“One Health” Concept

“Collaborative, multisectoral, and trans-disciplinary approach—working at the local, regional, national, and global levels—with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment”

CDC: https://www.cdc.gov/onehealth/basics/index.html
One Health Communities & Activities

http://www.onehealthinitiative.com

https://www.onehealthcommission.org/

https://onehealthplatform.com/home

world one health CONGRESS

Advancing science to improve health and security
EDINBURGH SCOTLAND 30 OCT - 3 NOV 2020 RESCHEDULED
www.worldonehealthcongress.org
Origin of COVID-19

• SARS-CoV-2 is believed to originate from bats, similar to MERS-CoV and SARS-CoV

• Gene sequencing of SARS-CoV-2 is similar across countries to the strain in China, indicating single emergence from an animal reservoir

• 2 main hypotheses of CoV-2 evolution:
  • Natural selection in non-human host and jumping to humans
    • No documented case of coronavirus transmission from bat to human. Previous coronaviruses have passed through an intermediate host (Currently unknown: Pangolins? Cats? Dogs?)
  • Non-pathogenic version of CoV-2 jumped from animal to human and evolved within humans to its current state

CDC MMWR (April 21, 2020): Possible bat origin of severe acute respiratory syndrome coronavirus:  
https://wwwnc.cdc.gov/eid/article/26/7/20-0092_article
AVMA FAQs on COVID-19 Animal Transmission

The National Veterinary Services Laboratory (NVSL) has confirmed only 4 pets nationwide confirmed with COVID-19. Globally, 25 reports of pets infected.

- **Cats**: 2 domestic cats tested positive in NY in a house where no human was positive for COVID-19.
- **Other animals**: Several lions and tigers at Bronx Zoo with respiratory illness. One Malayan tiger had positive COVID-19 test.
  - Transmission is believed to be from zoo worker who was shedding virus.
  - Only 1 tiger tested due to general anesthesia needed to obtain sample. Three more tigers and 3 African lions tested positive via fecal samples.

CDC (May 29, 2020): To date, there is no evidence that animals play a significant role in spreading SARS-CoV-2. Based on limited research, risk of animal spread to humans is considered to be low.


In-depth Summary of Reports of Naturally Acquired SARS-CoV-2 Infections in Domestic Animals and Farmed or Captive Wildlife

AVMA (May 28, 2020):

<table>
<thead>
<tr>
<th>EVENT START OR REPORT DATE</th>
<th>COUNTRY (STATE)**</th>
<th>SPECIES (NUMBER)</th>
<th>RT-PCR</th>
<th>VIRUS ISOLATION</th>
<th>NEUTRALIZING ANTIBODY</th>
<th>PUBLISHED ON OIE-WAHIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 21, 2020</td>
<td>Spain^2</td>
<td>CAT (1)</td>
<td>Positive</td>
<td>Not reported</td>
<td>Not reported</td>
<td>NO</td>
</tr>
<tr>
<td>May 18, 2020</td>
<td>Russia^12</td>
<td>CAT (1)</td>
<td>Positive</td>
<td>Not reported</td>
<td>Not reported</td>
<td>Yes (May 26)</td>
</tr>
<tr>
<td>May 15, 2020</td>
<td>The Netherlands^10</td>
<td>DOG (1)</td>
<td>Negative</td>
<td>Not reported</td>
<td>Positive</td>
<td>NO</td>
</tr>
<tr>
<td>May 15, 2020</td>
<td>The Netherlands^1</td>
<td>CATS (3; mink farms)</td>
<td>Positive</td>
<td>Not reported</td>
<td>Positive (1 cat only)</td>
<td>NO</td>
</tr>
<tr>
<td>May 25, 2020</td>
<td>The Netherlands^1</td>
<td>CATS (4; mink farms)</td>
<td>Positive</td>
<td>Not reported</td>
<td>Positive (all 7 cats)</td>
<td>NO</td>
</tr>
<tr>
<td>Mar 27, 2020</td>
<td>USA (New York/Bronx Zoo)^2</td>
<td>TIGERS/LIONS (7)***</td>
<td>Positive</td>
<td>Not done</td>
<td>Not done</td>
<td>NO</td>
</tr>
<tr>
<td>Mar 27, 2020</td>
<td>USA (New York/Bronx Zoo)^2</td>
<td>LION (1)</td>
<td>Positive</td>
<td>Not reported</td>
<td>Not reported</td>
<td>Yes (Apr 17)</td>
</tr>
<tr>
<td>Mar 27, 2020</td>
<td>USA (New York/Bronx Zoo)^2</td>
<td>TIGER (1)</td>
<td>Positive</td>
<td>Not reported</td>
<td>Not reported</td>
<td>YES (Apr 6)</td>
</tr>
<tr>
<td>Mar 18, 2020</td>
<td>Belgium^8</td>
<td>CAT (1)</td>
<td>Positive</td>
<td>Not reported</td>
<td>Not reported</td>
<td>NO; but OIE is aware</td>
</tr>
<tr>
<td>Mar 18, 2020</td>
<td>Hong Kong^6</td>
<td>DOG (1)</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
<td>YES (Mar 20 &amp; Apr 7)</td>
</tr>
</tbody>
</table>
AVMA FAQs on COVID-19 Animal Transmission

• According to AVMA:
  • Animals susceptible to COVID-19: Cats, ferrets, minks, Syrian hamsters
  • Animals less or not susceptible: Dogs, pigs, chickens, ducks

• Generally, low risk of transmission from human to animal (but do not kiss, lick or snuggle with your pet if you are COVID-19 positive)

• No evidence of transmission from domestic pet to human

• Recommendation = Wash hands after being around animals

COVID-19 cases among U.S. workers in 115 meat and poultry processing facilities were reported by 19 states. 

CDC MMWR (May 8, 2020): https://www.cdc.gov/mmwr/volumes/69/wr/mm6918e3.htm

- Meat/Poultry processing facilities form part of the critical infrastructure within the Food and Agriculture Sector
- Workers involved in meat and poultry processing are not exposed to SARS-CoV-2 through the handled meat products. Their work environments may contribute substantially to potential exposure
- Risk factors: distance between workers, duration of contact, type of contact

US Agency of International Development’s Role

• **PREDICT (2009-2019)**
  - Launched in 2009 (after 2005 H5N1 bird flu), USAID’s Emerging Pandemic Threats (EPT) program developed 4 projects: PREDICT, RESPOND, IDENTIFY, PREVENT
  - To build global capacity and identify sources of zoonotic disease and places/practices of high exposure of humans to pathogens for zoonotic spillover
  - Accomplishments:
    - Identified ~1,000 new viruses, including new strain of Ebola
    - Trained ~5,000 people around the world to identify new diseases
    - Improved and developed 60 research laboratories
    - Formed <20% of USAID investment (US$200M) in global health security

• **Strategies To Prevent (STOP) Spillover Program (Sept 2020 - ?)**
  - To leverage the data collected and knowledge gained by PREDICT to develop interventions to reduce risk of the transmission of dangerous zoonotic pathogens (e.g. strains of influenza, Ebola, Lassa fever, Marburg, Nipah, coronaviruses) that lack specific, proven treatments and vaccines.

Discussion Points

- Which data and tools can help us identify emerging threats and predict the next pandemic?

- Additional data are important to explore pending questions:
  - Primary: clinical (e.g. immunity), epidemiology (e.g. human/animal surveillance), and environmental (e.g. seasonality)
  - Secondary: environmental (e.g. lockdown effects)

- Which research questions would be ideal for integrating Earth and health science data?

- How can we best motivate transdisciplinary collaborations in a strongly connected clinical-epidemiology research?

- How should we approach the next steps to curb disease transmission?

The One Health approach can aid to curb disease spread!

Integrating innovative data and technology – like Earth observation and public health data – will be instrumental to examine SARS-CoV-2 transmission!