

Medicine for a Changing Planet
A joint project of the University of Washington and Stanford University

Case studies summary April 2023

- I. Emerging zoonoses:** *A 28-year-old man presents to the ER in Kerala, India with confusion, fever, and vomiting. His relatives, some of whom catch wild animals and collect fruit, are also in the ER and have similar symptoms.*

Learning objectives:

1. *Understand how ecological changes and human-animal interactions contribute to emerging zoonoses.*
2. *Apply knowledge of the local human-animal interface to identify and prevent emerging zoonotic diseases.*

Clinical competencies:

1. *Learn how to take a history of animal contacts and environmental exposures to build a differential diagnosis that includes zoonoses.*
2. *Recognize and order appropriate diagnostic testing for emerging zoonotic diseases.*
3. *Understand the origins of zoonotic outbreaks including modes of transmission and sources of spillover.*
4. *Identify community health interventions that can limit zoonotic disease spread.*

- II. Climate change & vector-borne disease:** *A female in her 30s presents to an emergency room in Miami, Florida with fever, headache, and flank pain.*

Learning objectives:

1. *Understand how climate change can affect risks for vector-borne diseases.*
2. *Identify sentinel cases of vector-borne disease related to climate change.*
3. *Understand the role of the clinician in the diagnosis, management, and prevention of vector-borne disease.*

Clinical competencies:

1. *Integrate history of vector exposure into patient history*
2. *Develop a differential diagnosis for vector-borne disease.*
3. *Understand and prioritize diagnostic testing for vector-borne disease.*
4. *Understand populations vulnerable to vector-borne disease.*
5. *Access and integrate surveillance data and local outbreak and entomology data to improve diagnostic accuracy.*
6. *Detect sentinel cases of vector-borne disease.*
7. *Integrate weather data, extreme events, and local environmental factors to inform the differential diagnosis.*

8. *Access resources to guide clinical management of climate-sensitive infections.*
9. *Educate patients, communities, and policymakers about prevention and the links between vector-borne disease and climate change.*

III. Pandemic preparedness: A 44-year-old woman presents to the clinic with severe headache, fever, chills, nausea, vomiting, and diarrhea after returning from a 2-week safari in Uganda.

Learning objectives:

1. *Understand how globalization, travel, and changes to human-animal interface create opportunities for pandemics.*
2. *Identify sentinel cases of diseases with pandemic potential to safeguard human, animal, and planetary health.*

Clinical competencies:

1. *Know how to perform a comprehensive history, exam, and diagnostic testing for fever in a returning traveler.*
2. *Understand how to diagnose emerging zoonoses and high consequence pathogens.*
3. *Apply measures to ensure healthcare and laboratory worker safety.*
4. *Communicate and coordinate with public health outbreak response.*

IV. Environmental change & food security: A 50-year-old male living in a small town in rural Alaska presents for diabetes follow up. This patient has a history of hypertension and diet-controlled diabetes.

Learning objectives:

1. *Identify how global environmental changes directly and indirectly affect food security.*
2. *Explain the impacts of food insecurity on human health.*
3. *Understand what constitutes a “planetary health diet” – accounting for both environmental and health impacts of nutritional recommendations.*
4. *Describe how global food systems contribute to global environmental changes, including climate change, and the co-benefits of a carbon-reduced diet.*

Clinical competencies:

1. *Apply clinical evaluation skills to detect signs and symptoms of malnutrition.*
2. *Combine information obtained using validated tools with knowledge of local diets and food sources to identify patients with food insecurity.*
3. *Assess environmental and structural barriers to food access and dietary diversity.*
4. *Propose evidence-based and culturally appropriate dietary interventions that take into account both health and environmental considerations.*

- V. Toxic exposures:** In a rural area of West Africa, a three-year old child is admitted to the local hospital with abdominal pain and decreased responsiveness after a witnessed seizure.

Learning objectives:

1. *Understand how toxic exposures can manifest in both humans and animals.*
2. *Explain how to follow up concerns about animal health disease events – consult with other professionals including veterinarians, environmental health and public health experts.*
3. *Explain how toxic exposures are related to environmental change.*

Clinical competencies:

1. *Assess history of toxic exposures*
2. *Develop a differential diagnosis and utilize appropriate diagnostic testing for suspect heavy metal toxicity.*
3. *Recognize sentinel cases (human and animal) of toxic exposure.*
4. *Apply the host-environment approach to the management of a toxic exposure.*

- VI. Air pollution:** A 55-year-old woman in rural Rwanda presents with progressively worsening dyspnea and lower extremity and abdominal swelling. She cooks daily using a wood-fired stove in her dirt floored home.

Learning objectives:

1. *Understand local and global environmental factors that contribute to air pollution.*
2. *Describe the human health effects of indoor and outdoor air pollution.*
3. *Recognize air pollution as a threat to planetary health.*

Clinical competencies:

1. *Perform a detailed (and locally adapted) environmental history to identify environmental hazards that relate to patient's presentation.*
2. *Be able to recognize sentinel cases of air pollution-related health effects.*
3. *Demonstrate the use of an environmental hazard risk assessment framework to guide clinical decision making.*
4. *Demonstrate how to obtain, interpret, and utilize data on air quality to impact patient care.*
5. *Create preventive treatment plans that include improvement of host vulnerability (host factors) and reduction of environmental exposures to air pollution.*

- VII. Heat emergency:** You are a general practitioner in London. You are making a house call to see some of your most vulnerable patients. You received a call from your patient's niece, who reports that her aunt is not doing so well. Ms. Betty is an 83-year-old woman with congestive heart failure, atrial fibrillation, and chronic kidney disease. On your way to her house, you hear on the radio a weather report warning of a heat emergency. The heat index is 107°F.

Learning objectives:

1. *Analyze current epidemiology regarding heat-related morbidity and mortality and how this is expected to change with climate change.*
2. *Articulate how heat exposure impacts existing health inequities.*
3. *Connect the impact of increasing global temperatures to ecosystem health and how this in turn impacts human health.*
4. *Recognize the clinician's role in climate change mitigation and adaptation to prevent worsening impacts of heat on human health.*

Clinical competencies:

1. *Integrate a history of the patient's environment with individual risk factors for heat illness and heat sensitive disease.*
2. *Identify the signs and symptoms of heat illness.*
3. *Access and interpret heat indices and incorporate them into patient counseling.*
4. *Develop preventative counseling for all patients on steps to prevent heat illness.*
5. *Develop management plans that involve addressing both host susceptibility and environmental vulnerability.*

VIII. Mental health: You are seeing a 28-year-old patient in the Western U.S. who vaguely complains about “not feeling well” and generally worrying about her health. As you take a history, you find that she has significant concerns about climate change and the state of the environment.

Learning objectives:

1. *Understand range of ways environment-related emotions – including climate distress and ecoanxiety – are experienced.*
2. *Understand how climate- and environment-driven emotional distress can be embedded within other presenting symptoms in clinical practice.*
3. *Identify factors that enhance or diminish individual resilience.*
4. *Identify interventions to cope with climate-related emotions and eco-distress.*

Clinical competencies:

1. *Assess potential climate-related and environmental-driven emotional factors.*
2. *Differentiate between ecoanxiety, work burnout, and other confounding medical conditions.*
3. *Differentiate the normal range of emotional responses to our changing environment from clinically significant presentations.*
4. *Develop capacity to teach patients behavioral strategies for management of ecoanxiety.*
5. *Develop capacity to counsel patients on managing exposure to troubling news and environments.*
6. *Identify resources for referrals when indicated.*

- IX. Displacement and Refugee Health:** A 28-year-old woman recently arrived in the US from Somalia presents to your primary care clinic in Seattle, Washington to establish care.

Learning objectives:

1. *Define forcibly displaced persons.*
2. *Illustrate global migration patterns of forcibly displaced persons.*
3. *Recognize how environmental and political factors contribute to forced displacement and impact the health of migratory population.*

Clinical competencies:

1. *Identify the leading health conditions among resettled refugees and migrant populations.*
2. *Access and apply the CDC guidelines for immigrant and refugee health in the clinical management of a newly arrived refugee.*
3. *Screen for, diagnose, and treat specific health conditions of concern among refugees presenting for care.*
4. *Provide preventive care for resettled persons.*
5. *Provide culturally competent care.*
6. *Integrate up-to-date resources and guidelines into the clinical management of refugees and migrant patients.*

- X. Water-related Disasters:** A 27-year-old male presents with severe pain in his right leg 7 days after a monsoon resulted in a severe flash flood in his community in the Philippines.

Learning objectives:

1. *Describe the link between climate change and changes in water availability and quality, including changes in the hydrologic cycle.*
2. *List common direct and indirect health effects due to flood and drought disasters, including both surgical and non-surgical syndromes.*
3. *Understand the concept of sentinel cases (human and animal) of water-related disease.*
4. *Recognize role of health care providers in response to water-related disaster.*

Clinical competencies:

1. *Take medical history that screens for water-related health risks.*
2. *Screen for water-related health issues in the physical exam, including surgical complications.*
3. *Detect and manage sentinel cases of water-related disease.*
4. *Recognize and manage surgical complications of necrotizing soft tissue infections (NSTIs)*

- XI. Human-Animal Medicine:** A 60-year-old woman is admitted to the hospital in the Northeastern US with fever, headache, nausea, vomiting, fatigue, and altered mental status. She reports that her dog died the week before – that also had fever and neurological problems.

Learning objectives:

1. *Understand three reasons why animals can be “sentinels” for environmental health hazards to humans, including infectious and non-infectious hazards related to environmental change.*
2. *Explain four reasons for health care providers to communicate with veterinarians about health events.*
3. *Explain five ways to communicate with veterinarians about animal health and sentinel disease events related to shared environmental risks.*

Clinical competencies:

1. *Understand what to do when patients give history of sick animals in the house or nearby.*
2. *Develop communication strategies with veterinarians and animal health experts.*
3. *Recognize sentinel cases (human and animal)*
4. *Understand how to notify regarding sentinel cases as a first step to improving shared environments.*