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ORIGINAL ARTICLE

Lots of luck on thin ice from Tokyo to Paris: Following the track of the preparedness and results of Emergency Medical Services and Disaster Medical Response during 2020 Tokyo Olympic and Paralympic Games from the Perspective of Academic Consortium (AC2020) of Japan and Medical Advisory Board of Tokyo Metropolitan Government

Suivi de la préparation et des résultats des services médicaux d'urgence et de l'intervention médicale en cas de catastrophe pendant les Jeux Olympiques et paralympiques de Tokyo 2020 du point de vue du Consortium académique (AC2020) du Japon et du Conseil Consultatif Médical du gouvernement métropolitain de Tokyo. Bonne chance pour cette traversée de Tokyo à Paris sur une fiche couche de glace !

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incident

Summary

Introduction. — The 2020 Tokyo Olympic and Paralympic Games (2020 Tokyo Olympics) was held in Japan during the pandemic of new coronavirus infection (COVID-19) in 2021.

Preparedness. — In 2016, the Academic Consortium consisting of 29 major medical associations (AC2020) was launched and undertook medical risk assessment, issuing statements, and disseminating manuals/guidelines, training materials through its website. Administratively, Tokyo Organizing Committee of the Olympic and Paralympic Games (TOC) was responsible for preparations inside the venue, while Tokyo Metropolitan Government (TMG) was responsible for preparations on the last mile and around the venue. In response to the AC2020 recommendation, the TOC and TMG has set up the subcommittee for reviewing emergency and disaster medical systems for the games. Finally, the 2020 Tokyo Olympics gave up accepting spectators from abroad and limited domestic spectators. The multi-organizational training was not systematically performed until just prior to the event due to the delay in deciding on the form of this big event.

Results. — A total of 779,820 people participated during the entire period. The 316 patients were seen at hospitals including 53 COVID-19 cases, and the patient presentation rate (PPR) was 2.4/1000. The COVID-19 cases in Japan increased as the games approached, and a major wave peak of the epidemic was observed during the games.

Conclusion. — If MCI had occurred during the games, the current medical care system would not have been able to cope with such situation. We were walking on thin ice, but fortunately, we didn't step out and drown in the water.

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MOTS CLÉS

Jeux olympiques ;
Paralympiques ;
Rassemblement de
foule ;
Services médicaux
d'urgence ;
SAMU ;
Dispositif
prévisionnel de
secours ;
Santé publique ;
COVID-19 ;
Catastrophe ;
Afflux de victimes

Résumé

Introduction. — Les Jeux Olympiques et Paralympiques de Tokyo 2020 (Jeux Olympiques de Tokyo 2020) ont eu lieu au Japon pendant la pandémie COVID-19 en 2021.

Préparation. — En 2016, le Consortium Académique composé de 29 grandes associations médicales (AC2020) a été lancé et a entrepris une évaluation des risques médicaux, publié des mises aux points et diffusé des manuels/directives, du matériel de formation via son site Web. Sur le plan administratif, le comité d'organisation des Jeux olympiques et paralympiques de Tokyo (TOC) était responsable des préparatifs à l'intérieur du site, tandis que le gouvernement métropolitain de Tokyo (TMG) était responsable des préparatifs sur le dernier kilomètre et autour du site. En réponse à la recommandation AC2020, le COT et le TMG ont mis en place le sous-comité chargé d'examiner les dispositifs prévisionnels de secours pour les urgences et en cas de catastrophe pour les jeux. Enfin, les Jeux Olympiques de Tokyo 2020 ont renoncé à recevoir des spectateurs étrangers et ont limité les spectateurs nationaux. La formation multi-organisationnelle n'a été systématiquement effectuée que juste avant l'événement en raison du retard dans la décision sur la forme de ce grand événement.

Résultats. — Au total, 779 820 personnes ont participé pendant toute la période. Les 316 patients ont été vus dans les hôpitaux dont 53 cas de COVID-19, et le taux de présentation des patients (PPR) était de 2,4/1000. Les cas de COVID-19 au Japon ont augmenté à l'approche des jeux, et un pic de vague majeur de l'épidémie a été observé pendant les jeux.

Conclusion. — Si un afflux de victimes s'était produit pendant les jeux, le système de soins médicaux actuel n'aurait pas été en mesure de faire face à une telle situation. Nous marchions sur de la glace mince, mais heureusement, nous n'avons pas dérapé et ne nous sommes pas noyés dans l'eau.

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Introduction

The Olympics and Paralympics are one of the largest mass gathering events in the world. Mass gathering events are defined as “the concentration of people at a specific location for a specific purpose over a set period of time that have the potential to strain the planning and response resources of the host country or community” by the World Health Organization (WHO) [1].

Mass gatherings also have the potential risk to escalate the transmission of widespread infectious diseases.

The 2020 Tokyo Olympic and Paralympic Games (2020 Tokyo Olympics) was held in Japan during the pandemic of new coronavirus (SARSCoV-2) infection (COVID-19) [2] in the summer of 2021.

In this article, the outline of the preparedness of emergency and disaster medical care system related to the running of this big event, and the outcome of the medical challenges in hosting the 2020 Tokyo Olympics are hereby described from the perspective of the academic consortium and the advisory board of emergency and disaster medical response planning of the 2020 Tokyo Olympics and COVID-19 in the health and welfare bureau of Tokyo metropolitan government.

Preparedness

Establishment of AC2020

In April 2016, the “Academic Consortium on Emergency Medical Service and Disaster Response Plan during the Tokyo Olympic and Paralympic Games in 2020” (AC2020) was launched to provide academic support for the establishment of an emergency and disaster medical system dedicated to the 2020 Tokyo Olympics [3].

Twenty-nine various Japanese major medical associations participated in the AC2020. The joint committee of AC2020, consisting of members from each association, has been set up as a department in charge of gathering knowledge from each specialty field (Fig. 1), undertaking academic studies, issuing statements, and disseminating manuals/guidelines, seminar information, lecture contents, and simulation training materials through its website. A lot of manuals and guidelines were released dealing with penetrating/explosive injuries, cardiac arrest during sports, management of multiple burn cases and management of intensive care units and operating rooms, infection control, and for nurses working at mass gathering events, and so on (Table 1).

AC2020 aims to be a “platform” for the transmission of information by experts, and a “portal” of information source for citizens and those involved in planning. AC2020 put these contents together under the “The Mass Gathering Medical Guidebook (in Japanese)” and uploading it to the web in the spring of 2022. An English version is scheduled to be released following this Japanese version.

Box 1 : Medical risk and its cause related to the 2020 Tokyo Olympics.

Concentration of people in venue and surrounding area

- Impact on daily emergency medical system
 - Increase of number of medical telephone consultations and ambulance calls
 - Increase of ambulance usage
 - Hospitals burden resulting from increase of referral to ED

- Impact on disaster medical system
 - MCI due to increased population density in limited areas
 - Earthquake directly under the capital city as an assumed natural disaster

Weather condition related

- Heatstroke
- Lightning strike
- Nationwide increase in tourists including visiting foreigners

- Epidemic of infectious disease

- COVID-19

- Impact on daily emergency medical system
 - Language, religion, insurance, repatriation
 - High international interest related

- Multisite MCI caused by terrorism

- Explosion, gunshot wound, special disaster
- Health care workers related

- Training of large number of medical staff and volunteers

ED: emergency department; MCI: mass casualty incident.

Recommendations for the establishment of a system based on organizing and presenting the medical risks by the AC2020

The AC2020 has identified four major categories of risk based on reports of past Olympic Games [4–9] (Box 1). The first is a temporary increase in the population of the host and surrounding areas. This will place an additional burden on the emergency medical system, which is under pressure on a daily basis [8,9]. An increase in workload for emergency telephone counseling and the operation of ambulance dispatch is considered inevitable. In addition to the increase in the number of emergency room visitors, there are concerns about the possibility of delays in the start of basic treatment caused by traffic network disruption due to congestion and delays between the arrival of ambulances and the arrival on a hospital [7,10]. The increase in infectious diseases due to the increased flow of people from home and abroad has also been cited as a risk from the outset. The second risk is the weather condition of the event [6]. In the extremely hot and humid environment, there is concern about increase in the occurrence of heat stroke not only at outdoor competitions, but also at large outdoor event sites called “live

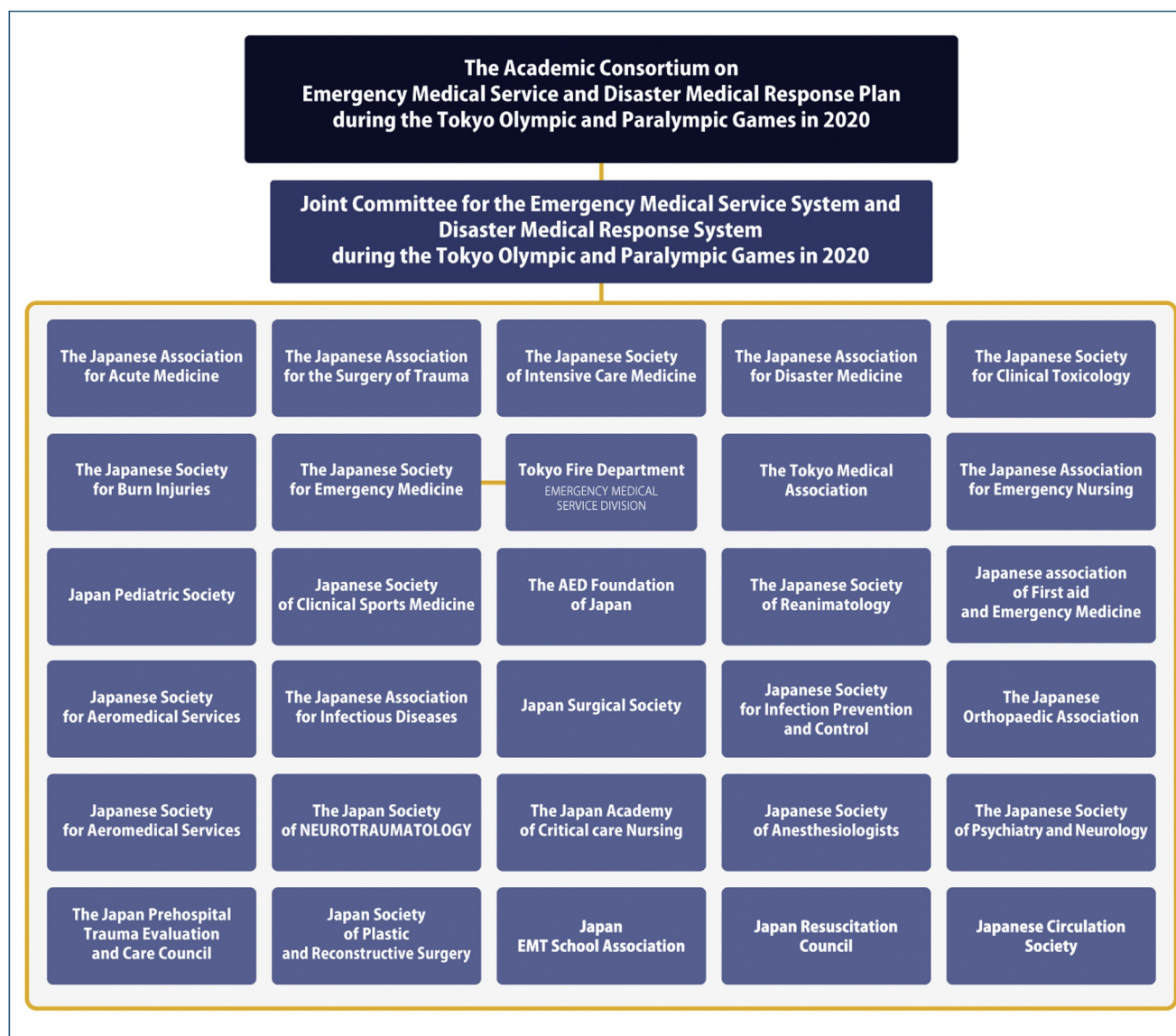


Figure 1. Organization chart of the AC2020.

sites'' and on route from the nearest train station to the competition site (the last mile), where large crowds are expected. The third issue is the increase in the number of foreign visitors to Japan, which is expected to be nationwide. The workload related to language, religion, insurance, and repatriation will have a significant impact on the daily emergency medical care system. The fourth is the risk of mass casualty incidents (MCI) caused by terrorism in light of the recent international situation or by other events resulting from the increase in population density. It is necessary to bear in mind the possibility of bombings, gunshot wounds, and special disasters, of which there is little experience in Japan. Based on these issues, the AC2020 has identified the following as important issues: ensuring a routine emergency medical care system, establishing medical care system for large-scale events, and responding to unforeseen circumstances.

Medical system preparation inside and outside the venue

Administratively, Tokyo Organizing Committee of the Olympic and Paralympic Games (TOC) was responsible for preparations inside the venue, while Tokyo Metropolitan Government (TMG) was responsible for preparations on the last mile leading to the venue, in penumbra, and around the venue.

The TOC was in charge of developing a medical system for athletes and spectators at the venues, as well as the athletes' village, the Olympic family accommodation facilities, and the media.

Medical service system at each venue

TOC has formulated a basic plan for the on-site medical system based on its experience in preparing for the FIFAWC and

Table 1 Released statements, guidelines, manuals from AC2020 through its website (excerpts).

No.	The organization in charge of document preparation	Document type	Title of document	Uploaded date
1	AC2020 Joint Committee	Statement	Formation of AC2020 joint committee	20 May, 2016
2	AC2020 Joint Committee	Statement	Basic policy of emergency medical service and disaster medical response plan during Tokyo Olympic 2020	30 Sep, 2016
3	AC2020 Joint Committee	Report	Report from participating organizations	7 Nov, 2017
4	AC2020 Joint Committee	Statement	The kick-off symposium of AC2020	7 Nov, 2017
5	Japanese Society of Intensive Care Medicine	Report	Survey of ICU capacity of each hospital around each venue	20 Apr, 2018
6	Japanese Society for Burn Injuries	Guideline	Survey on severe burn and guidebook of first response on burn	20 Apr, 2018
7	AC2020 Joint Committee	Statement	Proposal on necessity for multi-agency coordination center for medical and first response system at mass-gathering events	20 Apr, 2018
8	AC2020 Joint Committee	Statement	Proposal from the consortium regarding preparation for mass-gathering event based on a plan by Tokyo Metropolitan	20 Apr, 2018
9	The AED Foundation of Japan	Statement	Preventing sudden death during Exercise	18 May, 2018
10	The Japanese MHLW research team	Report	Report of the Japanese MHLW research team	19 June, 2018
11	AC2020 Joint Committee	Statement	Proposal for constructing medical and first responding system in event-site during Tokyo Olympic 2020	24 July, 2018
12	AC2020 Joint Committee	Recommendation	Consortium proposal of requirements for medical and EMS staffs, ver.1	5 Sep, 2018
13	Tokyo Medical Association	Event-News	Workshop program on disaster responses for Tokyo Olympic and Paralympic Games by Tokyo Medical Association	19 Sep, 2018
14	Japanese Association for The Surgery of Trauma	Guideline	Guideline of treatment for trauma by gunshot and explosion	20 Sep, 2018
15	Japanese Society for Aeromedical Services	Overseas invited lecture	Prehospital emergency medical care at the 2020 Tokyo Olympics -Based on the experience of London helicopter emergency medical service response at the 2012 London Olympics	12 Oct, 2018
16	AC2020 Joint Committee	Recommendation	Consortium proposal of requirements for medical and EMS Staffs, ver.2	18 Oct, 2018
17	The Japanese Society of Intensive Care Medicine	Report	Guidance for disaster responses and preparedness in ICU	5 Nov, 2018
18	Japanese Society for Emergency Medicine	Guideline	Guideline of medical care for heatstroke	12 Dec, 2018
19	Japanese Society for Emergency Medicine	Guideline	Guideline of medical care points for visiting foreigners	12 Dec, 2018
20	National Center for Global Health and Medicine	Report	Report of symposium on medical preparedness for Tokyo Olympic Paralympic Games 2020	21 Dec, 2018

Table 1 (Continued)

No.	The organization in charge of document preparation	Document type	Title of document	Uploaded date
21	The Japanese Association for Emergency Nursing, The Japan Academy of Critical Care Nursing, The Japanese Society for Emergency Medicine, The Japanese Society of Intensive Care Medicine, The Japan Society for Infection Prevention and Control, The Japanese association of First aid and Emergency Medicine	Guideline	Guideline for nurses on Tokyo Olympic and Paralympic Games 2020	19 Feb, 2019
22	AC2020 Joint Committee	Recommendation	The curriculum and program for the knowledge and skills training necessary for medical staff during the event have been started.	19 June, 2019
23	Japanese Orthopaedic Association		Questionnaire result about correspondence at the time of genital injury	29 July, 2019
24	Japanese Association for Infectious Diseases	Manual	Response to Inbound Infectious Diseases, For Tokyo 2020 Games: Infectious Diseases Quick Reference	29 July, 2019
25	Japanese Society for Burn Injuries updated	Report	“Survey on the current state of medical care for severe burns, Heisei 30th” supported by Administrative Promotion for Survey of the Ministry of Health, Labor, and Welfare.	23 Aug, 2019
26	Japanese Association for Acute Medicine	Report	Committee visit report on heat stroke and hypothermia	12 Sep, 2019
27	Japanese Association for Acute Medicine	Statement	The symposium session in “Emergency and disaster medical system for international mass gatherings events”	7 Oct, 2019
28	Japanese Association for Acute Medicine	Report	The panel discussion in “Activities and issues for the Academic Consortium on Emergency Medical Service and Disaster Medical Response Plan during the Tokyo Olympic and Paralympic Games in 2020”	7 Oct, 2019
29	AC2020 Joint Committee	Recommendation	The medical staff training for the athletes in the venue has been started by the program created by the consortium	24 Nov, 2019
30	Special Research in Health and Labor Sciences	Guideline	FOURTH GENERATION AGENTS: MEDICAL MANAGEMENT GUIDELINES (updated: January.18.2019) (in Japanese translation)	16 Jan, 2020
31	Japanese Society of Anesthesiologists	Guideline	Guideline of in-hospital response for mass casualty incident: the final version	3 Feb, 2020
32	Japanese Society for Infection Prevention and Control	Guideline	Instructional video in countermeasure for imported infectious disease “To prevent an outbreak: Infection control measure we all can start and deal with”	3 Feb, 2020

Table 1 (Continued)

No.	The organization in charge of document preparation	Document type	Title of document	Uploaded date
33	AC2020 Joint Committee	Statement	Activities of response to COVID-19 by AC2020	17 Mar, 2020
34	Japan Pediatric Society	Manual	ONLINE QQ: Guide for pediatric medical emergency	5 June, 2020
35	AC2020 Joint Committee	Guideline	Guideline for holding training course of emergency/disaster medicine during the epidemic of COVID-19	27 July, 2020

the results of its hosting. The medical plan of FIFA World Cup Games in 2002 learned a lot from the French medical plan of FIFA 1998, and at that time the Scientific Research Group of the Ministry of Health, Labor and Welfare of Japan provided much of the medical advice [4].

Based on the previous guidelines, one medical office for spectators was set up per 10,000 people per venue. For the first 10,000 people, two doctors and four nurses were assigned. For each additional 10,000 people, one additional doctor and two nurses were assigned. In the Field of Play (FOP), a medical office was set up for athletes and referees, and doctors, nurses, dentists, and physical therapists were assigned according to the characteristics of the sport.

The Venue Medical Officer (VMO) was in charge of medical supervision of the entire Venue; mainly responsible for spectator care, and doctors and nurses were dispatched from university hospitals and core hospitals in the region, which were assigned to each venue. The Athlete Medical Supervisor (AMSV) was mainly responsible for athlete care, and sports doctors affiliated with each athletic organization were in charge of this. Depending on the sport, physicians and team doctors from international athletic federations also participated (Fig. 2).

In addition, as in previous Games, a polyclinic was set up in the athletes' village. Doctors working at the polyclinics were mainly general practitioners and emergency physicians, who were systematically dispatched from related societies and organizations at the request of the TOC. Hospitals were designated in advance for athletes and VIPs. If the injured or illness was not suitable for transportation to a designated hospital, such as if the patient was in shock requiring immediate medical attention, it was possible to choose transportation to a regular tertiary emergency medical institution.

AC2020 presented the requirements for the skills and knowledge of medical staff working in the venue. In response, TOC asked AC2020 to help develop an education and training program for medical and volunteer staff. The program started in the fall of 2019 consisting 13 e-learning materials and practical training content for 4 items (CPR, initial trauma care, first aid, and disaster triage/radio communication). After the event, a survey was conducted on the status of pre-training venue medical staff and volunteers. Of the 7,497 participating staff eligible for training, 94.1% had completed some form of face-to-face group or remote training, or DVD on-demand self-training.

Tokyo Metropolitan Government response

Below we report on the process of establishing the system and its activities in Tokyo, where 24 of the 43 venues of the Olympic games were located.

Establishment of subcommittees

In response to the recommendations from the AC2020 [11], the TMG has set up the subcommittee for reviewing emergency and disaster medical systems at large-scale events as a medical advisory board dedicated to the 2020 Tokyo Olympics at the end of 2018. The initial aim was the following issues:

- the securing of daily emergency medical systems including for "penumbra", i.e., people affected by the event even if they do not participate, such as local residents [8];
- building a medical system for the 2020 Tokyo Olympics officials including athletes, domestic and foreign spectators, and a large number of domestic tourists and visiting foreigners, and;
- measurement against Mass Casualty Incidents caused by terrorism and natural disasters.

The subcommittee held regular monthly meetings from January 2019, assessed medical risks of "last mile" of venues, and formulated categorized medical support plans.

Risk identification and response planning

At the beginning of assessment, heat stroke was considered as the greatest medical risk during the hot and humid summer season in addition to MCI. We therefore quantitatively or qualitatively evaluated the degree of load that the emergency medical care system in each of the regions centering on the Tokyo Olympics venues would face during the games, and categorized the medical support according to the degree of load. The following three indicators of load in the region centered on each venue were established.

Daily medical supply capacity within each regional area: total T-score (sum of T-scores calculated from the number of doctors, number of nurses, total number of beds, and number of additional beds for emergency medical services at each medical institution):

Based on data by tertiary and secondary emergency medical institutions in Tokyo, correlation analysis between such items was conducted to select the four items mentioned above, and robust z-scores were calculated to standardize the values for each item, where T-score is a conversion of

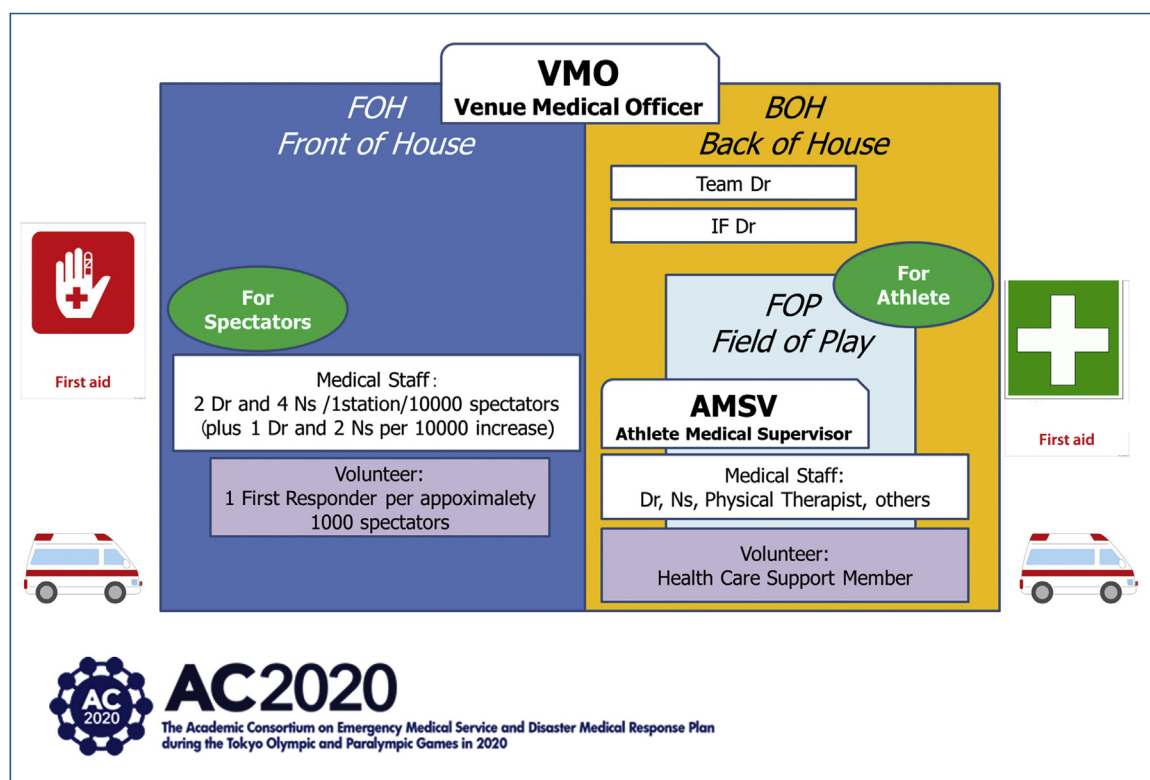


Figure 2. Medical service system at each venue. Dr: doctor; Ns: nurse; IF: international federation; First aid: first aid station.

the robust z-score. They are calculated by the following equation:

Robust $z\text{-score} = (x - \mu) / (MAD \times 1.4826)$, μ = median value, MAD (median absolute deviation) = median $(|x_i - \mu|)$, $T\text{-score} = 50 + 10 \times z\text{-score}$

MCI response capacity within each region which is defined the number of emergency center facilities capable of transporting patients within 60 minutes of a disaster and the median estimated time to arrive at the scene after requesting an ambulance (42 ambulances) for high urgency cases. Assuming a uniform number of MCI patients at a single location of 300, and assuming that 14% (42) of these patients require rapid medical transport due to high urgency, as in past cases in Japan, the calculation is based on ambulance data from the Tokyo Fire Department.

Demand-supply ratio of emergency medical services (which we named Risk-Resource Ratio: RRR) during mass gathering:

$$\left[\frac{\text{[Number of patients per day daily accepted by medical facilities within a 2-kilometer radius]} + \text{[emergency demand added during mass gathering (projected crowds at each site multiplied by injury and illness incidence rate*)]}]{\text{total T-score}} \right]$$

*The rate in Tokyo was calculated using the formula = number of patients seen in Tokyo per day [Sunday, July 22, 2018] (number of patients coming alone + number of ambulances brought in = 6,383) / Tokyo population [15,920,000 daytime residents].

The values of these indicators were then used to formulate a flowchart for the typology of medical support for

each region centered on the venue (Types A, B, C, D, and E) (Fig. 3).

Command and control system

In line with the Consortium's recommendations, a system was created from the preparatory stage to ensure constant, real-time coordination between the Medical Coordination Headquarters within the Main Operation Center, which is located within the Organizing Committee, and the Medical Section within the City Operation Center, which oversees the entire Tokyo Metropolitan Government.

Preparation of information and communication system

Hierarchy of information platforms was prepared and planned in advance to define who would share what and when utilizing what information tools.

Staffing

GPs from the Tokyo Metropolitan Medical Association were mainly in charge of the last mile, and a support system was planned, including the establishment of medical aid stations according to the aforementioned risk types. However, as there were almost no visitors in Tokyo in the end, only medical aid stations were set up at some Type A venues. Penumbra, therefore, went ahead with the current emergency medical care system.

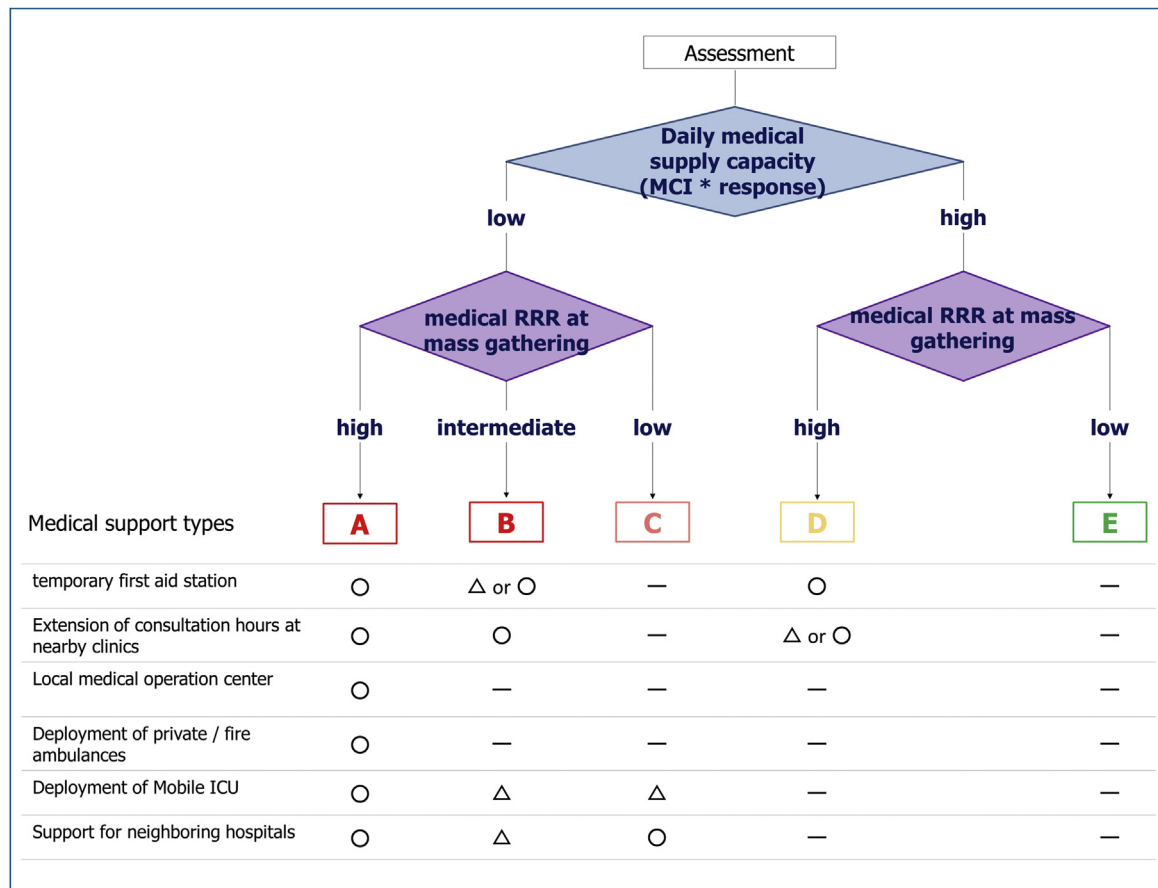


Figure 3. Type of medical support for each region centered on the venue. ○:required. △:may be required. -:not applicable. MCI: mass casualty incident. MCI response; low if number of available hospitals ≤ 2 or on site to hospital transport time > 15 mins. Medical response capacity; low if total T-score ≤ 152 . RRR: Risk Resource Ratio: high if $RRR \geq 0.12$, intermediate if $RRR = 0.11$, low if $RRR \leq 0.1$. Each value is the median for each indicator.

Infection control measures

Following the decision on March 24, 2020, to postpone the games by one year, an inter-organizational “Coordination Meeting on COVID-19 Countermeasures at the Tokyo Olympics” was launched in September 2020, with the Cabinet Secretariat as the secretariat. In order to thoroughly avoid the introduction of COVID-19 into Japan through the participating athletes, officials, and spectators, as well as its spread both domestically and internationally, this meeting discussed and adopted the “bubble method”. This method was an infection control method that limited the movement and stay of athletes and related persons to a certain space in order to avoid contact with the outside world as much as possible. As it is called, a large bubble that envelopes and divides the inside and the outside, thus restricting the places of stay to accommodations, training grounds, and stadiums, and separating the means of transportation from those of general public.

AC2020 prepared and provided the administration with a manual on how to deal with the sick on the last mile during the epidemic period of infection, measures to be taken in first aid stations, and how to deal with medical offices in the competition venues [3].

The five-party conference (government, TMG, TOC, International Olympic Committee (IOC), and International

Paralympic Committee (IPC)) decided to give up accepting spectators from abroad in March 2021, in light of the domestic infection situation.

The five-party panel finally decided on July 8, two weeks before the Games, to limit the number of domestic spectators. Of the 43 venues, 35 venues in Tokyo and three neighboring prefectures that were under the COVID-19 emergency declaration or subject to priority measures, and three venues out of Tokyo hosted the competition without spectators, and four venues were to be “50% of capacity or 10,000 spectators, whichever is less,” and one venue was to admit spectators as only children and students participating in spectator programs in school partnership.

Results

Based on the data provided by TOC to AC2020 with the review and approval of the Clinical Research Ethics and Review Committee of the Japanese Association for Acute Medicine, the mass gathering size (for the entire period) was 779,820 (approximate value). The breakdown was 15,820 athletes, 43,000 convention officials from abroad, 662,000 domestic convention officials, and 59,000 spectators (olympic: 43,300, paralympic: 15,700). The number of injured and

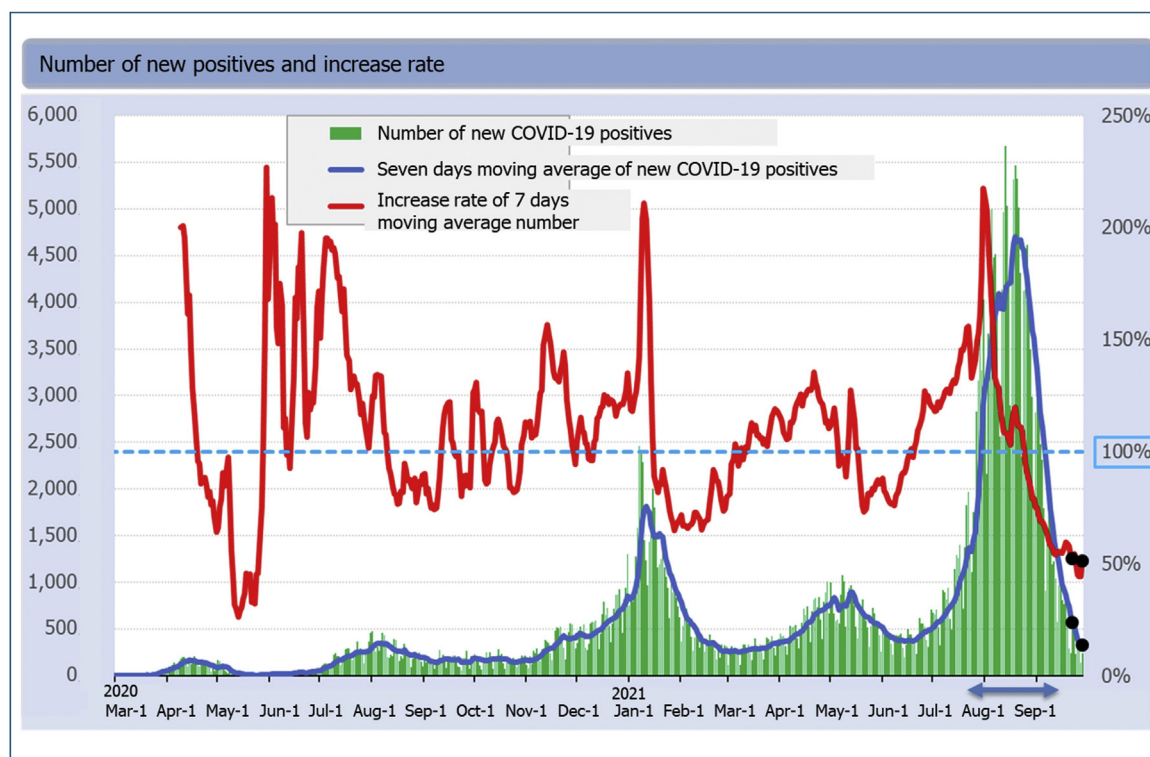


Figure 4. Trend of number of COVID-19 cases in Tokyo. Blue bidirectional arrows show the period of the 2020 Tokyo Olympics.

illness (during the competition period) was 1,856. Of these, 1,035 were spectators, officials, and media, and 821 were athletes*. The number of cases in the athletes' village was 21438 (during the entire period).

The number of patients seen at hospitals (during entire period) was 316 including 53 COVID-19 cases, of which 120 were transported by ambulance (during entire period), and 80 were hospitalized (during entire period). There were 2 out-of-hospital cardiac arrests (during entire period), both with favorable neurological outcome. The patient presentation rate (PPR) was 29.0/1000 including the athletes' village cases and 2.4/1000 excluding the athletes' village cases. The transport to hospital rate (TTHR) was 0.4/1000.

Regarding the number of COVID-19 cases in Japan, the number of cases increased as the 2020 Tokyo Olympics approached, and even though the increase ratio decreased just before the games, a major wave peak of the epidemic was observed during the games (Fig. 4).

Discussions

It was a big step forward that experts formed a consortium and provided expert advice together as one team, not just only in their individual areas. Command and control structure and communication between different organizations are usually major challenges during events and disasters, but based on the expert advices, we were able to overcome them. The fact that we were able to create a framework that encompassed both inside and outside the venue, and establish such a public-academic framework, and that the

various academic associations were able to work together to develop statements and guideline/manuals, could be considered the true fruits of this big event.

The challenge is that there are too few temporary clerks in the MOC. The future challenge will be the preparation of a proactive information sharing infrastructure with the MOC, especially since participation in the COC is a historical fact for Japan, but it is by no means functional and lacks autonomy as a department.

Another issue is the inadequate multi-organizational training on each venue and receiving hospitals including the Fire Department. The training was not systematically performed until just prior to the event, and the site thought that the event itself might not even take place, but in the end, site-specific training and multi-organizational training could not be implemented systematically.

The risk assessment method used in this study will enable us to predict the urgency and number of casualties to be transported to medical facilities in the vicinity of each site, and thus make more concrete preparations possible. At the same time, the busyness of other medical institutions in the vicinity will be known, which will be useful in advance planning for the entire region. In addition, the flowchart created in this study was thought to be simple and versatile when establishing a medical support system based on risk assessment.

The drop in the increase ratio of COVID-19 cases in Japan just prior to the Tokyo 2020 Games may be due to the effect of citizens' disciplining restraint due to the rapid increase in the number of new positive cases. On the other hand, the increase in the number of cases as the games approached

may be due to a change in behavior caused by a sense of excitement toward the Tokyo 2020 Games and baseless sense of security.

In summary, the direct impact of COVID-19 to Tokyo 2020 was not significant. This is probably due to the fact that the event was held without spectators in principle. On the other hand, considering the indirect impact, the increasing rate continued to rise until just before Tokyo 2020. The change in people's behavior need to be studied from various aspects, including social and psychological standpoint. If a mass gathering is to be held during an epidemic, it is important to take measures not only to the participants within the venue, but also to thoroughly communicate the risks to all citizens.

In these contexts, if MCI had occurred during the 2020 Tokyo Olympics, the current medical care delivery system would not have been able to cope with such situation, because we were actually very busy dealing with infectious diseases, in addition of the lack of multi-professional training due to the delay in deciding on the form of this big event.

We were actually lucky [12]. We were walking on thin ice, but fortunately, we didn't step out and drown in the water.

Approval of the research protocol

N/A.

Informed consent

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Disclosure of interest

The authors declare that they have no competing interest.

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