

Original Article

Activities of medical centers for athletes and spectators at cycling track events in the Tokyo 2020 Olympic and Paralympic Games

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Aim: We focused on the preparation and activities of clinics for spectators and athletes in the Izu Velodrome in Shizuoka Prefecture, which was managed by the Tokyo Organizing Committee of the Olympic and Paralympic Games (TOC).

Methods: Two medical clinics were established for the track cycling competition: one for Olympians and their associates, and one for spectators, TOC-related individuals, and volunteers. Each medical clinic had two separate buildings. One was for individuals with suspected coronavirus disease (COVID-19); the other was for individuals who were deemed unlikely to have COVID-19.

Results: During the Olympics, five Olympians and one umpire were transported to a designated hospital. All of them had fall-related injuries. Nine patients visited the clinic for spectators, and six of the nine were volunteers. Two volunteers showed side-effects in association with COVID-19 vaccination. Five of the nine patients had outdoor-related disease. During the Paralympics Games, no Olympians visited the clinic, and three volunteers were treated at the clinic for spectators. All had outdoor-related diseases and returned to work after treatment. There were no confirmed cases of COVID-19 among individuals who attended the Olympic cycling track during the Tokyo 2020 Olympics and Paralympics.

Conclusions: The present study showed the results of activities of the two clinics for the Olympics and Paralympics. Both medical clinics were necessary for the safe operation of the Olympics and Paralympics.

Key words: Clinic, COVID-19, Tokyo Olympic and Paralympic Games

BACKGROUND

THE TOKYO 2020 Olympic Games were moved to 2021 due to the developing coronavirus disease (COVID-19) pandemic. Thirty-three events of the Tokyo 2020 Olympics were held from July 23 to August 8, 2021, followed by 22 events of the Tokyo 2020 Paralympics from August 24 to September 5, 2021. This period was the summer season in Japan. The Izu Velodrome is an indoor cycling venue in Japan,

located in Izu City, Shizuoka Prefecture (Figs. 1, 2). It houses a 250-m wooden cycling track that fully complies with the technical standards required by the Union Cycliste Internationale, the world governing body for cycling. This building can accommodate 3,600 spectators. The Izu Velodrome was selected as the venue to host the track cycling events at the 2020 Summer Olympics and Paralympics in Tokyo. On July 8, 2021, all spectators were banned from the Tokyo Olympic venues after the government declared a state of emergency for the capital in relation to COVID-19. Only three prefectures, including Shizuoka, held events within the three cycling categories of mountain biking, road cycling, and track cycling, which allowed spectators during the COVID-19 pandemic. However, the delta coronavirus variant surged in Japan, including Shizuoka, after the commencement of the Tokyo 2020 Olympics, and all spectators were banned from the Tokyo 2020 Paralympics, including cycling in Shizuoka Prefecture.

Tokyo Organizing Committee of the Olympic and Paralympic Games

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There have been previous reports concerning polyclinic activity in the Olympics.^{1,2} However, there have been no reports on clinics for spectators and athletes during the COVID-19 pandemic. We herein focused on the preparation and activities of the clinics for spectators and athletes at Izu Velodrome in Shizuoka, managed by the Tokyo Organizing Committee of the Olympic and Paralympic Games (TOC).

METHODS

Preparation of medical clinics (centers) at Izu Velodrome

Medical clinics

TWO MEDICAL CLINICS were established for the track cycling events: one was for the Olympians and

their associates; the other was for spectators, TOC-related individuals, and volunteers. Two ambulances were on standby near the clinics for Olympians and spectators during the Tokyo 2020 Olympics and Paralympics. Each medical clinic had two separate buildings (Fig. 3). One was for individuals with suspected COVID-19; the other was for those deemed unlikely to have COVID-19. The staff of the medical clinic for Olympians and their associates was appointed by the Japan Cycling Federation after being selected from all over Japan. These staff members included doctors, nurses, and physical therapists, who formed three teams. Two of the three teams were distributed at separate locations opposite the inside area of the track lane. The other team rested at the clinic for Olympians or took turns in treating patients there. The staff members who managed the spectators, TOC-related

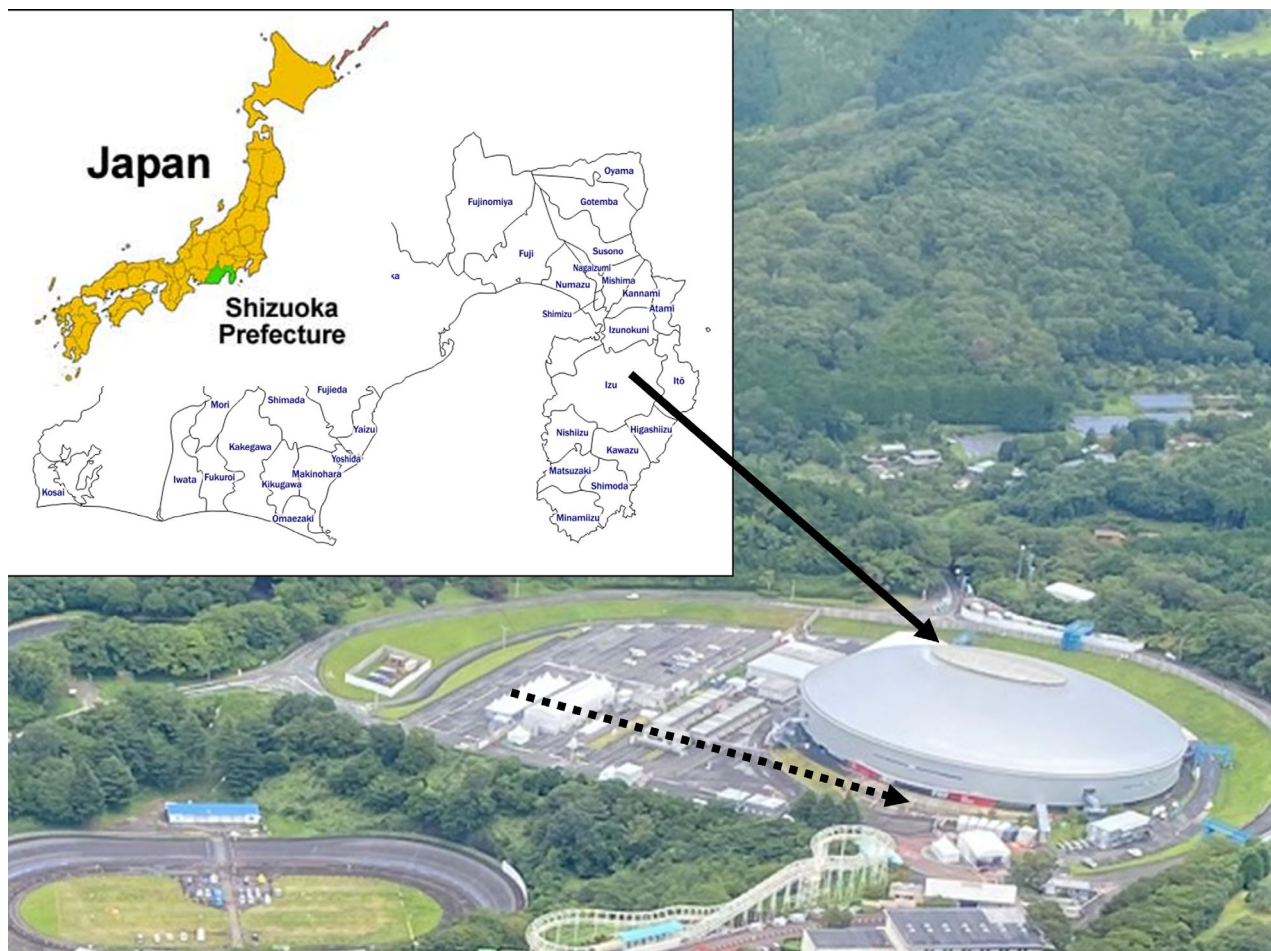


Fig. 1. Izu Velodrome is an indoor cycling venue that was used for events at the Tokyo 2020 Olympic and Paralympic Games. It is located in Izu City, Shizuoka Prefecture, Japan (arrow with solid line). The bus stop for spectators is located approximately 100 m from the entrance of the velodrome. Spectators could enter the Izu Velodrome after body temperature check and body search (arrow with broken line).



Fig. 2. Inside Izu Velodrome, used for cycling events at the Tokyo 2020 Olympic and Paralympic Games. Two medical teams for Olympians and Paralympians were placed on opposite sides of the inside lane of the cycling track. FAS, first aid station.

individuals, and volunteers were provided by Juntendo Shizuoka Hospital, which made an agreement with the TOC to receive patients from the Olympic venue. These staff members included doctors and nurses. In addition to the staff of the clinic for spectators, the TOC provided three teams of trained first aid responders who were placed outside the Izu Velodrome before and after events, and inside of Izu Velodrome during events to escort injured or ill people to the clinic for spectators. If patients needed to be transferred to Juntendo Shizuoka Hospital, they were scheduled for transport by ambulance (approximately 30 min transportation time from Izu Velodrome to Juntendo Shizuoka Hospital). If patients were severely injured or ill, transportation by a physician-staffed helicopter would be considered (approximately 5 min transportation time from Izu Velodrome to Juntendo Shizuoka Hospital).³

Staff education

The staff of the medical clinic for Olympians/Paralympians usually worked as medical practitioners at hospitals or clinics, and sometimes worked as volunteers at cycling games in Japan. The staff of the medical clinic for spectators worked as medical practitioners at Juntendo Shizuoka Hospital. The staff of both of the clinics was selected from among medical applicants; experienced medical practitioners were selected. Accordingly, they did not need to learn first aid methods for injured or ill patients. The COVID-19 pandemic made it difficult for staff to participate in group education. Accordingly, the staff underwent self e-learning in advance regarding topics specific to the Olympics (e.g., doping, mass gatherings, dealing with patients who speak other languages, terrorism, and heatstroke). In addition, on official training days or at the time of training on the days of Olympics/



Fig. 3. Clinic for spectators at Izu Velodrome during the Tokyo 2020 Olympics and Paralympics. The medical clinic had two separate buildings. One was for individuals with suspected COVID-19 infection (right), and the other was for those deemed unlikely to have COVID-19 infection (left).

Paralympics, the staff underwent education on the location of medical equipment, how to communicate among medical staff and associates, how to transport injured or ill patients, and how to treat febrile patients at the scene.

Cooperation with local emergency medical system

A command post of the local fire department was established in the headquarters of the TOC at Izu Velodrome. When patients required transport by ambulance, medical staff of the clinic contacted the command post by a landline or cellular phone. In addition, two teams of emergency medical technicians (a total of six technicians) were on standby near the medical clinics for Olympians/Paralympians and spectators, respectively. Accordingly, actual patient information could be shared immediately between medical staff and emergency medical technicians. Furthermore, the Venue Medical Officer (VMO) at Izu Velodrome administered both the clinic for Olympians/Paralympians and the clinic for spectators, and directed the acute critical care center of Juntendo Shizuoka Hospital. When patients required transportation to Juntendo Shizuoka Hospital, the VMO collected patient information and ordered Juntendo Shizuoka Hospital to receive the patient before emergency medical technicians contacted the hospital.

Accordingly, patient transportation was carried out without any delays.

Preparations for COVID-19 pandemic

Olympians, their associates, and medical staff members of the clinic for Olympians had to undergo daily saliva screening tests for COVID-19 during the Tokyo 2020 Olympics and Paralympics. Olympians and their associates were asked to limit their movements to commuting between the Olympic Village and their competition site. The medical staff of the clinic for spectators had to undergo regular screening tests (every 4 days) for COVID-19 during the Tokyo 2020 Olympics and Paralympics. The results of the screening tests for COVID-19 were shared among venue medical officers each day.

Preparations for heatstroke

Olympians could travel near the Izu Velodrome using cars provided by the TOC. Spectators and volunteers were transported by buses to a bus stop near the Izu Velodrome from the nearest railway stations (Fig. 4). The distance from the bus stop to the entrance of the Izu Velodrome was less than 100 m, with a gentle slope. The Izu Velodrome was air conditioned, so special measures were not implemented.



Fig. 4. Shuzenji and Ito railway stations were treated as last mile relief stations during the Tokyo 2020 Olympic and Paralympic Games.

Preparations for terrorism

A large number of police officers were placed inside and outside of Izu Velodrome, in addition to the last mile (from the nearest railway station to the Izu Velodrome) (Fig. 4). A police helicopter also performed surveillance flights during the Games. In advance, training for terrorism was undertaken by the local government, fire department, police, designated hospitals, and associates at Izu Velodrome and Shuzenji railway station, which was one of the last mile stations.^{4,5}

RESULTS

Characteristics of patients treated by clinic staff

Tokyo 2020 Olympics

MINIMUM AND MAXIMUM outside temperatures in Shizuoka Prefecture from August 2 to August 8, 2021 were 24.8°C and 34.2°C, respectively.

Clinic for Olympians The estimated maximum number of people who participated at Izu Velodrome, as Olympians and their associates, was 1,400. During the Olympic Games, three or four cyclists crashed each day. Among them, five Olympians and one umpire who were injured in bicycle

crashes⁶ were transported to Juntendo Shizuoka Hospital. All of them had fall-related injuries. The diagnoses of the six patients were as follows: facial contusion, $n = 1$; rib fracture, $n = 1$; clavicular fracture, $n = 1$; radial distal fracture, $n = 1$; scapular fracture, $n = 1$; and multiple severe injuries (injury severity score, 19),⁷ $n = 1$. The latter patient was transported to Juntendo Shizuoka Hospital by ground ambulance because the physician-staffed helicopter was transporting another patient at that time. The Olympian required hospitalization in the intensive care unit and a favorable outcome was obtained.

Clinic for spectators Table 1 shows the characteristics of patients treated at the clinic for spectators. There were nine patients, six of whom were volunteers; the remaining three were spectators. Two volunteers showed side-effects of vaccination for COVID-19. One of the two volunteers returned home after treatment. None of the patients were transported to Juntendo Shizuoka Hospital. The maximum number of spectators accommodated at Izu Velodrome was 3,600, and half the number of spectators (1,800) was allowed to attend due to countermeasures against COVID-19 infection. Approximately 600–800 spectators per day actually attended Izu Velodrome during the Tokyo 2020 Olympics. The total number of spectators at Izu Velodrome was approximately 5,000. Accordingly, the patient presentation rate was 3/5,000 and no spectators required transportation to hospital.⁸

Table 1. Characteristics of patients treated at the medical clinic for spectators at Izu Velodrome during the Tokyo 2020 Olympics

Age (years)	Sex	Diagnosis	Nationality	Classification
28	Male	Insect sting	JPN	Volunteer
59	Female	Side-effect of vaccination (vomiting)	JPN	Volunteer
20	Male	Insect sting	JPN	Volunteer
41	Male	Sunburn	JPN	Volunteer
20	Female	Menstrual pain	JPN	Spectator
59	Male	Dehydration (COPD)	JPN	Spectator
43	Male	Side-effect of vaccination (headache)	JPN	Volunteer
44	Female	Motion sickness	JPN	Spectator
60	Male	Removal of sutures	Foreigner	Olympic staff

JPN, Japan; COPD, chronic obstructive pulmonary disease.

Unfortunately, we could not count the total number of workers, including volunteers at Izu Velodrome in during the Tokyo 2020 Olympics.

Tokyo 2020 Paralympics (held without spectators)

The minimum and maximum outside temperatures in Shizuoka Prefecture from August 25 to August 28, 2021 were 24.9°C and 34.8°C, respectively.

Clinic for Paralympians The estimated maximum number of Paralympians and their associates who were present in Izu Velodrome was 1,100. During the Paralympics, a total of two bicycle accidents occurred. However, none of the Paralympians visited the clinic.

Clinic for spectators Three volunteers were treated at the clinic. Two of the three volunteers had grazes due to falling down. The remaining patient had a bee sting. All returned to work after treatment.

Total number of staff at the two clinics and their working time In total, 11 physicians and 22 nurses worked in the clinic for spectators, and 44 physicians, 29 nurses, and 28 physical therapists worked in the clinic for Olympians and Paralympians.

Regarding the clinic for Olympians at the Tokyo 2020 Olympics, the working time was 7:30 a.m. to 8:00 p.m. from July 20 to August 8 (including the official training period), and 6:30 a.m. to 2:15 p.m. on August 8. At the Tokyo 2020 Paralympics, the working time was 7:30 a.m. to 8:00 p.m. from August 20 to August 24 (official training period), 6:30 a.m. to 5:40 p.m. from August 25 to 27, and 6:30 a.m. to 2:15 p.m. on August 28.

Regarding the clinic for spectators at the Tokyo 2020 Olympics, the working time from was from 12:30 p.m. to 9:30 p.m. from August 2 to August 7, and 7:00 a.m. to 4:00 p.m. on August 8. At the Tokyo 2020 Paralympics, the working time was 7:30 a.m. to 6:30 p.m. from August 25 to August 27, and 7:00 a.m. to 4:00 p.m. on August 28.

COVID-19 infection There were no confirmed cases of COVID-19 among Olympians, Paralympians, or volunteers—including medical staff—in relation to the Tokyo 2020 cycling track events.

DISCUSSION

THE PRESENT STUDY showed the activities of the two clinics for Olympians, Paralympians, and spectators at the Izu Velodrome, where track cycling events of the Tokyo 2020 Olympics (with spectators) and Paralympics (without spectators) were held during the COVID-19 pandemic. We undertook a PubMed search using the key words “track cycling” and “clinic”, however, we could not find any reports concerning the activity of clinics at indoor track cycling events, or the results of their activities.

Based on the results of the present study, Olympians had the most important demand for medical care. Among the Olympic and Paralympic Games, cycling events are considered particularly dangerous, as the potential exists for fatal injuries to occur.^{7,9–12} The physical ability of Olympians and Paralympians in these competitions could increase the risk of fatal accidents.^{10,11} Fortunately, although there were cases of serious injury, there were no fatal accidents in any events during the Tokyo 2020 Olympic and Paralympic Games. Accordingly, medical services for Olympians and Paralympians are definitively necessary to provide appropriate first aid, and to transport

patients to designated hospitals for definitive diagnosis and treatment.

With regard to spectators and volunteers during indoor sports events with air conditioning, there was almost no demand for medical care for spectators, even though the events were held in the hot summer season. In addition to the controlled indoor temperature, the spectators tended to be young. Younger, healthy individuals tend to suffer heatstroke less frequently than older people.¹³ In contrast, some of the volunteers working outside the Izu Velodrome experienced outdoor-related disease.¹⁴ Accordingly, medical services for spectators and volunteers may also be necessary, even when an event is held without spectators.¹⁵ Furthermore, security for the Olympic and Paralympic Games has become undeniably visible in recent years.¹⁶ A certain degree of this visibility became unavoidable after the 1972 Munich Olympics, when military and/or police personnel and hardware became standard elements of Olympic security.¹⁶ To prepare for all possible security threats, especially catastrophic threats and worst-case scenarios, medical clinics and staff are definitively necessary to provide appropriate first aid at mass gathering events like the Olympics. Fortunately, no such worst-case scenario occurred during the Tokyo 2020 Olympic and Paralympic Games, with the exception of the largest surge of COVID-19 infection in Japan. As the COVID-19 pandemic resulted in the events of the Tokyo 2020 Olympics/Paralympics being held without spectators, and induced severe damage in Japan and throughout the world, we hope that the Paris 2024 Olympics/Paralympics will be held in peaceful times.

CONCLUSION

THE PRESENT STUDY described the activities of two medical clinics at the Tokyo 2020 Olympics and Paralympics. Both clinics were necessary for the safe operation of the Olympic and Paralympic Games.

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DISCLOSURE

Approval of the research protocol: The protocol of this retrospective study was approved by our institutional review board (IRB #298), and the examinations were carried out

according to the standards of good clinical practice and the Declaration of Helsinki.

Informed consent: N/A.

Registry and registration no. of the study/trial: N/A.

Animal studies: N/A.

Conflict of interest: None.

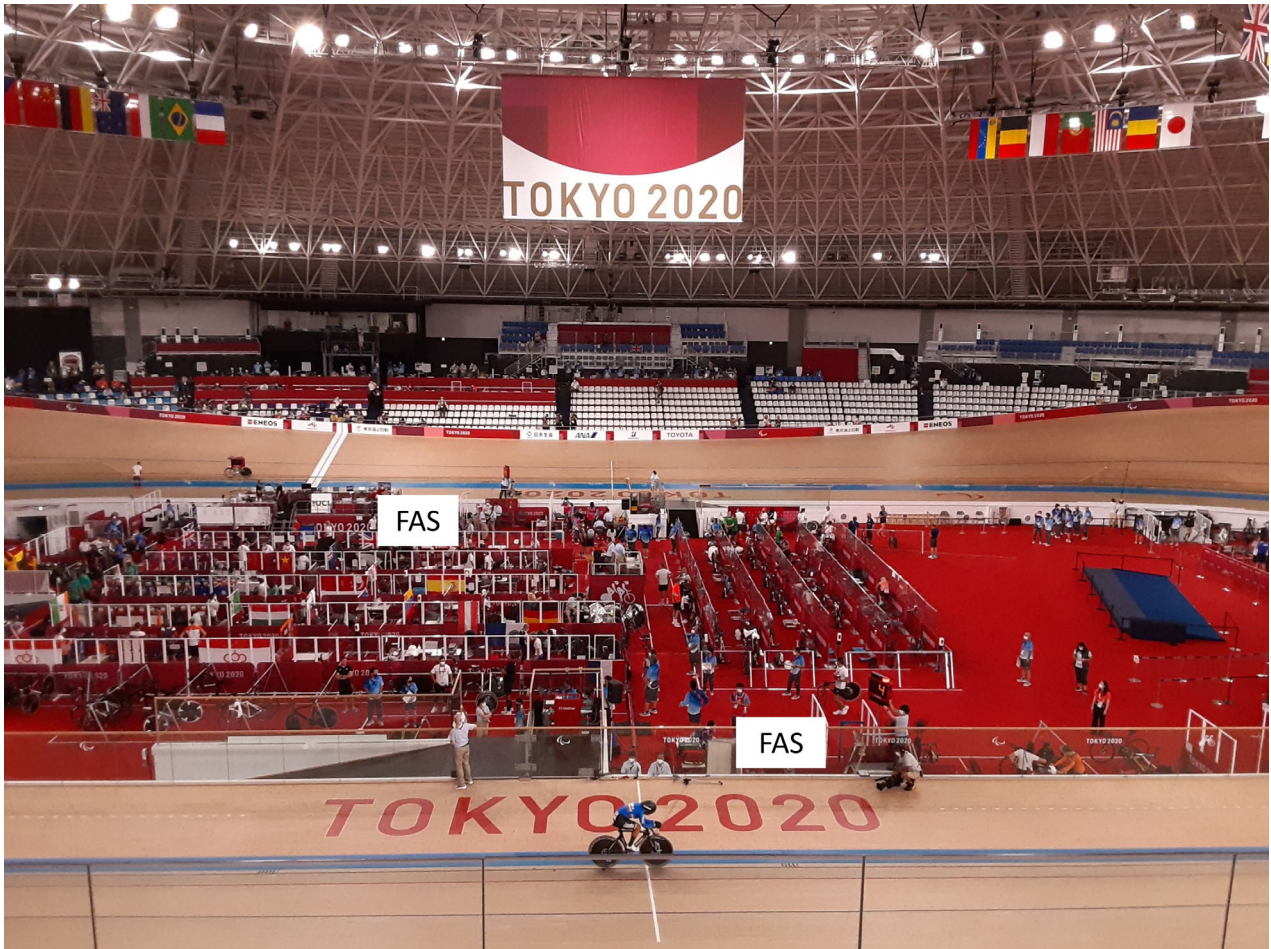
REFERENCES

- 1 Soligard T, Steffen K, Palmer D *et al.* Sports injury and illness incidence in the Rio de Janeiro 2016 Olympic Summer Games: A prospective study of 11274 athletes from 207 countries. *Br J Sports Med.* 2017; 51: 1265–71.
- 2 Engebretsen L, Soligard T, Steffen K *et al.* Sports injuries and illnesses during the London Summer Olympic Games 2012. *Br J Sports Med.* 2013; 47: 407–14.
- 3 Yanagawa Y. Preparedness, including preparation of a physician-staffed helicopter, for the Tokyo 2020 Olympic and Paralympics Games in Shizuoka prefecture. *Juntendo Med J* 2020; 66(Suppl 1): 53–7.
- 4 Yanagawa Y, Ishikawa K, Takeuchi I *et al.* Should Helicopters Transport Patients Who Become Sick After a Chemical, Biological, Radiological, Nuclear, and Explosive Attack? *Air Med J.* 2018; 37(2): 124–5.
- 5 Yanagawa Y. Japanese responders train for railway attack. *EMS World.* 2019; special supplement : MCI training and presence: 6-7.
- 6 Baer J. Massive cycling crash takes out 7 athletes, including defending champ. *Yahoo Sports.* 2021 August 8. [cited 3 Feb 2022]. <https://www.msn.com/en-us/sports/olympics/massive-cycling-crash-takes-out-7-athletes-including-defending-champ/ar-AAN3Uw8>
- 7 Reuters Olympics-Cycling-Dutch rider Van Riessen sent to hospital after huge crash. Aug 5, 2021. https://news.yahoo.com/olympics-cycling-dutch-rider-van-083309189.html?fr=sycsrp_catchall
- 8 Turris S, Rabb H, Chasmar E, Munn MB, Callaghan CW, Hutton A, Ranse J, Lund A. Prehosp Disaster Med. 2021. Measuring the Masses: A Proposed Template for Post-Event Medical Reporting (Paper 4) - CORRIGENDUM.
- 9 Venara A, Mauillon D, Gaudin A, Rouge-Maillart C, Jousset N. Fatal falls from bicycles: a case report. *Forensic Sci Int.* 2013; 226: e1–3.
- 10 Cooke CT, Margolius KA, Cadden GA. Cycling fatalities in Western Australia. *Med J Aust.* 1993; 159(11-12): 783–5.
- 11 Segarra LM. These Athletes Have Died While Competing in the Olympics Over the Years. *Time.* 2018. Feb 14. https://news.yahoo.com/athletes-died-while-competing-olympics-234044645.html?fr=sycsrp_catchall
- 12 Rio Paralympics. 2016: Iranian Para-cyclist dies after crash. *BBC Sport* 2016; 18 September. <https://www.bbc.com/sport/disability-sport/37398333>

- 13 Bobb JF, Obermeyer Z, Wang Y, Dominici F. Cause-specific risk of hospital admission related to extreme heat in older adults. *JAMA*. 2014; 312: 2659–67.
- 14 The National Institute for Occupational Safety and Health. Hazards to outdoor workers. Centers for Disease Control and Prevention. <https://www.cdc.gov/niosh/index.htm>
- 15 Hosokawa Y, Nagata T, Hasegawa M. Inconsistency in the Standard of Care-Toward Evidence-Based Management of Exertional Heat Stroke. *Front Physiol*. 2019; 10: 108.
- 16 Boyle P, Haggerty KD. Planning for the worst: risk, uncertainty and the Olympic Games. *Br J Sociol*. 2012; 63: 241–59.

Graphical Abstract

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The present study described the activities of two medical clinics at the Tokyo 2020 Olympics and Paralympics at Izu Velodrome. Both clinics were necessary for the safe operation of the Olympic and Paralympic Games.