Public Health Surveillance and Response in Mass Gatherings

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Mass gatherings are a stress test for public health. Crowds, and the infrastructures that support them, can be an ideal setting for outbreaks of disease.

Dr Margaret Chan, Director-General of WHO
Lancet Conferences: Mass Gathering Medicine, 23-25 October 2010
Mass Gatherings

- Planned
  - Same Place
  - Different place
- Spontaneous
  - Short time
  - Longer time
<table>
<thead>
<tr>
<th>Major Areas of public Health responsibilities during Mass Gathering:</th>
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</thead>
<tbody>
<tr>
<td>Health Care facility Capacity</td>
</tr>
<tr>
<td>Mass Casualty Preparedness</td>
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<tr>
<td>Diseases Surveillance and outbreak Response</td>
</tr>
<tr>
<td>Environmental health and food safety</td>
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<tr>
<td>Public Health information and Health promotion</td>
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<tr>
<td>Public Health preparedness and response to natural hazards including extreme weather conditions</td>
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<tr>
<td>Leadership and coordination and communication</td>
</tr>
<tr>
<td>Public Health Preparedness and response to incidents potentially involving explosives, biological and chemical agents or nuclear materials</td>
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</tbody>
</table>
Why are we worried?

- Increase the potential for public health events due to changes in population dynamics, changes in services and changes in behaviors
- Provide a platform for terrorist events
- Attract media attention
- Health systems are stretched beyond their capacity
- Routine health measures can become difficult or impossible to implement during MGs
- Risk mitigation requires coordination and cooperation across multiple sectors and ministries
Why are we worried?

- Non-endemic diseases can easily be introduced during the event and circulate rapidly
- International dimensions of some events (languages, cultures, etc.) increase the complexity of risk communication
- Intense media interest and the potential threats of deliberate events bring high visibility and political scrutiny
• Temporary increases in population – increase number of reports
• Necessitate decreasing the timeframe for reporting, data analysis & dissemination
• Must be able to detect NEW diseases
• New prioritization
• long-term consequences for the spectrum of diseases in the host country
• Political pressures and the need for heightened sensitivity may require implementation of temporary Surveillance systems
• Rumor control and public reassurance in the case of non-events
• Need for enhanced surveillance (different technology and surveillance methods)
Public Health Concerns

- Communicable diseases
  - Investigation Interventions e.g. FBD
  - Prevention and Control e.g. Meningitis

- NCD and injuries
  - Burden to Health System

- Adverse events of environmental exposures
  - Prevention and Treatment e.g. Heat and air related conditions
Communicable disease in MG

- What are the likelihood of diseases to occur?
- Which diseases have risks which can be minimized? – prevention
- Which diseases are vital to detect and respond to? - highest risk vs. biggest response-polio
- Any outbreak in the host community?

Importation of infections

Outbreak of local infections

Exportation of infections
Some outbreaks described in the literature: Examples of religious event

<table>
<thead>
<tr>
<th>Event</th>
<th>Country</th>
<th>Year</th>
<th>Organism/outbreak</th>
<th>No. of cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hajj</td>
<td>KSA</td>
<td>1987</td>
<td>Neisseria meningitidis A</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Hajj</td>
<td>KSA</td>
<td>2000</td>
<td>Neisseria meningitidis</td>
<td>400</td>
<td>1</td>
</tr>
<tr>
<td>Religious fair, Maha Kumbh Meela</td>
<td>India</td>
<td>2001</td>
<td>Cholera outbreak</td>
<td>7 positive tests</td>
<td></td>
</tr>
<tr>
<td>Pilgrimage Lourdes</td>
<td>France/Switzerland</td>
<td>2002</td>
<td>Norovirus</td>
<td>350</td>
<td>1</td>
</tr>
<tr>
<td>Le Magal de Touba pilgrimage</td>
<td>Senegal</td>
<td>2005</td>
<td>Cholera outbreak</td>
<td>8296</td>
<td>117</td>
</tr>
<tr>
<td>Religious festival</td>
<td>Thailand</td>
<td>2006</td>
<td>Botulism outbreak</td>
<td>163</td>
<td></td>
</tr>
<tr>
<td>Jamboree Christchurch</td>
<td>New Zealand</td>
<td>2008</td>
<td>Norovirus</td>
<td>30?</td>
<td>90 primary</td>
</tr>
<tr>
<td>Pilgrimage Lourdes</td>
<td>France</td>
<td>2008</td>
<td>Norovirus</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
MG outbreaks in Literature

• **1993**: 69 crowd crush injuries at a Madison, Wisconsin, football game
• **1996**: Thousands of heat-related illnesses; 111 injuries and one death due to bombing at the Atlanta Olympics
• **1997**: Meningococcal outbreak from a soccer event in Belgium
• **200-2001**: Meningococcal outbreak in Hajj
• **2008**: Influenza outbreak at World Youth Day in Australia
• **2010**: Measles outbreaks in Germany from a Christian pilgrimage in France
• **2013**: Norovirus disease outbreak at World Youth Day in Brazil
What is the primary task of PH Surveillance in MGs?

• Detect cases and Reduce time of detection
  – Public health interventions can be employed to prevent further illness,
  – To reduce morbidity and mortality
Early detection

Reducing morbidity/mortality for exposed asymptomatic individuals

- First cases seek medical care
- Public health systems notified

3 days to:
- Identify source & exposed persons
- Locate the exposed, give prophylaxis.

Timeframe for effective prophylaxis of exposed asymptomatic persons (incubation period of disease)
 WHICH DISEASES TO INCLUDE UNDER SURVEILLANCE?
• Endemic diseases and non-endemic diseases (i.e. diseases with the potential for importation or which present specific public health threats).

• Key is PROPER risk assessment
• Outbreak potential
• Short incubation period
• Difficult to treat or manage (e.g. XDR-TB),
• Modes of transmission likely to be enhanced/intensified in a MG (e.g. meningitis, GI and RI)
• Causing severe illness and requiring investigation or application of control measures, like quarantine
• May cause severe illness, known to be of particular risk for use as bioterrorism agents
• Known to be a particular risk for use as bioterrorism agents
• Not normally seen in the host country (if participants are foreign)
Remember the Acronym **DIED**

- D for Diarrhea, Dehydration (due to heat), Dyspnea (respiratory distress)
- I for influenza, injuries, intentional use of infection
- ED (Unusual number of Emergency Department visits)
### Types of Surveillance: Advantages and Disadvantages

<table>
<thead>
<tr>
<th>Surveillance System</th>
<th>Collects and Analyzes</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notifiable Disease Surveillance</td>
<td>Diseases that health care personnel are mandated to report (such as anthrax, giardia, Legionnaire's disease)</td>
<td>• Public health and health care personnel familiar with this approach&lt;br&gt;• Easily standardized</td>
<td>• May not be sensitive enough to detect all conditions of relevance&lt;br&gt;• Passive and subject to underreporting&lt;br&gt;• May not be timely&lt;br&gt;• Depends on a specific lab diagnosis which takes time and delays reporting</td>
</tr>
<tr>
<td>Sentinel Site Surveillance</td>
<td>Health data by institutions chosen based on their geographic location, medical specialty, and ability to accurately diagnose and report high quality health data</td>
<td>• May be more specific risks of interest&lt;br&gt;• May be more efficient</td>
<td>• Does not necessarily cover the entire at-risk population&lt;br&gt;• May be more labor-intensive&lt;br&gt;• Requires training</td>
</tr>
<tr>
<td>Injury Surveillance</td>
<td>Data about unintentional and intentional injuries</td>
<td>• Can tailor to specific risks of interest</td>
<td>• Information may not be routinely collected, so additional resources may be needed</td>
</tr>
<tr>
<td>Surveillance system</td>
<td>Collects and analyzes</td>
<td>Advantages</td>
<td>Disadvantages</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Syndromic Surveillance</td>
<td>Health data systematically collected based on symptoms rather than confirmed diagnosis. Most often performed with electronic records, but manual paper systems are also an option.</td>
<td>• May detect disease outbreaks more quickly</td>
<td>• Can be expensive and labor-intensive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• May have poor specificity</td>
<td>• May have poor specificity</td>
</tr>
<tr>
<td>Novel Surveillance</td>
<td>Health data collected using alternative methods, like text messaging, first aid station reports, pharmacy records, etc.</td>
<td>• May detect disease outbreaks more quickly</td>
<td>• Can be labor-intensive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• May be more specific for the mass gathering event</td>
<td>• May not be sustainable</td>
</tr>
<tr>
<td>Laboratory Surveillance</td>
<td>Laboratory specimen results</td>
<td>• Public health and health care personnel familiar with this system</td>
<td>• Limited to laboratory tests ordered and laboratory diagnosis which takes time and delays reporting</td>
</tr>
</tbody>
</table>
Probably no single system is enough
When to conduct/implement our Surveillance system?

- Pre-MG Surveillance
- MG surveillance
- Post MG Surveillance
- Post incidence Surveillance
Pre-MG surveillance is the use of surveillance to determine baselines and to gain a general understanding of the public health conditions in the community hosting the event, and is based on routine surveillance approaches.

Any new or enhanced surveillance systems required for the event should be implemented well in advance.
Surveillance during MG

• **Enhanced surveillance** is needed in order to rapidly identify events of public health concern that occur during the MG

• To communicate information about them, and to respond to them.

• This type of surveillance must occur at the site of the MG as well as at local hospitals and other health care delivery establishments in the areas surrounding the MG venue.
Strategies for Enhanced Surveillance and Response

- Enhance reportable/notifiable disease by clinicians
- Enhance laboratory capacity and reporting
- Implement a paper-based or automated syndromic surveillance system
- Consider environmental (Health) monitoring
- Create 24/7 on-call and rapid response teams
Question your self..

- Am I receiving the data timely?
- Is there an appropriate cycle of communication?
- Integration of PHS with other intelligence data
- Efficient lab?
- Adequate communication?
- Trigger point for PH action?
- Surge capacity identified?
- Spokesperson?
In the post MG, we usually use routine and enhanced surveillance.

Ensure detection of diseases with a longer incubation period.
• A key objective for post-event surveillance is to define the exposed population in as much detail as possible, in order to ensure that the most effective public health and medical response measures are put in place.

• Think of XDR TB
Post MG surveillance

• Duration of surveillance based on risk assessment
• Exist strategy to wind down the PMG surveillance
• Plan for surge capacity
• International connections to ensure cross border information sharing
• Plan for maintaining communication with surveillance partners
Post incident Surveillance

- If an incident occurred, surveillance needs to expand to include incident-specific post-incident surveillance in addition to ongoing surveillance for other incidents.
- Readiness should happen before the event, so that incidents cause minimum disruption to the event.
To implement post incident surveillance, we may need
  – Additional resources
  – More preparedness (one outbreak happened, others of same infection may happen)

Appropriate command and control
• Aim: to detect events earlier than lab confirmation
• Timeliness and sensitivity are its key attributes.
• SS makes it possible to determine rapidly that a problem may be developing
• SS can identify broad nature of the problem, but it cannot define the problem precisely, and its results can be misleading.
• So results of SS must be treated with care
• Syndromes must cover range of diseases
• SS is also useful for establishing the absence of a problem e.g. no hepatitis, no meningitis
• Threshold of detection too low threshold versus too high
Syndromic Surveillance

SS can be targeted to detect:

– Events that have outbreak potential
– Non-communicable events that require urgent public health response
– Require more timely detection to facilitate control
– Bioterrorism agents
Implement Syndromic Surveillance?

• Is this necessary?
• What do we look for and is it effective?
• How much does it cost?
• What methods should be used?
• For how long should it be implemented?
• How do you respond to this information?
• What are the challenges and limitations?
• Links between the CD surveillance system and agencies e.g. military, environment, civil defense, animal health, environmental health, etc.

• Inclusion of info from non-health sectors (e.g. police, tourist offices, hotels, banks, pharmacies, etc.)

• Developing SOPs for rapid establishment of active surveillance if an incident occurs
• Always think of Integration and coordination
• Timeliness of reporting and dissemination
• Points of entry: Associate with facilities for isolation, quarantine and other IHR requirements
What will we do when something happened?”
• In a mass gathering, you will still use many of the same techniques that you would normally use for emergency response or outbreak investigation. But given the conditions of a mass gathering, you will need to do some extra planning to make sure you are ready to respond effectively to anything that happens during the event.

• Your plans should include procedures for food outbreak/case investigation, isolation, quarantine, chemoprophylaxis many more
• Risk ratings are priority codes

<table>
<thead>
<tr>
<th>Level of Risk</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 = High</td>
<td>Action must be taken to reduce consequences or likelihood</td>
</tr>
<tr>
<td>3 = Significant</td>
<td>Some action must be taken</td>
</tr>
<tr>
<td>2 = Moderate</td>
<td>Specific monitoring or response procedures required</td>
</tr>
<tr>
<td>1 = Low</td>
<td>Managed by routine measures</td>
</tr>
</tbody>
</table>
• Outbreak threshold vs response threshold
• Outbreak management (Epidemic Management System EMS)
• ICS
• Push button mechanism through RSTs or mobile teams (Public Health SWAT squads)
Functions of EMS

- Establish structures, tools and procedures to manage events that threaten public health
- Identify and clarify roles and responsibilities, and provide guidance for alert and response activities
- Facilitate standardised data management, risk assessment and response.
Ensure availability of

- Coordination and communication
- Case management as a component of outbreak management
- Triage and management of large number of cases
- Infection control
- Medical Services and Communicable disease Control
Ensure availability of

- Standard Operating Procedures for medical Services
- Medical and none medical Supply
- Health Care System and Surge Capacity
• Surveillance Must be a key component for MG preparation
• Surveillance should be established based on proper risk assessment and prioritization of diseases
• Surveillance system should be established well ahead of time and continue after the events for sometime
• Health system and its capacity should be under our lens
• Surveillance information should be reconciled with Public Health Intelligence information
• Outbreak Management and EMS should be attached to surveillance systems
Thank you