“U.S. Trends in Water-Related Infectious Disease Correlated to Climate Change”

Background

- Climate change is being observed on every continent in multiple ways with climate change processes (including precipitation, temperature, and wind) being driven by changes in the chemistry of the atmosphere; this abiotic feature influences all biotic elements of the earth, including those of human health and microbial fitness.

- Alterations in these weather components can drive changes in transmission of water-related and water-dependent microbes, including those of bacteria, viruses, fungi, and parasites.

- “Water-Related” microbial disease for our purposes is defined as a disease that occurs due to a microbe being transmitted to humans directly in the water (“water-borne”) or a microbe being transmitted to a human via the bite of vector (“vector-borne”) whose life cycle is dependent upon the presence of water (inclusive of bodies of water or certain precipitation levels).

Methods

- The study was undertaken as a narrative review with the goal of evaluating the current literature for changes in prevalence of water-related infectious disease as potentially correlated to climate change process timeframes within the United States.

- State and nationally notifiable disease databases were utilized.

- Complete search parameters included one fungal etiology not nationally notifiable (Sporothrix schenckii) and infectious diseases caused by microbes in 3 groups: bacteria, viruses, parasites.

Results

- Water-borne human infectious microbes are increasing in numbers and types (i.e., on the strain level).

- Vector-borne infections are emerging based on differences in vector range/habitat, as well as climate differences that allow for more points of contact between the critical levels of vector infection by the pathogen as well as critical levels of pathogen transmission from the vector to the human (e.g., "intrinsic incubation time")

- Recognition of the water-related infectious disease rates correlated to climate change and relative to key microbes will aid physician diagnosis and treatment accuracy, decrease response time, result in patient education measures that could result in prevention, and potentially enhance efficacy of appropriate diagnostic tests for key climate-related infectious diseases.

Conclusion

Increase awareness (medical school curriculums, residency grand rounds, licensing exams, CME) of infectious disease and climate change interrelatedness

- Bring together of a national database of microbes that should be considered in non-standard situations.

- Algorithm that consists of questions that are short, give the patients the most "air time", and is focused on risk factors with a deductive approach to the algorithm seeking to identify newly emerging, climate change-connected infectious disease in a new geographical area.

- Establish a database (analogous to the National Healthcare Safety Network, FoodNet, Nationally Notifiable Disease Surveillance System) specifically for emerging infectious disease correlated to climate change.

References

2. Projected Changes in Tick Habitat at the U.S. Globate Climate Change Research Program (http://www.globalchange.gov/browse/multimedia/projected-changes-tick-habitat)

Key to Vector Types

- Water
- Tick

Increasing frequency and intensity of precipitation