

Cricket World Cup: A Stress Test for the Surveillance System in the Caribbean

EV Boisson, M Imana, P Roberts

ABSTRACT

Objective: To describe the development and implementation of, and major findings and recommendations from, a regional mass gathering surveillance system (MGSS) in support of the International Cricket Council Cricket World Cup West Indies 2007.

Methods: The regional MGSS was developed by the Caribbean Epidemiology Centre (CAREC) and its member countries as an adaptation of the routine communicable disease surveillance system in order to rapidly detect unusual disease events during the tournament. The implementation of the MGSS required the identification of additional human and financial resources, capacity building activities, laboratory strengthening, and improved global epidemic surveillance and communication mechanisms.

Results: Timeliness and completeness of data reporting in the MGSS were both > 85%. No unusual pathogens were identified in the region during the tournament. Only dengue and influenza, both endemic to the region, were identified. The early alert detection software used identified a total of 24 aberrations from seven countries, the largest proportions being gastroenteritis, fever and respiratory symptoms and injuries. All aberrations were promptly investigated and most were found to be false alerts. Three unusual disease events were detected, all from one country. They were responded to in a timely manner and did not adversely affect the tournament.

Conclusions: The surveillance capacities gained in preparing for, and supporting, the tournament assisted in strengthening and testing the already existing national and regional communicable disease surveillance systems. Events such as these should be utilized to strengthen already existing surveillance systems, which should be flexible enough to respond to changing events.

Keywords: Caribbean, communicable diseases, mass gatherings, surveillance

La Copa Mundial de Críquet: un Test de Estrés para el Sistema de Vigilancia en el Caribe

EV Boisson, M Imana, P Roberts

RESUMEN

Objetivo: Describir el desarrollo e implementación, así como los hallazgos principales y las recomendaciones de un sistema de vigilancia regional de eventos masivos (MGSS), en apoyo al Consejo Internacional de Críquet en la Copa Mundial de Críquet de West Indies 2007.

Métodos: El sistema de vigilancia regional de eventos masivos, conocido por sus siglas en inglés MGSS, fue desarrollado por el Centro de Epidemiología del Caribe (CAREC) y sus países miembros, como una adaptación del sistema de vigilancia rutinaria de enfermedades comunicables a fin de detectar rápidamente manifestaciones inusuales de enfermedades durante el torneo. La implementación del MSGS requirió la identificación de recursos humanos y financieros adicionales, actividades de construcción de

capacidades, fortalecimiento de los laboratorios, así como el mejoramiento de la vigilancia epidemiológica y los mecanismos de comunicación globales.

Resultados: La calidad del reporte de los datos en cuanto a su integridad y disponibilidad en tiempo y forma fue en ambos casos > 85%. No se identificaron patógenos raros en la región durante el torneo. Sólo el dengue y la influenza, ambos endémicos de la región, fueron identificados. El software de detección y alerta tempranos utilizado, identificó un total de 24 anomalías de 7 países, entre las cuales la gastroenteritis, los síntomas febriles y respiratorios, y las lesiones, alcanzaron las mayores proporciones. Todas las anomalías fueron investigadas rápidamente y en la mayor parte de los casos se encontró que se trataba de falsas alarmas. Se detectaron tres manifestaciones patológicas inusuales, todas de un mismo país. A todas se les dio respuesta oportuna, y no afectaron adversamente el curso del torneo.

Conclusiones: Las capacidades de vigilancia desarrolladas en la preparación y apoyo al torneo, contribuyeron a fortalecer y a poner a prueba los sistemas nacionales y regionales ya existentes para la vigilancia de enfermedades comunicables. Debe utilizarse eventos como éstos, a fin de fortalecer los sistemas de vigilancia ya existentes, y hacerlos suficientemente flexibles para responder a las condiciones cambiantes en eventos futuros.

Palabras claves: Caribe, enfermedades comunicables, eventos masivos, vigilancia

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INTRODUCTION

During the period March 11 – April 28, 2007, the International Cricket Council Cricket World Cup West Indies 2007 (ICC CWC WI 2007) was hosted in nine countries in the Caribbean, namely Antigua and Barbuda, Barbados, Grenada, Guyana, Jamaica, St Lucia, St Kitts and Nevis, Trinidad and Tobago and St Vincent and the Grenadines (Fig. 1). Sixteen teams

gle Domestic Space functioned as one country, with both local persons and visitors able to move freely within it (5). Public health issues were incorporated into a Regional Security Strategy for the event, with efforts directed toward ensuring the health and safety of local persons and visitors. The Health Sector Programme was aimed at effective disease prevention, control and response in accordance with international standards. There were four major components of the programme, namely: provision of medical services, preparedness management of mass casualty events and emergency medical care, the establishment of port health programmes and a regional mass gathering surveillance system (MGSS).

This article describes how the regional MGSS was developed, the system itself, how it was implemented in parallel with the routine communicable disease (CD) surveillance system, the major findings and implications for routine surveillance, and recommendations for establishing MGSS for small island states such as those in the Caribbean.

METHODS

Development of the mass gathering surveillance system in support of CWC 2007

The Multilateral Agreement with member countries, for the operation of the Caribbean Epidemiology Centre (CAREC) mandates that the Centre is responsible for the overall promotion and coordination of the regional surveillance system for its 21 member countries (*ie* the English and Dutch-speaking Caribbean) and for building capacity in epidemiology, laboratory and related public health disciplines in these countries (6). Additionally, the ICC Medical, Health and Anti-Doping Directorate requested that CAREC be responsible for public health surveillance in support of CWC 2007. As such, CAREC was responsible for coordinating both the routine regional public health CD surveillance system and a MGSS in the host countries.

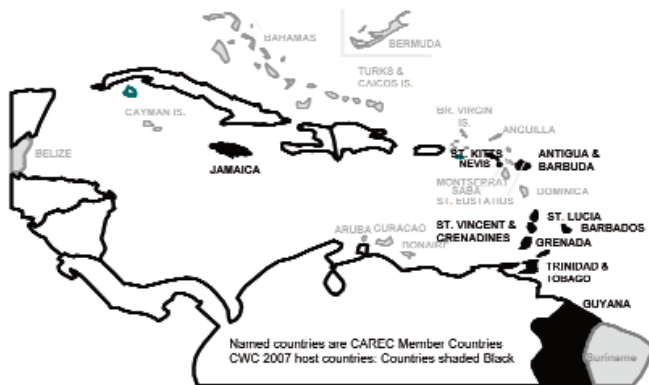


Fig. 1: Caribbean Epidemiology Centre (CAREC) member countries and Cricket World Cup (CWC) 2007 host countries.

competed over a 47-day period in 51 matches. The cricket teams, their trainers and coaches, officials, event staff, volunteers, the media, visitors and local spectators created a ‘mass gathering’ of people from around the world. In addition to the sporting events, unofficial parties and celebrations occurred. Mass gathering events such as these can result in an increased risk of illnesses and outbreaks and can also be used as a platform for terrorist activities (1–4).

In July 2006, Heads of Government of the Caribbean Community (CARICOM) agreed to the creation of a Single Domestic Space, consisting of the nine host countries plus Dominica. During the period February 1 – May 15, 2007, the Sin-

In May 2005, CAREC, in consultation with member countries, began developing a plan for a regional MGSS. The plan was finalized in 2006 and utilized for resource mobilization. A risk assessment was also done to determine the syndromes and diseases to be under surveillance and the required laboratory capacity to support the system. During this time, there was much consultation with regional partners such as the ICC Medical, Health and Anti-Doping Directorate, CARICOM and offices of the Pan American Health Organization (PAHO) and international partners such as the Public Health Agency of Canada, United States Centres for Disease Control and Prevention (US CDC) and the European Centres for Disease Prevention and Control.

Mass gathering surveillance system

In addition to the regional CD surveillance system operating in all CAREC member countries (in existence since 1980), during the CWC 2007, the nine host countries also implemented a MGSS at selected sites associated with the cricket matches. This system is described below.

Objective: The major objective of the MGSS was to rapidly detect unusual disease situations/patterns, disease outbreaks or injuries that might require immediate intervention before, during or after the event. This was an adaptation of one of the major objectives of the routine CD surveillance system (*ie* to detect and respond to outbreaks in a timely fashion).

Surveillance period: The MGSS was initiated in each host country three weeks prior to the start of their group of matches to resolve outstanding issues at sentinel sites and establish baselines. The MGSS operated in each country for the duration of their group of matches and ended the day after the last match or the end of the week of the last match.

Sentinel sites: Sentinel sites in each host country that participated in the MGSS were:

- Medical stations at the match venues (on match days)
- Medical personnel responsible for the participating teams
- Medical personnel at major hotels, housing teams and large numbers of visitors
- Accident and Emergency Unit at the major hospital closest to the venue site
- Health centres, sentinel private physicians and private health facilities close to venues, which were most likely to be used by visitors
- The National Public Health Laboratory

Most sites identified for the MGSS also participated in the routine CD surveillance system.

Reporting structure: In each country, all sentinel sites participating in the MGSS reported to the unit responsible for surveillance at the national level, which then reported to CAREC.

This is the same reporting structure that exists for routine CD surveillance (Fig. 2).

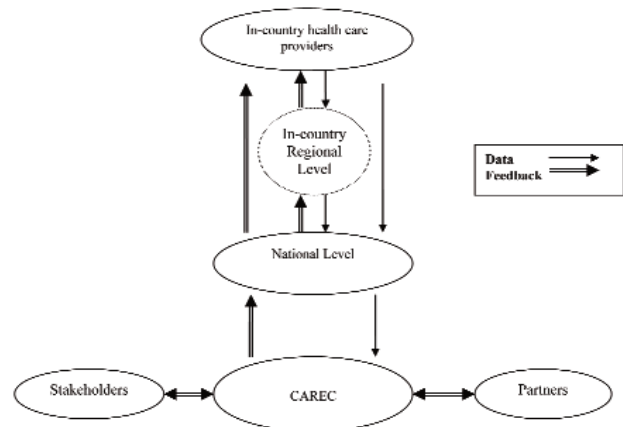


Fig. 2: Reporting and feedback structure in the communicable disease surveillance system in CAREC member countries.

Data reporting and transfer: Daily reporting, review and feedback occurred among in-country sentinel sites, the National Surveillance Units and CAREC. A web-based reporting tool, EARS-X from the US CDC, was used for real-time reporting of syndromes from host countries to CAREC (7, 8). During interruptions in internet connectivity, these data were faxed. EARS-X was also used within some countries, but most used *e-mail*, telephone, fax or hand delivery for data transfer from sentinel sites to the national level. Calls were made to any country that had not reported data by noon on a given day. The same generally occurred at the national level if data were not received from a sentinel site on time.

The following syndromes are reported as part of the routine CD surveillance system (usually transmitted weekly) and were under surveillance in the MGSS for daily data transmission:

- Acute flaccid paralysis
- Fever and haemorrhagic symptoms
- Fever and neurological symptoms
- Fever and respiratory symptoms < 5 years and ≥ 5 years
- Fever and rash
- Gastroenteritis < 5 years and ≥ 5 years
- Undifferentiated fever < 5 and ≥ 5 years

In addition to the syndromes listed above, the following conditions were added to the MGSS:

- Fever and jaundice
- Heat stroke
- Injuries
- Additional categories of events deemed important by the country

MGSS data analysis, interpretation and dissemination: As with routine surveillance, at the national level, countries were responsible for daily data, review, validation, analysis and interpretation, as well as for information dissemination within their country. At CAREC, the surveillance team met daily to

review data, identify disease alerts, follow-up with countries to validate data and investigate unusual reports and potential outbreaks, and produce a one-page daily surveillance report, which was disseminated *via* a blog on CAREC's website.

MGSS human resource requirements

In each of the nine host countries and at CAREC, at least two persons (one technical, one administrative) were identified to work on CWC surveillance activities during the MGSS period. However, additional technical support was required to conduct routine surveillance activities. Twenty epidemiologists were secured to provide assistance for surveillance activities, from Public Health Agency of Canada Epidemiology – Emergency Response Team and Canadian Field Epidemiology Programme, Canadian British Columbia Centre for Disease Control, Ministère de la Santé et des Services/Sociaux, Quebec, Canada, United Kingdom Health Protection Agency, Johns Hopkins University, PAHO, Spanish Field Epidemiology Training Programme and the European Programme for Intervention Epidemiology Training.

Capacity building

Laboratory, food safety and environmental health supplies in support of surveillance activities were procured, training sessions in outbreak investigation, laboratory diagnoses, and food and environmental health safety were conducted, protocols and laboratory algorithms were established, surveillance tools were developed and global epidemic surveillance was enhanced. A multi-country Caribbean Regional Health Emergency Response Team was established. This team was trained in outbreak investigation and emergency response and a mechanism was established for rapid deployment of team members if required. In an effort to build capacity in non-host countries, eight persons from seven non-host countries in the Caribbean were assigned to a host country for one week during the tournament.

The role of the laboratory

In order to adequately support surveillance during CWC 2007, it was essential for the nine host countries and CAREC to enhance laboratory capacity with special focus on:

- * Rapid diagnosis of diseases of public health importance
- * Diagnosis of exotic diseases not endemic in the region
- * Bio-threat identification
- * Upgrading the support to routine surveillance and outbreak investigations

Syndromic surveillance at mass gatherings, though useful for generating early alerts, lacks specificity for effective diagnosis (9, 10). Thus, timely laboratory confirmation was essential to increase specificity of reports and the use of rapid tests was useful in this regard. Laboratories in host countries were equipped with validated commercial rapid test kits, while CAREC concentrated on polymerase chain reaction (PCR) techniques.

Global epidemic surveillance

Daily summaries of possible alerts from newspapers were received from the Canadian Global Public Health Information Network (GPHIN), produced specifically to support surveillance during the tournament. During daily CAREC surveillance team meetings, postings from the Programme for Monitoring Emerging Diseases (ProMed) were reviewed and various websites were monitored for unusual health events.

Communication

The creation of an electronic listserv was vital in facilitating communication. Comments, questions and documents were rapidly shared with a large number of persons in national, regional and international agencies involved in surveillance for the tournament. There were also weekly conference calls with surveillance teams in hosting countries and minutes were posted on the listserv.

Resource mobilization

The hosting of CWC 2007 in the Caribbean inevitably meant that public health security had to be assured; however, financial resources to support this were initially very limited. Hence, several resource mobilization activities were conducted, including: collaborating with regional and international partners, networking with potential donors, and developing a grant proposal which was successful in securing funds from the Canadian Department of Foreign Affairs and International Trade. Resource mobilization activities were crucial to the successful preparation for, and implementation of, surveillance in support of the tournament.

RESULTS

The MGSS was in operation during the period February 28 – April 29, 2007. Reports were received from the nine host countries, with 86% of reports submitted on time and 88% of the reports being complete.

The global epidemic scan identified a total of 12 possible clusters or outbreaks in five countries that were participating in the tournament and two outbreaks in Caribbean countries that were not participating in the tournament, but none of these affected the tournament. A meat recall in the USA and the death of the Pakistan coach were also detected by the system. No unusual pathogens were identified in the region during the tournament. Dengue (endemic to the region) was identified in three countries and influenza was detected in one.

The early alert detection software used identified a total of 24 aberrations from seven countries. These occurred on 17 of the 57 reporting days. The aberrations most commonly observed were gastroenteritis, fever and respiratory symptoms and injuries (5–6 aberrations each). The first two syndromes were also most commonly reported under the routine surveillance system. All aberrations were promptly investigated and most were found to be false alerts.

Three unusual disease events were detected, all from one country as follows:

- * Two small localized outbreaks of gastroenteritis were reported from warm-up matches prior to the tournament. *E coli* and *Salmonella* enteriditis were identified in food samples from the first outbreak, in which five local officials were affected. Norovirus was identified in a sample from one of the five spectators affected in the second outbreak.
- * A tear gas canister was discharged in a hotel hosting visiting cricket teams. Eighteen persons attended health facilities for minor symptoms and one person was hospitalized for overnight observation.
- * There was an unofficial report of 16 staff members with diarrhoea from one hotel, but this occurred during a labour dispute and was not confirmed by local authorities.

DISCUSSION

The Caribbean region was well prepared and equipped to detect and respond to any unusual disease event that may have occurred during the tournament. Health personnel were trained, additional human resources were provided to the host countries and CAREC surveillance systems were strengthened, global disease and outbreak surveillance was enhanced, and laboratory capacity was strengthened. The hosting of the CWC 2007 provided an excellent opportunity for countries to develop and test many of the core capacities required for compliance with the International Health Regulations, such as the early detection of, and appropriate and timely response to unusual disease events (11). The surveillance capacities gained in preparing for, and supporting, the tournament assisted in strengthening and testing national and regional CD surveillance systems.

Host countries reported that CWC 2007 had a positive effect, putting surveillance on the political agenda and increasing awareness of the importance of surveillance in multiple sectors (food, water and port authorities, tourism, transport and veterinary health). Cricket World Cup 2007 surveillance also had a positive impact on overall national surveillance systems, with the implementation of the MGSS highlighting system strengths and weaknesses and increasing capacity. There was increased private sector and local health level involvement, improved timeliness of reporting, improved mechanisms for data verification and the provision of much needed equipment, software and laboratory supplies. Countries also benefited from technical expertise from regional and international agencies.

There were challenges with respect to implementing surveillance activities for the tournament. Countries would have welcomed earlier high level commitment to surveillance. Human resource challenges were sometimes compounded by insufficient funding for salary expenses, including overtime. Due to late receipt of funding and lengthy procurement processes, laboratory reagents and supplies were received later than desired. There were also some challenges in the area of

information technology due to a combination of poor connectivity at times and the introduction of new reporting software close to the start of implementation. Transportation of specimens also provided challenges for some countries. Finally, medical teams at match venues did not include a representative from the national surveillance teams, which would have facilitated easier reporting and feedback.

Overall, many lessons were learnt from the implementation of surveillance activities during the tournament. These types of events give countries an opportunity to critically review and strengthen their surveillance systems. Real-time data reporting was essential and was facilitated by the use of a web-based reporting tool. However, some countries experienced connectivity challenges due to bandwidth and other communication limitations. Hence a back-up mechanism for data transfer (*ie* fax or phone) is essential in the Caribbean. Real-time information sharing was also important and the use of a simple listserv was invaluable in this regard. Early planning should be done, taking into account the length of procurement processes for supplies and allowing sufficient time for training and piloting of the system prior to the event. It was advantageous to build the MGSS on the already existing surveillance system. Flexing an already familiar system resulted in a smoother transition into and out of the MGSS. Finally, regional and international collaboration was very important to the successful execution of the surveillance activities.

Although there were many surprises and disappointments with respect to cricket games, from a public health perspective, the tournament was very successful. Dr Jerome Walcott, Chairman of the CARICOM Health Sub-Committee and the Council of Human and Social Development and, at the time, also the Health Minister of Barbados, stated in an interview that the "The Mass Gathering Surveillance System enabled a daily review of data and provided for prompt, appropriate public health interventions and responses".

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Erratum

Extravasation Injuries by REC Rose, R Felix, A Crawford-Sykes, R Venugopal, G Wharfe, Arscott G was published in the *West Indian Medical Journal* 2008; 57: 40–7. However, Table 1 was incorrectly used as Table 2. The error has been corrected and the updated article is available online at <http://ojs.mona.uwi.edu/index.php/wimj/article/view/871/798>. The correct Table 2 is also shown below. The error is regretted.

Table 2: Patient data and results

Case	Treatment for the extravasation	Necrosis interval (hours)	Extravasation injury	Treatment of injury	Days in hospital for treatment
1	None	48	Swelling 1 x 0.7 cm partial thickness skin loss	Elevation antibiotics healed by secondary intension	34
2	None	24	4 cm x 2 cm partial thickness skin loss	Bactroban ointment healed by secondary intension	Managed as an out-patient
3	None	24	6 cm x 7 cm full thickness skin loss	Died while awaiting skin graft procedure	70
4	Limb elevated	34	6 cm x 4 cm partial thickness skin loss	Skin grafting	44
5	Limb elevated	No skin necrosis	1 cm x 1cm hypopigmented area around the intravenous site	Parenteral antibiotics	6
6	None	Not recorded	5 cm x 4 cm full thickness skin loss	Groin flap	55
7	Limb elevated	48	3 cm x 1.5 cm partial thickness skin loss	Skin graft	21
8	None	34	2.5 cm x 1.5 cm ulcer	Debridement healed by secondary intension	12
9	None	12	Purple discolouration of the foot, ankle and leg	Elevation Bactroban ointment separation of eschar re-epithelization of wound	37
10	None	Not recorded	Ulcers	Debridement antibiotics healed by secondary intension	14
11	None	24 hours	3 x 3 cm full thickness skin loss	No treatment scar formation	Out-patient
12	Cold compresses	3 months	Scarring around the tendons 1 x 1 cm scar dorsum of hand	Tenolysis excision of scar with Z-lengthening Dorsal capsulotomies of metacarpophalangeal joints of the index, middle and ring fingers	21