Public Health Surveillance for Mass Gatherings

PHO Rounds

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Objectives

• Define mass gatherings

• Identify key components to consider for public health surveillance of mass gatherings

• Review approaches to public health surveillance at two recent international mass gatherings

• Discuss potential approaches, challenges and opportunities for public health surveillance at mass gatherings in Ontario, with specific consideration of the upcoming 2015 Pan Am / Para-Pan Am Games.
Key messages

• Public health surveillance for mass gatherings (MGs) aims for timely detection and reporting to enable timely response

• MGs present a surveillance legacy opportunity

• Recent international sporting MGs have involved extensive coordination and collaboration to plan, test, refine, execute and evaluate public health surveillance for MGs
OVERVIEW OF PUBLIC HEALTH SURVEILLANCE CONSIDERATIONS FOR MASS GATHERINGS
Mass gathering

- A specified number of persons at a specific location for a defined period of time for a specific purpose, which may include:
  - a social function;
  - large public event;
  - sports competition
- Spontaneous or planned
- The number of people attending is sufficient to strain the planning and response resources of the community, state or nation hosting the event
Examples of mass gatherings

- Olympic and Paralympic Games
  - Example: Vancouver 2010
  - Length of stay: 2-3 weeks

- The Hajj
  - Pilgrimage to Mecca
  - Location: Mecca, Saudi Arabia
  - 2.5M pilgrims
  - Average stay: 40 days

- Rock concerts
  - Example: SARS Stock
  - Length: 1 day

Potential disease transmission paths

- Surveillance for disease brought back from venue locale
- Visiting population brings in external disease
- Local population is exposed to external disease
- Visiting population is exposed to local disease
- Surveillance for disease of local origin
- Surveillance for disease brought into venue locale
- Surveillance for disease brought back to venue locale

Lombardo et al 2008
The HAJJ: June-Nov 2012
global population movements
Potential health hazards during mass gatherings

• Communicable:
  • Foodborne and waterborne illnesses
  • Other communicable diseases (e.g., respiratory, STIs)

• Non-communicable:
  • Heat or cold related illnesses
  • Injuries and other trauma
  • Alcohol and illicit drug misuse and associated dehydration / injury
  • Illness, injuries and panic related to intentional chemical, biological, radiological, nuclear, and explosive events
  • Natural events (e.g., severe weather events, such as torrential rainstorms, electrical storms, earthquakes, floods)

• Risk analysis should inform surveillance priorities

Enock and Jacobs 2008; Memish et al 2012; WHO 2008
Surveillance for mass gatherings

**Example.** Early detection – reducing morbidity/mortality for exposed asymptomatic individuals

*prophylaxis is not relevant in some cases*
Surveillance for mass gatherings

- Coordination across all authorities (e.g., public health, EMS, police, security, etc.) and local through international levels of government
  - Ensures adequate disease surveillance and response across multiple jurisdictions

- Amount of effort required is based on suitability of systems in place for mass gatherings and scalability of those systems for this purpose
  - New systems set up or leverage/enhance existing system?
  - Legacy systems

- Primary task of public health surveillance is to reduce time to detection of illness to enable rapid reporting and response
## Types of surveillance

<table>
<thead>
<tr>
<th>Surveillance System</th>
<th>Collects and Analyzes</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| Reportable diseases | Mandatory reporting (e.g. Anthrax) | • Familiarity  
• Easily standardized | • Passive/underreporting  
• Reporting delays |
| Sentinel site       | Data based on geographic location | • Specific risks of interest | • Not broadly representative of population at risk  
• Labour intensive  
• Requires training |
| Injury              | Data on injuries       | • Specific risks of interest | • Not routinely collected |
## Types of surveillance cont’d

<table>
<thead>
<tr>
<th>Surveillance System</th>
<th>Collects and Analyzes</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syndromic</td>
<td>Data on symptoms</td>
<td>• Early detection of outbreaks</td>
<td>• Lacks specificity</td>
</tr>
</tbody>
</table>
| Novel               | Data collected using alternative methods (e.g. texts, first aid station reports, pharmacy records) | • Specific for event  
• Early detection of outbreaks | • Labour intensive  
• Not always sustainable  
• Separate signals from noise |
| Laboratory          | Laboratory specimen results | • Familiar with the system  
• Standardized | • Time required for confirmation |
Pre/intra/post-event surveillance

• Consider duration of event when prioritizing diseases / syndromes for surveillance in the host jurisdiction
  • E.g., For a 2-3 day event, communicable diseases with longer incubation period may be lower priority

• Consider all phases
  • After the event surveillance is not finished!
  • Infectious agent discovered at the end of a mass gathering event
  • Consider the incubation period of the priority communicable diseases when determining the duration of the surveillance systems operations
Challenges

• Increased transient population may increase volume of reports (staffing, data handling issues)
• Decreased time to report and disseminate information
• Importation of non domestic diseases in host country
• Reprioritize reporting practices
• Rumour control and public reassurance in case of non-events
Challenges

• Historical baseline data may not be relevant due to increased transient population attending mass gathering
  • Long term impact to baseline disease rates

• May sacrifice data quality for more timely data

• How long to continue surveillance after event?

• Return of cases to home countries and follow-up of known cases
EXAMPLES OF PUBLIC HEALTH SURVEILLANCE IN RECENT INTERNATIONAL MASS GATHERINGS
International sporting mass gatherings

• Infectious diseases NOT a major cause of morbidity at recent international sporting mass gatherings (e.g., Olympics)

• Rumour (i.e., non-event) detection / management equally valuable as event detection?

• Routine factors to consider:
  • Who and how many at risk
  • Disease severity, transmissibility, ease of control
  • Potential media/public interest

• Sporting MG-related factors:
  • Involvement of athletes, staff, visitors
  • Within / proximity to a venue, training site, transport hub, polyclinic
  • Timing in relation to event

WHO 2008 CDR; Memish et al 2012; Severi et al 2012
Vancouver 2010
Vancouver 2010: VCH Public Health Surveillance Unit

An Investment in Regional Public Health - Highlights from the First Five Years
2007-2012
Games disease and injury surveillance goal:
To monitor and respond to unusual health events before, during and after the Vancouver 2010 Olympic and Paralympic Games

Long-term public health surveillance goal:
To enhance public health surveillance capacity [via new and existing systems] to serve as a surveillance legacy for the region after the Games.
## Vancouver 2010: Surveillance systems

<table>
<thead>
<tr>
<th>Surveillance system</th>
<th>Respiratory</th>
<th>Enteric</th>
<th>Other CD</th>
<th>Injury</th>
<th>Health system impact</th>
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</thead>
<tbody>
<tr>
<td>Communicable disease surveillance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Facility outbreaks</td>
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<tr>
<td>Foodborne illness complaints</td>
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<td>✓</td>
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<td>School absenteeism</td>
<td>✓</td>
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<td>Employee absenteeism</td>
<td>✓</td>
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<tr>
<td>Emergency room visits</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<td>✓</td>
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<tr>
<td>Daily partner call-out</td>
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<td>Medical service provider visits</td>
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<td>BCCDC influenza bulletin</td>
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<td>PHSA laboratories</td>
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<td>GPHIN updates</td>
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<td>PHAC FluWatch Report</td>
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Dr J Sandhu, Public Health Surveillance Unit, Vancouver Coastal Health

Sandhu 2013
Vancouver 2010: Surveillance system enhancements

- Comparable data elements
- Standardized, timely data entry for daily reporting
- 2 year+ historical baselines
- Secure electronic data transfer
- Automated analysis and reporting
- Training and surge capacity
- Stakeholder engagement
Figure 1. Number of ER visits related to assaults* by resident location† and visit date.
Vancouver Coastal Health Authority, 2010 compared to previous 3-day average‡

*Visits related to assaults are monitored through ICD-9 codes E960-E968.
†Determined by the patient’s postal code at the time of visit. Non-BC residents include those with an unknown postal code at time of visit.
‡Historical data are not available.
Source: Emergency Department Visits from CareCast System (Richmond Hospital, UBC Hospital, Vancouver General Hospital), Eclipsys System (Mount Saint Joseph Hospital, St. Paul’s Hospital) and McKesson System (Lions Gate Hospital, Pemberton Health Centre, Squamish General Hospital, Whistler Health Care Centre).
Prepared by: Vancouver Coastal Health, Public Health Surveillance Unit.

Vancouver 2010: Injury surveillance
Vancouver 2010: Surveillance reporting

- Daily updates during Games
- Communicable disease and injury surveillance
- Air and water quality, food safety, weather
- Health promotion message

- Audience: health/non-health, local to int’l
Vancouver 2010: Surveillance findings

• Health system impact:
  • No significant impact due to visitors
  • Small increase in injury-related ED visits at the designated spectator hospital (E.g., falls, assaults and public intoxication)

• Communicable disease outbreaks:
  • Norovirus outbreak at temporary housing camp for Olympic workers
    • Pre-Games community transmission & close camp living quarters
  • Measles importation into the community post-Games
    • 22 measles cases reported after the Paralympics, most under/unimmunised
Vancouver 2010: Public health surveillance legacy

• Legacy surveillance systems (new and enhanced) that continue to monitor the VCH region’s health
• New monthly reporting tool
• PHSU and partner MG surveillance capacity building
• Raised profile for public health
• Capacity building with future host jurisdictions, PHAC workshops, etc.
LONDON 2012
LONDON 2012: Key anticipated ID risks

Gastrointestinal
- Salmonella
- E. coli
- Norovirus

Respiratory
- Influenza
- Legionella

Waterborne diseases
- Leptospirosis
- Cryptosporidium
- E. coli

Rash
- Measles
- Meningococcal illness

Moran-Gilad et al 2012
LONDON 2012: Enhanced ‘business as usual’

EVENT-BASED SURVEILLANCE

- Daily and Olympic epi link reporting and health protection risk assessment

NOTIFIABLE ID REPORTING

- Extra fields in data reporting systems re: Olympic links
- Daily and Olympic epi link reporting and telephone notifications from medical practitioners (+ polyclinics); daily HPU and national analysis

LAB SURVEILLANCE

- Daily reporting, new tests (e.g., multiplex PCR for gastro), daily gastro and resp pathogen analysis, plus enhanced leptospirosis dx
LONDON 2012: Enhanced ‘business as usual’

INTERNATIONAL SURVEILLANCE

- Daily reporting; strengthened collaboration with ECDC
- WHO (GOARN, IHR), ECDC EI, European Early Warning and Response System, other un/official sources, automated + human

MORTALITY SURVEILLANCE

- Daily reporting of excess all-cause mortality;
- General Register Office

SYNDROMIC SURVEILLANCE

- Daily reporting; scenario testing
- National telephone health helpline, GPs
ED syndromic surveillance (EDSSS)

- Early detection of impact/non-impact of potential public health threats, reassurance

GP out-of hours syndromic surveillance (GP OOHSS)

- As above, data captures weekends, evenings, holidays - may better capture different care-seeking patterns of visitors

Undiagnosed serious infectious illness surveillance (USII)

- Detection of new/emerging infections presenting with serious illness in sentinel ICUs/PICUs, risk factors (e.g., Olympic)
LONDON 2012: Scenario testing

- Pre-Games scenario testing used to predict utility of 4 different syndromic surveillance systems for different presentations.
  - 2 existing: NHS Direct telephone advice line, In-hours general practitioner (GP) consultations
  - 2 new: GP Out-of-hours/unscheduled care (GPOOHSS), Emergency Departments Syndromic Surveillance System (EDSSS)

- Findings:
  - Sensitivity depended on # symptomatic, severity, spatial and temporal clustering of cases
  - Timeliest system varied by scenario
  - Good historical baseline data key, preferably for 1 year prior
  - Need for better understanding of patterns of health care use
Lessons from the London 2012 Olympic Games

One of the key elements of the HPA’s Olympic legacy will be identifying and learning from the experiences of both planning and delivery. This will inform and support planning for future mass gathering events as well as improving working practices within the agency and beyond. A number of debriefing sessions will be held to capture lessons from the Olympic Games and any
LONDON 2012: Surveillance findings

- **59 new events** included in daily public health SitRep
  - Most routine summer events re: gastroenteritis and VPDs
  - No risk to Games, standard PH management
  - Small number of events linked to athletes, managed by HPA /LOCOG

- **No major public health incidents** occurred:
  - “The numbers and pattern of illness were comparable with normal business and that seen in other mass gatherings.”

- Key surveillance and reporting function was HPA’s provision of providing timely and credible **re/assurance**
  - e.g., 59 events assessed, but none merited escalated responses
  - e.g., enabled prompt responses to inaccurate media reports of pertussis, measles linked to Games

- **49 international ID incidents; none assessed as risk to Games**
LONDON 2012: Health protection events in daily SitRep, by source
LONDON 2012: Lessons learned

- Roles clear, reporting efficient due to prior testing/exercises
- More time required for standard local public health management and HPA responses to routine business (e.g., re: VPD/gastro cases) if any Olympic link
- Administrative issues: earlier HR engagement, site access
- More collaboration and support for development and operation of polyclinic syndromic surveillance system
- Planning for scaling up / down
- Clarify rationale for daily reporting, surveillance and response
LONDON 2012: Surveillance legacy

- Enhanced and new surveillance systems (e.g., EDSSS, GP OOHSS, USII, microbial detection)
- Strengthened working relationships across HPA (including lab and health protection), and with external UK and international partners and networks
- Internationally recognized expertise and leadership
  - WHO Collaborating Centre on Mass Gatherings
  - International observer program
- Peer-reviewed publications
THE ONTARIO CONTEXT FOR MASS GATHERINGS SURVEILLANCE
Ontario G8/G20 mass gathering

- Canada responsible for hosting G8 Summit in Huntsville, ON (Simcoe-Muskoka)
- G20 held in City of Toronto, after G8
- June 25 – 27, 2010
Surveillance Initiatives  G8/G20

• Emergency room activity

• Telehealth Ontario

• Daily partner call-out

• Laboratory submissions

• Media scanning
  • Global Public Health Intelligence Network (GPHIN)
  • International media scanning: ID Watch summaries

• Pharmacy Surveillance
  • Purchases of over-the-counter anti-diarrheal medication
G8-G20 Public Health Surveillance Updates
Wednesday, June 2, 2010

SUMMARY:
- Heat-related illnesses seen in Simcoe
- Indications of increased gastrointestinal activity in Toronto

SIMCOE MUSKOKA
- ER VISITS (Appendix 1): The number of ER visits yesterday is above baseline. The majority of the visits are related to asthma.
- HEAT ALERT (Appendix 5): Huntsville is currently experiencing a sustained period of extreme heat with temperature > 30°C for the past 12 days. Overall risk assessment: LOW.

TORONTO
- RESPIRATORY OUTBREAK (Appendix 6): St. Michael’s Hospital, critical care unit. Overall risk assessment: LOW. The outbreak is being managed by the health unit and poses no significant threat to the community.
- PHARMACY SURVEILLANCE (Appendix 5): Increases in over-the-counter (OTC) gastrointestinal-related drug purchases in the Toronto beginning May 20 (data available up to May 28). Overall risk assessment: LOW.

ONTARIO
- CYCLOSPORAISIS OUTBREAK: Lambton health unit (in southwestern Ontario) has identified an outbreak linked to a charity event with ~400 participants. As of today, 4 confirmed cases have been reported. The health unit is investigating and will provide situation updates to the Ministry.
- TELEHEALTH CALLS (Appendix 5): One geographic cluster of respiratory illness was identified from yesterday’s calls affecting Toronto, Peel, York, and Simcoe health units.
- LABORATORY SUBMISSIONS (Appendix 4): The number of non-summit-related enteric specimens submitted yesterday is above baseline.

CANADA & INTERNATIONAL
- AFRICA - MEASLES (Appendix 5): Recent measles outbreaks have been reported in Botswana, Malawi, Namibia, South Africa, Switzerland and Zimbabwe. FIFA World Cup 2010 is currently ongoing in South Africa. Overall risk assessment: MEDIUM.

OTHER INTERNATIONAL UPDATES
Pan Am / Parapan Am 2015

• 3rd largest international multi-sport Games
  • 41 countries
  • 10,000 athletes and officials
  • 17,000 volunteers
  • 250,000 + visitors anticipated

• 36 Pan Am sports, 15 Parapan Am sports

• Toronto + Greater Golden Horseshoe area
Pan Am / Parapan Am 2015

http://www.toronto2015.org/
Looking ahead to 2015
Key messages

• Public health surveillance for mass gatherings (MGs) aims for timely detection and reporting to enable timely response

• MGs present a surveillance legacy opportunity

• Recent international sporting MGs have involved extensive coordination and collaboration to plan, test, refine, execute and evaluate public health surveillance for MGs
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- Dr. Jat Sandhu and colleagues (Vancouver Coastal Health)
Questions?

THANK YOU
References


References


