

Good afternoon. I'm Captain Ibad Khan, and I'm representing the Clinician Outreach and Communication Activity (COCA) with the Office of Emergency Risk Communication at the Centers for Disease Control and Prevention. I'd like to welcome you to today's COCA Call, Resurgence of New World Screwworm in the Americas: What Healthcare Providers Need to Know.

All participants joining us today are in listen-only mode.

Free continuing education is offered for this webinar, and instructions on how to earn continuing education will be provided at the end of the COCA Call.

In compliance with continuing education requirements, all planners, presenters, and moderators must disclose all financial relationships in any amount with ineligible companies over the previous 24 months, as well as any use of unlabeled product or products under investigational use.

CDC, our planners, presenters, and moderators wish to disclose to have no financial relationships with ineligible companies whose primary business is producing, marketing, selling, reselling, or distributing healthcare products used by or on patients. Content will not include any discussion of the unlabeled use of a product or a product under investigational use, with the exception of Dr. Rebecca Chancey's discussion of anecdotal reports of using ivermectin in off-label treatment of NWS infestations in humans. However, there are no controlled double-blind studies measuring the impact of ivermectin use on myiasis. At this time, it is not a CDC recommended treatment for NWS. In addition, Mr. Mark Fox and Dr. Susan Montgomery, who will be participating in the Q&A session, may also discuss this if requested.

CDC did not accept financial or in-kind support from ineligible companies for this continuing education.

At the conclusion of today's session, participants will be able to accomplish the following, explain the lifecycle of *Cochliomyia hominivorax* and why the larvae are a threat to animal and human health; describe the current epidemiological situation in Central America; summarize how to identify and treat infestations; and outline how to report human and animal cases.

After the presentation, there will be a Q&A session. You may submit questions at any time during today's presentation. To ask a question, click the Q&A button at the bottom of your screen, then type your question in the Q&A box. Please note that we often receive many more questions than we can answer during our webinars.

If you're a patient, please refer your questions to your healthcare provider. If you're a member of the media, please contact CDC Media Relations at 404-639-3286, or send an email to media@cdc.gov.

I would now like to welcome our presenter for today's COCA Call. We're pleased to have with us Dr. Rebecca Chancey, who's a medical officer with the Division of Parasitic Diseases and Malaria in the National Center for Emerging and Zoonotic Infectious Diseases at the Centers for

Disease Control and Prevention. I will now turn it over to Dr. Chancey. Dr. Chancey, please proceed.

Thank you very much, and welcome to today's COCA Call. We appreciate you joining us this afternoon. Next.

Today, we are discussing New World screwworm because there is an ongoing outbreak of New World screwworm currently in Central America with recent northward spread that poses a threat of reintroduction into the United States. New World screwworm causes significant morbidity in patients, and can also contribute to mortality.

There have been cases of returned travelers to the U. S. from endemic areas, and New World screwworm is a significant economic pest of livestock. Next. First, we'll provide some background information on New World screwworm before we discuss what is happening in Central America.

This is a picture of a New World screwworm fly. The adult fly is about the size of a common house fly, or slightly larger. The adult flies have orange eyes, a metallic blue or green body, and three darker longitudinal stripes down their back. Female flies lay eggs directly on existing wounds or on exposed mucous membranes. A wound as small as a tick bite may attract a female fly to lay her eggs. Next.

The term screwworm refers to the screw-like shape of the larva and the way the larva burrow into tissue. New World screwworm flies are unique compared to other flies. New World screwworm larva are obligate parasites of living, healthy flesh, whereas other fly larvae only consume dead flesh. A female fly can lay hundreds of eggs in a single wound, which can hatch out into hundreds of larvae, causing extensive tissue destruction, debilitation, and a risk of death. The larvae are primarily a pest of livestock, but can infest humans and other warm-blooded animals. Next.

This is a picture of the New World screwworm lifecycle. Female adult flies mate only once in their lifetime. When they mate, they lay hundreds of eggs on a host adjacent to an existing wound. The eggs then hatch within 24 hours, and the screwworm larvae emerge and burrow into living tissue. The larvae can present feeding on healthy tissue for up to seven days. Third-instar larvae, the final larval stage, drop from the host and become pupae in the environment. Adult flies emerge from the pupae roughly seven days later, ready to mate. All of these developmental processes may be influenced by the ambient temperature and humidity. Next.

Let's look at how New World screwworm was eradicated and examples of reintroduction into the United States. Next.

New World screwworm was previously present in the United States and was a significant economic pest of livestock in the United States. The United States Department of Agriculture developed an eradication strategy using sterile male flies. The fly production plant is currently located in Panama.

A unique feature of this species is that a female New World screwworm fly will only mate once in her 21-day lifespan, so if she mates with a sterile male fly, she won't produce fertilized eggs, so larvae will never hatch.

This strategy was successful in eradicating New World screwworm from the United States in 1966 and re-eradication in the United States in 2017 after reintroduction. And our colleagues at USDA estimate that elimination of New World screwworm saves U. S. farmers and ranchers around \$900 million every year. USDA, in an effort to further secure the U. S. livestock industry from New World screwworm, was successful in eradicating the flies from Mexico and then southward through countries in Central America, all the way through Panama to the Panama-Colombia border. In 2006, New World screwworm was declared eradicated in Panama, and since 2006, a biological barrier has been maintained in the Darien Gap, which separates Panama from Colombia. New World screwworm remains endemic in South America and several countries in the Caribbean. Next.

This figure displays the timeline of eradication of New World screwworm in North and Central America. In some cases, such as Panama, the official New World screwworm-free date seen here may be slightly later than the date in the figure. The duration of any eradication program depends on many factors, including the geographical extent of infestation, the New World screwworm status of neighboring countries, the characteristics of the sterile insect technique eradication program, and the number of sterile male flies that can be released. Next.

Because New World screwworm remains endemic in South America and the Caribbean, the threat of reintroduction to the United States always exists. Reintroduction can happen because travelers arrive to the U. S. with New World screwworm infestations.

Here we have a few examples of cases in returning travelers over the last 10 years. In 2014, there was a traveler who returned to Washington State after spending their vacation in the Dominican Republic, where they acquired a New World screwworm infestation. In 2023, there was a patient who traveled with a recent surgical wound. He returned to Arkansas with New World screwworm infestation after visiting Argentina and Brazil on vacation. And earlier this year, in 2024, there was a traveler who returned to Florida after spending their vacation in the Dominican Republic, where they acquired a New World screwworm infestation. We will discuss these cases in more detail later in the presentation. Next.

In 2016, there was a local outbreak of New World screwworm in key deer in the Florida Keys. The response that followed was a large, multiagency response, requiring over 500 deployments among 350 individuals. There were over 188 million sterile flies released across 35 release sites and over 20 medication sites with over 15,000 individual doses of medication applied to at-risk deer. Eventually, these intense efforts resulted in re-eradication in the Florida Keys in 2017. The source of the outbreak was never identified. Next.

We'll pause here for the first knowledge check. The question is, which of the following statements about the New World screwworm lifecycle is correct? Option A, the screwworm eggs take up to seven days to hatch. Option B, the eggs are laid on unbroken skin, and newly hatched larvae burrow into the skin, creating a lesion. Option C, screwworm larvae feed for up to seven

days while maturing within a wound or a lesion before dropping off into the ground. And Option D, adult female flies can only lay a few eggs at a time. Next.

C is the correct answer.

Screwworm larva feed for up to seven days while maturing within a wound or lesion before dropping off into the ground. The other options are incorrect. Screwworm larva emerge from eggs within 24 hours. The eggs are laid on a host adjacent to an existing wound, and female flies can lay hundreds of eggs at a time. Next.

Now, let's talk about the current outbreak in Central America. Next. As mentioned previously, the biological barrier for New World screwworm is maintained at the Darien Gap in the southernmost part of Panama. Countries in South America remain endemic for New World screwworm. Resurgence of New World screwworm beyond this biological barrier into Central America is likely multifactorial. Next.

Here is a timeline of the current outbreak in Central America. In August of 2022, the first New World screwworm cases were described beyond the biological barrier in Panama. By July of 2023, the flies had spread northward to Costa Rica, and cases were reported in animals. By February of 2024, Costa Rica had declared a state of emergency, and the first human case was reported, although now a newly published case report describes a case of New World screwworm myiasis in a patient in Costa Rica identified in January of 2024, one month earlier than the previously reported first human case.

There was likely a delay in reporting due to the confirmation process required for diagnosis. In March of 2024, the first animal cases were reported in Nicaragua, Costa Rica's northern neighbor. And last month, in September of 2024, the first animal cases were confirmed in Honduras. Next.

This map is from the COPEG website. COPEG is the Panama-United States Commission for the Eradication and Prevention of Screwworm. The most recent data we received reported over 18,000 animal cases in Panama, depicted in red on the map, over 8,600 animal cases in Costa Rica, shown in blue on the map, and over 3,300 animal cases in Nicaragua, shown in green on the map.

There are 15 animal cases in Honduras, depicted with a pink square on the map. Wild and sylvatic animals have also been impacted, and these reported numbers may not be fully representative of wild animal cases, since those are more difficult to track. As far as the number of human cases, the latest data that we have show that there have been 79 human cases in Panama, 33 human cases in Costa Rica, and two human cases in Nicaragua. So far, there have been zero reported human cases in Honduras. There have also been three human deaths reported in Costa Rica. For the first two death cases, both patients had underlying comorbidities, including organ dysfunction, immune dysfunction, and debilitation, so their deaths were not likely solely attributable to New World screwworm. The other death is currently being investigated. You can see based on the numbers that the animal cases far outnumber the human cases as New World screwworm is primarily a pest of animals and livestock. Next.

The challenges with containment of New World screwworm are many, including the varied topography of the countries which make surveillance difficult. Surveillance of New World screwworm is limited in hard-to-reach areas where many indigenous communities reside. Communication across language barriers has proven challenging, and there is inadequate wound care for livestock and other animals predisposing them to infestation. Animals continue to be transported through irregular and unmonitored checkpoints, which do not allow cases of New World screwworm to be identified in these animals. Next.

Control efforts are underway in the region, and here I've listed a brief overview of some of the activities that are being conducted. Partners in the region continue to raise and release sterile male flies, and they are evaluating and updating the fly strains as needed. New fly strains are periodically required due to selection pressure. There is ongoing field surveillance, which includes visits to farms and animal control checkpoints.

Additionally, there are ongoing health education campaigns directed at communities and livestock producers, for example, around identifying and treating wounds and animals as well as human healthcare providers and migrant workers and veterinarians and wildlife management personnel. And finally, there is a message-sharing app, or WhatsApp, reporting line for the public to enable them to report any suspicious cases. Next.

CDC is working across the agency and with our external partners, including the U. S. Department of Agriculture Animal and Plant Health Inspection Service, also known as USDA APHIS. We are also working closely with the U. S. Department of State, the Pan American Health Organization, as well as the United States Agency for International Development or USAID. Next.

Now, let's talk about the important clinical considerations for New World screwworm myiasis. Next.

New World screwworm is an obligate parasite that consumes and damages healthy tissue, but there are other obligate myiasis flies endemic to the United States. These other obligate myiasis flies are veterinary or wildlife pests that rarely affect humans. These include the sheep ked fly, the horse bot fly, the rodent bot fly and the warble fly, among others.

The facultative or opportunistic myiasis flies are much more common in the United States and are often associated with people who are bedridden or otherwise unable to clean themselves or protect their sores or wounds. The common house fly is one example. Many of the larvae of these facultative myiasis flies may resemble New World screwworm larvae; therefore, morphologic diagnosis of any larvae is critical to correctly identifying the species causing infestation. Next.

In Central America, the human bot fly (*Dermatobia hominis*) is one of the main considerations for the differential diagnosis of New World screwworm. The presentation is very different, though, as only a single larva is transferred to the patient, resulting in only one or very few lesions on exposed skin. The infestation with the larva remains subdermal and does not go

deeper into healthy tissue. A patient may feel itching, pain, or sensation of movement with infestation of the human bot fly. Next.

Human bot fly larvae are much larger than New World screwworm larvae. You can see a picture of a size comparison between a human bot fly larva on the left and a New World screwworm larva on the right. Human bot fly larvae also have robust black spines on the middle body segments and are stout and grublike. The New World screwworm larvae are screw-shaped and tapering towards the head. Morphologic examination is required for correct identification, and correct diagnosis is critical to inform treatment options for patients and to inform the public health response. Next.

Risk factors for New World screwworm infestations in humans include open wounds, foul-smelling wounds, ulcerated wounds, bacterial infected wounds, hyperkeratosis, a compromised immune system, decreased ability to protect themselves from bites, sleeping outdoors, working around infested livestock, and being elderly or incapacitated. Next.

Clinical symptoms of New World screwworm will vary based on the site of infestation. The most common symptoms are pain at the site of infestation, sensation of movement of the larvae, and malodorous bloody discharge. There can be extensive tissue invasion and destruction. Larvae may be seen around or in open sores or mucous membranes. Secondary bacterial infections may be present, causing fever or chills. Death may occur due to secondary infections or as a result of extensive tissue destruction. Risk factors for death in humans with New World screwworm infestation include organ dysfunction, immune system impairment or debilitation, and death is more likely when larvae are present in deep structures of the head. Next.

New World screwworm can cause infestations of any mucous membrane or open body orifice, including the eyes, the ears, the nose, the mouth, the vagina, or the rectum. Cutaneous and wound myiasis is the most common presentation. Orbital myiasis may require extensive debridement and sometimes enucleation. Auricular myiasis is rare and primarily occurs in children. The pictures on this slide show myiasis of the malar region and myiasis of an ulcer in two different patients. Next.

As mentioned earlier, over the last 10 years, there have been three imported cases of New World screwworm identified in the United States. The case in 2014 was of a 26-year-old woman who presented with two days of ear pain and bloody discharge after returning from a one-week vacation in the Dominican Republic, where she stayed at a beachside resort with screened-in windows. She did fall asleep one night on the beach after drinking alcohol, and the next day, noted some ear discomfort and sensation of movement inside of her ear. She removed a fly from her ear, and then pain and bloody discharge from the ear started one day later. Next.

Upon seeking medical care in the U. S., an otoscopic exam revealed multiple motile larvae as seen on the previous slide. She underwent debridement in the OR with findings including soft tissue larval infiltration extending to the temporal bone and tympanic membrane perforation without middle ear involvement. She was prescribed amoxicillin-clavulanic acid for potential secondary soft tissue infection, and she underwent a tympanoplasty with split-thickness skin graft. The larvae were diagnosed as New World screwworm. Next.

The second case, which occurred last year in 2023, was of a 64-year-old man who traveled to Argentina and Brazil for vacation. He had a fresh surgical cheek wound, and while visiting Argentina and Brazil, larvae were visualized in the surgical wound. His surgical wound was bandaged for flight, but the cheek bandage fell off during his return flight home to the U. S. He sought medical care upon arrival to the U. S. and was hospitalized for wound debridement and treatment, and mature third instar larvae were removed from the wound in the hospital and diagnosed as New World screwworm by the CDC's DPDx laboratory diagnostic team. Next.

Earlier this year, the third recent imported case of New World screwworm into the U. S. was of a traveler who visited the Dominican Republic for approximately seven to 10 days. He had a history of neuroblastoma 30 years ago, at which time, a cancerous tumor had been removed from his nose, and now he was immunosuppressed. After his visit to the Dominican Republic, he noted facial swelling, pain, and nasal discharge. He sought medical care and was hospitalized. One hundred to 150 larvae were surgically removed during the hospital stay. He also received treatment with ivermectin, and the larvae were identified as New World screwworm. Next.

The patient described his symptoms as follows, "Over a couple of hours, my face just started swelling. My lips swelled. I could hardly talk. My whole face felt like it was on fire. I started getting nosebleeds, constant nosebleeds. I couldn't even get up to go to the bathroom without my nose starting to bleed. "

And you can see the picture on the slide here was taken from his nose during the procedure to surgically extract the larvae. Next.

The larvae were so large that they clogged the suction machine. The doctor had to remove them one by one using different instrumentation. The patient said the removal hurt because the larvae weren't coming willingly, and these pictures are courtesy of First Coast News Jacksonville, that reported on this patient's experience. Next. Some of the challenges during this most recent imported case included uncertainties about correct disposal of the larvae, larvae possibly exiting the wound en route to the airport or hospital, and delayed reporting of the case to public health officials. Next.

As mentioned earlier, morphologic examination of larvae is vital to correct identification of New World screwworm infestation. New World screwworm larvae are usually between 6.5 to 17 millimeters long and taper anteriorly and truncate posteriorly. They have encircling bands of one, two, and three pointed spines on each body segment, as seen in this close-up photo. Next.

This photo shows the gross appearance of third instar larva of New World screwworm showing a lateral and a dorsal view. Next.

The peritreme of the posterior spiracle is another unique feature of the New World screwworm larva. It is incomplete, not enclosing the button. Next.

The best features to distinguish New World screwworm from other similar larvae that may cause facultative myiasis are the tracheal trunks. The tracheal trunks lead from the posterior spiracles

and are pigmented dark brown to black. The pigmented portion extends anteriorly across at least two full body segments. Next.

We'll pause here for another knowledge check. The question is, which of the following statements about the diagnosis of suspected newborn screwworm myiasis is true? Option A, wound myiasis is not an endemic issue in the United States, so any such case is very likely to be New World screwworm. Option B, there are many morphologically similar species of fly that can cause myiasis, so differential diagnosis should incorporate travel and exposure history as well as clinical presentation. Option C, if larvae with an incomplete peritreme and indistinct button are observed by the clinician, the species can only be *C. hominivorax*, and confirmatory morphologic examination by reference laboratory is not needed. Or option D, since New World screwworm larvae primarily infest wounds and cutaneous sites, any larvae found in other body locations would not be New World screwworm. Next.

Option B is correct. There are many morphologically similar species of fly that can cause myiasis, so differential diagnosis should incorporate travel and exposure history as well as clinical presentation. Facultative wound myiasis is endemic in the United States, though it is not very common, and many of the species associated with facultative myiasis are morphologically quite similar to New World screwworm, and some share the features listed in answer C. Larvae with dark pigmented tracheal trunks, along with known travel or occupational exposure history and clinical presentation of larvae in healthy rather than necrotic tissue, are all key indicators of New World screwworm infestation. Any suspected cases should be confirmed by a qualified reference laboratory. Larvae of New World screwworm can infest any healthy tissue or mucous membranes, including wounds.

Next, if you identify a patient with myiasis, all larvae should be collected and sent to a clinical lab for morphologic identification. All collected larvae should be placed into a leak-proof container with 70% ethanol. The volume of ethanol should be sufficient to fully submerge the larvae. This will kill the larva and preserve them for confirmatory diagnostic examination.

If 70% ethanol is not available, alternatives include 70%-or-greater isopropyl alcohol or 5% to 10% formalin. The most important message is do not discard live larvae in the trash. They all must be killed in order to prevent progression to adult flies. Next.

As mentioned on the previous slide, treatment of New World screwworm requires physical removal of all larvae. This may look different depending on where the larvae are located and how deep into the wound they have burrowed. Debridement of necrotic tissue and general wound care is also important to prevent reinfestation and to allow the lesion to heal. Pain management will likely be needed for patient comfort. Next.

There are anecdotal reports of ivermectin being used to treat or prevent New World screwworm, but there have been no appropriate studies to demonstrate benefit. There have been in-vitro lab studies and some studies in livestock that show efficacy of ivermectin for killing New World screwworm eggs and larvae. There have been no such studies in humans, but there are case reports of off-label ivermectin use as a supplement to attempted removal of larvae, but surgical

removal of all larvae is still the standard of care for patients infested with New World screwworm. Next.

Please report suspected cases immediately to your local or state health department, followed by reporting to CDC. For suspected human cases, diagnostic assistance is available through CDC's DPDx. This is our parasitologic telediagnosis service. You can send an email to dpx@cdc.gov requesting diagnostic assistance, and DPDx will respond with a secure sharefile link where you can upload patient information and images for telediagnosis. This is a CLIA-approved diagnostic service. DPDx can also accept actual specimens in addition to or in lieu of photos.

Consultation for healthcare providers and health departments is also available through CDC's Parasitic Diseases Branch. You can call us at 404-718-4745, or email parasites@cdc.gov. Both the phone and the email are always monitored during normal business hours. If you call, you will have to leave a message, but we aim to return all phone calls and respond to all emails within 24 hours, and the people manning the service are now sensitized to possible New World screwworm cases.

If you have an emergency and a suspected New World screwworm case qualifies as an emergency, after hours or over a weekend or a holiday, you can call the Emergency Operations Center and they will reach out to the epidemiologist on call. We are asking that all suspected animal cases be reported immediately to the state Animal Health Office and USDA APHIS for diagnosis. Next.

We have created a laboratory diagnostic bench aid available online on our website to assist clinicians and laboratory personnel with morphologic identification. Next.

We have developed educational materials for providers in English and in Spanish, which is also available online on our website. Next.

And we have created educational materials for the general public in English and in Spanish that can be accessed on our websites. Next.

In summary, some of the key messages to remember are as follows. Next.

New World screwworm should be suspected in patients with recent travel to an area endemic for New World screwworm or countries in Central America that are currently experiencing reemergence. These patients may present with painful lesions, sensation of movement, malodorous bloody discharge, or visible larvae. New World screwworm should be suspected in patients with extensive tissue invasion and destruction or wounds with secondary bacterial infections. Next.

Prevention messages for patients and the general public include keeping skin wounds clean and covered, limiting exposure of skin to flies by wearing loose-fitting long-sleeve shirts, long pants and socks, using effective insect repellent, ideally containing DEET, treating clothing and gear with 5% permethrin, and sleeping indoors or in rooms with screens. Next.

Important public health messages include the fact that animal cases are an indicator of the ongoing presence of flies. Human cases can continue to occur in areas where the flies are circulating and laying eggs.

New World screwworm infestation can be prevented. If larvae are present in a wound, handle appropriately and send all larvae for identification. Treatment of New World screwworm infestation requires extraction of all larvae, and public health officials should be notified of any human cases of New World screwworm. Ending the outbreak will require more than just sterile fly release. Next.

Thank you very much. This concludes our presentation.

Presenter, thank you so much for providing this timely information to our audience. We will now go into our Q&A session. And joining us today for the Q&A session from the Division of Parasitic Diseases in Malaria and the National Center for Emerging and Zoonotic Infectious Diseases at CDC are Dr. Susan Montgomery, a veterinary medical officer and team lead, and Mr. Mark Fox, a biologist and entomologist.

For our audience, please remember, if you need to ask a question, click the Q&A button at the bottom of your screen, then type your question.

So our first question asks, "What should clinicians' advice be to their patients when considering traveling to places where NWS is endemic, like the Dominican Republic, or places that recent cases have been reported, like Costa Rica or Honduras?"

Thank you for that question. We are not changing any advice regarding travel. There is -- people can still travel as they desire, but as mentioned in the presentation, preventative messages would include wearing DEET, avoiding exposure to the flies, wearing long-sleeve pants and shirts, sleeping indoors or in areas with screens, but at this time, there's no restriction or caution regarding travel. Most of the flies are in remote areas around cattle and other livestock, not typically where people are traveling for vacation.

Thank you very much for that. We have some questions about some of the map and geographic details that you had shared. One of the question asks, "Can you elaborate or explain that biological barrier that you were referring to during your presentation?"

Yes, I'll let Dr. Susan Montgomery answer that question.

Sure. So the Darien Gap is a very narrow geographic stretch that separates Panama and Colombia, and so it's sort of a natural place to try and hold the line for the resurgence of flies, to keep them in South America and out of Central America, so the control program has been releasing sterile flies and monitoring that area since the eradication was successful in Panama. So it refers to the flies being released as well as the geographic area.

Yeah, the biological barriers is the fly release at the Darien Gap.

Right.

Yeah.

Thank you very much. A follow-up question that we've seen from our audience a lot is, "Can you explain how releasing sterile males helps eradicate or helps the eradication process?"

Sure. This is Mark, and I'll tackle that question. What -- because the female only mates once in her life, if she encounters a male who's been sterilized (and this takes place in a massive production facility, the current one, Rebecca mentioned, is in Panama), they're gamma irradiated to be sterile and then released by being dropped out of an airplane over the jungle. So they're basically flooding the environment with these males who are incapable of fathering viable offspring, and so if a wild female encounters one of these sterilized males, this will use up her one opportunity to mate in her lifetime, and she will never be able to produce eggs, and so it takes advantage of that pretty unusual aspect of their natural history, and it has been tremendously successful in pushing the species down there. So there's a pattern of release by airplanes over the Darien Gap. I believe it's certainly at least once a month. It may even be more frequent. Right now, I'm sure it's more frequent in response to this outbreak, but so they'll fly a pattern and drop millions upon millions of these sterilized flies into the jungle down there.

Thank you very much for that clarification. Our next question asks, "Can you talk about the risk of transportation of the larvae on birds as the birds migrate and can introduce NWS north of that sort of sterile-fly-release area?"

This is Mark again. Yes, they are obligate parasites of warm-blooded animals, particularly mammals. They're really not found in birds, so there is a risk associated with animal movement, particularly some of these wild animals in the jungle that are not, you know, managed by people or tracked by people, but birds, which would be a concern because they can travel so far, are thankfully not really a host for this fly.

That's very helpful. Thank you for sharing that. Similar question, but from a different natural phenomena, "Can you speak to the effects of climate change? And is climate change causing NWS to reemerge in these countries in Central America?"

No, there's -- this is Rebecca. There's no evidence that climate change has played a part in the reemergence of New World screwworm in Central America. The New World screwworm flies were present in both Central and North America, you know, prior to eradication, so they've been present, as we saw, back in the 1950s and '60s before it was eradicated.

Thank you for that. So the next question asks, "The maps you showed early on with NSW confined to the southern tier of states, can you speak to the risk gradient more northward than that?"

Yes, this is Mark again. Back when it was still endemic in the U. S. in the early first half of the 20th century, they persisted year-round in the very southernmost states, Florida and Texas, but in the northern -- the more northern states, there was sort of seasonal migration. They were not

really endemic north of South Carolina at any point, but there were occasional outbreaks into states further north in warmer years when animals were being transported by train.

For instance, I believe there was -- there had been an outbreak in Montana that didn't persist because they can't survive the cold winters, but it was an unseasonably warm year, and so there was a temporary outbreak northward of that. So they are constrained in their northern limit by cold winter, essentially.

Thank you for that clarification. We have several questions also about the actual cases. The first question asks, "Are human and animal cases considered immediately reportable?"

Yes, we would like to -- the USDA APHIS will receive reports on animal cases, and we would like to know about human cases.

Thank you. And similarly, another question asks, "Are there any concerns or comorbidities or other things particular to children and adolescents if they acquire NWS infestation?"

This is Rebecca. No, their risks are similar to adults. Adults, older adults, tend to be more at risk because of their, you know, potential debilitation status. The older -- we've seen more cases in older adults. I would think the younger the child, they also would have fewer abilities to protect themselves from flies if they had wounds and such. So in general, children would have the same risks as adults if they're out and exposed with wounds. Mark has a comment.

Yeah, I have just one thing to add, which is just in both animals, and it has been reported in humans that for brand, brand-new infants, the umbilical wound is a wound site that the flies favor.

That is true, yes.

Thank you for sharing that. We have some cases about other demographics as well, questions about other demographics as well, such as, "Are human cases equally likely to be acquired in urban areas as well as rural areas?"

It's more likely to acquire cases in rural areas.

Okay, thank you. We also have questions regarding treatment. Our first question asked, "Is surgical treatment always necessary? Can we just try ivermectin for medical management solely?"

So the urgency for removal of larvae surgically versus medical management with ivermectin is to address the extensive pain and local tissue destruction caused by the larvae, as well as the need to remove the larvae before they can contaminate the environment. And these larvae, as mentioned, are pretty tenacious and hang on pretty tightly, so oftentimes, you know, a great deal of force is required to remove them, so it's important to make sure that every single larva is removed, and surgical extraction usually provides that opportunity.

Thank you for that. And on the topic of antibiotics, should antibiotics be prescribed after removing larvae from the wound? And if so, what are your recommendations? And in case of a secondary bacterial infection, do you have a recommended antibiotic for that?

So this would again be dependent on the location and site of the larval infestation and the wound. You know, typical skin flora include staph and strep, so coverage for that would be important. Obviously, the patient who had an infection in the ear, the typical *Haemophilus* and pneumococcus and whatever else would be covered by the amoxicillin-clavulanic acid. So if there is evidence of a secondary bacterial infection with fever and chills and such, and pus present, then definitely treating with antibiotics after wound care would be important, and treating with an appropriately indicated antibiotic based on the location of the wound would be my recommendation.

Thank you very much. And is a wound always required for infection?

So it's -- the larvae are present in either wounds or mucous membranes, open orifices in the body, which is why the umbilical cord, as Mark mentioned, or the ear or the nose, so any body orifice or an open wound is required.

Thank you. We have a laboratory-based question as well. The question asks, "Is there need sometimes for adult transformation to happen to be able to support accurate identification, or is larval identification usually sufficient?"

This is Mark again, and I can certainly address this. Fortunately, the screwworm larvae are distinctive using a combination of the features that Dr. Chancey presented earlier, and there's additional features that we would go through to really nail it down if we thought it was an index case or something along those lines. But there are other -- some of the flies that are facultative myiasis agents and may be associated simply with, like, a nosocomial bed sore infestation, some of those flies really do resemble the screwworm closely in a larval stage, so I guess we can resolve the species if it is screwworm by the larvae only. We can also rule out screwworm without reaching a species identification simply by eliminating those specific characteristics, but we may not always be able to reach a species-level ID on some of this whole suite of other flies that are just sort of around in the environment. I hope that helps.

Thank you. That is helpful. We have another sort of fly-related question, and the question briefly asks, "How far can the flies fly?"

They're quite strong flyers. This is Mark again. And they don't tend to fly a lot if they're in an area where there is available food and potential hosts, so they might typically only fly one or two kilometers in a day or less, but they are able to fly up to, you know, maybe 15 kilometers or something. So they're able to fly quite far. Behaviorally, they don't often choose to do that, though. Animal transport is really the thing that causes rapid spread for these guys.

Thank you for that. Our next question asks, "Can you speak to what the U. S. is doing, as far as partnering with or working close? With some of the other countries, like Costa Rica, etc.?"

So USDA APHIS -- this is Rebecca -- USDA APHIS is leading the charge in the region of Central America. They have many partners on the ground with OIRSA and IICA and lots of other acronyms, because, again, this is primarily a concern for animals. From a -- we have been coordinating with Costa Rica Ministry of Health and with our CDC country offices in the region, in Panama and Guatemala, and they have eyes and boots on the ground as well for local partnership, so it's a multiagency response and multi-armed effort, and we definitely are working with everyone diligently to address this.

Great, thank you so much. We have time for one last question, and the question asks, "How would you characterize the current risk of NWS to people or pets in the United States?"

This is Rebecca, again. Since there's no reports of New World screwworm in the U. S. presently among pets or people, there's no current risk to pets or people in the U. S., and as I mentioned, CDC is working closely with all of our partners to monitor the situation. One of the reasons that we're presenting this COCA Call today is so that, all of you as physicians in the community, if you see any patients who may have traveled to endemic areas, can let us know, so that we are aware of new cases coming in, but we would encourage any patients traveling, as we said before, to take the steps to protect themselves, to clean and cover their wounds, to avoid insect bites by using EPA-registered insect repellent, by wearing the loose-fitting clothing. And so if the patients are able to protect themselves, and if we're able to monitor anybody that comes into the U. S. who may have had exposure, then hopefully we'll be able to keep an eye on any emerging situation here.

Thank you very much. And that concludes our Q&A session, and I want to thank everyone for their time and for sharing your expertise with us today on this COCA Call.

For our audience, this year, CDC is moving from the Training and Continuing Education Online (TCEO) system that provides access to CDC educational activities for continuing education, to CDC TRAIN. If you do not already have a TRAIN account, please create one at www.train.org/cdctrain. All new activities that offer continuing education from CDC will only be listed in CDC TRAIN.

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The move to one system improves efficiency and makes it easier for learners, CDC staff and partners, to offer and earn CE in one place. You can continue to use TCEO for existing activities that have CE set to expire in 2024 since these courses will not move to CDC TRAIN. You may also use TCEO for existing activities with CE set to expire in 2025 before the course is transitioned to CDC TRAIN sometime next year. If you begin one of these courses in TCEO, we will let you know when the course will move to CDC TRAIN. You can access and download CE transcripts and certificates in TCEO through the end of 2025.

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Again, I want to thank everyone for joining us for today's COCA Call, and have a great day.