The Past, Present, and Future of Arboviruses

“Arbovirus” is an informal but common term used to abbreviate arthropod-borne virus. Arboviruses are transmitted by mosquitoes, ticks, sandflies, and other arthropods. These bugs carry or “vector” a wide range of viruses like dengue, chikungunya, Zika, yellow fever, West Nile, Japanese encephalitis, and others.

From the perspective of a virus, mosquitoes are an ideal vehicle to reach new hosts like humans, pigs, monkeys, and other mammals. Mosquitoes transmit viruses through their salivary glands when they bite, allowing the virus to enter the bloodstream of the host and replicate.

As a result of historic circumstances and modern conditions, arboviruses continue to emerge from their ancestral homes in the forest to infect people and animals across the world. Christopher Gregory, MD, MPH is the Chief of the Arboviral Diseases Branch, Division of Vector-Borne Diseases at the United States Centers for Disease Control and Prevention (CDC). Here he explains how the characteristics of the virus, the vector, and the host all play a role in arboviral disease transmission today.

The Virus

In the past couple of centuries, five arboviral diseases have emerged and dispersed across both hemispheres: yellow fever, dengue, West Nile, chikungunya, and most recently, Zika.¹

Many other viruses have dispersed rapidly in one hemisphere or the other. Arboviruses are special because they have evolved relationships with two kinds of hosts: invertebrate insects (arthropods) and vertebrate mammals. "They require a competent vector that can get infected and transmit virus," says Dr. Gregory. “But because the vector’s lifespan is so short, arboviruses also require a reservoir host like humans or birds. It is the ability to replicate in a vector and a host that makes arboviruses unique.

They have to be able to do both efficiently to be widely transmitted.”

There are over 500 confirmed or potential arboviruses listed in the CDC’s International Catalog of Arboviruses. Viruses are registered into the database and classified as being a definite, probable, or possible arbovirus.

This classification process provides public health officials like Dr. Gregory with an opportunity to sort through the
Antibiotics in Agriculture, What Are the True Risks?

Kathleen L Arnolds, Staff Writer, Center for Global Health

There is a lot of talk about the use of antibiotics in food production these days. In fact, public demand for meat and poultry raised without antibiotics has driven massive corporations like Chipotle, McDonalds and Tyson Food, Inc. to eliminate antibiotics from many of their products.

Critics of antibiotic use in livestock cite concerns that it may promote the evolution of so called “superbugs” or bacteria that are resistant to many kinds of antibiotics and pose a threat to human health. Others are concerned the antibiotics themselves can make their way through the food chain, exposing humans to low levels of the drugs which could impact the microbiome -- the millions of bacteria the live in and on the human body and contribute to your health.

Proponents of the use of antibiotics in food systems maintain that antibiotics keep livestock healthy, reduce the risk of foodborne illness in people, and increase the productive capacity of farmers allowing them to lower their costs, making their products cheaper for the consumer.

Understanding such a complex issue requires the insights of an expert, such as Keith Belk, PhD, MS, Professor, Department of Animal Sciences and the Center for Meat Safety & Quality, as well as the Ken & Myra Monfort Endowed Chair in Meat Science at Colorado State University. Dr. Belk and his research partner, Dr. Paul Morley, have been pondering these questions for decades and are involved in a number of multi-year, inter-disciplinary projects to understand the true risks and benefits of using antibiotics in livestock.

One of the major concerns people have about using antibiotics in livestock is the fear that their use will promote gene mutations in bacteria that will make them resistant to antibiotics.

The theory that pervades in society is that mutations confer antimicrobial resistance in organisms; such genes are referred to as antibiotic resistance determinants, or AMDs.

Fear of AMDs is not without basis.

The Centers for Disease Control and Prevention estimates that approximately 2 million people around the world are infected with antibiotic resistant bacteria annually, which lead to treatment failure, and 23,000 of them die in the United States alone with an additional 700,000 being killed globally1.

While the threat of bacteria that can’t be treated with antibiotics is real, Dr. Belk explains there has never been a study that has directly linked the use of antibiotics in livestock with AMR infections in humans that were via the food chain. Dr. Belk and his team are working on doing just that by using gene sequencing technology to look for AMDs in livestock and see if they can trace these genes through the food chain into humans.

AMR genes in the food chain are very hard to find even if they are highly abundant in the livestock. This could be due to the many steps that are taken during food production to eliminate bacterial contamination. These efforts are effective enough that even resistant bacteria don’t make it all the way to the consumer.

Although his data suggests using antibiotics in livestock may not significantly increase the risk of being exposed to drug resistant bacteria through the food-chain. Dr. Belk still strongly believes that we need to do better with prudent use, and reduced use, of antibiotics in agriculture.

Dr. Belk explains that antibiotics are used in a few different ways in food production and these different applications can have unique impacts on the bacteria. To understand the different ways various antibiotic uses can affect bacterial communities, we need to know a little more about bacterial communities.

When most people think about bacteria becoming resistant to antibiotics they think of the bacteria mutating while under the selective pressure of the drug. What actually happens is a little different. Bacteria have been living in complex communities for millions of years and during that time have evolved in maintaining their defenses.

Bacteria also have a unique genetic trick called “horizontal transfer” which means bacteria can exchange bits of DNA with each other. While we can only pass our DNA down from one generation to the next, bacteria can share DNA within a generation making bacteria more flexible when it comes to defending itself.

So, when we treat a human or an animal with an antibiotic, we aren’t driving the development of new resistance genes,

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thousands of viruses carried by bugs—primarily mosquitos—and pay attention to the ones that pose the greatest threat to human health.

“Because there are so many possible [virus] candidates, we want to look more downstream,” says Dr. Gregory. “We do not try to guess which viruses will infect humans, but once we have evidence of infection, we try to determine the likelihood that it will become a large-scale public health problem.”

It is well understood that arboviral diseases have the capacity to cause great morbidity and mortality. For example, dengue alone causes 300-400 million cases of fever/hemorrhagic fever and 22,000 deaths annually.

While there are untold numbers of viruses carried by mosquitos, the ones that are human pathogens have something in common; they are all RNA viruses.

“RNA viruses evolve and change more rapidly than DNA viruses,” Dr. Gregory explains. “In arboviruses, however, they cannot change too drastically because they need to continue replicating in two different environments [the mosquito and the mammal]. The virus cannot create too much change or it risks affecting its fitness for either host.”

Maintaining this delicate balance is important for the survival of the virus. While arboviruses cannot thrive by infecting mosquitos exclusively, the mosquito is necessary for the viruses to break away from their native ecosystem and expand their geographic and biologic reach.

The Vector

“All of these viruses originally existed in a non-urban situation,” says Dr. Gregory. “There had to be some natural ecosystem where a vector and a host lived in relation to each other and the virus could get passed back and forth in that cycle. Yellow fever, for example, was transmitted between non-human primates and mosquitos living in the same area.

Development over the last several centuries means that humans have become more and more exposed to sylvatic [jungle] environments, and humans became spillover hosts. An infected mosquito could infect a human, but humans did not develop enough viral load to pass it back to another mosquito.”

Christopher Gregory, MD, MPH, Chief, Arboviral Diseases Branch, Division of Vector-Borne Diseases, United States Centers for Disease Control and Prevention

However, over time mosquitos and the viruses they carry have adapted to the presence of humans and become more efficient in infecting humans. Eventually, virus transmission can be sustained among humans only, and this is called the urban transmission cycle.

“The really dangerous part is when urban transmission occurs and humans are the primary host. In particular, the Aedes aegypti mosquito, which lives around and inside human dwellings and breeds in non-natural bodies of water, has become a very efficient vector for yellow fever, dengue, chikungunya, and Zika viruses,” explains Dr. Gregory.

The effects of increasing urbanization and climate change are very advantageous for arboviruses. As urban environments grow and infringe on natural habitats, human/mosquito interactions become more frequent and increase the likelihood of humans becoming a primary reservoir for an arbovirus.

Some conditions of urban living encourage mosquito breeding, such as poor waste management and storage of standing water. Mosquito lifecycles and breeding habits are also influenced by changing temperatures.

Dr. Gregory elaborates, “There is a range of temperatures where different mosquitos can survive and thrive. If there is a place that is hospitable year-round, that is much better for the virus than when there is only a seasonal period that is suitable for the mosquito vector. For example, in a place where you have Aedes aegypti only present in the summer,
it has to figure out how to survive when Aedes aren’t around [in the winter]. Up to a certain point, higher temperatures can also increase mosquitos’ longevity, and if they stay alive longer, they can transmit the virus longer.”

Adaptation of Aedes aegypti to the urban environment have been fundamental to the emergence and global spread of chikungunya and Zika viruses. Aedes’ propensity for domestication and preference for human feeding also raises concerns that yellow fever, which has rarely had urban transmission cycles in the last century, may increasingly do so in the future.1

There is fear this is occurring in Brazil where large sylvatic outbreaks of yellow fever, causing over 600 deaths from 2016-2018, have been getting closer to larger urban centers such as Rio de Janeiro and Sao Paulo. Concern over a potential urban outbreak resulted in large vaccination campaigns were over 40 million persons in these heavily populated areas were targeted for vaccination and expanded recommendations for yellow fever vaccine usage for travelers to Brazil.

The Host
In addition to humans, mosquitoes transmit viruses to hosts like pigs, primates and migratory birds. Just like humans, these hosts play important roles in virus transmission by amplifying the virus, as in the case of Japanese encephalitis (JE) in pigs, or transporting them over long distances, as in the case of West Nile virus in migratory birds.

JE is a particularly interesting case that demonstrates the process of virus amplification. Dr. Gregory explains, “Once infected, an amplifying host generates high levels of virus. The host becomes very effective in infecting a large number of mosquitoes in a short period of time. There are wading birds that are the natural reservoir for JE, but pigs are amplifying hosts.

With a lot of recent changes in land use, especially in Asia, several things are happening in one place. Rice fields are ideal environments for these wading birds, so there are more areas where the vector [the Culex mosquito] can feed upon the reservoir host. There has been a large increase in pig farming too, and if that happens in the same area where there are a lot of rice fields, there are good opportunities for the virus to spill over and infect humans.”

When these factors come together, explosive outbreaks of JE can occur. Of all the arboviruses carried by the Culex mosquito species, JE is considered the most important public health threat, causing at least 10,000 deaths per year.1,3

Changes in land use and agriculture are just one example of how humans have shaped the evolutionary course of these viruses and their mosquito vectors. Anthropogenic activities like global travel and trade have an undeniable effect on arboviral disease transmission.

For instance, the introduction of dengue and yellow fever viruses to the Americas is epidemiologically linked to the slave trade. Slave ships carried mosquitos and viruses of African origin across the Atlantic along with their human passengers. Arboviruses have likewise influenced the trajectory of human history.

Between the 17th and 19th centuries, yellow fever and dengue viruses were significant determinants of geopolitical colonial conflicts in the Americas, causing more casualties among French and British troops than combat.1

It is this dynamic relationship between virus, vector, and host distinguishes arboviruses from other infectious diseases.

Strategies for Prevention

Christopher Gregory, MD, MPH, Chief, Arboviral Diseases Branch, Division of Vector-Borne Diseases, United States Centers for Disease Control and Prevention

and Control

So, what can be done to manage arboviral transmission and prevent infection? Some interventions attempt to control the mosquito population through “integrated vector management,” and others take a more human-centric approach through behavior change and vaccination.

Controlling the mosquito population can happen at the individual level to some extent, but generally district- or county-level efforts are needed.

Individuals can discourage mosquito breeding and the development of larvae by removing or treating standing water and managing garbage appropriately. People can also reduce their risk by using screens in their windows and wearing long clothing, but these individual interventions only go so far.

“Behavioral change is hard to sustain, and it is human nature to get fatigued of doing those things in perpetuity,” says Dr. Gregory. “Structural changes that support integrated vector management use several components that build on one another to reduce vector density.”

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The Past, Present, and Future of Arboviruses

(Continued from page 4)

There is a time and a place for different control measures. For example, insecticide treatment is effective, but if used all the time, it becomes ineffective because mosquitoes develop resistance. There are other strategies like genetically modified mosquitoes and sterile mosquitoes to reduce the population. “There are questions about whether these strategies are effective because they have not yet been shown to reduce mosquito populations on a large-scale or disease, and it is unclear how sustainable these approaches are,” says Dr. Gregory.

Dr. Gregory recognizes how the alliance between academia and public health agencies like the CDC can work to pioneer innovative and effective solutions to arboviral disease transmission. Given the complexity of arboviral disease transmission, a high level of collaboration between experts from several disciplines is necessary to develop effective programs.

Entomologists, epidemiologists, veterinarians, and medical doctors are some of the key groups working in arboviral disease control.

“These viruses have different hosts and different vectors, so this cross-disciplinary approach is really important,” says Dr. Gregory. “For instance, if you could stop the amplification of Japanese encephalitis in pigs with vaccination, it would be a huge step forward to reduce the risk. Unfortunately, due to the small window of time when you can vaccinate pigs, it has proven very difficult to do this.”

Human immunization against arboviral diseases is another approach that comes with its own challenges. Recent efforts by Sanofi Pasteur to bring to market a vaccine for dengue virus have been met with serious obstacles and controversy.

“There has to be a clear enough disease burden and a clear enough economic rationale to invest such significant resources. Additionally, even if we had a good vaccine for dengue or chikungunya or Zika, we would still need the vector control component because those same vectors can transmit many other viruses. It is hard to get people to invest in vector control at any time. Similar to vaccination, when the problem is not so obvious, it is hard to get people to spend money. This is a central problem of public health: how do you prove the value of something that doesn’t happen?”

However, the story of arboviruses over the last 20 years has been one of an apparent accelerating pattern of emergence and rapid spread resulting in large-scale diseases outbreaks. Nothing suggests that this pattern is likely to change in the future, and therefore expanded efforts to detect, control and prevent these complicated and dangerous viruses are urgently needed.

References

♦ By Molly T Moss

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Registration is open:
2018 Global Health & Disasters Course
September 24 - October 4, 2018

September 24 - 28  Global Health Course  |  October 1 - 4  Pediatrics in Disasters

This international health course is a two week training offered once a year as part of the University of Colorado School of Medicine Global Health Track. The first week of the course is the Global Health section and the second week of the course is the Pediatrics in Disasters section.

This course prepares its participants for international experiences and future global health work. The interactive training incorporates readings, lectures, small group problem based learning exercises, technical skill sessions, and a disaster simulation exercise.

Want to register? Click here to learn more.

October 5, 2018

Global Health Symposium

Join us the morning of October 5th - all Students, Faculty, Staff, Community Members and Leaders with an interest in global health work are welcome to attend. No registration is needed.

Now accepting: Call for Abstracts and Call for Nominations for the 2018 Excellence in Global Health Award.

2018 Global Health Fair
October 5, 2018

Are you a student looking for a global health project and mentor?
Mark your calendar to join us from 1:30 to 3:30 p.m. on October 5th for the Global Health Project Fair and learn about the exciting global health opportunities currently available to CU students enrolled in a graduate program.

Global Health faculty from different CU schools will give overviews of projects and opportunities for student involvement for academic year 2018-2019. Faculty will be available to network and answer your questions. Learn more.
but we are selecting for those bacteria that are already resistant to the drugs as well as unintentionally encouraging other bacteria to pick up those genes that will make them resistant.

Ultimately, the bacterial community (microbiome) that lives in an animal is an ecosystem and when we treat that animal with antibiotics we shift that ecosystem. With that in mind, Dr. Belk continues by sharing that the different ways antibiotics are used in food production systems can have really different impacts on the microbiomes.

For example, when antibiotics are used clinically for a short period of time to treat an animal that is sick, Dr. Belk and his team see the bacterial ecosystem return to normal shortly after treatment is finished. However, sometimes animals are given antibiotics in their food or water over very long periods to time. This is done both to prevent illness and it promotes growth of the animals, making the farm more productive.

The problem is the bacterial populations don’t recover after these long-term treatments. This is concerning for a couple of reasons—we know that changes in microbiome can be very detrimental to human health and the same thing could be happening to animals, Dr. Belk and his team are currently working to understand how these shifts affect animal health.

Another concern with these permanent changes to the microbiome is that you now have a whole community of animals that is resistant to a certain antibiotic. These studies have led Dr. Belk and his colleagues to be less concerned about the short term clinical use of antibiotics in livestock but more concerned with long-term feed and water treatments. In fact, one of his projects is an effort to eliminate the need for antibiotics and find suitable substitutes.

To do this they are turning to microbiome research and seeing if they can “modify or manipulate the microbiomes associated with productions systems to essentially optimize health and remove the need for antibiotics.”

Dr. Belk says that while they “haven’t found the silver bullet yet” they have found some very promising options that they are starting to test in large scale studies. If successful, these treatments could provide better techniques to keep the animals healthy and maximize production in ways that would reduce the use of antibiotics in agriculture.

Dr. Belk and his team are also working on ways to reduce the risk of AMR before it even has a chance to work its way through the food chain. To do this they are using the novel CRISPR-CAS9 gene editing technology to specifically target and destroy bacteria that have the antimicrobial resistance genes (check out the infographic on this page to see how it works).

While this intervention is still a far way from being used commercially, it could potentially reduce the risk of antimicrobial resistance in our food systems.

With a rapidly growing global population and increasing demand for meat and poultry throughout the world the use of antibiotics in food production systems is a global practice.

While the specific antibiotics and rates of use vary from region to region, concerns regarding the risk of antimicrobial resistance as well as the implications of altering the microbiomes of animals and humans are universal.

Researchers like Dr. Belk are working hard not only to carefully assess the risks and benefits of using antibiotics in agriculture, but to develop innovative ways keep animals and humans safe and to feed a growing population.

Reference
The Global Health Primer Course

This is a one-day course for healthcare providers with little to no international experience who are interested in learning basic principles of global health and international health work. This introductory course aims to provide practical knowledge about healthcare delivery in international and low-resource settings.

Key Topics:
- Acute care and trauma
- Humanitarian response
- Global health ethics
- Health disparities
- Global burden of disease
- Practical tips for trip preparation and safety
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Registration deadline is August 15!

Click here for more information and registration

Target Audience: MDs, RNs, APPs, Techs, EMTs, Pharmacists or anybody interested in expanding their global health knowledge!

Jointly provided with the CU College of Nursing, Skaggs School of Pharmacy and the Center for Global Health
As a member of a multi-cultural family, Sandra Duwaik, DO, is no stranger to global health. She was born and raised in Colorado as a first generation Arab American, after her parents immigrated from Palestine. Sandra shares, “I always liked having that understanding and perspective of living in two different cultures, both the Middle Eastern culture from [her parents] upbringing, and the American culture from living in Colorado.”

After growing up in Colorado, Sandra graduated from Colorado State University in Fort Collins with a degree in biology. She continued on to Rocky Vista University College of Osteopathic Medicine located in Parker, Colorado, where she participated in the Global Health Track. Sandra believes the Global Health Track helped support her passion for global health work.

Upon completion of medical school, Sandra knew that she wanted to do a residency program that was focused on global health. She chose the residency program at Saint Anthony North in Westminster, Colorado, where she was given the opportunity to start working internationally in Jordan.

While in Jordan, Sandra worked to advance the idea of preventive medicine. Preventive medicine emphasizes the measures taken for disease prevention, rather than disease treatment. Sandra stated, “There’s so much misunderstanding about what preventive medicine really means. I think that it’s the future of medicine, not only in the United States but abroad as well.”

Sandra’s time abroad was accompanied by rotations and moonlighting at Ardas Family Medicine, a health clinic in Aurora, Colorado that exclusively serves the local refugee population.

The majority of patients at Ardas Family Medicine are underserved patients who are on Medicaid. Sandra shared how her experiences at Ardas helped strengthen her passion for global health, saying, “These refugee populations have a hard time navigating the medical system, because of language, cultural, and financial barriers. Working with that patient population definitely furthered my interest in global health.”

Sandra’s most recent research project involves the patients she saw at Ardas. Her research looks at the perception of preventive medicine from a refugee perspective. Her findings showed that refugee populations only seek care when they’re sick.

“There’s so much misunderstanding about what preventive medicine really means. I think that it’s the future of medicine, not only in the United States but abroad as well.”

Sandra Duwaik, DO, Global Health Fellow, Department of Family Medicine and Center for Global Health at the Colorado School of Public Health

At the Center for Global Health, Sandra hopes that she can create a bridge between the center and her work in the Middle East that helps further the conversation about preventive medicine. She wants to gain experiences in different areas of global health, such as research, teaching, and becoming a better practitioner in general.

Outside of work, Sandra loves to travel, read, go to concerts, and try new restaurants. As a Colorado native, she definitely loves to spend time outdoors. We are excited to have Sandra join the center for the upcoming year!

♦ By Claire Fendrick
Born in rural Colorado, Jessica Landry, MD, has been interested in health for as long as she can remember. Living in a rural area sparked her initial curiosity in health. Her plans to practice rural medicine were interrupted when she had her first encounter with international work in high school.

Visiting Peru while in high school introduced Jessica to the world of travel and international work. She fell in love with seeing new places, learning about new cultures and meeting new people. Jessica claims, “My favorite part of intentional work are the connections that you make. You develop friendships and relationships that form into a group to share experiences with, it’s great.”

Even though this was her first experience with global health work, it was far from the last.

After high school, Jessica attended the University of Colorado in Boulder where she majored in biochemistry and minored in chemistry. Upon graduation, she continued at the University of Colorado School of Medicine, where she started working with CU Peru, a student group that does community health worker trainings in the Amazon region of Peru.

This group inspired her to continue working in Peru during her residency in pediatrics at University of Texas Southwestern.

“This because of my experience doing community health worker trainings in the Amazon region, I really just fell in love with the people and the area. During residency, I continued to do more clinical work, rotating to a couple different sites. I wanted to see the difference between project-based work versus clinical work and get to know the community and their resources.”

Jessica Landry, MD, joined the Center for Global Health at the Colorado School of Public Health as a Global Health Fellow in the Summer of 2018. Her goals are to create sustainable infrastructure in injury prevention.

This inspired Jessica to research common causes of injury in the Amazon region of Peru, where she hopes to implement injury prevention projects in the future.

Jessica was the chief resident at the University of Texas Southwestern, where she got to dabble in both clinical work and administrative work.

Jessica commented on her role as chief resident, “I really got to dip my toes into a lot of different areas of running a hospital. It was a really neat experience. Because of my leadership role, I also got a lot of experience in conflict management.”

Outside of work, Jessica loves to hike, camp, ski, and be outside with her husband, PJ and her two dogs, Emily and Finley.

She’s excited that her fellowship will offer her research and clinical experience that can help her move forward with her goals of working closely with communities and developing sustainable injury prevention interventions.

♦ By Claire Fendrick
If you’re looking for Christopher “Dale” Shamburger, MD, the outdoors is definitely the first place you should check. Born and raised in Alabama, Dale loves to spend his time outside, whether it be in the pool, in the bike lane, or in his community garden.

Dale’s interest in traveling and learning about other cultures began at a young age.

In high school, Dale participated in an exchange student program through the Alabama School of Math and Science that allowed him to go to Spain for three months. Through this program, he realized his love for the Spanish language, and continued studying it at the University of Colorado in Boulder, along with molecular and cellular biology.

Dale was no stranger to international travel in college either; he spent 5 months in Chile studying Spanish language and literature and joined a mission trip to Honduras in which money was raised for medical supplies.

While Dale credits his introduction to global health work to the mission trip he took in college, he claims that it wasn’t until he started medical school at the University of South Alabama College of Medicine that he really developed an interest in global health. “It was a combination of wanting to utilize my ability to speak Spanish, to work with underserved populations, and getting the opportunity to learn about other cultures.”

As he transitioned from international traveling to international work, Dale states that one of his favorite things about global health work was the challenge of working with underserved populations.

Dale shares, “The challenge of trying to take care of someone in a setting where you have limited resources is really intriguing to me. The US healthcare system is arranged in such a way where you can order any test at any time, no matter what the cost, so I think being in a setting where you and the patients have limited options, that challenge is really interesting.”

He did a project on the inappropriate use of peripherally inserted central catheters (PICCs), which are used to both deliver medications and draw blood in a hospital setting.

During his fellowship, Dale will use his previous QI research experience, where he plans to do data analytics to create better working conditions for health workers at the Trifinio Center for Human Development in Guatemala. This work will also be in collaboration with the Center for Health, Work and Environment at the Colorado School of Public Health.

During his year as a fellow, Dale hopes that he can create high quality global health opportunities that are available for internal medicine residents.

Dale said, “My goal during my fellowship is to develop a global health curriculum for internal medicine residents to select if they are interested in learning more about what global health really is.”

He also is excited to gain research experience and skills, so he can begin to implement his interests in quality improvement in an international setting.

We can’t wait to see what Dale accomplishes!

Dale Shamburger, MD, Global Health Fellow, Hospital Medicine and Center for Global Health at the Colorado School of Public Health

By Claire Fendrick

Intertwining Internal Medicine and Global Health

July 2018, Christopher “Dale” Shamburger, MD joined the Center for Global Health at the Colorado School of Public Health as a hybrid fellow in hospital medicine and global health. Dale intends to create a new global health curriculum for future internal medicine residents.

Dale on a foggy trip to the Laguna Chicabal in Guatemala
World Breastfeeding Week
August 1 - 7, 2018

Objective of #WBW2018

Inform
people about how breastfeeding is linked to nutrition, food security and poverty reduction.

Anchor
breastfeeding within the nutrition, food security and poverty reduction agenda.

Engage
with individuals/organisations working on these issues.

Gala
action to advance breastfeeding as part of nutrition, food security and poverty reduction strategies.

Stay connected for more updates on http://worldbreastfeedingweek.org

World Humanitarian Day
August 17, 2018

This World Humanitarian Day we continue to bring attention to the millions of civilians affected by armed conflict every day.

People in cities and towns struggle to find food, water, and safe shelter, while fighting drives millions from their homes.

Children are recruited and used to fight, and their schools are destroyed. Women are abused and humiliated.

As humanitarian workers deliver aid, and medical workers treat the wounded and sick, they are directly targeted, treated as threats, and prevented from bringing relief and care to those in desperate need.

The humanitarian concerns described here can’t possibly capture the lives of all those affected by conflict around the world.

From people with disabilities, to the elderly, migrants, and journalists, all civilians caught in conflict need to be protected.

Join the #NotATarget movement and demand world leaders to do everything in their power to protect all civilians in conflict.
On June 14th the Government of the Republic of Zambia acting through the Ministry of Health, Project CURE, and the University of Colorado participated in a ceremony to recognize the signing of a memorandum of understanding (MOU).

This MOU sets the stage for faculty from the Global Emergency Care Initiative and the Center for Global Health both at the University of Colorado Anschutz Medical Campus and Children’s Hospital Colorado to work with colleagues in Zambia to strengthen health care across the country.

Some of the areas being developed include:
- Research into maternal, child and family health, as well as childhood immunization programs
- Health care services for maternal, child and family health
- Disaster response training with a focus on assistance to children and their parents
- Research and training on essential newborn care
- Policy in maternal and child health
- Public health, comprehensive healthcare and human development

Clockwise from top: 1) Formal signing celebration with Guest of Honor Her Excellency Ms. Esther Lungu—First Lady of the Republic of Zambia
2) Doug Jackson, President of Project CURE (red shirt) and First Lady of the Republic of Zambia inspecting the equipment Project CURE delivered
3) Julia Dixon, MD, Faculty at the Global Emergency Care Initiative addressing the crowd at the signing celebration.

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<td>Aug 28</td>
<td>12-1 p.m.</td>
<td>ED2 South, Rm 1307</td>
<td>Interventional Pulmonology: A Global Perspective</td>
<td>Ali I Musani, MD, FCCP, Vice Chair, Global Health, Department of Medicine, Professor of Medicine and Surgery, Division of Pulmonary Sciences &amp; Critical Care Medicine, School of Medicine, University of Colorado Anschutz Medical Campus</td>
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<td>Sep 26</td>
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<td>Kenya Paediatric Association's Partnerships in Supporting Child Health</td>
<td>Rosemarie Gachie-Lopokoiyit, MBChB, MMed Paeds, Consultant Paediatrician, M.P. Shah Hospital, Dan Alaro, MD, Consultant Paediatrician, Department of Paediatrics, Avenue Healthcare</td>
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<td>The State of the Global Tobacco Epidemic in 2018</td>
<td>Jonathan M Samet, MD, Dean and Professor, Colorado School of Public Health</td>
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<td>Nov 21</td>
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<td>Children for Sale: The Global Trafficking of Children</td>
<td>Carmelle Tsai, MD, Pediatric Emergency Medicine and Global Health Fellow at the Children’s Hospital of Philadelphia and the University of Pennsylvania</td>
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<td>Dec 5</td>
<td>12-1:30 p.m.</td>
<td>ED2 South, Rm 1307</td>
<td>Celebrating Forty Years of the Alma Ata Declaration: Primary Health Care and Health for All</td>
<td>Alejandro Cerón, PhD, Susan B Rifkin, PhD, Angela Sauaia, MD, PhD, Calvin Wilson, MD</td>
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Want to watch a lecture you missed? [Click here](#).