Title

Enhanced syndromic surveillance by the Tokyo Metropolitan Government for the 2019 Rugby World Cup: lessons learned for the Tokyo Olympic and Paralympic Games

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ICMJE Statement

All authors meet the ICMJE authorship criteria.

Author Contribution

Yoshiyuki Sugishita contributed to the study conceptualization. Yoshiko Somura contributed to the interpretation of the results. Nobuyuki Abe contributed to the manuscript drafting. All authors reviewed the manuscript draft and approved the final version for submission.

Abstract

Background: The Rugby World Cup (RWC) competition was held in Japan during September 20 through November 2, 2019. During that time, the Tokyo Metropolitan Government conducted enhanced syndromic surveillance including routine traditional surveillance based on diagnoses for RWC (ESSRWC).

Objective: This report presents a summary of incidents related to public health response in ESSRWC, with discussion of their lessons for the Tokyo Olympic and Paralympic Games of 2020.

Methods: We operated ESSRWC during September 20 through November 2, 2019. It consisted of official surveillance for diseases designated as notifiable, official sentinel surveillance, official syndromic surveillance, cluster surveillance, ambulance transfer surveillance, the Tokyo infectious alert system, and other data.

Results: We experienced one outbreak incident that required a response: dengue fever in September. Three cases of dengue fever were reported. Domestic transmission outside of Tokyo was suspected. No additional case was confirmed at the estimated transmission places.

Discussion and Conclusion: The Dengue fever outbreak highlighted evaluation of surveillance precision as important, along with mosquito control and monitoring, for the

Tokyo Olympic and Paralympic Games of 2020. After close in ESSRWC, a visitor to RWC was diagnosed as invasive meningococcal disease. The period of enhanced surveillance should be defined to include some delays due to incubation period and/or reporting delay of whom were estimated to be infected the targeted event. Furthermore, these two incidents are expected to have provided good lessons for international risk communication and domestic cooperation among public health centers and among local governments.

Keyword：enhanced syndromic surveillance, mass gathering, dengue fever, invasive menin,gococcal disease, olympic games

Introduction

The Rugby World Cup (RWC) was held from September 20 through November 2, 2019, Japan. Games were held at 12 locations around Japan, including Tokyo. It was a large tournament, comparable to the Olympic and Paralympic games and FIFA World Cup tournaments. Enhanced syndrome surveillance for RWC (ESSRWC) was operated as a response of the public health sector for the mass-gathering events. In some host prefectures, including Tokyo, enhanced syndrome surveillance was conducted [1,2]. It was expected to be a drill for Tokyo 2020 Olympic and Paralympic Games to be held the following year. The purpose of this report is to summarize the public health response with ESSRWC by Tokyo Metropolitan Government (TMG) and its results, followed by discussion of the lessons learned for the Tokyo Olympic and Paralympic Games of 2020.

Methods

The ESSRWC consisted of TMG's unique syndromic surveillance as well as official national surveillance. The former included cluster surveillance, ambulance transfer surveillance [9], and Tokyo infectious alert system. The latter included official surveillance for diseases designated as notifiable, official sentinel surveillance, and official syndromic surveillance [10]. Additionally, (N)SASSy [11], prescription

surveillance [12] and rumor information from public health centers were used.

The period of ESSRWC operation was September 20 through November 2, 2019, including national holidays and weekends which was the same duration of RWC itself.

Results

No particular response was required other than for one incident. One incident of dengue fever from the official surveillance for notifiable diseases was remarkable to note. In this incident, three teenage patients were identified: students of the same school in Tokyo [3,4]. No history of mosquito bites in the three patients could be confirmed. In addition, none of the three had traveled abroad within one month prior to the onset of the disease. The infected place was estimated as Nara or Kyoto, which they visited during a school trip. Moreover, they went sightseeing there in the same group. Nevertheless, no report from the estimated infected areas described Dengue fever. Moreover, no case was diagnosed after these patients among students of the same school.

September 18–20: patients A, B and C went together on a school trip to Nara and Kyoto.

September 26: patient A showed onset of fever and visited a doctor.

September 27: patients B and C showed onset of fever and visited doctors at different

clinic.

October 1: patients A and B were hospitalized at the same hospital.

October 3: patient C reported relief of fever.

October 5: patient C was examined by testing.

October 6: patient A was discharged.

October 10: patient B was discharged; patients A and B were diagnosed. The case was reported to official notifiable infectious disease surveillance.

October 30: patient C was diagnosed. The case was reported to official notifiable infectious disease surveillance.

Discussion

Because the incubation period of dengue fever was presumed to be 5–7 days (range, 3–10 days) [5], September 16–24 were estimated as the likely times of infection. During this period, even though these three patients travelled during a school trip as members of the group, they had no mutual contact at all in school or with others aside from the school trip. Because no person in the school, in Tokyo, or in the patients' living area except for the patients had been confirmed as infected in Tokyo or the surrounding area, the place of infection was estimated as Nara or Kyoto, which they had visited during a school trip.

Nevertheless, no case of dengue fever was confirmed in these places. Therefore, its likelihood as the estimated infected place is not sufficiently high. Alternatively, the surveillance sensitivity might not be sufficiently high to find the infected cases. Using active surveillance is expected to be necessary to ascertain the infected cases in Nara, Kyoto or Tokyo. Monitoring for pathogen retention among mosquitoes might also have low sensitivity because domestic infection cases had occurred in Nara or Kyoto but any alert of detection had not been issued before and after this incident. Evaluation for surveillance precision or monitoring sensitivity for mosquitoes might be necessary to prepare for enhanced surveillance during the Tokyo Olympic and Paralympic Games in 2020 because the Tokyo Olympic and Paralympic Games were to be held in summer. Mosquito control was the main issue for public health measures against the Zika virus outbreak that occurred during the Rio Olympic Games in 2016 [6].

After close in ESSRWC on November 2, a visitor to RWC from abroad and went sightseeing around Japan by cruise ship [7] was diagnosed as invasive meningococcal disease at Shizuoka prefecture, western area of Tokyo. Because the patient stayed in Tokyo while the patient was supposed to be infected, Shizuoka prefecture informed it to TMG. The patient's visiting history in Japan was;

October 28: the patient arrived in Japan with family and staying at Tokyo

November 1: the patient watched bronze medal team match of RWC in Tokyo

November 2: the patient watched the final game of RWC in Yokohama, neighboring to Tokyo

November 3-8: the patient stayed at Tokyo and went sightseeing

November 9: the patient joined cruise ship tour from Yokohama

November 10: the patient showed onset, disembarked at Shizuoka prefecture and visited a doctor

November 12: the patient was diagnosed and notified to the official notifiable infectious diseases

In this incident, because the incubation period was presumed to be 3–4 days (range, 1–10 days) [8], the patient was estimated to have been infected in Tokyo or some surrounding area, such as a stadium in Tokyo and Yokohama during the period of ESSRWC. However, because the period of RWC and ESSRWC were the same, some incident infected during RWC might be ignored from ESSRWC. Incubation period and reporting delays should be taking into consideration. As previous enhanced surveillance [13], it should be started since two weeks before the event opening and ceased until two weeks after the event closing. If so, this incident should be treated as an incident in ESSRWC. This too earlier closing of the enhanced surveillance should be one of the

lesson from ESSRWC.

Because the patients were diagnosed in Shizuoka prefecture, sufficient information to trace back to the infection source might not be available in TMG. If the patients were infected at the stadium, then other persons including foreign visitors would also probably become infected and develop the disease outside Japan. Actually, tracing back at mass-gathering events is expected to be extremely difficult. Moreover, even though the duration of the patient's stay on a cruise ship was very short, the probability of infection to guests or crew of the cruise ship by the patient was not negligible. If so, because the ship was foreign-registered, almost all of the passengers and crew were non-Japanese. It means that a lot of effort is required because epidemiological investigations cannot be conducted in Japanese. The ship visited at a South Korean port during their cruise. For that reason, invasive meningococcal disease cases might emerge at various places worldwide. Although contact tracing on the ship was very difficult, its jurisdiction of public health center or local government was not clear. If many cases were to occur in a wider area than the jurisdiction of a public health center or local government, then cooperation among public health centers and local governments, including adjustment by the central government, should be the next challenge to be solved before the Tokyo games. Moreover, risk communication and information sharing for this incident was

necessary through the central government and local authorities in Japan, as well as mass media, WHO, or other networks among countries of the world, including South Korea.

A similar incident occurred at the World Scout Jamboree held in Japan during July 28 – August 8, 2015. Four patients from the UK and Sweden were diagnosed as having invasive meningococcal disease in their home country after the closing event [14]. In this case, Health Protection Scotland and the public health agent in Sweden released the information quickly and started preventive internal administration to contacts as soon as possible. It remains unclear whether the experience from 2015 was helpful to address the incident on the cruise ship during RWC. However, our experience from cruise ship should be lessons learned from enhanced surveillance for the Tokyo Olympic Games of 2020 because many foreign visitors were expected to watch the games and go sight-seeing around Japan, as they did with RWC. Timely international risk communication through mass media or international networks should be prepared, along with contact tracing for foreign visitors travelling throughout Japan beyond the jurisdiction of public health centers or local governments.

Limitations

First, the COVID-19 outbreak emerged in China, immediately after closing RWC in

November 2019, we were unable to evaluate ESSRWC immediately. Moreover, publication of the ESSRWC evaluation was delayed until after the Tokyo games had closed.

Second, because daily report of ESSRWC was not informed from TMG to organizing committee implementing RWC, if large outbreak emerged during RWC, response to concerning person or decision about operation of RWC probably delay and were difficult to do appropriately. The enhanced syndromic surveillance in the future should involve implementing body of the event as a member of the enhanced syndromic surveillance with information sharing and assessment the situation.

Conclusions

Some lessons were learned from ESSRWC for the Tokyo Olympic and Paralympic Games, as explained below.

1) The period of enhanced syndromic surveillance should be from two weeks before to two weeks after the event closed.
2) International risk communication must be used if the case involves a foreign visitor or visitor aboard while they were infected.
3) Domestic cooperation among public health centers and among local governments are

especially important if the patient has moved or travelled.

4) Continued evaluation of surveillance precision is expected to be necessary.

5) Mosquito control and monitoring during the Tokyo Olympic and Paralympic Games are expected to be important.

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Competing Interest

The authors have declared that no competing interests exist.

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