Strengthening regional capacity for surveillance of pH1N1 influenza virus in pig populations in Central America and neighboring countries

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Talking points

- The international public health alert in 2009
- The UN FAO influenza project
- Basic elements of disease surveillance
- Politics and capacity building
- Initial surveillance efforts in some countries in Central America
- Summary

Influenza pH1N1: Mexico
1 April – 24 September 2009

- 24 April: WHO phase 5
- 2 May: School & NEA suspended nationwide
- 11 May: Schools re-open
- 17 April: EPI Alert
- 16 April: Obama in Mexico City
- 29 April: WHO phase 5
- 11 June: WHO phase 6
- 21 June: Enhanced mitigation +++ in Yucatan

Confirmed cases
- Mexico: 29 417
- Yucatan: 2 991
Trying to see past the front gate
Belize, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama

A new influenza virus (reassortment) strain is identified in pigs
......then what?
Do you have a surveillance plan for (and response to) pH1N1 in pigs?

Pig population in Central America

- Belize
- Panama
- Costa Rica
- Honduras
- El Salvador
- Guatemala
- Nicaragua

0
100000
200000
300000
400000
500000
600000
700000

Decision making
Analysis and interpretation
Data collection
Pig population in Nicaragua and Costa Rica

<table>
<thead>
<tr>
<th></th>
<th>Nicaragua</th>
<th>Costa Rica</th>
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</thead>
<tbody>
<tr>
<td>Total number of pigs</td>
<td>671,905 (100.0)</td>
<td>336,328 (100.0)</td>
</tr>
<tr>
<td>Backyard</td>
<td>638,403 (95.0)</td>
<td>42,501 (15.6)</td>
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<tr>
<td>Commercial</td>
<td>33,502 (5.0)</td>
<td>290,827 (86.4)</td>
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<tr>
<td>Total number of farms/holdings</td>
<td>258,525 (100.0)</td>
<td>12,721 (100.0)</td>
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<tr>
<td>Backyard</td>
<td>258,490 (99.9)</td>
<td>11,259 (88.5)</td>
</tr>
<tr>
<td>Commercial</td>
<td>35 (0.1)</td>
<td>1,462 (11.5)</td>
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</tbody>
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Questions of interest

- Are pigs the source of exposure in humans?
- Can we demonstrate disease freedom of influenza pH1N1 virus?
- What subtypes of influenza virus are circulating in swine populations?
Case definition (suspect)

...that should trigger a field investigation

- Clinical cases in pigs with fever, sneezing, cuffing, nasal/ocular discharge in one SPU, over a one-week period, where ≥ 10% of the pig population is affected
- In backyard holdings with < 10 pigs (2 cases)

Basic elements of disease surveillance

1 Identify priority pathogens
2 Objective(s)
3 Populations of interest
4 Case definition
5 Surveillance approach: passive, active surveillance
6 Sample size
7 Type of samples and diagnostic tests
8 Data collection, analysis & interpretation
9 Risk management: decision making
10 Evaluation
11 Communication
12 Feedback
13 Budget
Priority pathogens

Influenza viruses pH1N1, H1N1, H3N2, H1N2

Pasteurella, Actinobacillus, Haemophilus, Mycoplasma
PRRS, pseudorabia, coronavirus

What are the objectives of interest?

• Early detection of pH1N1 influenza virus in pig populations

• Determine what influenza viruses (endemic subtypes) are circulating in pig populations affected with outbreaks of respiratory disease

• Identify genetic changes of influenza viruses in pig populations

• Estimate prevalence of other pathogens associated with outbreaks of respiratory disease in pig populations (Pasteurella, Haemophilus, Mycoplasma, PRRS, …)
### Surveillance approach

**PASSIVE SURVEILLANCE**

- **Case identification and notification from the Department of Health to VS**
  Sample/test SPU epidemiologically related with influenza pH1N1 case in human

- **Case identification from veterinarians or producers**
  Sample/test SPU with cases of respiratory disease

**ACTIVE SURVEILLANCE**

- **National survey**

- **Sentinel SPU**
  Sample/test SPU when new cases (outbreaks) of respiratory disease are detected

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### Sample size

How many pigs do I need to sample and test for diagnosis of influenza virus in a Swine Production Unit with 500 pigs, where 50 pigs show clinical signs of respiratory disease and all 50 are currently infected with influenza virus?
Minimum sample size to detect the pandemic H1N1/2009 influenza virus in a SPU affected with clinical signs of respiratory disease

\[ n = \frac{(1 - (1 - \alpha)^D)}{(N - 1/2(SeD - 1))} / Se \]  
[PVM 2001;49:141-163]

<table>
<thead>
<tr>
<th>Sick pigs</th>
<th>Prevalence 100%</th>
<th>30%</th>
<th>20%</th>
<th>10%</th>
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<tr>
<td>1,000</td>
<td>1</td>
<td>9</td>
<td>14</td>
<td>29</td>
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<tr>
<td>90</td>
<td>1</td>
<td>9</td>
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<td>5</td>
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Type of samples & diagnostic tests

Nasal swabs for virus isolation

PCR (detection): influenza virus type A

PCR (confirmation) + virus isolation + sequencing
Risk management  What’s the response?
political, religious, scientific, or what...?

What options do we have?  ...which are justified and acceptable?

- Quarantine
- Enhanced biosecurity
- Enhanced surveillance
- Vaccination ?
- Animal movement control

Are communication channels open?
- Swine industry
- Public health services
- Veterinary services

a new strain is identified, then what?
Communication
What’s the incentive of reporting to WHO and OIE?

Confirmed cases
- Mexico: 29,417
- Yucatan: 2,991

- 11 June: WHO phase 6
- 21 June: Enhanced mitigation in Yucatan

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11 June
Analysis and interpretation
Data collection
Feedback
If everything is ok, something is wrong...
Decision making
Politics and capacity building

Initial surveillance efforts: 2010

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<thead>
<tr>
<th>Country</th>
<th>Pigs tested</th>
<th>Influenza A</th>
<th>pH1N1</th>
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Surveillance and epidemiology of pH1N1 and other influenza viruses in pigs and farm workers in a network of sentinel swine farms in Florida, Mexico, Guatemala, Colombia, and Chile

Jorge Hernandez, Gregory Gray, Moe Long, Henry Wan

Baja California, Mexico
Yucatan, Mexico

Guatemala
Can I trust you?
Trust and per capita income

Summary and take home message

- Early on, VS in the region were not fully prepared to implement a surveillance plan and a rapid response to the 2009 international public health alert due to the pH1N1 influenza virus.

- There is a need for capacity building and training in epidemiology and diagnostics in most countries in the region.

- There is a need for more and better communication between VS and PHS and industry representatives.

- As a consultant in epidemiology, it is important to deliver the best product(s) possible that can help change or upgrade existing policies and recognize the connection between epidemiology, policy, culture, and politics involved in capacity building and training efforts in animal health.