Clade: klād/

A clade (from Ancient Greek: κλάδος or klados, meaning "branch") is a group of organisms that consists of a common ancestor and all its lineal descendants, representing a single "branch" on the "tree of life."
EXCOMM Meeting #1

May 15, 2018
Four weeks after onset of first illness
GNN Video Update 1

Watch on YouTube
Clade X Timeline

**APRIL 15**
- First illness in Germany

**APRIL 28**
- Virus isolated

**MAY 2**
- Parainfluenza identified

**APRIL 18**
- First death in Germany

**MAY 1**
- First case in Venezuela
Clade X Cases

Frankfurt, Germany
Cases: 316
Deaths: 32

Caracas, Venezuela
Cases: >100
Deaths: >20

May 15, 2018
Clade X Cases
May 15: NSC Staff Briefing

• True origin of the Clade X pathogen is unknown
• Probable spread to Venezuela by air travel from Frankfurt
• Reports of possible cases in London, Tokyo, Taipei, and Kabul
• Surveillance is poor in many countries
More than 10% of infected individuals have died
Transmitted from person to person through the air
Infectious individuals transmit the illness to about 2-3 other people
Incubation period is approximately 5-7 days
Human Parainfluenza Phylogeny

Rinderpest
  Measles
    Canine Distemper
  Nipah
  Hendra

Parainfluenza 3
  Sendai
  Parainfluenza 1

Newcastle
  Simian Virus 5
    Parainfluenza 2
  Mumps
    Parainfluenza 4A
      Parainfluenza 4B
        SKPIV4

CLADEX
JOHNS HOPKINS CENTER FOR HEALTH SECURITY

Adapted from Yea C, et al.
Clade X Medical Countermeasures

• No known antivirals
  • Thousands of licensed drugs being screened
• Parainfluenza virus vaccines in development for years
  • None are licensed
  • Unlikely to be effective against Clade X
• Vaccine research for the Clade X virus has begun
  • It will likely take >12 months to have a vaccine
May 15: NSC Staff Briefing

- Clade X has pandemic potential
- CDC developed a PCR test
- CDC issued travel alerts for Germany and Venezuela
  - Fever screening at US airports for direct flights from Germany and Venezuela
- CDC issued alerts to health departments and hospitals
  - Suspect cases should be isolated and reported to CDC
What are you most worried about?

What should the government’s highest priorities be?
GNN Video Update 2

Watch on YouTube
May 15: NSC Staff Briefing

- Screening may miss people with mild disease or who are incubating
- Australia, China, and Singapore have closed down all travel from Germany and Venezuela
- A recent poll shows that 65% of the public is in favor of suspending all travel from Germany and Venezuela
- The US has $170 billion in annual trade with Germany
- 40,000 travelers from Germany to the US each week
- Suspending travel violates WHO and WTO agreements
Should the President issue an executive order to suspend air travel to the US from Germany and Venezuela?
GNN Video Update 3

Watch on YouTube
May 15: NSC Staff Briefing

- WHO is requesting US medical teams for Venezuela
- Venezuela may be willing to accept US medical assistance
- Interagency has developed an option for response:
  - 6 DMAT teams, 2 DOD Combat Support Hospitals
  - 750 medical personnel, 330 beds
  - Unprecedented for an infectious disease emergency
Should the US send a substantial medical response to Venezuela?
GNN Video Update 4

Watch on YouTube
EXCOMM Meeting #2

June 1, 2018
Six weeks after onset of the first illness
Clade X Situation Update

• President issued a 4-week suspension for all travel from Germany and Venezuela
• President decided against deploying medical aid to Venezuela
• Preliminary analysis suggests that the Clade X virus could have been deliberately engineered
• First suspected cases of Clade X in the US have been reported
Clade X Timeline

**APRIL 15**
First illness in Germany

**APRIL 28**
Virus isolated

**MAY 2**
Parainfluenza identified

**MAY 25**
First US cases

**APRIL 18**
First death in Germany

**MAY 1**
First case in Venezuela

**MAY 20**
Travel ban implemented
GNN Video Update 5

Watch on YouTube
A Brighter Dawn (ABD)

- International group focused on overpopulation
- No past history of violence
- Well funded
- Local chapters in several countries, including the US
  - FBI has identified multiple US members
  - One is a parainfluenza researcher whose whereabouts are unknown
  - All other known US members have been detained
ABD Investigation

• Analysis of the group’s social media accounts now indicate a schism in ABD
• An ABD splinter group may be responsible for release of Clade X
• ABD uploaded a video to YouTube claiming responsibility
  • Efforts were made to conceal its origin
ABD Investigation

• The intel community is working to locate perpetrators
  • The FBI is lead agency of the investigation
  • Foreign intel services are conducting similar investigations

• Investigation is hampered by limited biological expertise in the intel and law enforcement agencies
Clade X Virus Synthesis

• Genes for neurologic virulence of Nipah have been inserted into the parainfluenza genome
  • Virologists with special training and a reasonably outfitted laboratory could make the virus
• ABD has probably been working on this for a long time
• Animals and perhaps humans were likely used for testing
June 1: NSC Staff Briefing

- CBP has increased airport screening and banned all liquids and powders on inbound international flights
  - CBP is attempting to open and search all luggage
  - All liquids or powders found are being destroyed
- This has caused air traffic to grind to a halt
- There is no way to screen most freight traffic
- DHS is working with CDC to incorporate Clade X into BioWatch
- NBACC is working to understand nature of the virus
This appears to be a biological weapon.
How does this change our response?
GNN Video Update 6

Watch on YouTube
June 1: NSC Staff Briefing

- If the President decides to federalize the quarantine, we would need to:
  - Organize logistics for food, water, and other supplies
  - Provide medical care for quarantined individuals
  - Arrange for due process
  - Federalize the National Guard and/or bring in US marshals
  - Determine level of force authorized to maintain quarantine
- A federalized mass quarantine would be unprecedented
Should the President assert federal control to enforce the quarantine in Massachusetts?
June 1, 2018
Clade X Cases
June 1: Probable & Confirmed Cases

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>2177</td>
<td>216</td>
</tr>
<tr>
<td>Venezuela</td>
<td>&gt;1,000</td>
<td>&gt;250</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>&gt;1,000</td>
<td>&gt;100</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>187</td>
<td>17</td>
</tr>
<tr>
<td>Europe (other)</td>
<td>158</td>
<td>4</td>
</tr>
<tr>
<td>UAE</td>
<td>151</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>120</td>
<td>5</td>
</tr>
<tr>
<td>Russia</td>
<td>130</td>
<td>12</td>
</tr>
<tr>
<td>Egypt</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>Jordan</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>United States</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>China</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>&gt;5,056</td>
<td>&gt;632</td>
</tr>
</tbody>
</table>
June 1: NSC Staff Briefing

• Large outbreak in Afghanistan confirmed as Clade X
• Hospitals in all of these countries are struggling
• WHO says that there have been a number of outbreaks in hospitals
  • 10% of confirmed cases are healthcare workers
• Most confirmed cases require intensive care
  • 20% death rate among those hospitalized
June 1: NSC Staff Briefing

• Options for medical countermeasures and diagnostics are being explored
• Vaccine research is proceeding on multiple fronts in multiple countries
• Medical supply shortages are being reported across the US
June 1: NSC Staff Briefing

• Many patients have very mild illness but may still be contagious
• Modeling suggests a severe pandemic is possible if Clade X is not contained soon
• The President declared a national state of emergency
• HHS Secretary declared a public health emergency
Military Challenges

• Kabul and Helmand provinces in Afghanistan have large outbreaks
  • Local medical facilities are overwhelmed
• A dozen US troops have Clade X and are in critical condition
  • Evacuation to the US is very difficult
• Combatant Commanders concerned about effect on force readiness
• Force Protection Level increased for military installations around the world
Do you recommend to the President that we start bringing US personnel home from affected countries?

If so, whom do we bring home?
GNN Video Update 7

Watch on YouTube
EXCOMM Meeting #3

June 17, 2018

Eight weeks after onset of the first illness
Clade X Situation Update

• Massachusetts governor agreed to maintain quarantine
• No ABD perpetrators have been located
• DOD created isolation units in the US for DOD Clade X patients
• All high-level isolation units in the US are full
• Remainder of sick US personnel are being treated overseas
• Mass evacuation of nonessential personnel and dependents is planned
• New major Clade X outbreak in Bethesda, MD
Clade X Timeline

APRIL 15
First illness in Germany

APRIL 28
Virus isolated

MAY 2
Parainfluenza identified

MAY 25
First US cases

MAY 1
First case in Venezuela

MAY 20
Travel ban implemented

JUNE 8
Evacuation of US personnel commences

JUNE 15
Clade X in Bethesda, MD
GNN Video Update 8

Watch on YouTube
Bethesda Outbreak

• 51 cases in Bethesda and DC, and most are critically ill
• Area ICUs are already exceeding capacity
• Hospitals cannot handle more than 1-2 Clade X patients at a time
## June 17: Probable & Confirmed Cases

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>10,000</td>
<td>900</td>
</tr>
<tr>
<td>Venezuela</td>
<td>7,650</td>
<td>3,420</td>
</tr>
<tr>
<td>Germany</td>
<td>7,250</td>
<td>354</td>
</tr>
<tr>
<td>Europe (other)</td>
<td>3,650</td>
<td>1,846</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1,600</td>
<td>135</td>
</tr>
<tr>
<td>UAE</td>
<td>1,100</td>
<td>100</td>
</tr>
<tr>
<td>Colombia</td>
<td>850</td>
<td>380</td>
</tr>
<tr>
<td>Russia</td>
<td>575</td>
<td>42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>India</strong></td>
<td>412</td>
<td>72</td>
</tr>
<tr>
<td><strong>Egypt</strong></td>
<td>387</td>
<td>75</td>
</tr>
<tr>
<td><strong>China</strong></td>
<td>289</td>
<td>29</td>
</tr>
<tr>
<td><strong>Jordan</strong></td>
<td>135</td>
<td>15</td>
</tr>
<tr>
<td><strong>Indonesia</strong></td>
<td>120</td>
<td>15</td>
</tr>
<tr>
<td><strong>UAE</strong></td>
<td>110</td>
<td>10</td>
</tr>
<tr>
<td><strong>Russia</strong></td>
<td>575</td>
<td>42</td>
</tr>
<tr>
<td><strong>United States</strong></td>
<td>63</td>
<td>3</td>
</tr>
<tr>
<td><strong>S. America (other)</strong></td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>34,172</td>
<td>7,399</td>
</tr>
</tbody>
</table>
Severe Pandemic Possible

• No pre-existing immunity
• About half of patients have mild illness but are still contagious
• The other half experience severe symptoms
  • Approximately 20% of those will die, even with good medical care
• Rapidly rising case fatality in areas where hospitals are failing
• Modeling suggests possibility of 0.5-2 million US deaths over the next year and >50 million globally
GNN Video Update 9

Watch on YouTube
(Followed by discussion prior to GNN Video 10 on next slide)
GNN Video Update 10

Watch on YouTube
June 17: NSC Staff Briefing

• DC area ICUs are full and trying to transfer some Clade X patients
• Some potential receiving hospitals are refusing to accept transfers
• Vast majority of US hospitals are privately owned
  • Federal government has limited authority over private hospital operations
• DOD and VA hospitals are already at capacity
What should we do about hospitals that refuse to accept Clade X patients?
Military Situation in Jordan

- Severe Clade X outbreak in Jordan
- Terrorist groups have taken the city of Mafraq
- Jordanian forces cannot repel these groups on their own
  - The government of Jordan is requesting assistance
  - Israel also requests that the US respond
- US would send a brigade of about 4,500 personnel
  - Approximately 3-6 months
  - May put troops at significant risk of Clade X
Should we deploy military personnel to assist Jordan?
GNN Video Update 11

Watch on YouTube
EXCOMM Meeting #4

September 15, 2018
5 months after onset of the first illness
Clade X Situation Update

• US deployed brigade to Jordan
  • Many US troops have died from Clade X
• HHS has provided major medical centers with extra funding and training to care for Clade X patients
• The President met with the National Governor’s Association, and the Arizona governor relented
  • Commercial air travel restored, but volume is still down 43%
Clade X Timeline

APRIL 15
First illness in Germany

APRIL 28
Virus isolated

MAY 2
Parainfluenza identified

MAY 25
First US cases

MAY 1
First case in Venezuela

MAY 20
Travel ban implemented

JUNE 15
Clade X in Bethesda, MD

JUNE 8
Evacuation of US personnel commences

JUNE 18
Air travel restored in AZ

JUNE 20
US deploys to Jordan
GNN Video Update 12

Watch on YouTube
September 15, 2018
Clade X Cases
## September 15: US Probable & Confirmed Cases

<table>
<thead>
<tr>
<th>Location</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bethesda/DC</td>
<td>25,603</td>
<td>1,349</td>
</tr>
<tr>
<td>S. Norwich, MA</td>
<td>21,349</td>
<td>1,134</td>
</tr>
<tr>
<td>Roanoke, VA</td>
<td>5,426</td>
<td>551</td>
</tr>
<tr>
<td>Albany, NY</td>
<td>1,791</td>
<td>147</td>
</tr>
<tr>
<td>Coeur D'Alene, ID</td>
<td>981</td>
<td>108</td>
</tr>
<tr>
<td>Norwich, CT</td>
<td>599</td>
<td>66</td>
</tr>
<tr>
<td>California, MD</td>
<td>320</td>
<td>39</td>
</tr>
<tr>
<td>Hanford, CA</td>
<td>310</td>
<td>30</td>
</tr>
<tr>
<td>Salisbury, MD</td>
<td>194</td>
<td>19</td>
</tr>
<tr>
<td>Bismarck, ND</td>
<td>154</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>57,517</strong></td>
<td><strong>3,543</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augusta, ME</td>
<td>124</td>
<td>11</td>
</tr>
<tr>
<td>Burlington, VT</td>
<td>103</td>
<td>8</td>
</tr>
<tr>
<td>Logan, UT</td>
<td>102</td>
<td>14</td>
</tr>
<tr>
<td>Grand Island, NE</td>
<td>87</td>
<td>8</td>
</tr>
<tr>
<td>Bend, OR</td>
<td>86</td>
<td>9</td>
</tr>
<tr>
<td>Racine, WI</td>
<td>65</td>
<td>5</td>
</tr>
<tr>
<td>Modesto, CA</td>
<td>49</td>
<td>7</td>
</tr>
<tr>
<td>Columbia, MO</td>
<td>48</td>
<td>5</td>
</tr>
<tr>
<td>Sherman, TX</td>
<td>43</td>
<td>7</td>
</tr>
<tr>
<td>19 Others w/ &lt;20 cases</td>
<td>83</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>57,517</strong></td>
<td><strong>3,543</strong></td>
</tr>
</tbody>
</table>
September 15: NSC Staff Briefing

• Many domestic hospitals are failing
• CDC encouraging telework and social distancing
  • Many schools have closed nationwide
  • Many public gatherings are cancelled
• Public demand for surgical masks and respirators is surging
• Multiple states have deployed National Guard to provide security at pharmacies and hospitals
• States are considering canceling in-person voting for the 2018 elections
## September 15: Global Probable & Confirmed Cases

<table>
<thead>
<tr>
<th>WHO Region</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Mediterranean</td>
<td>3,539,500</td>
<td>1,327,400</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>3,350,000</td>
<td>1,210,000</td>
</tr>
<tr>
<td>Americas</td>
<td>1,163,500</td>
<td>354,000</td>
</tr>
<tr>
<td>Europe</td>
<td>258,300</td>
<td>100,000</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>212,100</td>
<td>90,000</td>
</tr>
<tr>
<td>Africa</td>
<td>145,000</td>
<td>25,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>~8,668,400</td>
<td>~3,106,400</td>
</tr>
</tbody>
</table>
September 15: NSC Staff Briefing

• High transmission in megacities
• Patients are being turned away from hospitals; many are dying at home
• Some countries have deployed military to keep order and secure borders
• Many are blaming immigrants/minorities for disease spread
• Widespread looting has led to violent crackdowns by some governments
• Several national governments have fallen
• Catastrophic outcome is likely unless a vaccine is deployed soon
Clade X Vaccines

• Azalea Pharmaceuticals
  • Working with other companies, HHS, and FDA to test and manufacture the vaccine
  • Could be enough vaccine for 80% of the US population in 6-9 months
  • Azalea will license the vaccine for production in other countries

• Initial production capacity expected to be 5 million doses/month

• Vaccine will confer immunity ~1 month after vaccination
  • More than 1 dose may be required

• This would be the fastest that a vaccine for a novel virus has ever been produced
Clade X Mortality vs. Vaccine Timing

Estimated cumulative deaths after 2 years

- 6 months
- 9 months
- 12 months
- 18 months
- No vaccine
How Best to Allocate Vaccine?

Option 1: Prioritize those with key societal functions

- Healthcare workers and scientists working on the vaccine may ensure more people are vaccinated
- Government officials to ensure continuity of government
- Critical infrastructure to ensure function of essential services
- Business leaders to help prevent economic collapse

Option 2: Prioritize those most likely to benefit

- People most severely affected by the virus to save more lives
- Children to help reduce Clade X transmission and preserve future societal function
- Pregnant women to preserve health of future generations

Option 3: Lottery

- Everyone has an equal chance of being selected to receive the vaccine when it becomes available
# How Best to Allocate Vaccine?

<table>
<thead>
<tr>
<th>Option 1: Prioritize those with key societal functions</th>
<th>Option 2: Prioritize those most likely to benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Healthcare workers</strong></td>
<td><strong>&gt;65 years old</strong></td>
</tr>
<tr>
<td>16 million</td>
<td>49 million</td>
</tr>
<tr>
<td><strong>Transportation, shipping, and aviation</strong></td>
<td><strong>&lt;4 years old</strong></td>
</tr>
<tr>
<td>5 million</td>
<td>20 million</td>
</tr>
<tr>
<td><strong>Federal government</strong></td>
<td><strong>Immunosuppressed</strong></td>
</tr>
<tr>
<td>3 million</td>
<td>10 million</td>
</tr>
<tr>
<td><strong>Military</strong></td>
<td><strong>Pregnant</strong></td>
</tr>
<tr>
<td>3 million</td>
<td>6 million</td>
</tr>
<tr>
<td><strong>First responders (eg, police, firefighters, EMTs)</strong></td>
<td><strong>TOTAL</strong></td>
</tr>
<tr>
<td>2 million</td>
<td>85 million</td>
</tr>
<tr>
<td><strong>Public utilities</strong></td>
<td></td>
</tr>
<tr>
<td>0.5 million</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
</tr>
<tr>
<td>29.5 million</td>
<td></td>
</tr>
</tbody>
</table>
GNN Video Update: Epilogue

Watch on YouTube
Implications of Clade X for National Policy

1. Capability to produce vaccines and drugs for novel pathogens within months not years
2. Strong and sustainable global health security system
3. Robust, highly capable national public health system that can manage the challenges of pandemic response
4. National plan to effectively harness all US healthcare assets in a catastrophic pandemic
5. International strategy for addressing research that increases pandemic risks
6. National security community well prepared to prevent, detect, and respond to infectious disease emergencies
Hotwash

• What will you take away from this event?
• What was the most surprising aspect?
• What should the US government (and other governments) be doing differently?
centerforhealthsecurity.org/cladex