org/10.1136/bjsports.2018.100069>
2. Stuart M, Mottram D, Erskine D, Simbler S, Thomas, T. Development and delivery of pharmacy services for the London 2012 Olympic and Paralympic Games. *Eur J Hosp Pharm*, 2013;20:42–5.
<https://doi.org/10.1136/ejhpharm.2012.000253>
3. Wagner JC, Ulrich LR, McKean DC, Blankenbaker RG. Pharmaceutical services at the tenth Pan American Games. *Am J Hosp Pharm*, 1989;46(10):2023–27.
<https://doi.org/10.1093/ajhp.46.10.2023>
4. Skouroliaiou M, Kani C., Kompogiorgas S, Kontozamanis V. Drug consumption during the 2004 Olympics: the special Olympic Pharmacy. *Pharm World Sci*, 2005;27(6): 478–9.
<https://doi.org/10.1007/s11096.005.2223-x>
5. WADA. World Anti-Doping Agency Prohibited List. 2019.
6. FIP. International Pharmaceutical Federation FIP Guidelines: The Role of the Pharmacist in the Fight against Doping in Sport. 2019.
7. WADA. World Anti-Doping Agency World Anti-Doping Code. 2019.
8. Mountjoy M, Junge A, Alonso JM, Clarsen B, Pluim BM, Shrier I, Hoogenband C, Marks S, Gerrard D, Heyns P, Kaneoka K, Dijkstra HP, Khan KM. Consensus statement on the methodology of injury and illness surveillance in FINA (aquatic sports). *Br J Sports Med*, 2016;50(10):590–6.
<https://DOI.org/10.1136/bjsports.2015.095686>
9. Holmer I. Swimming physiology. *Ann Physiol Anthropol*, 1992;11(3):269–276.
<https://doi.org/10.2114/ahs1983.11.269>
10. Ambrose PJ. Drug use in sports: a veritable arena for pharmacists. *J Am Pharm Assoc*, 2004;44(4):501–14. <https://doi.org/10.1331.1544345041475698>.

Figures

Figure 1

Number of prescriptions dispensed per day during the FINA World Masters Championships Gwangju 2019

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementalfilePharmacyGuideBook.pdf](#)