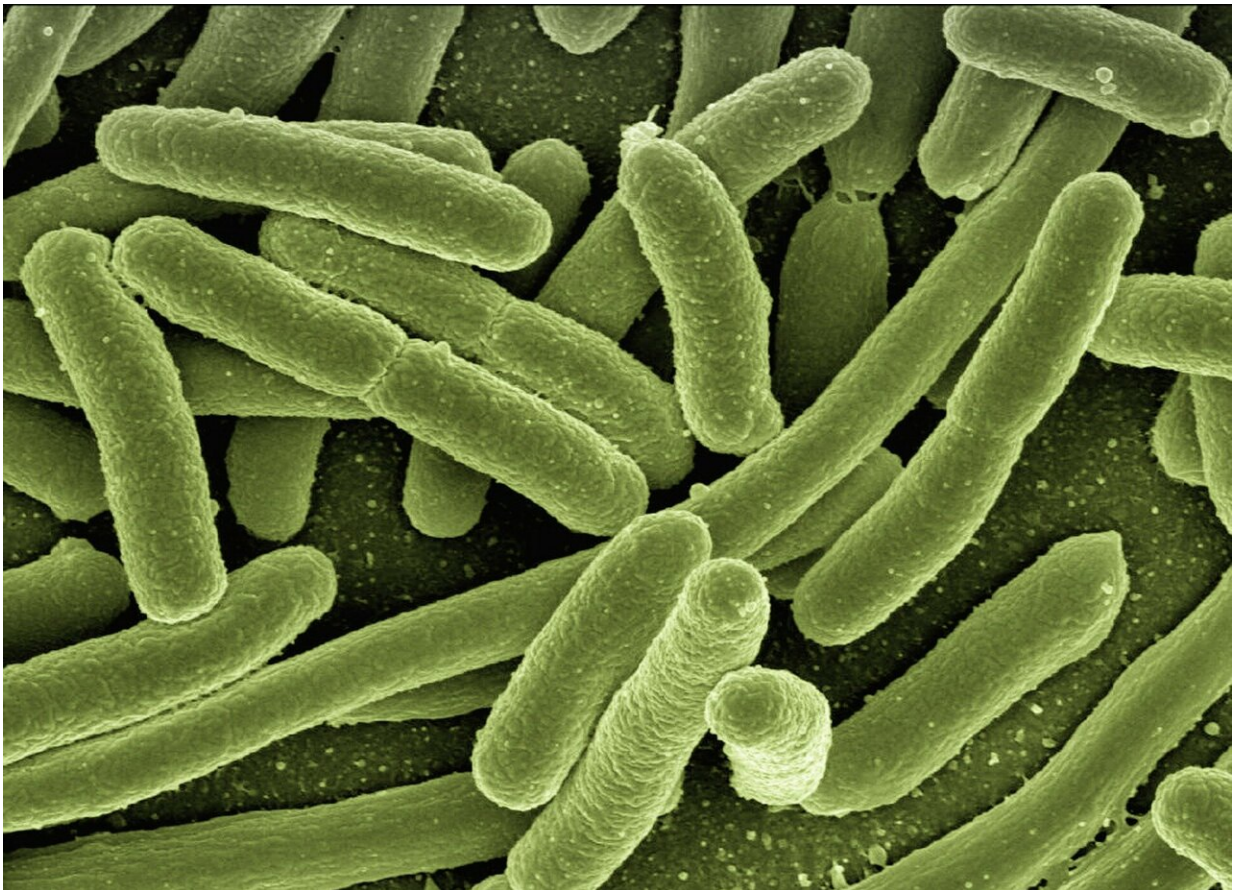


# As new diseases emerge and old ones surprise us, infectious disease doctors work overtime

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Infectious disease specialist Nesli Basgoz woke up before dawn one morning last month with a patient on her mind.

She had admitted the young, previously healthy man to her Massachusetts General Hospital unit five days earlier, with fever, sweats, swollen glands and a rash.

His lack of improvement worried her.

Searching for the cause of his suffering, Basgoz and her colleagues had tested and retested him for every obvious infectious [disease](#) and even autoimmune conditions. She'd gone through what she describes to her Harvard Medical School students as the Three L's: what's the most likely possibility, what's the most lethal one and what's left?

Infectious disease care has always involved solving such medical mysteries. But in recent years, thanks to climate change as well as economic and social factors, the pace of those mysteries has increased and the scale widened, experts told U.S. TODAY.

Just in the last decade, scientists have been faced with identifying a handful of never-before-seen human diseases or unusual paths for known ones: Middle East Respiratory Syndrome, Zika, Ebola and of course, COVID-19.

As the light began to appear in the sky, Basgoz went through her mental checklist again and reconsidered his rash. The day before she'd noticed that the center of some of his fluid-filled blisters seemed a little different, sunken compared to what they'd looked like previously.

A word flashed through her mind: Pox.

A quick computer search of "poxviruses and outbreaks" revealed an announcement earlier that same day from the British health care system. They'd just diagnosed four patients with monkeypox, a cousin of the much deadlier smallpox, which was eliminated worldwide in 1980.

Every year, a few travelers arrive in Europe and the U.S. with monkeypox picked up in communities in West and Central Africa where the virus is endemic in animals. But at least some of the newly infected men, like Basgoz's patient, hadn't left their own continent. And the disease shows up rarely enough that she had never seen anyone with it in her busy infectious disease ward.

Basgoz quickly messaged her suspicions to her hospital's associate chief of infection control. The colleague called back immediately, though it was still just 5:30 a.m.

Before people in Massachusetts sat down to lunch that day, the state Department of Health had confirmed the man was infected with a poxvirus and a sample Basgoz collected from his sores was on its way to the Centers for Disease Control and Prevention in Atlanta, which would later confirm a monkeypox diagnosis.

The European outbreak, which now includes at least 800 people, had arrived in the United States too.

A similar detective story has unfolded since early April, with 650 children across 33 countries identified as having acute hepatitis, a severe form of liver inflammation.

The children, most under age 5, showed no signs of having a contagious, viral form of hepatitis. But many, research found, had recently been infected with adenovirus 41, one of a group of viruses that typically cause the common cold.

Both new outbreaks are extremely limited and unlikely to turn into much larger outbreaks, experts said. But the fact that they're happening at all—and that the world learned about them so quickly—are signs of the times, experts say.

## Spreading infectious diseases

Scientists rarely hear about the first instance of a new outbreak. It's only after a pattern appears that it becomes noticeable.

"We're coming into the story on Chapter 3 or 4 and have to go back and read the earlier chapters to really understand what's happening," said Anne Rimoin, an infectious disease epidemiologist at the University of California, Los Angeles Fielding School of Public Health.

With monkeypox—incredibly rare outside Africa—it took only one or two patients without a travel history for authorities to become alarmed. But it's still too early in the outbreak to know what sparked the outbreak, what's in those earliest chapters, Rimoin said.

Often, scientists never learn the full story.

Even with the Ebola outbreak of 2014, a "patient zero" was never confirmed.

COVID-19 came to international attention on Jan. 1, 2020, but as the name implies, cases of the then-unnamed disease began in 2019, with little information coming from the Chinese government.

Knowing the origin of an outbreak matters because "only when you know exactly the origin of things can you create policy to prevent it in the future," said Dr. Luis Ostrosky-Zeichner, an infectious disease specialist at McGovern Medical School and Memorial Hermann Texas Medical Center, both in Houston.

If the SARS-CoV-2 virus, which causes COVID-19, was accidentally released from a Chinese lab, as some suspect, that suggests one set of policy responses. If it jumped by itself from animals to people as Ebola,

monkeypox and other so-called zoonotic diseases have, different policy changes should occur.

But often, it's unwise to wait for complete information before taking action, Ostrosky-Zeichner said.

Dr. Peter Hotez has a long list of factors he thinks contribute to the global rise in infectious diseases, including deforestation, urbanization, climate change, economics, political instability and science skepticism.

People encroaching on tropical rainforests drive animals closer to humans where they can infect them, said Hotez, a pediatrician and dean of the National School of Tropical Medicine at Baylor College of Medicine Houston.

He cites a few more examples: Yemen's political instability let the Middle Eastern country to halt its vaccination programs, allowing the return of measles and polio. Warmer temperatures dry up agricultural lands, driving people into cities from the countryside like Aleppo in Syria, or from one country to another, as in Central America—destabilizing economies and spreading disease. Anti-science opposition to vaccines left many Americans unprotected against COVID-19, with 200,000 dying during the delta wave alone.

"They all kind of mutually reinforce each other," Hotez said. "It's a wake-up call that we have to stop thinking about infections merely as a [public health threat](#). We have to recognize these are economic threats."

Technology and travel are also transforming infectious diseases and the study of them, several experts said. Diseases in one part of the world are only a plane flight away from everyone else. Monkeypox reached so many people so quickly because of large, international gatherings followed by plane flights home.



The world largely ignored monkeypox until it reached Europe and the United States, but there has been an outbreak since 2017 in Nigeria and just in the last year, 1,200 people in the Democratic Republic of Congo have fallen ill and 58 have died, according to the World Health Organization.

Even outside of Africa, "there may have been undetected transmission for a while," said Rosamund Lewis, technical lead for monkeypox, in the WHO's Health Emergencies Programme. "What we don't know is how long that may have been. We don't know if it was weeks, months, or possibly a couple of years."

Digital technology also means people learn about outbreaks much faster. Basgov was able to immediately gain support for her suspicions by reading online about the U.K. patients.

Scientists from all over the world now share information about emerging diseases, said Dr. Trini Mathew, chair of the Public Policy and Government Affairs Committee for the Society for Healthcare Epidemiology of America and an infectious disease physician at Beaumont Hospital in Royal Oak, Michigan.

For instance, researchers quickly created a spreadsheet to tally what's known about each of the people suspected or confirmed to have monkeypox. "That has come together because of the digital platforms that people are comfortable with sharing," Mathew said. "Maybe that is the silver lining from the pandemic."

But that extra awareness can also stoke public fears.

### **Tracking hepatitis outbreak in kids**

With acute hepatitis, one of the challenges has been figuring out who

truly has it, said Dr. Eric Pevzner, chief of the CDC's Epidemic Intelligence Service, which is charged with resolving disease mysteries.

"Whenever you have something that's scary, people start looking for it," he said. "You want to make sure that what you're detecting is really hepatitis."

In the U.S., once the outbreak was identified, dozens of patients were added to the list, many dating back to last winter.

With a disease like hepatitis, which is present in the general population, it's also important to make sure that an outbreak is different and not just people noticing the normal, background rate of disease, Pevzner said. "Are these cases really more than you'd expect?"

Most of the more than 200 American children identified as part of the outbreak were hospitalized and recovered. About 14% needed liver transplants. At least six have died.

The CDC said parents should be alert to symptoms of liver inflammation in their children, including fever, fatigue, [abdominal pain](#), vomiting, joint pain, dark urine, light-colored poop and yellowing of the skin known as jaundice.

The CDC asks three basic questions as it investigates an outbreak: What is the problem, what is the cause and what can be done about it.

Pevzner said he thinks about "person, place and time." Who's getting sick, where are they, when were they diagnosed and how long did their illness last?

"As you gather that information about person, place and time, you start trying to generate hypotheses of what is really happening and then you

go and test those hypotheses," he said.

Pevzner said the COVID-19 pandemic, which disproportionately hit lower-income communities and people of color, taught him to ask a new question at the beginning of his investigations. "Are there things that are making some people more vulnerable than others, and what can we do to protect the most vulnerable?"

### **Monkeypox cases on the rise**

Not much is known yet about what sparked monkeypox's rampage through Europe. So far, 24 Americans are confirmed to be part of the outbreak, with 120 pox tests run nationwide.

Of the 17 that have been investigated, 16 of the 17 identified as men who had sex with men, while one was a woman, Captain Jennifer McQuiston, deputy director of the CDC's Division of High Consequence Pathogens and Pathology said in a Friday news conference.

Fourteen of the people were likely infected during travel while two came in close contact with one of the other infected Americans. The remaining man had no travel or contact history, suggesting there may be some transmission that's going undetected, McQuiston said.

Genetic sequencing of patients, including the man from Massachusetts General, suggests the current outbreak may have had more than one origin, as first reported by the website STAT, and may have gone undetected for some time.

But the virus itself doesn't appear to have become more dangerous or infectious.

"If there's nothing weird about the virus, then it's people's behavior"



that's driving the outbreak, said Barry Bloom, a global health expert and public health professor emeritus at the Harvard T.H. Chan School of Public Health. "What's unique here is not the virus, it's the mode of transmission."

Several parties in Europe, a common denominator for at least some of the infections, may have been super-spreader events. Partygoers, infected by close personal contact with an infected person, returned home, bringing the infection with them.

Hopefully, Bloom said, with global attention, any more cases will be identified quickly and infected people isolated to prevent more transmissions.

Of the nearly 800 confirmed patients so far, the earliest ones had symptoms in late April, while other people were identified at the end of May or earlier this month. It's not clear how much of the transmission happened at one or two events and how much happened as people passed the virus on to others.

The man at Massachusetts General hadn't traveled to either Africa or Europe, so he must have caught it from someone who did.

Luckily, monkeypox can be relatively easily contained, Hotez said, because people aren't contagious until they have open sores, about two weeks after they are exposed, which "gives you time to isolate individuals."

Public awareness can be crucial for stopping an infectious disease outbreak. But only if the public trusts officials enough to follow their advice, Bloom said.

"We don't do very well at controlling people's behavior in public health,

as we learned with COVID."

In the case of monkeypox, the early cases seem to have been concentrated among gay and bisexual men. Because that's a community now well served by HIV treatment and advocacy, public health officials will hopefully be able to contain the outbreak before it spreads further, Bloom said.

### **Know your pathogen**

The handful of disease experts interviewed all said the same thing about pathogens: Don't underestimate them.

COVID-19 provided repeated reminders of that maxim, several said. Pevzner remembers in early 2020 telling other parents on his son's basketball team not to worry about a respiratory virus they'd heard was spreading in China. "We've had viruses like this in the past and we've been able to contain them," he reassured the other parents.

"I was sure wrong."

But scientific findings can help make pathogens like the SARS-CoV-2 virus and monkeypox more manageable, if not fully containable.

"Ultimately, we're trying to collect the best available evidence to identify what is the source or cause of these cases so you can stop them and prevent anybody else from getting sick," Pevzner said. "That's what we're all striving to do."

At Massachusetts General, Basgoz said, everyone who interacted with the patient was masked because of COVID-19 precautions, as was he. It's standard procedure for infectious disease doctors to use gloves when examining a rash.

Right after Basgoz suspected he had monkeypox, she had the man moved into a special pathogen unit, attended to by nurses and others trained in infection control. He was masked and gloved the whole time.

That's where it was helpful that monkeypox has already been extensively studied and understood, she and others said. It's well known that the discharge from a monkeypox rash can be infectious and people with sores in their mouth can exhale the virus. Armed with that knowledge, caregivers can keep themselves safe, Basgoz said.

There are two vaccines currently available. One called Jynneos was approved in 2019 to treat both smallpox—in case of an accidental or intentional release—and monkeypox. More than 1,200 vaccine doses have been distributed around the country, offered to people who came into contact with one of the infected patients.

Basgoz said she's been offered that two-dose vaccine and took it just to be safe. "This is a great vaccine," she said. "A lot of people (who were in contact with infected people) are choosing to get vaccinated." (None of the people infected with monkeypox before the outbreak reached Europe had been offered the vaccine, according to WHO officials.)

Treated at Massachusetts General in mid-May, the man has since met CDC criteria for no longer being infectious and was released home, Basgoz said. Most people take two to four weeks to recover from monkeypox, but this patient was particularly young and healthy, she said.

"He got better pretty fast."

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