Japanese Journal of Infectious Diseases

Enhanced surveillance for sports festival in Tokyo 2013: preparation for Tokyo 2020 Olympic and Paralympic games

Naotaka Shimatani, Yoshiyuki Sugishita, Tamie Sugawara, Yuuki Nakamura, Yasushi Ohkusa, Takuya Yamagishi, Tamano Matsui, Masashi Kawano, Hirotoshi Watase, Yukiko Morikawa, and Kazunori Oishi

Received: May 28, 2014. Accepted: October 7, 2014
Published online: January 20, 2015
DOI: 10.7883/yoken.JJID.2014.233

Advance Publication articles have been accepted by JJID but have not been copyedited or formatted for publication.

Naotaka Shimatani, Yoshiyuki Sugishita, Tamie Sugawara, Yuuki Nakamura, Yasushi Ohkusa, Takuya Yamagishi, Tamano Matsui, Masashi Kawano, Hirotoshi Watase, Yukiko Morikawa, Kazunori Oishi

1) Okayama University, Medical School
2) Tokyo Metropolitan Institute of Public Health, Epidemiological Information Section
3) National Institute of Infectious Diseases, Infectious Disease Surveillance Center
4) Nihon University, Graduate School of Pharmacy

Keywords:
enhanced surveillance, sports event, ambulance transfer syndromic surveillance, pharmacy surveillance, (nursery) school absenteeism surveillance

Running title:
Enhanced Surveillance for Sports Festival Tokyo

Corresponding to:
Infectious Disease Surveillance Center, National Institute of Infectious Diseases, 1-23-1 Toyama, Shinjuku-ku, Tokyo 162-8640, Japan
Yasushi Ohkusa
Tel.: +81-3-5285-1111
Fax: +81-3-5285-1129
E-mail: ohkusa@nih.go.jp
This manuscript is being submitted for consideration for publication in JJID. The manuscript, which includes substantially the same content, has not been submitted or published elsewhere. All authors have made contributions to the study and are responsible for its content.
Summary

The enhanced surveillance was conducted during the Sports Festival in Tokyo 2013 (September 28-October 14, 2013), for early detection of outbreaks of infectious diseases and other health emergencies.

Through this enhanced surveillance, there were 15 cases which required additional process for gathering information outside the routine process of creating/evaluating the Daily Report. However, none of the 15 cases was assessed as critical. Through the enhanced surveillance, we were able to structure a framework that allows for earlier response when detecting aberrations. It includes the role of the Tokyo Metropolitan Government (TMG) in communications and contacts with relevant parties such as public health centers, as well as in monitoring of surveillance data.

However, there are some issues to be further considered toward the Tokyo 2020 Olympic and Paralympic Games, such as criteria for additional response steps, increasing of the bodies participating in syndromic surveillance, and strengthening of cooperation with related departments including those for crisis management assuming potential bio/chemical terrorism.

1. Introduction

When international sporting events such as the Olympic Games and Fédération Internationale de Football Association (FIFA) World Cup, or other high-profile mass gatherings or political events are held, syndromic surveillance is conducted and enhanced to detect epidemics of infectious diseases and other health emergencies, including bioterrorism early (1-11).
Most recently, a comprehensive surveillance system was established for the London 2012 Olympic and Paralympic Games (3). In Japan, enhanced surveillance had been conducted in the past for the Kyushu Okinawa Group of Eight Summit (G8 summit) 2000 (4,5), the FIFA World Cup 2002 competition (6,7), the Hokkaido Toyako G8 summit meeting 2008 (8), President Obama’s visit to Japan in 2009 (9), the Yokohama Asia-Pacific Economic Cooperation (APEC) 2010, the Nagoya Tenth meeting of the Conference of the Parties (COP10) 2010 (10), and during the Fourth Japan–China–South Korea Trilateral Summit (May 21–22, 2011) (11). Although there is no system that monitors specifically only for those events at stadiums or for the participating athletes, however, our enhanced surveillance also covers food-borne illness or unusual health event that occurs in the community where the events are held, including the stadiums and participating athletes.

Drawing on these past experiences, enhanced surveillance was conducted during the Sports Festival in Tokyo 2013, the official name of the 68th National Sports Festival (September 28–October 8, 2013) and the National Sports Festival for People with Disabilities (October 12–October 14, 2013). National Sports Festival and the National Sports Festival for People with Disabilities are nationwide sporting events held each year at a different prefecture. The 68th events were held in Tokyo in 2013, with 27,000 players and managers participating in 50 sports. These games were held throughout the cities in Tokyo metropolitan area. The enhanced surveillance for the Sports Festival in Tokyo 2013 was conducted in preparation for the Tokyo 2020 Olympic and Paralympic Games. This was done by utilizing the
surveillance systems that are already active on a daily basis, with enhancements on sharing of information between parties that normally conduct surveillances on its own, making daily reports, conducting risk assessments on a daily basis, and structuring a response framework when additional action is deemed necessary.

This report presents the overview and the details of the enhanced surveillance, and through the results of this study, we identified both the usability and issues of the existing system. In addition, we aim to provide fundamental information that would be useful for the implementation of enhanced surveillance for mass gatherings in the future.

2. Materials and Methods

As a joint work between the Bureau of Social Welfare and Public Health, Tokyo Metropolitan Government (TMG) and the National Institute of Infectious Diseases (NIID), enhanced surveillance was performed from September 21, 2013, one week before the event, to October 28, 2013, two weeks after the event. Four surveillance systems, the Official Sydromic Surveillance (OSS), Ambulance Transfer Syndromic Surveillance (ATSS) (12), Pharmacy Surveillance (PS) (13,14), and (Nursery) School Absenteeism Surveillance system ((N)SASSy), all of which operate routinely, were utilized, in addition to case-based and sentinel surveillance covered under the Infectious Diseases Control Law. Data from OSS and ATSS were collected at the Tokyo Metropolitan Institute of Public Health (TMIPH), a division within TMG focused on gathering and analysis of health information within Tokyo,
and which also provides information to the public. Data from PS and (N)SASSy were collected at NIID. Information from the four surveillance systems was then mutually exchanged, and daily risk assessment was performed jointly.

The enhancements of the routine surveillance were conducted through reinforcement of the processes involved: sharing of information, daily risk assessment, daily situation reporting, and readiness for action when needed. Figure 1 outlines the information sharing and daily reporting process.

External (third-party) evaluation was done by Dr. Nobuhiko Okabe, Director of Kawasaki City Institute of Public Health. During the enhanced surveillance, we engaged Dr. Okabe as the external evaluator in the daily reporting process. After the surveillance was completed, we sent the final report of this surveillance to the evaluator. He then provided his feedback as “evaluation from an external party”, to highlight issues and areas for improvement in the enhanced surveillance, to prepare for future mass gathering events, especially the Tokyo 2020 Olympic and Paralympic Games.

2-1. Surveillance Systems

Four existing surveillance systems were utilized. Among them, the methods of OSS, ATSS, and PS were described in (11), but they have been updated as described hereinafter.

Official Syndromic Surveillance (OSS)

OSS, based on the Infectious Diseases Control Law, started on April 1, 2008. When a physician at the designated medical facility (sentinel clinic or
hospital) sees a patient meeting the reporting criteria, the facility must immediately report to the public health center via internet or fax. The report criteria are the following: (1) fever over 38°C and respiratory symptoms (except for external injury or organic cause) (respiratory symptoms refers to critical cases that must be admitted to a hospital) and (2) fever and rash or blistering skin disease (except for symptoms that are clearly from diseases classified in categories II~IV, under the Law). Throughout the duration of the enhanced surveillance, fever and rash or blistering skin disease (criteria (2)) was especially monitored closely for surveillance of bioterrorism using smallpox.

Ambulance Transfer Syndromic Surveillance (ATSS)

From the results of fundamental studies conducted since 2005, TMG adopted the ATSS system as a countermeasure against bioterrorism attack, outbreak of infectious diseases, and other health risk incidents. After making a test installation in 2008, the actual operation began in 2011. This surveillance system covers the Tokyo Metropolitan area almost entirely, excluding Inagai city and the small islands off the coast of Tokyo. This surveillance system captures the data of around 600 thousand ambulance transfers per year that is initially recorded in the emergency record system. The surveillance system then rapidly analyses the information regarding the symptoms of each patient, recorded during ambulance transfer. The data that is captured in the surveillance system are those cases that are classified as acute diseases, or cases that have a record of one or more of the four chief complaints: fever, diarrhoea, vomiting, and rash. 10 items (date, day of the
week, time, address, sex, age, degree of severity, disease, transferred hospital, and chief complaint) are captured for each case on a daily basis. During patient transportation, the ambulance crew also enters clinical conditions classified into 12 categories: Vomiting/Nausea, Dizziness, Palpitation, Unconsciousness, Breathing disorder, Fever, Spasm/Paralysis, Collapse/Weakness, Bloody emesis/Nasal hemorrhage, Rash, Headache, and Diarrhoea/Bloody stool. This data on the clinical conditions is used for analysis through the surveillance system. Data entered by 8:00 AM is analyzed through the system.

Pharmacy Surveillance (PS)

After a thorough fundamental study, PS is being performed nationally since January 2009. During the enhanced surveillance, 1257 pharmacies in Tokyo (about 13% of the total number of pharmacies in Tokyo) were participating in PS. In this surveillance, only data that is collected is the number of prescriptions made, classified into therapeutic categories. Therefore, the collected data does not include any personal information. The data on number of prescriptions is automatically extracted and analyzed daily, through the receipt computer (type: Application Service Provider (ASP)). The surveillance monitors drugs categorized under, “relief of fever and pain”, “drugs for common colds”, “antibiotics”, “anti-influenza virus drugs” (excluding for Amantadine), and “anti-Varicella-Zoster Virus drugs”, with the last two categories further sub-classified by age: “younger than 15”, “16–64”, and “older than 65 years old”. As surveillance for a potential bioterrorism using smallpox, we monitored the change in prescription of acyclovir to
adults, without increase in the population of children or the elderly.

The (Nursery) School Absenteeism Surveillance system ((N)SASSy), has been active since January 2009, after a thorough fundamental study. This unique surveillance is made available in Japan, because the parents of students is required by the schools to report the reasons for their child being absent from school activities. They are required by the schools to report their child’s symptoms, until the diagnosis is made by a doctor. After being diagnosed by a doctor, they are required to report their diagnosis to the schools as the reason for their child's absence. By reporting the diagnosed a certain type of disease such as influenza or varicella from parents, the school can order the student to be “Suspended” from school activities to prevent disease transmission inside class, specific grade, or school. The days during the suspended period was not count against the total number of days required to advance to the next school grade. (N)SASSy is an internet based system, through which a school representative, who has been given access to the system, records the reported information regarding absentee/suspensions due to infection on a daily basis.

Out of the total 23 wards and 39 other municipal districts (cities, villages, etc.) within Tokyo, at the time of the event, Sumida Ward (as of January 1, 2013, the ward had an estimated population of 249 thousand), Setagaya Ward (886 thousand), Nakano Ward (314 thousand), Nerima Ward (717 thousand), Mitaka City (186 thousand), Higashiyamato City (84 thousand), and Inagi City (86 thousand) had implemented the surveillance system in Tokyo. Of the participating municipalities, Nakano Ward participated in
both the School and the Nursery School program. Sumida Ward, Setagaya Ward, Nerima Ward, Higashiyamato City, and Inagi City only participated in the Nursery School system. Mitaka City participated only in the School system (Figure 2).

Through the (N)SASSy, we monitored for “Class/School Closing” of the school, “Number of Absentees” categorized by symptoms, and “Number of Suspensions due to infection” categorized by the diagnosed illnesses. For “Class/School Closing”, the actual numbers of the institutions were monitored. For the “Number of Absentees”, the aberrations were monitored using the C1-MILD method of the Early Aberration Reporting System (EARS) of the Centers for Disease Control and Prevention (CDC) (15). If the number of institutions in the surveillance unit (Ward or City) with aberrations for “Number of Absentees” exceeded 10% of the total number of participating institutions, then it was defined as low level aberration (In addition, criteria require at least one institution with aberrations.). If it exceeded 20% of the total number of participating institutions, then it was defined as medium level aberration (In addition, criteria require at least two institutions with aberrations.). If it exceeded 30% of the total number of participating institutions for the surveillance unit, then it was defined as high level aberration (In addition, criteria require at least three institutions with aberrations.). For “Number of Suspensions due to infection”, we utilized EARS, defining the low level aberration as a value greater than the mean plus three standard deviations (SD), with the mean and SD based on the prior 7 days. Similarly, the medium level was defined as a value greater than the mean plus 4 SD, and high level aberration as a value greater than the
mean plus 5 SD, with the mean and SD based on the prior 7 days.

2-2. Assessment System

On the risk assessment part, as also described in the WHO guideline (16), daily information was verified, analyzed, and assessed by the Jointly Daily Risk Assessment Team (JDRAT) from TMIPH and NIID.

Every day, including nonworking days, information from PS and (N)SASSy was collected at NIID by 7:00 AM, and the information from OSS and ATSS were collected at TMIPH by 9:00 AM.

After sharing surveillance information, assessment of the information was conducted at the daily morning meetings at NIID on weekdays, and through emails and conference calls on weekends, to discuss whether further investigation was needed. The Daily Report was then finalized and distributed by 10:30 AM.

The following action steps were taken as response to the surveillance data. For OSS, if there was a reported case, we made an inquiry to the corresponding public health center for verification. For ATSS, if there was a high level aberration, we confirmed if there was any accumulation, such as time, person, and place. If any accumulation was suspected, then we verified it with the corresponding public health center. For PS, we checked the aberration levels and assessed whether any correlation can be suspected with the other three surveillance systems. In order to use information from PS for diagnosis by doctors, if a high level aberration was found, then we confirmed with the nearby sentinel clinics or hospitals via corresponding public health centers to confirm whether there was any unusual case or not.
For (N)SASSy, if there was a high level aberration, then we checked the details in the system to ascertain whether there was any accumulation or not, and then we contacted the boards of education, departments of nursery schools, and public health centers in respective cities.

3. Results

3-1. Official Syndromic Surveillance (OSS)

During the enhanced surveillance, total of 7 incidences were reported from three designated institutions in three different wards, however JDRAT decided not to seek additional investigation in any of these cases (Table 1). Because inquiry to the public health center was made timely, details of each case were available when JDRAT assessed it. On the other hand, the average delay from the examined date to the reported date was 6.3 days, with a median of 6 days (3-11 days).

3-2. Ambulance Transfer Syndromic Surveillance (ATSS)

Surveillance for ambulance transfer identified a total of 38 high level aberrations (Table 2). Of the total 38, 30 were high level aberrations for “Hematemesis/Epistaxis”. However, because the number of patients with Hematemesis/Epistaxis in ambulance transfer is usually low, even a single case of transportation caused the aberrations to be at a higher-level. The other high level aberrations were for “Nausea/Vomiting” (4 times), “Dizziness” (3 times), and “Unconsciousness” (1 time). For these high level aberrations the additional information was obtained from the system to
assess if there were any concern of accumulations in the reported cases, however through the risk assessment, JDRAT concluded that no further investigation was necessary. Additionally, data from ATSS were not available on one day during the enhanced surveillance period because of system maintenance.

3-3. Pharmacy Surveillance (PS)

High level aberration was not detected. 51 medium level aberrations were detected, of which 28 were for “Relief of fever and pain”, 17 were for “Antibiotics”, 5 for “anti-Varicella-Zoster virus drugs”, and 1 for “Drugs for common colds”, but no case required additional investigation (Table 3). 4 low level aberrations were detected for “Anti-influenza virus drugs”.

3-4. (Nursery) School Absenteeism Surveillance system (N)SASSy

17 high level aberrations for “Number of Suspensions due to infection” were detected, of which, 7 were for “Chickenpox”, 5 were for “Hand-foot-mouth disease”, 2 were for “Hemolytic streptococcus infection”, 1 was for “Mumps”, 1 was for “RS virus infection”, and 1 was for “Others” (pertussis) (Table 4). For the aberrations on “Number of Absentees”, no high level or medium level aberrations were detected. However, 17 low level aberrations were detected, of which 17 were for “Fever”, 4 were for “Acute respiratory symptoms”, and 1 was for “Other” symptoms. In addition, for the “Class/School Closing”, a nursery school inside a hospital in Akishima City was shut down for four days due to influenza from September 27 to September 30.
3-5. Assessment System

In total, there were 15 cases, where additional steps were taken for creating the Daily Report. Of them, there were 7 cases from the OSS on inquiry to the public health center for the reported cases. Also, 6 cases from the ATSS needed additional information to make the assessment; 2 cases from the (N)SASSy involved inquiries to the public health centers for confirmation. However, none of the 15 cases was assessed as a critical case that required any more additional measures.

3-6. External (third-party) Evaluation

External (third-party) evaluation was done by Dr. Nobuhiko Okabe. The report of the evaluation is presented below.

“Compared with the enhanced surveillances conducted in the past, the enhanced surveillance for Sports Festival in Tokyo 2013 was characterized by being implemented as an official business of both Tokyo Metropolitan Government (TMG) and NIID. This framework allowed for easier and faster response when aberrations were detected. Also, information was mutually shared with the Police Department. These new initiatives are positive steps in preparing for the Olympics. The surveillance framework also deserves credit as it made prompt sharing and assessment of information possible.

As areas for possible improvement, the benchmark for taking action should be further clarified. Through the enhanced surveillance it was observed that this benchmark for action taking was unclear, and TMG had some issues in taking additional steps. Therefore, in the future, the organizers should conduct feasibility studies to clarify the benchmark on assessment of
information and action taking.

Syndromic surveillances systems are expected to capture exhaustive information such as conditions of undiagnosed patients. (N)SASSy is a useful tool to capture such information, as it is able to capture the total number of absent students before being diagnosed by a doctor. However, the number of municipalities implementing the system is insufficient in Tokyo. By 2020, it is expected that this system covers at least the areas where the Games will be played, and has the baseline data necessary to make precise assessments. The Tokyo Metropolitan Government, the Bureau of Social Welfare and Public Health was fully engaged. However, the role of the Bureau is limited to the surveillance of infectious diseases. In order to fully cover possible health threats including food poisoning and bio/chemical terrorism during the Games, other departments within the TMG responsible for the overall crisis management should also be involved in the surveillance as well.

The Daily Report should be simplified, because during the Olympics, it is expected that many different organizations will be receiving the Daily Report, most of whom not familiar with the surveillance systems and the details of the captured syndromes/diseases. Also, the Daily Report should be revamped to add information on the possible effects to the event that is being monitored (would the operation of the Games be effected, etc.). In case there are no actions necessary, the Daily Report should also provide assurance that there are no possible effects to the Games.

Conducting enhanced surveillance should provide deterrent effects on intentional criminal acts such as terrorism. In preparation for the Olympics, more tests of the enhanced surveillances, involving other prefectures as well
(especially the neighboring prefectures), should be conducted to identify other issues and areas for improvement. Also, the results should be published through domestic and international papers to enhance the deterrent effects on possible criminal acts.”

4. Discussion

During the enhanced surveillance, each of the surveillance systems was able to detect aberration signals as described in Results. However, we were unable to ascertain any connection between the aberrations detected through separate systems. Therefore, from the dispersion in these results, we denied any suspected case of possible outbreaks of infectious diseases or other health emergencies including bio/chemical terrorism attack that might affect the games. We do understand that there is always a possibility of an outbreak that is not covered by our employed surveillances. However, other information source including media also did not identify any unusual events which could affect the games.

Here, we discuss each of the surveillance systems that were utilized in the enhanced surveillance, including areas for possible improvements for future utilization.

4-1. Official Syndromic Surveillance (OSS)

Because the case from OSS is reported directly from a medical institution, it is easy to make confirmations on the reported aberrations. As inquiry to the public health center was made in a timely manner, details of each report
were made available when creating the Daily Report. Additionally, because this syndromic surveillance has been operating routinely, no extra expense or system construction is necessary to initiate enhanced surveillance.

On the other hand, we consider that the sensitivity might be insufficient. This is because once a diagnosis is made, the doctor is not required to make a report through OSS. For instance, if a doctor diagnosed a patient with smallpox as chickenpox, or novel influenza as seasonal influenza, the doctor should not report to OSS. Therefore, we believe that OSS has its weakness in early detecting of unusual diseases such as smallpox or novel influenza. Moreover, the current system does not require zero-reporting. Therefore, we are unable to distinguish whether there was no case meeting the reporting requirement, or if the medical institution simply failed to report the case.

Furthermore, the reporting timeliness of each of the 7 cases was quite low, because reporting from the medical institution took a long time after the patient was examined. Additionally, the 7 cases were reported from just three institutions, which suggest that awareness of the surveillance reporting is quite different among the medical institutions, and it is difficult to discern whether there was no case needed reporting, or the system itself was not functioning to its potential.

4-2. Ambulance Transfer Syndromic Surveillance (ATSS)

This surveillance system through ambulance transfer is fully automated, imposing no burden on ambulance teams other than their routine tasks. The aberrations in this surveillance are reported when there is significant statistical increase compared with the past data. The public health agency
monitors the deviations from the baseline and makes the assessment based on the aberration levels.

The surveillance showed that it was able to detect the total number of severe patients early. The system also allowed for easy monitoring of continuations in the level of aberrations in each surveillance unit. In addition, detailed information such as age, gender, place of pick-up, and injury/disease type were available through the system. Based on this information, JDRAT decided whether more information or counter-measure action was required.

The surveillance frequently reported aberrations in Hematemesis/Epistaxis, even though the cases of Hematemesis/Epistaxis were few. Therefore, for these types of syndromes which have no high level of ambulance transfer, even a single case of transportation can cause higher-level aberrations. Transportation of diarrhea cases in the Yokohama APEC 2010 indicated a similar tendency. For the future, sensitivity of the aberration detection might require adjustment. However, because arbitrary adjustments can lead to reduced sensitivity in aberration detection, careful discussion must be done.

4-3. Pharmacy Surveillance (PS)

Regarding PS, system construction had already been finished and no extra expenses were necessary. There is also no burden to data entry because the process is fully automated. In addition, sensitivity of detecting infected patients through PS is high and the promptness of response is comparatively high, because the data are analyzed within 24 hours of person’s visit to a pharmacy. There is also no risk of information being left out. Currently, no
effective surveillance related to chickenpox or zoster in adults is executed through other surveillance systems. Therefore, PS plays an important part. Fortunately, no high-level aberration of anti-Varicella-Zoster virus drugs occurred during the event. If some increase of the prescription of anti-Varicella-Zoster virus drugs to adults were found without an increase in children or in elderly people, then a confirmation would need to be made to the medical facility.

However, the challenge for PS is that it is difficult to take action when an aberration is detected, because PS was not enforced by the law. In Tokyo, because we have not experienced a case in which verification was made with the medical facility through the public health center, it seems to be difficult to associate with related institution if an aberration is detected. Therefore, we should hold a study or training session to brainstorm how we can best arrange a framework for verification with the medical facility when aberrations are detected through PS.

4-4. (Nursery) School Absenteeism Surveillance system ((N)SASSy)

(N)SASSy was first added to the enhanced surveillance for the Yokohama APEC 2010, and at that time, “Number of Suspensions due to infection” was counted in actual numbers. However, there were quite a number of suspensions due to infection, and it was concluded that it was not feasible to count in actual numbers. Therefore, during this enhanced surveillance, we used EARS to identify the aberrations in the number of suspensions due to infection, similar to the method used to identify aberrations for “Number of Absentees”.

17
The strength of (N)SASSy is that it can identify the exact institution as well as the exact classroom of the reported patient (17). Although the geographical coverage of (N)SASSy was not high, all the infectious diseases including unknown disease for all members of the participating institutions were monitored in a timely manner. This is a unique system in Japan, and there are no comparable systems in other countries (18). Moreover, we were able to verify the usefulness of (N)SASSy through the enhanced surveillance because the reporting from the participating institutions was the most timely in comparison with other surveillance systems. Public health centers can also access (N)SASSy, however, they might not always monitor the system closely. In some cases, JDRAT was able to capture information of the number of absentee and suspensions due to infection, and therefore identify aberrations, even before the public health centers could identify them.

However, (N)SASSy has little or no reporting during weekends, because most schools are closed. Therefore, by utilizing EARS which takes the data from the prior 7 days, most of the aberrations were concentrated on the first day of the week. In addition, by utilizing EARS, the continuity of the level of aberrations was difficult to understand.

(N)SASSy was developed originally for the institutions to detect their own aberrations early. Therefore, we should conduct further feasibility studies in establishing a benchmark for aberration detection using (N)SASSy, to be able to utilize the system as a surveillance system on a larger scale (for an entire region).

Furthermore, we need to increase the number of participating municipalities, since it was limited to just 7 municipalities for this enhanced surveillance.
4-5. Assessment System

By gathering data on symptoms, the purpose of a syndromic surveillance is assessing the risks of possible outbreaks of infectious diseases and taking necessary action in a timely manner. Through the enhanced surveillance, we were able to make a comprehensive assessment by utilizing several syndromic surveillance systems.

Both TMG and NIID have had experiences of conducting enhanced surveillances in the past. Because all four surveillance systems operate routinely, the assessment and response handling were executed smoothly. There was a day when data from ATSS were not available due to system maintenance. For future operations, maintenance schedules for each of the surveillance systems should be checked in advance, and the relevant parties involved should be notified. However, even in such cases when one of the systems was unavailable, we were able to make an assessment utilizing the other three systems.

For the ATSS, when high level aberrations were detected, we checked the detailed information available in the surveillance system for information such as age, region, and degree of severity, to make qualitative assessment of the data. Additionally, even for medium level aberrations, if the aberration continued to the next day, we checked the detailed information to make the assessment as well. However, symptoms such as “Nausea/Vomiting” and “Unconsciousness” have many causes, and the details available in the system for the causes of illness were limited to reasons such as “others”, which made the interpretation of the information difficult.
For PS and (N)SASSy, the information was limited on weekends and the aberrations were concentrated on the first working day. Therefore, a consensus of how to assess the detected aberrations is an area to improve in the future. Furthermore, for PS and ATSS, because they are not regulated by law, it is difficult to take action when an aberration is detected.

In the future, it is crucially important to raise awareness and understanding for the enhanced surveillance to the public health centers and medical institutions.

Overall, assessments were carried out smoothly. However, in the current scheme, the available human resources to run the assessment are limited, especially at TMIPH. Therefore, reallocation of human resources from NIID to the municipalities (or vice versa) could be a solution for the future.

4-6. Toward the Tokyo 2020 Olympic and Paralympic Games

There are some issues to be further considered toward the Tokyo 2020 Olympic and Paralympic Games, such as criteria for additional response steps, increasing the bodies participating in syndromic surveillances, and strengthening cooperation with the related departments. Such issues were also pointed out by the external evaluation from Dr. Okabe. Those departments include Police Departments, Fire Departments, the Ministry of Defense, and the Cabinet Secretariat for crisis management, assuming potential bio/chemical terrorism.

Concerning about the Food Sanitation Law, we did not know some reports based on the Law, because these were reported to only public health center and thus were not integrated to JDRAT Although ATSS and (N)SASSy could
covered food-borne illness, if the reports based on the Food Sanitation Law are integrated, we would examine to use the information.

This enhanced surveillance serves as an important part of the preparation for the Tokyo 2020 Olympic and Paralympic Games, and therefore, we should continue to identify the related issues and areas of improvement in other opportunities toward it.
References


FIFA 2002 World Cup TM. Annual Report of The Tokyo Metropolitan 


presidential visit to Japan. Kansenshogaku Zasshi. 2010;84:708-713. (in 
Japanese).

10. Inaba S, Ohkusa Y, Sugawara T, et al. Operation and Evaluation of 
Enhanced Surveillance for COP10 at Nagoya in 2010. Japanese Journal of 

Surveillance for the Fourth Japan-China-South Korea Trilateral Summit 

Syndromic Surveillance in Ambulance Transfer. Journal of Japanese 


Conflict of interest

None.
Tables and Figures

Table 1 Details of the reported cases from Official Sydromic Surveillance during enhanced surveillance for the Sports Festival in Tokyo 2013, September 28 to October 14, 2013 ($n = 7$)

<table>
<thead>
<tr>
<th>Case no.</th>
<th>Reported Date</th>
<th>Examined Date</th>
<th>Medical Institution</th>
<th>Age</th>
<th>Gender</th>
<th>Criteria (1) or (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2013/10/16</td>
<td>2013/10/5</td>
<td>A Hospital</td>
<td>6</td>
<td>Female</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2013/10/16</td>
<td>2013/10/13</td>
<td>B Hospital</td>
<td>0</td>
<td>Female</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>2013/10/21</td>
<td>2013/10/15</td>
<td>C Clinic</td>
<td>5</td>
<td>Female</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>2013/10/21</td>
<td>2013/10/15</td>
<td>C Clinic</td>
<td>1</td>
<td>Female</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>2013/10/22</td>
<td>2013/10/15</td>
<td>B Hospital</td>
<td>1</td>
<td>Male</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>2013/10/22</td>
<td>2013/10/19</td>
<td>B Hospital</td>
<td>16</td>
<td>Female</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>2013/10/26</td>
<td>2013/10/18</td>
<td>A Hospital</td>
<td>0</td>
<td>Male</td>
<td>1</td>
</tr>
</tbody>
</table>

*Criteria (1) fever over 38°C and respiratory symptoms, (2) fever and rash/blistering skin disease*
Table 2 Number of aberrations detected from Ambulance Transfer Syndromic Surveillance during enhanced surveillance for the Sports Festival in Tokyo 2013, September 28 to October 14, 2013

<table>
<thead>
<tr>
<th>Condition</th>
<th>High Level</th>
<th>Medium Level</th>
<th>Low Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fever</td>
<td>0</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>Rash</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Diarrhea/Bloody stool</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nausea/Vomiting</td>
<td>4</td>
<td>11</td>
<td>44</td>
</tr>
<tr>
<td>Hematemesis/Epistaxis</td>
<td>30</td>
<td>25</td>
<td>60</td>
</tr>
<tr>
<td>Dizziness</td>
<td>3</td>
<td>4</td>
<td>38</td>
</tr>
<tr>
<td>Palpitation</td>
<td>0</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>0</td>
<td>10</td>
<td>48</td>
</tr>
<tr>
<td>Muscle weakness</td>
<td>0</td>
<td>5</td>
<td>34</td>
</tr>
<tr>
<td>Spasm/Paralysis</td>
<td>0</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Unconsciousness</td>
<td>1</td>
<td>15</td>
<td>49</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>38</strong></td>
<td><strong>75</strong></td>
<td><strong>323</strong></td>
</tr>
</tbody>
</table>
Table 3 Number of aberrations detected from Pharmacy Surveillance during enhanced surveillance for the Sports Festival in Tokyo 2013, September 28 to October 14, 2013

<table>
<thead>
<tr>
<th></th>
<th>High Level</th>
<th>Medium Level</th>
<th>Low Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anti-Herpesvirus drugs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–14 years old</td>
<td>0</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>15–64 years old</td>
<td>0</td>
<td>2</td>
<td>122</td>
</tr>
<tr>
<td>over 65 years old</td>
<td>0</td>
<td>2</td>
<td>69</td>
</tr>
<tr>
<td><strong>Anti-influenza virus drugs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–14 years old</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>15–64 years old</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>over 65 years old</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Relief of fever and pain</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>28</td>
<td>280</td>
</tr>
<tr>
<td><strong>Drugs for common colds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>124</td>
</tr>
<tr>
<td><strong>Antibiotics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>17</td>
<td>193</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0</td>
<td>51</td>
<td>803</td>
</tr>
</tbody>
</table>
Table 4 Number of aberrations about number of absentees and suspensions due to infection detected from (Nursery) School Absenteeism Surveillance system during enhanced surveillance for the Sports Festival in Tokyo 2013, September 28 to October 14, 2013

(Number of Absentees)

<table>
<thead>
<tr>
<th>(Number of Absentees)</th>
<th>High Level</th>
<th>Medium Level</th>
<th>Low Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fever</td>
<td>0</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Rash</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Diarrhea/Abdominal pain</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nausea/Vomiting</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Acute respiratory symptoms</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Influenza like illness</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0</td>
<td>0</td>
<td>22</td>
</tr>
</tbody>
</table>
(Number of Suspensions due to infection)

<table>
<thead>
<tr>
<th>Condition</th>
<th>High Level</th>
<th>Medium Level</th>
<th>Low Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pharyngoconjunctival fever</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Hemolytic streptococcus</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Infectious gastroenteritis</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chickenpox</td>
<td>7</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hand-foot-mouth disease</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Erythema Infectiosm</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Exanthema subitum</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Herpangina</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Mumps</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Acute hemorrhagic conjunctivitis</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Epidemic keratoconjunctivitis</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mycoplasma infection</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>RSV infection</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>17</strong></td>
<td><strong>11</strong></td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>
Figure 1 Action flow of daily reporting and information sharing during enhanced surveillance for the Sports Festival in Tokyo 2013, September 28 to October 14, 2013

Note:
OSS: Official Syndromic Surveillance
ATSS: Ambulance Transfer Syndromic Surveillance
PS: Pharmacy Surveillance
(N)SASSy: (Nursery) School Absenteeism Surveillance system
TMIPH: Tokyo Metropolitan Institute of Public Health
NIID: National Institute of Infectious Diseases
Figure 2. Map of the coverage of (N)SASSy in Tokyo Metropolitan Area

Black: Nursery School system only (Sumida Ward, Setagaya Ward, Nerima Ward, Higashiyamato City, and Inagi City)

Dark Grey: School system only (Mitaka City)

Light Grey: School and the Nursery School program (Nakano Ward)