

## Thinking Ahead of the World Cup: Hantavirus (Old and New World, ANDV)

### Emory University Resources:

- Session Resources Can Be Found on Our Website
  - <https://scdp.emory.edu/programs/echo-program/resources.html>
- Region 4 Situation Report
  - <https://scdp.emory.edu/programs/echo-program/situation-report.html>
- Register for upcoming sessions on our website
  - <https://scdp.emory.edu/programs/echo-program/echo-sessions.html>
- Region IV Concept of Operations (CONOPS) - Regional Partners and Contacts
  - <https://netec.org/about-netec/partners-regional-contacts/#regional-contacts>
- NETEC
  - <https://netec.org/>
- NETEC – National Special Pathogens System of Care (NSPS)
  - <https://netec.org/nsps/>

### General External Resources:

Disclaimer - Our program provides additional resources that may be of use to our session attendees. This list is not inclusive, nor does our program endorse specific organizations.

- Healthmap.org (Location based alerts)
- Center for Infectious Disease Research and Policy (CIDRAP), University of Minnesota (UNM)
- The University of Nebraska Medical Center (UNMC) - Global Center for Health Security: The Transmission
- Global Biodefense
- CDC – Division of High-Consequence Pathogens and Pathology
- Georgia Department of Public Health – Travel Clinical Assistant (TCA)
  - <https://dph.georgia.gov/TravelClinicalAssistant>
- ProMED – International Society for Infectious Diseases

Please continue to check your local and state public health websites for additional resources and guidance.

### Session Resources:

- CDC webpage on current hantavirus outbreak
  - <https://www.cdc.gov/hantavirus/situation-summary/index.html>
- General CDC webpage on hantavirus
  - <https://www.cdc.gov/hantavirus/about/index.html>

- Vial PA, Ferrés M, Vial C, Klingström J, Ahlm C, López R, Le Corre N, Mertz GJ. Hantavirus in humans: a review of clinical aspects and management. *Lancet Infect Dis*. 2023 Sep;23(9):e371-e382. doi: 10.1016/S1473-3099(23)00128-7. Epub 2023 Apr 24. PMID: 37105214.
- Martínez VP, Di Paola N, Alonso DO, Pérez-Sautu U, Bellomo CM, Iglesias AA, Coelho RM, López B, Periolo N, Larson PA, Nagle ER, Chitty JA, Pratt CB, Díaz J, Cisterna D, Campos J, Sharma H, Dighero-Kemp B, Biondo E, Lewis L, Anselmo C, Olivera CP, Pontoriero F, Lavarra E, Kuhn JH, Strella T, Edelstein A, Burgos MI, Kaler M, Rubinstein A, Kugelman JR, Sanchez-Lockhart M, Perandones C, Palacios G. "Super-Spreaders" and Person-to-Person Transmission of Andes Virus in Argentina. *N Engl J Med*. 2020 Dec 3;383(23):2230-2241. doi: 10.1056/NEJMoa2009040. PMID: 33264545.
- Afzal S, Ali L, Batool A, Afzal M, Kanwal N, Hassan M, Safdar M, Ahmad A, Yang J. Hantavirus: an overview and advancements in therapeutic approaches for infection. *Front Microbiol*. 2023 Oct 12;14:1233433. doi: 10.3389/fmicb.2023.1233433. Erratum in: *Front Microbiol*. 2023 Dec 12;14:1343080. doi: 10.3389/fmicb.2023.1343080. PMID: 37901807; PMCID: PMC10601933.

#### Responses to Unanswered Questions:

- *I have heard of 42 days and 49 days of isolation. Which is preferable? Which is the incubation period?*
  - The longest recorded incubation period for human-to-human transmission of the Andes virus is 40 days.
  - **This is the rationale for 42 days of quarantine** and observation for symptoms. Please note that people are not isolated for that period, but quarantined.
  - The Kansas Department of Health and Environment has asked that exposed individuals wear masks when in public, which again shows an abundance of caution.
  - We believe that patients are not contagious until symptoms develop. Nothing wrong with being cautious, though.
- *Are you concerned about potential for a wider outbreak with the World Cup coming soon?*
  - COVID is of wider concern.
  - There is no concern about a wider outbreak. The R0 (pronounced R-naught) expresses how many people one person with the illness passes the infection to. That sounds simple, but it is not simply virus dependent and depends on environment and prospective host.
  - An R0 > 1 suggests that the virus could expand to an epidemic, while an R0 < 1 indicates that it will die out. Dr. Simpson has seen overall R0 estimates for Andes virus as high as 1.2, but this is probably an overestimate because it is based ONLY on the few reports there are of human-to-human transmission. Andes virus causes at least 100 cases of HPS in South America every year, and sometimes as

many as 200. Yet, there are only now 4 reported clusters of human-to-human transmission. In other words, **most people do not transmit the infection at all.**

- Secondly, all published data suggests that one becomes infectious with the onset of symptoms. There is no passage from asymptomatic individuals as we see with COVID-19. Thus, if one knows that they were exposed to coli largo droppings or potentially contaminated dust and develops symptoms, both they and their daily contacts can know to isolate or quarantine. Likewise, if one knows they had significant exposure to an infected individual, they can monitor themselves and feel comfortable that they are not going to infect someone else, as long as they do not themselves have symptoms.
- Finally, everything we know about human-to-human transmission indicates that (with the exception of one report) one needs close and prolonged contact to a sick person with symptomatic Andes Virus infection to become infected themselves. Sexual contact, deep kissing, sleeping in the same bed without doing either of those things, inhabiting a closed space lacking substantial ventilation.
- By the way, the virus is not transmitted sexually, but that constitutes close contact. In most cases, anyway! Unfortunately, there are no specifics we can name for just how close and just how long. There aren't many volunteers for the experiment. many volunteers for the experiment.
- Andes Virus can be found in salivary glandular epithelium, saliva, gums, airway epithelium, alveolar epithelium, and alveolar macrophages. Given its tiny size - 80 - 160 nm - it is pretty inconceivable that coughing or breathing does not form aerosols of virus (particles smaller than 100 microns). Nevertheless, the features above are not suggestive of aerosol transmission and are more consistent with droplet or contact transmission. The virus remains viable on inanimate surfaces for 2 to 4 days, and up to two weeks in mouse excreta, if conditions are cool and dry.
- With all of this, if symptomatic patients are isolated until recovery or otherwise, it is unlikely that the virus has the capacity to cause an epidemic, and far less so a pandemic.
- Dr. Simpson has been asked about virus mutations and if it can become highly infectious, which of course could occur. Again, we can contrast this with highly infectious viruses such as SARS-CoV-2 or influenza which do, obviously mutate.
- However, one feature of these mutations is that they occur over many generations of human-to-human passage; the random mutations typically result in a more infectious virus. The highest number of passages of Andes Virus so far recorded has been three generations from the index zoonotic case. While it is possible for the virus to mutate in any given generation, the probability is quite low.