

Disease Surveillance during the VII South Pacific Mini Games, Palau 2005 – Lessons Learnt

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Abstract

During July/August 2005, Palau hosted the VII South Pacific Mini Games. With an expected influx of at least 2000 athletes and visitors, the Palau Ministry of Health (MOH) decided to operate under an Emergency Incident Command Structure for the duration of the event.

Surveillance for infectious diseases and injury was carried out under this framework by the Epidemiology/Intelligence team (Epi Team) established for the event. Health providers traveling with visiting teams or working in Koror were requested to complete daily log sheets of encounters using standardized case definitions. These sheets were collected each evening, either from designated “drop-off” points or directly from the team accommodation, and entered into a Microsoft Access database. Reports were generated and reviewed each morning to provide current statistics for the Incident Command meeting and determine further actions as appropriate.

912 games related encounters were recorded. 19.5% (178) of these presentations were at MOH operated facilities or field teams. The remaining 80.5% presented to visiting medical delegations. 689 (75.5%) of the presentations were considered to be “initial” visits, with the remainder recorded as follow-up visits. Of these “initial” visits the most common diagnoses were injury, prevention (massage or strapping), upper respiratory illness, headache, and dehydration. There were no outbreaks of infectious disease detected during the games.

Although several issues with the surveillance methodology arose during the games, the event highlighted the importance of good communication and a flexible team approach in carrying out effective surveillance. It is recommended that future events adopt a similar approach, with a strong emphasis given in the planning stages to establishing direct contact between the staff responsible for surveillance and field and visiting health personnel. (PHD, 2005 Vol 12 No 2 Pages 9 -16)

Introduction

The VII South Pacific Mini Games were held in Palau between July 25, 2005 and August 4, 2005. Over 2000 visitors to the country were anticipated, an increase of approximately 10% above the normal population of 20,700 (SPC mid-2004 estimate).¹ In order to cope with the influx, the Ministry of Health (MOH) decided to operate under an Incident Command Structure for the duration of the games. One important component of this response was the design and implementation of a surveillance system that would provide real-time information to identify potential public health issues. Key concerns included the possible introduction of diseases not endemic in Palau, the increased risk of person-to-person transmission of infectious diseases due to shared accommodation and the potential for food

and water borne diseases due to the high volume of meals to be supplied both centrally and from temporary food booths. The development of the system was also influenced by the present global concern regarding possible international spread of diseases such as avian influenza and an increased sensitivity to the possibility of bioterrorism related events.

This paper aims to outline how surveillance was carried out during the mini games, and provide a discussion of the issues encountered during the event.

Background

Palau is an archipelago of volcanic islands and atolls situated in the Northern Pacific Ocean. Most of the population lives within the main centre of Koror. Palauan and English are both official languages, although most day-to-day business is conducted in Palauan.

The South Pacific Mini Games

The South Pacific Mini Games were held over 11 days and involved 1473 registered athletes and team officials

competing in 12 sports. These were athletics, baseball, basketball, beach volleyball, canoeing, softball, swimming, table tennis, lawn tennis, weightlifting, wrestling and triathlon.

Nineteen countries from across the Pacific were represented at the games (Table 1). Many of these

Table 1: Countries Competing in the South Pacific Mini Games, Palau, 2005

	Country	Total registered attendees
1	American Samoa	13
2	Cook Islands	32
3	Federated States of Micronesia	130
4	Fiji	113
5	Guam	183
6	Marshall Islands	50
7	Nauru	18
8	New Caledonia	164
9	Niue	10
10	Norfolk Island	5
11	Northern Mariana Islands	135
12	Palau	260
13	Papua New Guinea	138
14	Samoa	42
15	Solomon Islands	131
16	French Polynesia	3
17	Tonga	14
18	Tuvalu	7
19	Wallis & Futuna	25
	TOTAL	1473

Source: SPG Organizing Committee

countries have a high prevalence of diseases that are not endemic to Palau. This issue was highlighted during the IX Festival of Pacific Arts, held in Palau in 2004, when the health system was caught unprepared for the number of visitors who developed Malaria and did not have access to medication.² Neither Malaria nor its mosquito vector (*Anopheles* species) are present in Palau.

Athletes were housed in 6 public schools across Koror, sleeping in classrooms on bedding provided by "host states". Permanent shower and toilet facilities at the schools were supplemented with temporary "container" facilities connected to the sewer or temporary septic tanks. Food was provided by Palau Community College and served in a central dining hall, although take away meals were available for athletes and officials with scheduled events. A number of visitors were also accommodated in hotels around town.

Sporting events were held at 15 venues, with most sites in Koror state. Many of these venues were provided with temporary toilet facilities for the games. Temporary food stalls and other booths were set up at several locations including a central "village" area in downtown Koror.

Contractors were responsible for rubbish removal and cleaning of facilities at all sites, with inspections carried out several times each day by inspectors from the Division of Environmental Health.

In planning for the event, some key information was not available until the start of the games, including where delegations would be located, the schedule of events and whether health personnel were traveling with the teams.

Health Services in Palau

Medical services in Palau are available through the Belau National Hospital, several outlying public health clinics ("dispensaries") and two private health clinics. US Navy personnel also have access to a clinic at the Seabees camp. Hospital facilities include an emergency room and outpatients clinics, a pharmacy, X-ray and basic laboratory facilities, and several operating rooms.

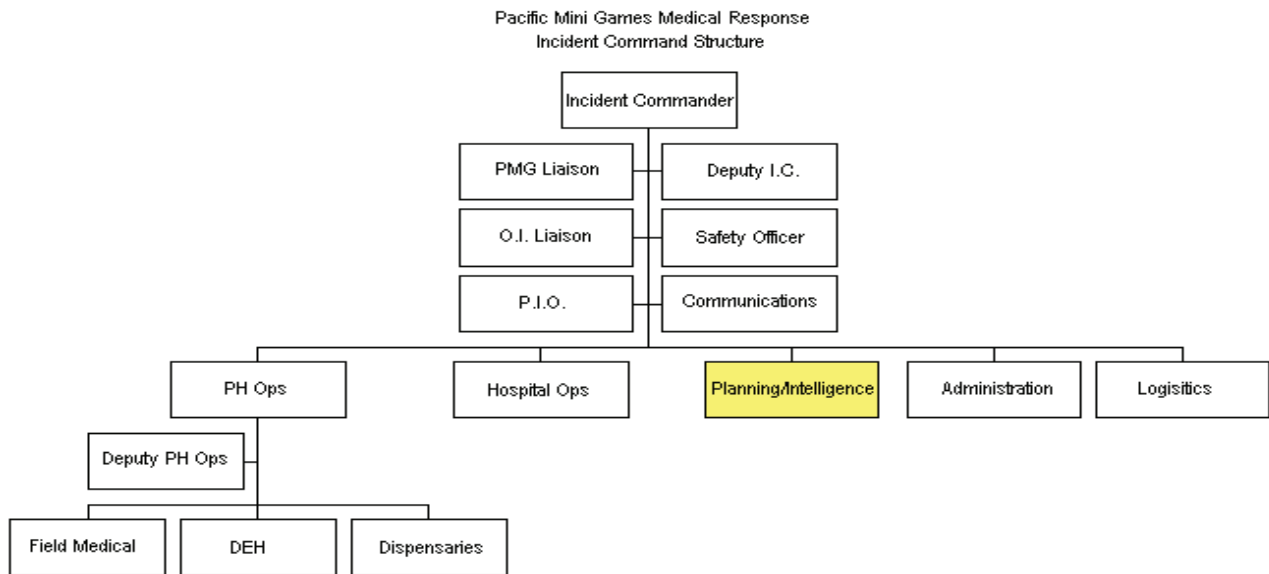
Elective surgery and several routine clinics were suspended during the games, and a number of additional services introduced to provide medical care in the field. These included a fully staffed clinic at the Palau Community College (close to the dining facilities), and a prevention booth at the central "village" area where athletes and visitors could access basic first aid, condoms and general health information. Mobile clinics were directed to venues by the Incident Commander according to the schedule of events. These mobile clinics also made a daily round of each accommodation site.

Palau does not currently have a robust reporting system for infectious diseases, although a new system is being implemented. At the time of the games, notification of infectious diseases was largely reliant on physicians or nurses contacting the epidemiologist or Communicable Diseases Control program by telephone when concerned.

The Incident Command Structure

The Incident Command Structure (ICS) is a system of communication and organization developed by firefighters in the United States.³ It has been widely accepted as a useful tool to assist organizations respond to emergency situations or other events beyond their normal capacity.⁴ The structure outlines a clear chain of command in order to minimize confusion and make the best possible use of available resources.

Figure 1: Basic Incident Command Structure (ICS) for the South Pacific Mini Games, Palau, 2005



Note: PMG Liaison=Pacific Mini Games (committee) liaison, Deputy IC=Deputy Incident Commander, OI Liaison=Off-Island Liaison, PIO=Public Information Officer, PH Ops=Public Health Operations, Hospital Ops=Hospital Operations, Deputy PH Ops=Deputy Public Health Operations, DEH=Division of Environmental Health.

An essential part of the ICS is Intelligence. The Epi/Intelligence team (Epi team) was responsible for obtaining information on the health effects of the event (the incidence of disease and injury) and making recommendations based on this information to the Incident Commander. The Epi team primarily consisted of both the epidemiologists currently employed by MOH with some part-time assistance from a visiting Medical Doctor from the University of Hawaii.

Methods

As many of the delegations brought their own health personnel, it was anticipated that many of the patient encounters would take place away from MOH sites. This, in addition to the lack of an effective routine surveillance system at the time, meant that surveillance could not be simply “scaled up” and that a specific system would need to be developed. The system that was designed was largely based on the one used in Palau in 2004 for the IX Festival of Pacific Arts, although some significant amendments were made.

Surveillance was carried out from July 23, 2005 to August 5, 2005, and involved the Belau National Hospital, the two private clinics in Koror, all MOH field teams and clinics and all visiting medical delegations.

Surveillance log-sheets and case definitions

A log-sheet was designed to capture the required information. Providers were requested to start a new form

each day and record any “games related encounters”. For field teams, special clinics and visiting medical delegations this meant entering every encounter. A “games related encounter” was defined as “Any person visiting from another country, any person working/playing in the Games, any person presenting to a games field clinic or mobile team, or any case of diarrhea, vomiting, or other food-borne illness like symptoms”.

Details requested for each encounter were: first name; last name; date of birth; diagnosis code; treatment code;

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if the patient was referred for further treatment; whether drug or alcohol use was suspected; whether food-borne illness was suspected; country of residence; whether the encounter was an “initial” or “follow-up” visit; and whether the case was an athlete,

spectator, games worker or other. If the encounter was due to an injury, the cause of the injury was also requested. Space was also provided for comments on each encounter.

These fields were selected to provide sufficient information to identify trends without being overly onerous. Considerable emphasis was placed on keeping the reporting requirements as simple as possible to ensure a reasonable level of compliance. Although recording names was debated, this was included in order to facilitate further investigation if required. Teams were given the option of recording a “2X2 name code” (First 2 letters of each name) if uncomfortable recording full names.

Box: Case definitions for syndromes reported during the South Pacific Mini Games, 2005

Acute Fever & Rash

Any person who presents with acute onset fever plus any rash, excluding diaper rash or rash confined to the genitalia.

Acute Upper Respiratory Infection

Any person who presents with an acute onset of at least one of the following symptoms:

- Pharyngitis
- Laryngitis
- Sinusitis
- Rhinitis
- Tonsillitis
- Cough

(If acute onset of fever is present – Influenza-like illness should be considered first)

Acute Lower Respiratory Infection

Any person who presents with or without fever, with an acute onset of at least one of the following symptoms:

- Bronchitis,
- Tracheobronchitis
- Pneumonia

Influenza-Like Illness

Any person presenting with sudden onset of fever > 101° F (38°C) with cough and/or sore throat in the absence of other diagnoses.

Diarrhea & Gastroenteritis

Any person presenting with non-bloody diarrhea and/or vomiting with or without abdominal pain and/or cramping where there is no clear evidence that symptoms are due to chronic illness or other medical condition (pregnancy, specific drug side effects etc).

Bloody Diarrhea

A person presenting with symptoms of diarrhea (3 or more stools passed in a 24 hour period) containing blood.

Meningitis-Like Illness

Any person presenting with fever and either stiff neck or acute onset of neurological signs/symptoms or both.

For “diagnosis code” health personnel were requested to select the most appropriate diagnosis from a provided list or record the diagnosis as “Other” and write a specific diagnosis in the comments section. The provided list included “injury”, “dehydration”, “heat rash” and seven syndromes taken directly from the Reportable Disease Surveillance System that Palau is currently working to implement.

Health promotion activities focusing on HIV and STI’s were a major part of the games response. Information and condoms were distributed to all team members arriving in Palau, with free condoms distributed through medical teams, at bars and clubs, at the airport, and at the health promotion booth at the “village”. Due to the short time frame during which the surveillance

system operated and the need to focus on syndromic surveillance, STI’s were not specifically included but could be reported under the “Other” category.

Log sheets were collected every evening from designated “drop-off” boxes located at the prevention booth, the emergency room and the first-aid booth at the track and field venue. The Epi team also visited medical delegations at their accommodation sites each evening (when possible to locate them) to collect surveillance sheets.

Information Collation and analysis

A database with automated reports was developed in Microsoft Access to collate the data and facilitate daily reporting at the Incident Command meeting. Information

Table 2: Syndromic Response Protocol for South Pacific Mini Games, Palau 2005

Diagnosis:	Threshold for Investigation:
Injury	None
Dehydration (includes associated headache)	None
Heat Rash	None
Acute Fever & Rash	Every case
Acute Upper Respiratory Illness	Clusters* of greater than 3/day or 7 total cases per day
Acute Lower Respiratory Illness	Clusters* of greater than 3/day or 7 total cases per day
Influenza-like Illness	Clusters* of greater than 3/day or 7 total cases per day
Diarrhea and Gastroenteritis	Clusters* of greater than 3/day or 7 total cases per day
Bloody Diarrhea	Every case
Meningitis-Like Illness	Every case
Foodborne Note: Any case marked as a food-borne illness will be investigated.	

*Cluster: Defined as a group of cases within a set location such as living quarters or team site.

provided to this meeting included encounters by clinic by date, initial encounters by diagnosis code and date, number of encounters suspected to be food-borne, number of drug or alcohol related encounters and any clusters identified based on diagnosis and accommodation site. The notebook computer on which this database was stored was password protected.

Cases reported as "Other" were initially recorded as such in the database and individually reviewed. Additional categories for common diagnoses were later added to the database and encounters recoded based on the comments provided. "Prevention" was used as a category for all strapping and massage where no injury was listed and all encounters that indicated pain in relation to a specific body part (other than headache) were recoded to "injury".

Investigation Protocols

Investigation protocols were established prior to the games in order to set a reasonable level of expectation for investigation given the limitations of the resources available. Thresholds established for active investigation are shown in table 2.

Standardized questionnaires were developed for each syndrome with a listed investigation threshold to be used during the games. These were based on case questionnaires in use in various jurisdictions and several had been trialed by MOH staff prior to the event.

Communication

Both formal and informal communication was an integral part of the surveillance system.

Formal communication included introductory meetings for MOH staff and visiting health personnel. At these meetings, providers were given an outline of the purpose of the surveillance and were introduced to members of the Epi team. Folders of log sheets with accompanying instructions and case definitions were distributed and reviewed.

Formal feedback during the games was relayed to MOH staff through the Incident Command structure, and to visiting delegations through the SPG committee liaison officer and subsequently through the SPG organizing committees' daily communication with delegation chiefs.

MOH mobile teams and clinics were requested to report

any concerns through their supervisors in the Incident Command Structure. Visiting medical delegations were provided with contact details (by phone and by radio via the incident room) for both the Medical liaison officer and the Epi team, and advised that they could call at any time to discuss concerns or questions.

Posting were also regularly made on PacNet, the Pacific Public Health Surveillance Network discussion forum, in order to keep other interested professionals up to date.

Informal communication was carried out through regular face-to-face contact with the health providers during visits to collect log-sheets. Meals eaten at the prevention booth were also an opportunity to catch up with other MOH staff and review the days events.

Results

A total of 912 games related encounters were recorded. 88.3% (805) of these were athletes, 2.5 % (23) were games workers (including health and law enforcement) with the remaining 9.2% (84) made up of spectators, coaches, officials and others that were not specified.

Seven countries participating in the games brought health personnel to Palau.

Although most surveillance sheets were collected daily, several log-sheets (accounting for 9 encounters) were returned to the epidemiologist in the weeks following the games.

Diagnoses

689 (75.5%) of the presentations were considered to be "initial" visits. Of these, the most common diagnosis was injury. Categories specifically included on the surveillance form accounted for a total of 60.5% (419) of the initial visits recorded. The remaining 39.5% of visits were recorded as "Other" and subsequently recoded. The most common diagnoses for initial visits once recoding was done are shown in table 3.

Table 3: Most Common Diagnoses at Initial Presentation during the South Pacific Mini Games, Palau 2005, after Re-coding of Data (N=689)

Diagnosis	Initial Cases	Percent
1. Injury	329	47.75%
2. Prevention (Massage or Strapping)	155	22.50%
3. Upper Respiratory Illness	38	5.52%
4. Headache	34	4.93%
5. Dehydration	21	3.05%
6. Boil/Abscess/Sores	15	2.18%
7. Influenza-Like-Illness	12	1.74%
8. Diarrhea and Gastroenteritis	11	1.60%
9. Toothache	6	0.87%
10. Ear problems	6	0.87%
11. Acute Lower Respiratory Infection	5	0.73%
12. Acute Fever & Rash	1	0.15%
13. Other – unclassified	56	8.13%
TOTAL	689	100%

A small cluster of Influenza-like illness (ILI) cases was identified in one accommodation venue, and questionnaires completed with each reported case. These cases were sharing a room and had also been in close contact prior to arriving in Palau. None of the cases had any travel history or other contacts with any country affected by avian (H5N1) influenza. The team decided to voluntarily quarantine these four athletes until fever had subsided and they had clinically improved. All four were substantially better within 48 hours and no further cases were reported in the cluster.

Cases of upper respiratory illness (URI) reported from the same accommodation venue were determined not to be linked to the cluster.

Figure 2 shows ILI and URI cases for all sites. The cluster of cases was identified on July 25, as reflected by the early peak in ILI cases shown on the graph.

There was one case of Mumps during the games in an athlete from a country that does not routinely immunize for Mumps as Palau does. Once identified, this case was placed in isolation at Belau National Hospital until the contagious period ended. Active surveillance was carried out to monitor close contacts, and other

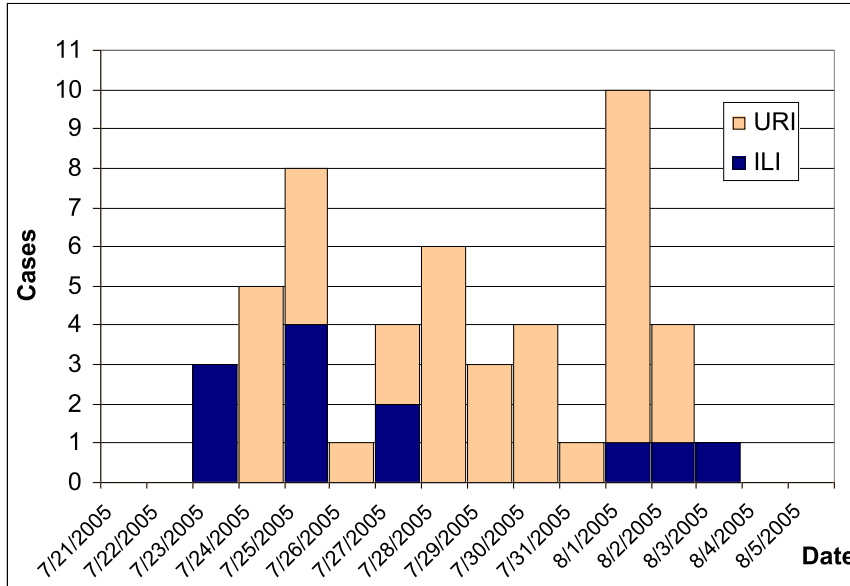
Upon review, only one case had both fever and rash. This case could not be interviewed (the case was feeling better by the time of notification and could not be located). However follow-up with the medical delegation for that team found that symptoms resolved quickly (rash resolving within 24 hours) and no contacts developed similar illness. No further diagnosis was available for the case.

Of the 11 cases of diarrhea and gastroenteritis reported, 5 were reported as potentially food borne. All 5 cases were investigated. Two identified eating a common meal but could not identify where this meal had been purchased making further investigation impossible. No common links were identified between the other cases, and as such, none of the cases could be confirmed as being foodborne. One case had a history consistent with exposure prior to arrival in Palau. All premises identified in the food histories were inspected by the Palau Division of Environmental Health with no major issues identified.

Drug and Alcohol Related Notifications

There were no drug or alcohol related injuries or illness reported during the games. Many forms did not have this column completed.

Figure 2: Initial Encounters of Influenza-like Illness and Upper Respiratory Illness (URI) reported during the South Pacific Mini Games, 2005.



delegations were advised to be aware for symptoms. No additional cases were reported by the conclusion of the games and all contacts of the case remained well during their time in Palau.

Three cases of suspected Malaria were reported and treated by their own country medical delegations.

Several cases of Acute Fever and Rash were reported and all were investigated according to the protocol.

Ministry of Health Encounters

Figure 3 demonstrates that only 19.5% of the total encounters recorded were through MOH sites or roving teams. If only initial encounters are counted, this figure rises to 28.5%. Of the total encounters excluding those for "prevention", 27.1% (164 where N=716) were seen at MOH sites or mobile teams.

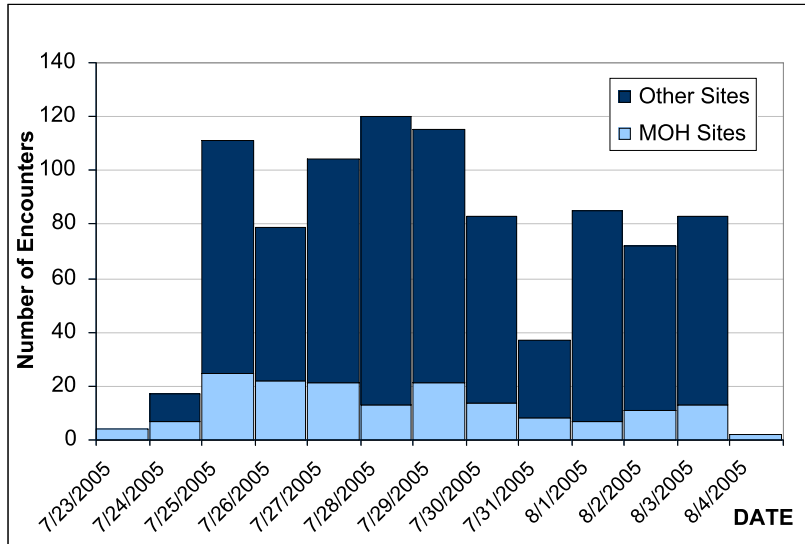
The majority of patient encounters with MOH staff occurred away from the hospital, either at the special clinic opened for the event or with the mobile teams. Only 3.9 % (36) of encounters were through the Emergency Room or Outpatient Department, and there was only one games related admission (the

Mumps case noted above). The hospital utilization rate was 2.5%, and the ER utilization rate was 2.3% based on the number of registered athletes (N=1473).

Treatment

The most common treatment type recorded was "Other" with a count of 544. As multiple treatments could be recorded for each encounter no percentages were calculated.

Figure 3: Games Related Medical Encounters during the South Pacific Mini Games, Palau 2005



sufficiently detailed for further analysis. As such, it was felt that this field was not particularly useful for surveillance and consideration should be given to removing it from future surveillance systems for this type of event.

There was also a great deal of discrepancy in reporting prevention activities such as massage and strapping. It is known that not all sites recorded these encounters, also it was difficult to determine from the log-sheets if the encounter was for preventative reasons or due to an injury. If prevention encounters are specifically of interest for study, a specific diagnosis category on the log form should be used to differentiate injury treatment from prevention. Otherwise, cleaner

Staff resources

The surveillance system and case investigation required substantial time and effort to be effective. It is estimated that the total number of person-hours of work completed for the games by the Epi team was approximately 240.

Lessons Learned

Structure

Although operating at a different scale, as found with other large sporting events such as the Sydney Olympics in 2000,⁵ one of the most important aspects of the system was flexibility. Having a team responsible for surveillance rather than leaving this task to one person was essential in allowing this flexibility and ensuring capacity to respond to changing priorities. The Incident Command Structure also meant that surveillance data could be reviewed at a system level and appropriate response measures allocated efficiently, with clear understanding of who was responsible.

Data and Data Management

Several of the fields collected on the log-sheet were problematic when it came to analysis.

As seen in the results, no cases of drug or alcohol related injuries or illness were reported. As cases were not completely anonymous, this may have led to underreporting. Consideration should be given to how to overcome this problem or whether other methods to collect information on drug or alcohol related events may be more appropriate.

Inclusion of treatment codes on the log sheet was designed to assess the demand on the ministry for particular items. However, the majority of treatment recorded was noted as “other”. and the level of treatment recorded (such as “bandage” or “medicine”) was not

data may be obtained by requesting providers not to record purely preventative encounters. This change would mean data about this pressure on the health care system would not be captured and is a drawback that should be considered when designing the system.

Confusion regarding the case definitions was also found to be a problem, with diagnosis categories often miscoded or recorded under “Other” on the surveillance sheets. For example, several fever and rash cases were investigated with all but one found to have had only one of the two symptoms required. Although an outline of case definitions was provided to the MOH medical teams and visiting medical delegations with the forms, further emphasis and review of case definitions in the initial provider meeting may be useful. In order to cope with providers wanting to report fever (without rash), it may also be worthwhile considering including separate diagnostic categories for “fever” and “rash” even if further case investigation is not planned for these presentations.

The Access database provided several advantages, including the ability to develop automated reports, and the ease with which these reports could be amended to include further analysis as new issues were identified or additional information was requested. With limited resources available to the Epi team, the time this freed up for actual interpretation of data and investigation of concerns was particularly valuable.

Logistics

MOH medical teams and visiting delegations were requested to complete a log sheet daily. If no cases were seen during the day, providers were not requested to complete a form. One problem encountered during the games was locating missing forms. Unless each site and team was contacted that evening, it was impossible

to distinguish whether they had not seen any cases or if the form was missing or delayed. This problem may have been alleviated by a "zero-reporting" approach where each site or delegation was requested to return a form for each day regardless of whether any patients were seen.

Delays in data analysis due to language difficulties was another obstacle faced, with some surveillance sheets completed in French, which is not an official language in Palau. Although both English and French are major Pacific languages, this obstacle was not anticipated as it had not arisen during the previous Festival of Pacific Arts event involving many of the same countries. The problem was overcome by translating the sheets using an English-French dictionary and checking the results with team doctors in their limited spare time.

Resources

Capacity of the health care system was expected to be an issue during the games. As seen in the results, a substantial proportion of encounters were handled by visiting health personnel. Each of these encounters represents a patient that most likely would have otherwise been seen at one of the MOH facilities. This highlights the significant resource that these visiting health personnel (and the supplies they bring with them) are for alleviating potential pressure on the health system.

Recommendations

The success of the surveillance system can largely be attributed to the cooperation of the health personnel (both local and visiting) involved. The strong communication fostered by ongoing contact with health providers at the accommodation venues and at field sites was vital in developing an atmosphere of trust in which teams were happy to share unconfirmed information, thus allowing a rapid response.

Specific recommendations for future events include establishing strong communication channels with visiting health personnel early in the event, through personal contact with the surveillance team. Both English and French languages should be accommodated within the surveillance system for any event held in the Pacific, even where problems are not anticipated.

Zero reporting should be introduced for all surveillance of this nature to avoid unnecessary uncertainty when dealing with the collected data. Visiting teams may also find "non-health" sites such as dining halls useful contact

points where drop-off boxes for surveillance forms could be located.

Case definitions must also be clearly understood in order to minimize time delays and discrepancies within the system and this should be a major component of pre-event training with providers and ongoing revision of cases and discussion with health providers.

Conclusion

Overall the surveillance system created for the games was an effective way of capturing useful information in a timely manner for response. Key elements included strong communication networks and a database that allowed some level of automation and therefore freed staff time up for other tasks. Although resource intensive, the daily contact with health personnel proved valuable, and should be retained in some form wherever resources allow.

The authors are happy to be contacted by national teams or health personnel who may be involved in preparing for future

events.

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