Health System Hazard Identification and Risk Assessment for the Pan/Parapan Am Games

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Conflict of Interest

• No conflict of interest to declare

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Outline

• HIRA:
  • Brief review: standard HIRA purpose & approach
  • HIRA Challenges from a health system perspective
  • HIRA Challenges from a mass gatherings perspective

• Pan/Parapan Am Games Health System Preparedness
  • Trying a new approach to HIRA
  • Experience and issues
Purpose of HIRA

- Ontario’s emergency management programs take a risk-based approach; determine which hazards are most likely to result in an emergency
- Office of the Fire Marshal and Emergency Management states that a HIRA:
  - Helps emergency management professionals prepare for the worst and/or most likely risks
  - Allows for the creation of exercises, training programs, and plans based on the most likely scenarios
  - Saves time and resources by isolating hazards that cannot occur in the designated area
- Also helps move emergency management programs from being reactive to also being pro-active.
Standard HIRA

1) Identify Hazards: Ontario’s provincial HIRA identifies the following categories of hazards:

- Natural Hazards: e.g. severe weather, forest fires, earthquakes & landslides, human health, disease & epidemics, and water-related such as drought & flooding
- Technological Hazards: e.g. building/structural collapse, Critical Infrastructure failure, energy supply, explosions/fires, Hazardous Materials (fixed site or in transport) nuclear facility emergencies, oil & natural gas emergencies, radiological emergencies and transportation emergencies
- Human-caused Hazards: e.g. civil disorder, sabotage, special events, terrorism, war and international emergencies
2) Hazards are then scored on probability and consequence:

- **Example**

<table>
<thead>
<tr>
<th>Probability</th>
<th>Spring flooding in the north</th>
<th>Nuclear facility emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>4: Extreme</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>3: High</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2: Moderate</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1: Low</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

- **Consequence**

  1: No impact
  2: Limited
  3: Substantial
  3: High
# Probability

<table>
<thead>
<tr>
<th>Probability Rating</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Possible considerations include time of year, geography, presence of factors in a community (e.g. chemical plant, venue) experience in immediate past, experience in previous events, pressures in local context</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Extreme</td>
<td></td>
</tr>
<tr>
<td>Consequence Rating</td>
<td>Description</td>
<td>Details</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>1</td>
<td>No impact</td>
<td>(i.e., no or limited injuries/illness, deaths in community, no impact to health human resources, no economic disruptions or infrastructure damage)</td>
</tr>
<tr>
<td>2</td>
<td>Limited</td>
<td>(i.e., minor injuries/illness/deaths, minor health human resources disruption, economic disruption and infrastructure damage)</td>
</tr>
<tr>
<td>3</td>
<td>Substantial</td>
<td>(i.e., significant injuries/illness, significant health human resources, economic disruption and infrastructure damage)</td>
</tr>
<tr>
<td>4</td>
<td>High</td>
<td>(i.e., high probability of death, extensive health human resources impact, infrastructure damage and economic impact)</td>
</tr>
</tbody>
</table>
HIRA for the Health System: Challenges

1. Health risk assessment must consider MOHLTC’s two mandated emergency management responsibilities:
   - “Health Services During an Emergency”, i.e. the ability of the health system to continue delivering critical services during the games – capacity, capability, and continuity of operations (COOP)
   - “Human Health, Disease and Epidemics”
Health Services During an Emergency – HIRA Challenges

- Standard HIRA breakdown of hazards can be of limited help for the health system in targeting health system planning efforts & resources:
  - Useful at community level to know local hazards
  - However, many individual hazards – e.g. storm, landslide, flood - create similar impacts on the health system:
    - Notification & communication
    - More patients and corresponding need for services & resources
    - Direct impacts on facilities/providers and their ability to continue providing services
Health, disease and epidemics - HIRA

Challenges

- Where health-specific challenges exist, high-level provincial HIRA doesn’t capture specific challenges:
  - ‘Pandemic’ or ‘Epidemic’ given as examples in provincial HIRA
  - Doesn’t capture range of severities or challenges that can be posed – e.g.
    - A routine illness that can be prevented/treated but requires a lot of resources/care?
    - Illnesses challenging to identify - emerging, rare, imported?
    - Illnesses challenging to treat – severity, absence of effective interventions, resistance to uptake of intervention, scarcity of specific treatment resources?
    - An illness with serious issues for a specific population?
    - Environmental risks to health arise in many and various circumstances – air quality, results of other emergencies
HIRA Mass Gathering Challenges

• Focus:
  • Risks to the gathering itself?
  • Risks to human health and/or the hosting area caused by the gathering?
  • A combination of the two?

• Scope:
  • Not starting from scratch:
    ▪ An event may create some new hazards, but is also interacting with existing hazards in a community
2015 Pan/Parapan Am Games Approach

- MOHLTC Emergency Management Branch task: supporting existing health system preparedness for the Games
- Worked with Advance Planning Group to carry out health system HIRA
- Developed a new approach to attempting a health system HIRA in a mass gathering context
- First time using this approach
Approach

• Reviewed Office of the Fire Marshal and Emergency Management (OFMEM) and the Games Integrated Security Unit (ISU) HIRAs (focus: hazards to the Games)

• Grouped hazards into general categories group assessed as likely to have similar health impacts

• At this point, divided into two parallel approaches:
  1. Infectious/communicable diseases: would benefit from its own HIRA process looking at likelihood and consequence of specific diseases

  2. An ‘extended health consequence analysis’: looking at specific kinds of health system impacts, and attempting a scoring process based on likelihood of specific system impacts and planning consequences
Consequence Analysis: Categories of General Hazard

- Infectious diseases
- Heat
- Severe Weather
- Other Natural Hazards excluding severe weather
- Public Safety
- Traffic Disruptions
- Critical Infrastructure/ Technology Failure
- Other external pressures
- Communications Breakdown
- Labour Disruptions in the health system
Common Areas of Consequence:

- **Lens:** what is the impact of the games on our already existing health landscape? What changes?
  - Increases in demand for capacity - Surge
  - Increases in demand for/changes in access to specific capability - i.e. are there special skill-sets/expertise/levels of care needed, can they still be accessed, and are they in the right place?
  - Changes to HHR availability — ability and willingness of staff to report to work
  - New or different impacts on Facilities/Infrastructure/Systems - COOP considerations
  - Delayed access — i.e. movement of people, services, goods
  - Changed or increased environmental health considerations — e.g. contamination
<table>
<thead>
<tr>
<th>Heat Wave</th>
<th>Severe Weather</th>
<th>Other natural hazards</th>
<th>Public safety issues</th>
<th>Traffic disruption</th>
<th>CI / technology emergency failure</th>
<th>Other external pressures</th>
<th>Communication breakdown</th>
<th>Labour disruption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in demand for Capacity/Surge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes to or increases in demand for / access to specific capability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes to HHR availability</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>New or different impacts on facilities/infrastructure or key critical infrastructure supports like power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New delays to access</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changed or increased environmental health concerns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Extended Consequence Analysis: Scoring

<table>
<thead>
<tr>
<th>Probability</th>
<th>Likelihood that the specific impact on the health system of the hazard would increase due to the presence of the Games</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>An increased impact to the health system is possible but unlikely</td>
</tr>
<tr>
<td>2</td>
<td>An increased impact to the health system is possible</td>
</tr>
<tr>
<td>3</td>
<td>An increased impact to the health system is likely</td>
</tr>
<tr>
<td>4</td>
<td>An increased impact to the health system is very likely</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Planning implications for the health system</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manageable within existing plans/resources</td>
</tr>
<tr>
<td>2</td>
<td>Review and minor adaptations to existing plans/resources are necessary and useful</td>
</tr>
<tr>
<td>3</td>
<td>Significant additional planning within an existing area/region is necessary and useful</td>
</tr>
<tr>
<td>4</td>
<td>Significant additional planning across LHINs/PHUs/Services is necessary and useful</td>
</tr>
</tbody>
</table>
Example: Possible Impacts on Health System from heat wave

• Changes in Capacity/Surge needs, potentially including:
  • E.g. Exposure of athletes and groups of spectators at Games events to heat can create additional demands
  • General increase in demand in several parts of the system due to pressures on population (e.g. heat wave = impact on acute care, public health, community care) can impact ability to provide capacity to respond to Games-specific demands

• Changes in demand for/access to capabilities:
  • E.g. need for rehydration capacity at events

• Changes in HHR availability, potentially including:
  • Impact on safety of workplace – e.g. heat impact on outdoor EMS workers at venues

• New or different facility/systems impact & COOP considerations:
  • Interaction with Games demands on key critical infrastructure supports such as power
  • An existing vulnerability in the system – facility ability to deal with temperatures and disruptions
Example: Possible Impacts on Health System from heat wave

- Delayed access - disruption of:
  - Travel of people to services
  - Travel of services to people
  - Travel of goods to services

- Changed or increased environmental health considerations –
  - E.g. water quality issues created by heat interacting with Games use of water facilities
# Human Health, Disease and Epidemics

## HIRA Tool

### 2015 Pan Am Games Risk Assessment Matrix Input: Communicable Diseases

<table>
<thead>
<tr>
<th>Probability/Likelihood</th>
<th>Consequence Rating</th>
<th>Description</th>
<th>Details / Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Probability Rating</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Low</td>
<td>Possible but not likely</td>
<td><strong>No impact (none)</strong></td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
<td>Possible</td>
<td><strong>Limited impact (Minor)</strong></td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>Likely</td>
<td><strong>Substantial impact (Moderate)</strong></td>
</tr>
<tr>
<td>4</td>
<td>Extreme</td>
<td>Very Likely</td>
<td><strong>High impact (Severe)</strong></td>
</tr>
</tbody>
</table>

### Consequence Description

- **No impact (none)**: Mild, self-limiting illness with no need for medical assistance; no to low transmissibility.
- **Limited impact (Minor)**: Mid-moderate morbidity, limited to no mortality; low to moderate transmissibility.
- **Substantial impact (Moderate)**: Moderate-severe morbidity, important mortality numbers; moderate-highly transmissible.
- **High impact (Severe)**: High disease severity, high mortality or mortality.

### Details / Impact

- Mid, self-limiting illness with no need for medical assistance; no to low transmissibility.
- Routine function of health system, surveillance systems and laboratory sufficient to manage.
- Negligible economic impact; local or no media coverage.
- No need for advanced planning beyond routine structures.
- Mid-moderate morbidity, limited to no mortality; low to moderate transmissibility.
- Higher incidence than expected or unusual disease clusters.
- Short-term capacity issues in health system but manageable within existing surge capabilities.
- Possibly requiring enhanced functioning in surveillance and laboratory services but manageable within existing resources and expertise.
- Local media interest; limited economic impact.
- Possibility for notification and monitoring by province.
- Manageable within existing health unit and/or LHIN plans and agreements.
- Need for advanced planning possible but limited.

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## Enhanced Risk Implications: Games Context

<table>
<thead>
<tr>
<th>Contextual Factor</th>
<th>Relevant themes</th>
<th>Contextual Factor</th>
<th>Relevant themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crowding</td>
<td>Close quarter accommodations</td>
<td>Exportation of diseases</td>
<td>Higher prevalence in Ontario</td>
</tr>
<tr>
<td></td>
<td>Hygiene considerations (hand and/or cough)</td>
<td></td>
<td>Multidrug-resistant strains from Ontario</td>
</tr>
<tr>
<td>Sporting events</td>
<td>Close contact (ie. wrestling)</td>
<td>Mixing of visiting and resident populations</td>
<td>Droplet transmission context</td>
</tr>
<tr>
<td></td>
<td>Recreational water (open water)</td>
<td>during Games</td>
<td>Contact transmission context</td>
</tr>
<tr>
<td>Seasonality</td>
<td>Throughout Games</td>
<td>Long incubation period</td>
<td></td>
</tr>
<tr>
<td>Importation of diseases</td>
<td>Tropical diseases or increased prevalence in visiting countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novel strains of Ontario endemic diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multidrug-resistant strains</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Specific Examples

<table>
<thead>
<tr>
<th>Disease</th>
<th>Risk Level</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meningococcus</td>
<td>Higher Risk</td>
<td>- Significant morbidity and mortality&lt;br&gt;- National or int’l media interest&lt;br&gt;- Endemic globally&lt;br&gt;- Reportable&lt;br&gt;- Invasive meningococcal disease is a feared disease among the public&lt;br&gt;- Crowding can amplify (close contacts)&lt;br&gt;- Possibility of importation of non-vaccine preventable and/or new strains&lt;br&gt;- Infectious before symptomatic</td>
</tr>
</tbody>
</table>
## Specific Examples

<table>
<thead>
<tr>
<th>Disease Sample</th>
<th>Risk Level</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlamydia/Gonorrhea</td>
<td>Higher Risk</td>
<td>• Mild but requires treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Athletes, visitors, spectators as well as HCW need to know where clinics are</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Potential for export of antibiotic-resistant strains</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Anticipate extra visits to clinics — surge capacity for staffing and supplies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ensure condoms are readily available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Media attention if an outbreak related to Games</td>
</tr>
</tbody>
</table>
Challenges

• Numerical scoring approach
  • May work well with hazards that have a degree of predictability/established history
  • Experience: difficulties working with experts in assigning numerical scores – an heuristic, not an algorithm
  • May create perception of rigour or hard evidence-base that is not accurate
  • Can be challenging re: focus question:
    ▪ E.g. Dermatological outbreak in a wrestling team: high impact to an event, but low impact to overall human health/health system perspective – how to score?
  • Planning consequence: attempting a provincial perspective on issues that vary among communities
    ▪ Multiple or a range of planning scores often recommended
Summary

- “Traditional” HIRA process not ideal for health planning, but can be adapted
- Definitions of probability and impact need to be established and communicated
- Don’t get too complicated: numbers not as important as priorities for planning scenarios
  - Workload created by very detailed/systematic approach may be prohibitive and not resource-effective
- May need separate processes for in-games and community
  - Hazards whose likelihood is directly caused or increased by the event specifically, vs. interaction with existing hazards
Thanks!