Injury Surveillance and Evaluation of Medical Services Utilized During the 2016 Track and Field Olympic Trials

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Background: Injury surveillance systems have been implemented at world championships, yet no previous work has determined the burden of injuries during the United States Track and Field Olympic Trials. Additionally, the type of medical service providers utilized throughout the meet has not been reported, leaving it unclear whether optimal staffing needs are being met.

Purpose: To describe the incidence of injuries presenting to the medical team at the 2016 US Track and Field Olympic Trials (Eugene, Oregon) by event type and competitor demographics.

Study Design: Descriptive epidemiology study.

Methods: A retrospective review was performed of all documented injuries and treatments recorded from June 28 through July 10, 2016. Descriptive statistics and the prevalence of newly incurred injuries were calculated for registered athletes and nonathlete (ie, support) staff. The incidence of acute injuries was analyzed for registered athletes, as stratified by athlete sex and event type.

Results: A total of 514 individuals were seen during the trials: 89% were athletes and 11% were supporting staff. Physicians treated 71 injuries and 14 illnesses. Of diagnosed injuries, 85% (n = 60) occurred among athletes, with hamstring strains (16.7%, n = 10) being the most prevalent. A mean of 124 medical services (median, 137; interquartile range, 65.5-179.5) were provided each day of the trials. Among medical services, 41.8% were attributed to massage therapists for athletes, while chiropractic services were the most utilized service (47.1%) by the support staff. There was an overall incidence of 59.7 injuries per 1000 registered athletes, with jumpers (109.4 per 1000) and long-distance athletes (90.4 per 1000) being the most commonly seen athletes.

Conclusion: Throughout the trials, athletes participating in jumping and long-distance events were the most commonly seen by physicians, creating the potential need for an increase in staffing of physicians during meet periods when these events occur. The provided medical services appeared to follow the number of athletes competing during the trials and the need for recovery treatments after competition. Findings from this study should inform future strategy for staffing and policy development at Olympic Trials and other elite-level track and field events in the United States.

Keywords: athletics; epidemiology; injury; medical coverage

Track and field continues to be a popular sport across the globe and in the United States. Injury risks to athletes have been documented at major meets such as the world championships and the Olympics.[3,7,11,15,16,18,19] During the 2012 Summer Olympic Games, injuries occurred among 17.7% of athletic participants, which is similar to the reported rates of other elite-level competitions.[1-4,8,15] Muscle injuries were the most commonly reported injury during international track and field competitions from 2007 to 2015, where the incidence rate was 1.71 times higher among males than females.[5]

Only a few surveillance studies have examined the injury burden at events other than the world championships and with nonelite-level athletes. A 3-year observational study was conducted during the Penn Relays Carnival, which hosts multiple rounds of competitions for high school, collegiate, masters, and elite-level athletes.[17] The study found college/elite athletes to have lower injury rates than masters and high school athletes.[17] For nonelite athletes, high schoolers participating in track and field had more injuries occur during competition than in practice from 2008 through 2014.[18] These athletes were more likely to report overuse/chronic injuries, which accounted for 27.5% of all reported injuries.[18] In contrast, jumpers, distance runners, and sprinters accounted for 65% of all reported injuries from the National High School Sports-Related Injury Surveillance Systems High School RIO (Reporting Information Online).[18]

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The Olympic Trials are a unique track and field event given its mix of nonelite and elite competitors, and it may have different injury patterns relative to world championship events and nonelite events such as the Penn Relays. The limited data on the injury occurrence and medical services utilized provide a challenge for hosting organizations when planning appropriate medical coverage for this multiday event. Only a few studies have examined the risk of injuries to athletes competing in national Olympic-qualifying events, and none of these studies were in track and field.[10,14] Also, there exists no previous information regarding the types of medical services needed and utilized, potentially leading to over- or understaffing of specific medical roles.

Therefore, the purpose of this study was to describe the incidence of injuries, by event type and competitor demographics, presenting to the medical team at the 2016 United States Track and Field Olympic Trials in Eugene, Oregon. The medical team included sports medicine physicians (medical directors), physical therapists, and athletic trainers, as well as complementary care providers (acupuncturists, chiropractors, and massage therapists). To our knowledge, we present the first report describing the incidence of injury and illness and associated medical care utilization type at a US Track and Field Olympic Trials event.

METHODS

Definition of Injury and Illness

This analysis followed the injury definition criteria that have been defined and used in previous injury surveillance studies.[3,4,6,8] Given the observational design and use of existing de-identified information, the institutional review board at PeaceHealth granted exempt status for the study. Confidentiality was ensured, so no individual athlete or support staff could be identified.

Data Collection

Data were collected on all injuries treated by the medical staff at the 2016 US Track and Field Olympic Trials, which ran from June 28, 2016, through July 10, 2016, in Salem and Eugene, Oregon. The 20-k race walk was held in Salem on June 30, and the track and field competition was held in Eugene from July 1 to 10. Data were recorded on a standardized treatment log adapted from the International Olympic Committee's medical reporting form.[12] All athletes who presented to the medical tent with injuries were evaluated by physicians on site. The primary medical staff included acupuncturists, athletic trainers, chiropractors, massage therapists, medical doctors and physical therapists. The type of injury, anatomic location, event in which the injury occurred, type of provider, and treatment were recorded. Demographic variables included athlete age and sex.

Data Analysis

Consistent with the International Olympic Committee's approach for injury surveillance and with previously published studies, the incidence rate of injuries and illnesses was calculated for the number of registered athletes, competing athletes, and athlete-participations.[12] These populations were calculated from a list of athletes registered and accepted into the Olympic Trials and its scheduled competitions, as published on the internet (http://www.usatf.org/Events—Calendar/2016/U-S–Olympic-Team-Trials—Track—Field/Start-Lists.aspx). "Registered athletes" were defined as the total number of athletes competing in the Olympic Trials events, in any combination of events. "Competing athletes" were defined by the number of events in which athletes were participating, recognizing that 1 athlete may compete in multiple events. For example, if an athlete competed in the 100-m and 200-m events, they were considered 1 registered athlete and 2 competing athletes. Athlete-participations were defined by the number of rounds of competition. If the same athlete made it to the semifinals in the 100-m and 200-m events, he or she would have 4 athlete-participations. Event groups are defined elsewhere.[2] Support staff were meet volunteers seen by the medical team and not registered as athletes. These included meet officials and other volunteers at the event who were nonspectators.

Frequencies of reported injuries and medical services coverage were reported per day and event group. Statistical analysis was completed in Stata (v 14; StataCorp) for incidence rate calculations, cross-tabulations, and chi-square analyses. As the masters 1500 m is an event unique to the Track and Field Olympic Trials competition, medical log entries by masters runners were recorded in the overall descriptive statistics but restricted from incidence calculations. Injury risk among athletes was compared by sex and across event groups. Additionally, to ensure individuals' privacy, medical services were censored if the count was <5 per day. The statistical significance level was accepted at an alpha of 0.05.

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Ethical approval for this study was waived by PeaceHealth System Institutional Review Board.

TABLE 1
Descriptive Statistics of Individuals Treated at the US Track and Field Olympic Trials: June 28–July 10, 2016

	Overall (N = 514)		Athletes (n = 457)		Support Staff (n = 57)	
Demographic	%	n	%	n	%	n
Age, y						
<20	3.7	39	4.2	19	1.8	1
20-25	44.7	242	51.0	233	1.8	1
26-30	22.3	121	25.8	118	1.8	1
>30	29.3	159	19.0	87	94.7	54
Sex						
Male	51.1	276	47.9	219	73.2	41
Female	48.9	274	52.1	238	26.8	15
Individual type						
Athletes	88.9	457				
Support staff	11.1	57				
Event groups[a]						
Sprints			16.6	76		
Hurdles			17.1	78		
Middle distance			8.8	41		
Long distance			9.4	43		
Jumps			21.0	96		
Throws			17.9	82		
Multievent			3.1	14		
Nonspecified athlete[b]			4.4	20		
Master's runners[c]			1.5	7		
Services[d]						
Acupuncturist	3.1	47	2.9	41	2.9	—
Athletic trainer	2.2	34	2.1	29	2.0	—
Chiropractor	33.9	522	32.8	459	47.1	48
Massage therapist	40.9	630	41.8	586	32.4	33
Medical doctor	6.7	103	6.4	89	11.8	12
Physical therapist	13.2	203	14.1	1401	3.9	102

[a]Sprints: 100 m, 200 m, 400 m. Hurdles: 110-m hurdle, 400-m hurdle. Middle distance: 800 m, 1500 m. Long distance: 3000-m steeple, 5000 m, 10,000 m, 20,000-m race walk. Jumps: high jump, pole vault, long jump, triple jump. Throws: hammer, javelin, shot put, discus. Multievent: heptathlon, decathlon.
[b]Nonspecified athletes: events were not recorded.
[c]Master's runners: 1500-m master exhibition event.
[d]Dashes (—) indicate <5 reported services, which were censored to ensure individual's privacy.

RESULTS

Medical Services Provided

Over the course of the 13-day period, 514 individuals were treated by the medical staff, approximately 89% were registered athletes (Table 1). Throughout the Olympic Trials competition, the most recorded treatments for athletes occurred on July 1 and 7 (Figure 1). From July 2 to 7, the medical team recorded between 29 and 59 entries in the medical log daily. After July 7, the number of entries decreased daily until the end of the competition period, 3 days later. Medical entries recorded for supporting staff ranged from 2 to 12. No recorded entries occurred for supporting staff on June 30 or July 4, when no competitions took place.

Overall, 1539 treatments (Figure 2 and Appendix Table A1) were recorded in the medical logs. Individuals presenting to the medical tent had a mean ± SD of 3 ± 1.13 visits during the trials. Regarding service providers, massage therapists (40.9%) were the most utilized provider, followed by chiropractors (33.9%) and physical therapists (13.2%). Entries by physicians represented 6.7% of the total number of entries recorded. The last day of the competition saw the lowest number of entries to the medical log, which coincided with the least amount of entries per service provider except for acupuncturists and athletic trainers. Athletic trainers were the least utilized service provider, reporting a mean of 3 treatment log entries per day (range, 0-6). Among athletes, the type of medical provider seen did not vary by sex ($P = .91$) or supporting staff ($P = .70$). Treatment to the support staff represented between 2.0% and 11.6% of total treatments by each provider type.

Demographics and Services Provided to Athletes and Supporting Staff

Overall, 81% of athletes seen by the medical staff were <30 years old. Females represented 52% of athletes seen. The highest proportion of athletes were from jumping events (21.0%), followed by throwing events (17.9%), hurdles (17.1%), and sprints (16.6%). Athletes who were seen but did

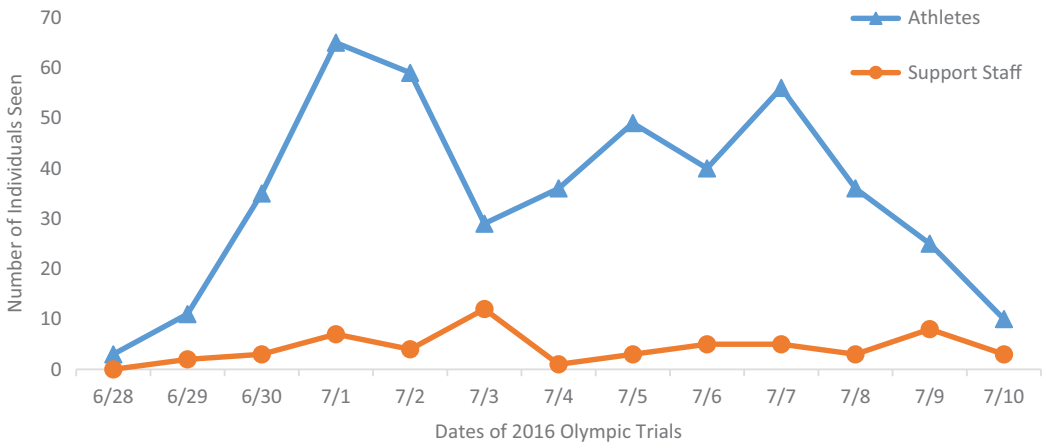

Figure 1. Number of individuals seen per day by medical staff at the 2016 US Track and Field Olympic Trials.

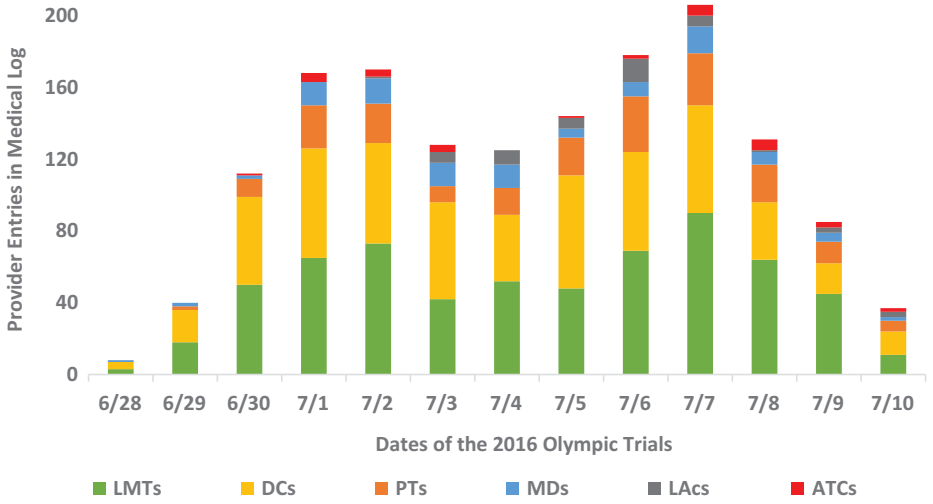

Figure 2. Providers seen by athletes and volunteer meet staff by day. ATC, certified athletic trainer; DC, doctor of chiropractic; LAc, licensed acupuncturist; LMT, license massage therapist; MD, medical doctor; PT, physical therapist.

not have an event code associated with the entry made up 4.4% of the athletes presenting for treatment. Masters runners represented 1.5% of athletes treated by the medical staff. For service providers, massage therapists represented the most utilized profession of the medical team seen by athletes, while medical doctors made up 6.4% of services provided.

Overall, 95% of the support staff seen by the medical team was >30 years old. Males represented 73.2% of the support staff seen for treatments. Of the support staff members who had recorded treatments, chiropractors represented 47.1% of all treatments recorded, followed by massage therapists (32.4%) and physicians (11.8%). Services recorded from athletic trainers, acupuncturists, and physical therapists represented <10% of the total records from the event support staff.

Injury Prevalence

Throughout the trials period, 71 injuries and 14 illnesses were diagnosed by physicians at the meet (Appendix Table A2) from individuals who sought treatment; 60 injuries were recorded for athletes and 9 for supporting staff. Two injuries evaluated by physicians had missing person-type data associated with the medical record. Injuries to the lower extremity represented three-quarters of injuries treated by physicians (Figure 3). Lower leg and thigh injuries were the most prevalent, followed by injuries to the foot. Six injuries had incomplete records, including 4 that did not have records of the injury location. Complete injury information was recorded for 60 injuries among athletes.

Strains to the thigh (specifically the hamstring) and musculature of the lower leg were the most commonly reported injury. Muscles strains were the most commonly diagnosed injury (35.00%), while abrasions and lacerations represented 20% of injuries diagnosed among athletes. Lower extremity tendinosis represented 13.3% of reported injuries. No significant differences were found among injuries reported to specific body regions among athletes compared by sex. Interestingly, 53% of distance were seen for wound

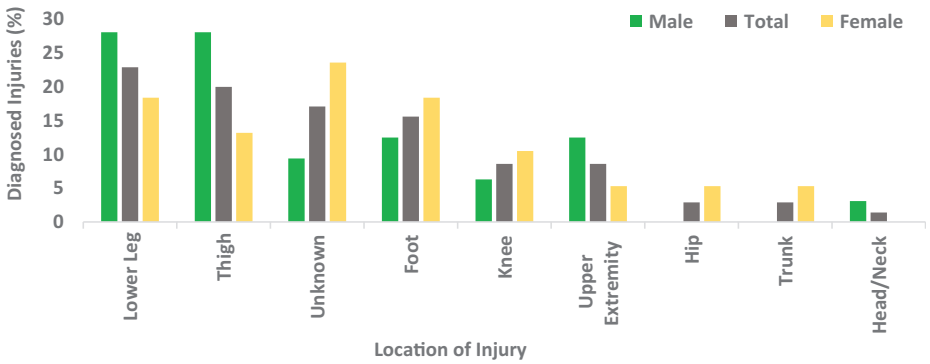

Figure 3. Prevalence of injuries by body location, stratified by sex.

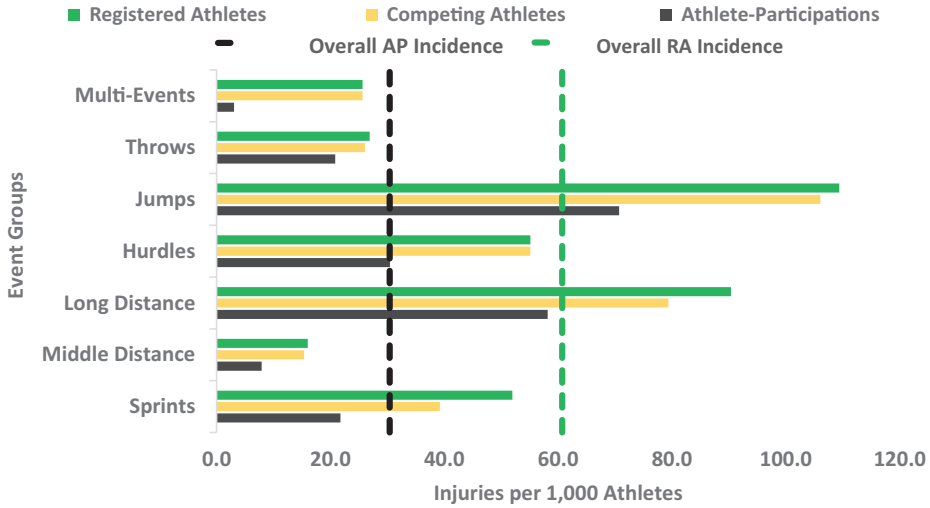

Figure 4. Incidence of diagnosed injuries in event groups. AP, athlete-participations; RA, registered athlete.

care for abrasions or lacerations sustained during their respective events. Eleven illnesses were reported for athletes, of which 90% occurred in females. For support staff seen by physicians, 9 injuries had complete information. No specific injury patterns appeared in this group, as most cases were singular events. Three illnesses were reported for the support staff, all of which occurred among males.

Incidence of Injuries and Illnesses in Athletes

Sixty injuries were diagnosed by physicians during the competition period, of which 59 had a reported event group, representing an incidence of 59.7 injuries per 1000 registered athletes (Figure 4). Similar injury rates were found between males and females. Males had no increased injury risk versus females (relative risk = 1.01; 95% CI, 0.59-1.73). By risk exposure through rounds of participation, there was a reported total incidence of 30.4 injuries per 1000 athlete-participation events. Individuals participating in jumping events had the highest incidence per event type (109.4 injuries per 1000 registered athletes), while athletes competing in middle-distance events had the lowest incidence (16.0 per 1000) (Appendix Table A3). As compared with middle-distance athletes, long-distance athletes had 5.64 times (95% CI, 1.31-50.90: $P = .008$) the risk of injury. Regarding competition rounds, the risk of injury in long-distance events was 7.35 times (95% CI, 1.71-66.28) the risk of injury of middle-distance athletes. Interestingly, among registered athletes, long-distance runners had 1.73 times (95% CI, 0.69-4.74) the risk of injury of sprinters. However, when the number of athlete-participations were taken into account, the risk of injury in long-distance events significantly increased to 2.67 (95% CI, 1.06-7.28). Similar rates of illness were found among hurdlers and middle- and long-distance athletes. No illnesses were diagnosed in other event groups.

DISCUSSION

The main findings of this descriptive analysis of the observed incidence of injuries and medical services utilized throughout the 2016 US Track and Field Olympic Trials were as follows: (1) athletes participating in jump events had the highest reported injury rates; (2) similar injury

rates were found between male and females athletes; (3) massage therapists and chiropractors were the most utilized providers during the trials; (4) hamstring strains were the most common reported injury; and (5) treatments to support staff represented approximately 10% of all entries recorded.

Injury surveillance programs have been successfully implemented in world championships and specific track and field competitions.[1-5,7,9,13,16-18] However, no previous reports quantified the injury burden during Olympic Trials competitions in track and field events.[10,14] Additionally, to our knowledge, this is the first study to report the type of medical providers utilized throughout the Olympic Trials competition. Only during the 2012 Olympics has the number of respiratory symptoms been reported in meet- and event-specific personnel.[15] The most entries to the medical log were recorded at the beginning of the trials, coinciding with the qualifying rounds of competition. Again, entries spiked on July 7, from which they declined to the end of the trials. This could be related to the number of competitions occurring, with fewer athletes competing in each event. For example, during the qualifying round of the women's 100-m dash, 34 athletes competed for 21 spots in the semifinals, of which 8 athletes moved on to compete in the finals. It is unknown if the athletes who did not move on to the finals/Olympic competition had an increasing need for medical services or if the increase at the beginning of the trials is due to the volume of athletes competing. However, we assume that the decrease in utilization is related to a decrease in the number of athletes competing, for which staffing could be planned accordingly.

Overall, we found an injury rate of 60 injuries per 1000 registered athletes during the competition period. These results were slightly lower than reported injury rates in previous world championships (male, 87.7 ± 7.6; female, 65.9 ± 7.2) but higher than that (5 per 1000 participants) reported during a 3-year period of the Penn Relays.[2,8,17] Injury rates from this Olympic Trial were more consistent with elite-level competitions, as opposed to track meets with a higher proportion of nonelite participants (eg, Penn Relays; 5 per 1000 participants).[2,8,17]

It is not uncommon for elite-level teams of athletes to travel with their own medical team. During the surveillance of world championships, athletes' personal medical teams reported injury information to event organizers, while at the Penn Relays Carnivals, the reported injuries were only from athletes who sought treatment. It is unclear if athletes at these Olympic Trials had access to other medical care or relied just on the event staff. Incidence rates were calculated with injuries solely diagnosed by the onsite medical staff; therefore, our findings can only be generalized to just those who were injured during competition and sought care. Long-distance runners had approximately 2 times the risk of reporting an injury compared with sprinters. This was primarily due to the number of acute injuries sustained by distance runners. Approximately 53% of injuries to distance runners were abrasions or lacerations to the lower extremity. We saw no significant differences in injury rates between male and female athletes, while other studies have reported higher risks among male athletes versus female athletes.[8] However, this may be due to the difference in sample sizes between studies. Edouard et al[8] found that no significant differences between sexes were seen at individual indoor and outdoor world events, outside of 1 outdoor championship in 2012. However, when the results were combined, these authors found the risk of injury to males to be 1.25 times (95% CI, 1.13-1.37) the risk of injury in females.

Hamstring injuries were the most common injury documented by physicians during the trials period. These results are similar to prior results that found hamstring injuries to be the most prevalent reported during world championships between 2007 and 2015.[5] Given the low number of reported injuries, we were unable to compare injuries by sex. Other frequent injuries found during the trials were lacerations and abrasions to the lower extremity and calf strains. Given the entry log, we cannot infer if these injuries were acute or may have occurred before the event and were exacerbated by the competition. During the 2013 IAAF World Championships in Moscow, athletes who reported an injury in the month before the competition were twice as likely to have an in-competition injury as compared with those who did not.[2] It may be beneficial for event organizers to include preparticipation screening during future Olympic Trials competitions to reduce the overall risk of injury to athletes during the competition.

Chiropractors and massage therapists were the most commonly seen providers during the trials period. No previous reports have published the medical services utilized during the competition, leaving it unclear if these services are being under- or overutilized. Given the number of competition rounds in which athletes may compete, the focus on recovery after an event is critical. These services are not ordinarily available at nonelite track meets, which may be the reason for the high proportion of services utilized. The study findings indicate that services rendered by the medical team may be focused more on event recovery than actual injury needs. Updates to medical logs for future events are needed to dictate whether the treatment was for an injury or for event recovery purposes. No data were available on the count of medical providers staffing the tent on each day of competition. It is unknown if enough providers were available to adequately meet the need of event participants and ensure that appropriate coverage was available throughout the complete event period. However, since we know that athletes competing in jump events and distance events had higher reported injury rates as compared with the other events, future event organizers may consider increasing the number of available providers on these event days. Athletic trainers were one of the least utilized service providers during the track and field competition. Primarily, these providers saw in-competition events that may not have been severe enough to be seen by a physician or were treated by the athletes' own medical staff.

A number of supporting staff roles, including volunteers and competition officials, are required to host a successful trials event. After our review of the medical log, we found nonathlete support staff to be predominately male and >30 years old. Supporting staff represented 1 in 10 individuals seen by the medical staff. Physicians diagnosed 11 injuries

and 3 illnesses in this group. No information was available on the total number of volunteers; therefore, incidence rates could not be calculated. Future event planners should consider policies and guidelines for the treatment of nonathlete support staff. As with athletes, a preparticipation intake and registration process, allowing volunteers to indicate any potential work limitations, may help to ensure that individuals are not placed in a role that may worsen a preexisting condition.

Strengths of this study include examining injury risk and prevalence in a population that combines elite-level athletes with top-level competitors to show that injury rates are similar to those previously reported for elite-level competitions. Additionally, the examination of medical services provided by event groups allows future event organizers to better serve the athletes and supporting staff, whose medical service utilization was previously unknown.

A few limitations should be recognized while interpreting our results. Surveillance studies are only as complete as the data collected. Missing data were present for 8% (n = 6) of reported injuries. The amount of missing data highlights an area where a quality control check can be used in future competitions to ensure complete cases. Another limitation was that the medical record log did not indicate the mechanism of injury or if injuries occurred before the start of the trials event. The use of an electronic intake process could help improve data quality assurance upon entry. Previous studies[1,2] have suggested the implementation of a preparticipation questionnaire to identify at-risk individuals, which could be extended to the support staff. Additionally, including team medical staff in the surveillance process would allow the actual incidence of injuries to be defined during Olympic Trials events. Last, it was unknown if all injuries, regardless of severity, were reported to the medical staff. Active surveillance methods could be used to monitor all injury events, even if the athlete does not seek treatment from the medical tent or has a personal medical team.

Overall injury patterns during the 2016 US Track and Field Olympic Trials reflected injury patterns similar to those of elite-level competitions rather than nonelite competitors. However, 1 out of every 10 individuals seen was a supporting staff member, an area that has not been previously documented. By understanding the injury burden of athlete event groups and supporting staff, surveillance efforts can determine the risk factors for injury in these groups, which can lead to future prevention strategies, including the implementation of policies and procedures for volunteers and supporting staff seeking medical care. Medical services appeared to follow the number of athletes competing during the trials and the need for recovery treatments for the athletes who had advanced to the finals of competitions.

Recommendations for Medical Planning of the 2020 Olympic Trials

Findings from this study should assist organizers of the 2020 US Track and Field Olympic Trials on staffing consideration and policy development for medical coverage to ensure the safety of all participants and volunteers. Before the structure of the medical teams is changed, we recommend increasing surveillance of current staffing levels during daily intervals or event periods to determine if the current numbers are appropriate to ensure proper medical coverage. Updates to the medical log are needed to distinguish if the high utilization of chiropractors and massage therapists are for injury-specific treatments or for recovery purposes. Introducing physician assistants in the medical team may reduce the number of physicians required at the meet. Additionally, meet medical directors can utilize athletic trainers in the treatment area for the evaluation and treatment of injuries in accordance with standard practice acts. Procedure manuals should be updated to include directives for the treatment of support staff members at these types of meets. Given the high number of treatments recorded in this group during the 2016 trials, event organizers will need to be explicit regarding expectations for on-site care versus asking support staff to seek treatment through their usual sources of care, as most of the support staff are locally based volunteers.

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APPENDIX

TABLE A1
Medical Services Recorded per Day of Competition[a]

	Jun 28	Jun 29	Jun 30[b]	Jul 1	Jul 2	Jul 3	Jul 4	Jul 5[c]	Jul 6	Jul 7	Jul 8	Jul 9	Jul 10	Total[d]
Acupuncturists	0	0	0	0	—	6	8	6	13	6	—	—	—	47
Athletic trainers	0	0	—	5	—	—	0	—	—	6	6	—	—	34
Chiropractors	—	18	49	61	56	54	37	63	55	60	32	17	13	519
Massage therapists	—	18	50	65	73	42	52	48	69	90	64	45	11	630
Medical doctors	—	—	—	13	14	13	13	5	8	15	7	5	—	100
Physical therapists	0	—	10	24	22	9	15	21	31	29	21	12	6	202
Total	8	40	112	168	170	128	125	144	178	206	131	85	37	1532

[a]For the year 2016. Dashes indicate days with <5 reported services, which were censored to ensure athletes' privacy.
[b]Start of the track and field competition.
[c]No competitions held that day.
[d]Seven treatments did not have a day of service recorded.

TABLE A2
Number and Diagnosis of All Injuries and Illnesses During the 2016 US Track and Field Olympic Trials[a]

			Athletes[b]						Support Staff[c]					
	Overall				Males		Females				Males		Females	
Injury Location	n	%	Total	%	n	%	n	%	Total	%	n	%	n	%
Head-neck	1	1.4	1	1.7	1	3.3	0	0.0	0	0.0	0	0.0	0	0.0
Strain	1	1.4	1	1.7	1	3.3	0	0.0	0	0.0	0	0.0	0	0.0
Trunk	4	5.6	2	3.3	0	0.0	2	6.7	2	22.2	1	16.7	1	33.3
Muscle cramps	1	1.4	1	1.7	0	0.0	1	3.3	0	0.0	0	0.0	0	0.0
Strain	1	1.4	0	0.0	0	0.0	0	0.0	1	11.1	1	16.7	0	0.0
Other	2	2.8	1	1.7	0	0.0	1	3.3	1	11.1	0	0.0	1	33.3
Upper extremity[d]	7	9.9	4	6.7	3	10.0	1	3.3	1	11.1	1	16.7	0	0.0
Laceration[d]	4	5.6	2	3.3	2	6.7	0	0.0	1	11.1	1	16.7	0	0.0
Sprain[d]	1	1.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Strain	1	1.4	1	1.7	0	0.0	1	3.3	0	0.0	0	0.0	0	0.0
Other	1	1.4	1	1.7	1	3.3	0	0.0	0	0.0	0	0.0	0	0.0
Hip	2	2.8	2	3.3	0	0.0	2	6.7	0	0.0	0	0.0	0	0.0
Sprain	1	1.4	1	1.7	0	0.0	1	3.3	0	0.0	0	0.0	0	0.0
Other	1	1.4	1	1.7	0	0.0	1	3.3	0	0.0	0	0.0	0	0.0
Thigh	16	22.5	15	25.0	9	30.0	6	20.0	1	11.1	0	0.0	1	33.3
Strain	12	16.9	11	18.4	7	23.3	4	13.4	1	11.1	0	0.0	1	33.3
Tendinosis	2	2.8	2	3.3	1	3.3	1	3.3	0	0.0	0	0.0	0	0.0
Other	2	2.8	2	3.3	1	3.3	1	3.3	0	0.0	0	0.0	0	0.0

(continued)

TABLE A2 (continued)

	Overall		Athletes[b]						Support Staff[c]					
					Males		Females				Males		Females	
Injury Location	n	%	Total	%	n	%	n	%	Total	%	n	%	n	%
Knee	6	8.5	5	8.3	2	6.7	3	10.0	1	11.1	1	16.7	0	0.0
Tendinosis	4	5.6	3	5.0	1	3.3	2	6.7	1	0.0	1	16.7	0	0.0
Other	2	2.8	2	3.3	1	3.3	1	3.3	0	0.0	0	0.0	0	0.0
Lower leg	13	18.3	12	20.0	8	26.7	4	13.3	1	11.1	1	16.7	0	0.0
Laceration	2	2.8	2	16.7	2	6.7	0	0.0	0	0.0	0	0.0	0	0.0
Strain	8	11.2	8	13.4	5	16.5	3	10.0	0	0.0	0	0.0	0	0.0
Tendinosis	2	2.8	2	3.3	1	3.3	1	3.3	0	0.0	0	0.0	0	0.0
Other	1	1.4	0	0.0	0	0.0	0	0.0	1	11.1	1	16.7	0	0.0
Ankle	5	7.0	5	8.3	2	6.7	3	10.0	0	0.0	0	0.0	0	0.0
Laceration	1	1.4	1	3.3	1	3.3	0	0.0	0	0.0	0	0.0	0	0.0
Sprain	4	5.6	4	6.7	1	3.3	3	10.0	0	0.0	0	0.0	0	0.0
Foot	13	18.3	11	18.3	4	13.3	7	23.3	2	22.2	1	16.7	1	33.3
Laceration	5	7.0	5	8.3	2	6.7	3	10.0	0	0.0	0	0.0	0	0.0
Sprain	1	1.4	1	3.3	1	3.3	0	0.0	0	0.0	0	0.0	0	0.0
Tendon rupture	1	1.4	1	3.3	0	0.0	1	3.3	0	0.0	0	0.0	0	0.0
Tendinosis	2	2.8	1	3.3	0	0.0	1	3.3	1	11.1	1	16.7	0	0.0
Other	4	5.6	3	6.7	1	3.3	2	6.7	1	0.0	0	0.0	1	33.3
Not available[e]	4	5.6	3	5.0	1	3.3	2	6.7	1	11.1	1	16.7	0	0.0
Laceration	3	4.2	2	3.3	0	0.0	2	6.7	1	11.1	1	16.7	0	0.0
Sprain	1	1.4	1	1.7	1	3.3	0	0.0	0	00.0	0	0.0	0	0.0
All (injury events)[d]	71	99.9	60	99.9	30	100	30	100	9	100	6	100	3	99.9
Illnesses[f]	14	100	11	78.6	1	9.9	10	90.1	3	21.4	3	100	0	0

[a]Percentages are based on injuries only (ie, not including illnesses).
[b]Athletes include all competing athletes during the trials period.
[c]Supporting staff individuals encompass all meet directors, staff, officials, and volunteers who were treated and diagnosed by medical doctors.
[d]Person-type data missing on 2 individuals.
[e]Injury location not recorded on medical form
[f]Illnesses encompass treatment for allergies, heat-related symptoms, and gastrointestinal illnesses.

TABLE A3
Incidence of Injuries to Athletes by Event Groups[a]

	Sprints	Hurdles	Middle Distances	Long Distances	Jumps	Throws	Multievents	Total[b]
Population								
Registered athletes	154	127	125	166	192	186	39	989
Competing athletes	204	127	130	189	198	192	39	1079
Athlete-participations	368	230	253	258	297	240	326	1972
Injuries								
No.	8	7	2	15	21	5	1	59
Per 1000								
Registered athletes	51.9	55.1	16.0	90.4	109.4	26.9	25.6	59.7
Competing athletes	39.2	55.1	15.4	79.4	106.1	26.0	25.6	54.7
Athlete-participations	21.7	30.4	7.9	58.1	70.7	20.8	3.1	29.9
Illnesses								
No.	0	4	4	3	0	0	0	11
Per 1000	0	31.5	32.0	18.5	0	0	0	11.1
Registered athletes	0	31.5	30.8	15.9	0	0	0	10.2
Competing athletes	0	17.4	15.8	11.6	0	0	0	5.6

[a]Sprints: 100 m, 200 m, 400 m. Hurdles: 110-m hurdle, 400-m hurdle. Middle distance: 800 m, 1500 m. Long distance: 3000-m steeple, 5000 m, 10,000 m, 20,000-m race walk. Jumps: high jump, pole vault, long jump, triple jump. Throws: hammer, javelin, shot put, discus. Multievent: heptathlon, decathlon.
[b]Event group is missing for 1 injury. Some athletes may have competed in >1 event group; this is not a sum of individual athletes.