Infection prevention and control: Whose role is it anyway?

Gary Garber MD FRCPC FACP CCPE
Medical Director, Infection Prevention and Control (IPAC)
Public Health Ontario
Who Are the Players?

- Local
- Regional
- Provincial
- Federal
- Worldwide
Local

- Hospitals
- Health care workers
- Physicians
- Administrators
- Acute care/long-term care
- Public health units
- Community health centres
- Municipal governments
Regional

- LHINs
- RICNs
- Public health units
- Regional authorities
- Unions/professional bodies
- IPAC Canada Chapters
- Home care institutions
Provincial

- Ministry of Health and Long-Term Care (MOHLTC)
  - Infectious Disease Branch
  - Drugs Program Branch
- CMOH
- ADMs and DM
- Ministry of Labour
- Ministry of the Environment
- Health care associations e.g., Ontario Hospital Association (OHA)
Provincial Bodies

- Public Health Ontario; PIDAC
- Health Quality Ontario
- Council of Medical Officers of Health (COMOH)
- Unions: health care groups
- Professional associations: medical, dental, midwifery, etc.
- Professional colleges
- Council of Academic Teaching Institutions: hospital or university
- Social welfare /Ontario drug benefits
National

- Health Canada
- PHAC
- Drugs/Product Directorate
- FPT Health Council
- AMMI and IPAC Canada
- Accreditation Canada
- Canadian Patient Safety Institute
World

- World Health Organization (WHO)
- Centers for Disease Control and Prevention (CDC)
- European Centre for Disease Prevention and Control (ECBC)
Knowledge to Action

Are You Confused Yet?

“Every system is uniquely and perfectly designed to produce the results it is currently producing.”

Peter Senge, MIT, Author of The Fifth Discipline

What should we expect from the system I just described?
What you can get is

SARS in Toronto

Ebola in Liberia

CDC/Dr. Erskine Palmer

CDC/NIAID
SARS

CDC/Dr. Erskine Palmer

- Communications
- Leadership
- Data
- Lab capacity
- Epidemiology capacity
- Preparedness
- Jurisdictional issues: eg. SARS research funding
What have we learnt from SARS?

- OAHPP “Agency” – PHO scientific capacity, planning, data analysis,
- PHO does NOT make policy decisions.
- Gov’t may decide that policy decisions and science don’t always align. (see N95 in H1N1)
- PHOL has been bolstered with expertise to develop new assays as needed
- Alignment with the CMOH, EMB and MEOC
EBOLA: Are we prepared?

Infection Prevention and Control Guidance for Patients With Suspected or Confirmed Ebola Virus Disease (EVD) in Ontario Health Care Settings

The document has been revised on Monday, 25 August 2014. The latest available evidence on that date. Version changes are summarised at the end of this document. Please refer to the Public Health Ontario website at www.publichealthonto.ca for the most up-to-date version.

PUBLIC HEALTH ONTARIO

PublicHealthOntario.ca
Classification of Ebola virus

**Enveloped**, nonsegmented, negative strand **RNA viruses**

- **3 genera:**
  - *Ebolavirus* (1976)
  - *Marburgvirus* – Lake Victoria marburgvirus (1967)
  - *Cuevavirus* – Lloviu virus (bats, Spain, 2002)
Reservoir and transmission to humans

- Fruit bats reservoir of virus - Drop partially eaten fruits
- Bats infect chimpanzees, gorillas, forest antelopes, porcupines
- Humans handle and eat bush meat (bats, chimpanzees, gorillas)
- Infected human passes from person to person
- Association with higher humidity and lower temperatures with outbreaks.

Centers for Disease Control and Prevention; Virus Ecology Graphic:
Pathogenesis of Ebola - transmission

- Among 173 household contacts of 27 patients with confirmed Ebola, the transmission rate was only 16% despite none of the standard infection control precautions routinely employed in U.S. hospitals being used.
- Of 78 contacts who reported no physical contact with the infected patient, none became infected.
- Among those who did have physical contact, risk for Ebola was highest after contact with the patients’ blood.
- Large HCW transmission in Sierra Leone associated with infected woman in labour.
Pathogenesis - transmission

- Fastest incubation period has been reported associated with needle stick injury.
- Viral load may correlate with disease severity and survival.
- This is NOT an airborne disease. Thus the pulmonary disease is hemorrhage and ARDS associated with severe sepsis.
Pathogenesis - how does Ebola cause disease?

- Virus enters the body via infected blood/body fluid in contact with a mucosal surface or a break in intact skin.
- Virus replicates preferentially in monocytes/macrophages and dendritic cells which facilitate dissemination of the virus throughout the body via lymphatic system.
- Other cells are secondarily infected and there is rapid viral growth in hepatocytes, endothelial and epithelial tissues.
- There is strong cytokine/inflammatory mediator release of TNF-a and inflammatory cascade.
Pathogenesis - inflammatory response

- Leads to endothelial damage, increased vascular permeability and shock.
- This results in the end organ damage and multi-organ dysfunction.
- Diffuse intravascular coagulopathy (DIC) with platelet and coagulation factor consumption which leads to hemorrhage.
- IgM starts forming in 2 day and IgG in 5-8 days post infection. Immunologic response correlates with survival.
- Thus the observation that those who live >1 week are more likely to survive.
Clinical Manifestations

- Incubation period 8-10 days (range 2-21)
- Sudden onset of Fever >38.6°C
- Flu-like symptoms: chills, myalgias, and malaise, sore throat
- Nausea, vomiting, abdominal pain, diarrhea
- Respiratory symptoms of chest pain, shortness of breath and cough
- CNS symptoms: Headache, confusion and coma
Clinical Manifestations

- Rash occurs around day 5
- Hypotension, peripheral edema
- Bleeding manifestations develop in >50% (internal/external)
- Can vary from petechiae & easy bruising, to mucosal hemorrhage, uncontrolled bleeding and massive GI blood loss
- Multi-organ dysfunction: kidneys and Liver
- Laboratory abnormalities
  - Thrombocytopenia and leukopenia
  - Elevated transaminases (AST > ALT), amylase, D-dimer
  - Reduced albumin
Immunity and Survival

• Treatment is supportive care
• IgG response appears to be protective
• Survivors may have persistent high antibody titres and associated sequelae of hepatitis, uveitis, muscle weakness etc.
• Previous observation was that serum from an Ebola survivor was therapeutic
• Anecdotal reports of Mab therapy being successful
• Caution, in a disease with 50% survival, any anecdotal observation can be a chance event
• It does support the potential role of vaccination
Ebola

- Ebola is Viral septic shock
- With Multi-organ dysfunction
- DIC
- Proper use of PPE is the key
Ebola Outbreaks prior to 2014

- First identified in 1976, causing two outbreaks
  - One in Sudan
  - One in Democratic Republic of Congo (previously Zaire)
  - Both had several hundred cases

- Multiple, mostly limited outbreaks over the years since then
  - Over 20 outbreaks since the first in 1976
  - Only 5 with more than 100 cases
  - Mainly in countries in Central Africa

Progression of outbreak up to August 25, 2014

Case counts and deaths in current outbreak in West Africa up to August 26, 2014

<table>
<thead>
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<th>Liberia</th>
<th>Sierra Leone</th>
<th>Guinea</th>
<th>Nigeria</th>
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<tr>
<td><strong>Cases</strong></td>
<td>1,378</td>
<td>1,026</td>
<td>648</td>
<td>17</td>
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<td><strong>Deaths</strong></td>
<td>694</td>
<td>422</td>
<td>430</td>
<td>6</td>
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<tr>
<td><strong>Totals</strong></td>
<td>3,069</td>
<td>1,552</td>
<td></td>
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</tbody>
</table>


**Cases in Nigeria not widespread, mainly limited to the city of Lagos**
Context for outbreak

- Widespread on multiple fronts
- Affected large cities which is accelerating the epidemic
- Weak and fragile infrastructure
- Lack of knowledge of the disease
- Distrust of government and foreigners
- Not seeking health care
- Social rituals / burial rituals
- Delayed response; more resources needed
Impact on social determinants of health

- Airline services have been curtailed
- Trading, industry, agriculture, tourism
- Worsening poverty
- Hunger
- Orphans
- Stigma
- School closures
- Other diseases not being treated
- Lack of preventive care: prenatal care, vaccination
Response – World Health Organization Roadmap

• Declare a Public Health Emergency

• Actual number 2-4 times higher projection of 20,000 cases

• Objectives targeted at countries:
  ➢ With widespread and intense transmission
  ➢ With an initial case(s) or with localized transmission
  ➢ Sharing land borders with an intense transmission area and those with international transportation hubs

• Elements of the response:
  ➢ Treatment centres, referral centres, laboratory access, surveillance and contact tracing, safe burial, social mobilization

• Estimated cost $ 490 million (this week increased to $600M)

Available from: http://apps.who.int/iris/bitstream/10665/131596/1/EbolaResponseRoadmap.pdf?ua=1&ua=1
[Accessed August 31, 2014]
Ontario Response

- Aug 5th - queries coming from the field
- Aug 6th - review of VHF guidelines: to modify or rewrite?
- Aug 7th - rewrite
- Aug 8th - First draft completed and sent out for consultation and feedback. PIDAC/IPAC specialists and other involved.
- PHOL writes lab guidelines
- Aug 8th - suspected cases in Brampton and Ottawa
- Aug 9th - CMOH communiqué announcing PHO guidelines
Ontario Response

- Aug 11th - edited document reviewed by EIRD-joint PHO/Lab and EMB
- Aug 11th - feedback from committees and Emergency and critical care groups. Guidelines also sent to PHAC
- Aug 12th - prep for release and translation
- Aug 13th - CMOH e-letter directing health care to PHO website
- Aug 15th - 1600 hits and 750 downloads
- Aug 29th - 13000 hits and 7000 download
- 5 Webinars (PHO/MOH) all sold out within hrs.
PHO EVD resource page

http://www.publichealthontario.ca/ebola
Key Ebola Virus Disease Facts

• Only spread by direct contact with blood and body fluids; not airborne
• Incubation 2-21 days; usually 8-10 days
• Only infectious when symptomatic
• Increasingly infectious as get sicker
Perspectives on risk assessment

- Ebola virus disease confined to well-defined geographic areas
  - Guinea, Liberia, Sierra Leone, Nigeria (Lagos and Port Harcourt only), Democratic Republic of Congo (Equateur province). Now Senegal
- Most infected individuals likely to have known exposures (not unrecognized exposures)
- Most infected individuals, other than aid and health care workers, not likely to travel to Ontario
- Common things are common
  - Malaria, typhoid fever, influenza, meningococcal, much more likely diagnoses
Interim Risk Assessment for Returning Traveller Action for the Symptomatic Patient

- Consider:
  - Presenting symptoms
  - Ebola virus disease (EVD) risk level
- If needed, consult with infectious disease and/or public health
- In hospital, notify Infection Prevention and Control (IPAC)
- Notify public health of symptomatic returning traveller from country/area affected by EVD, even if EVD not suspected after assessment
  - Public health will arrange additional follow-up
Screening tools

- Screening for travel to affected country/area and presence of symptoms

- Recommended action for:
  - Primary health care providers
  - Emergency departments – algorithm
  - Community laboratories
  - Dental and allied health care professional offices
  - Emergency medical services

- Communications to post-secondary schools
IPAC Practices for EVD: Droplet + Contact Precautions

- **Patient accommodation:**
  - Single room with dedicated bathroom (minimum requirement); door closed
  - Consider use of an isolation room that has an anteroom for donning or doffing PPE

- **PPE for all staff entering the room:**
  - Fluid-resistant, long-sleeved, cuffed gown
  - Gloves
  - Full face protection (face shield)
  - Surgical or procedure mask

- **Maintain log of all individuals entering the room; only essential people should enter the room**
Risk Assessment for EVD

- Use risk assessment to determine the need for additional PPE; as the patient’s condition changes, the risk to HCPs may change.

- The procedure being performed and the presence of clinical symptoms impacts the decision of what PPE to wear.

- Clinical risks may include:
  - Large amounts of blood/body fluids: foot/leg coverings, head coverings, waterproof gowns, or biohazard suits
  - Aerosol generating procedures: N95 respirators
  - Phlebotomy: double gloves

- Ensure adequate training before adding unfamiliar PPE
Other infection prevention and control measures covered in the IPAC document

- Donning and doffing
- Environmental cleaning
- Infection control during laboratory testing
Other issues

- Point of care testing
- Safe transport
- Regional hubs
- Transport from Africa

Key message is: using **first principles** is key
Lessons learned

• We can make the system work and work quickly and efficiently if we decide to work together.

• No matter how much preparation we do, we cannot anticipate all eventualities or questions. **USE FIRST PRINCIPLES**

• IPAC: risk assessment, personal protection and hand hygiene especially before any contact with the face

• If you are uncertain : wash your hands again!

• Planning, communication, revising guidance as new info become available (version control)
Infection prevention and control: Whose role?

- IPAC is everyone’s role and responsibility
- Responsibility for personal protection
- Responsible for patient care and protection
- Prevention of spread from HCW to patient, patient to HCW, patient to patient, to family members.
- IPAC is a culture of personal and mutual respect
- A culture of hand hygiene and personal behaviors and choices
Ebola in Africa

- 20 years ago, HCWs in mission hospitals no longer acquired Ebola by applying proper hand hygiene, and use of masks and gloves.
- Decreased community spread by educating locals about proper disposition of the dead.
- The spread to large centres had magnified the problem and the numbers.
- The lack of basic IPAC protection and HCWs, lack of planning, communication and leadership has made a bad situation worse.
Discussion and Comments