

COVER STORY



Hopes for Drones Fly High to Improve Rural Healthcare Access



STEPHANIE STEPHENS

WRITER
Stephanie Stephens is an experienced journalist, producer, voice over talent, and animal advocate in Orange County, CA. You can find her at www.stephaniestephens.com

Our fascination with drones shows no signs of abating, as Americans imagine walking out the door “someday” and sending their own drone merrily on its way to deliver “something.” Drones are no longer science fiction, as they continue to intrigue consumers with their versatility—plus, they’re just plain “fun” for avid drone aficionados. However, for those intently engaged in determining drones’ ultimate usefulness, the potential for doing good with this technology remains priority one.

The concept of healthcare applications for drones is “not just growing legs, but rotors,” said Phil Sizer, Ph.D. PT, associate vice president of Research and Innovation at Texas Tech University Health Sciences Center (TTUHSC). The use of drones in healthcare isn’t a ubiquitous occurrence—yet—even as proponents share enthusiasm about the future and drones’ ability to support more improved outcomes.

At academic institutions and forward-thinking start-ups, innovators are getting ready for drones’ omnipresence and potential by partnering up and doing their own research studies.

As to the timeline of “When?” it’s not an easy or clear answer, said Casey Calamaio, research engineer at the Unmanned Aircraft Systems (UAS) Research Programs Rotorcraft Systems Engineering and Simulation Center at the University of Alabama in Huntsville (UAH).

“There is no one-size-fits-all solution or use case,” he said. “Developers are thinking about and working on how to make using UAS as easy as possible—to successfully integrate drones into different environments and applications with minimal technical barriers.”

Drones Help Protect Donor Organs

Sizer is part of the Matador UAS Consortium, which includes experts from TTUHSC, Texas Tech University, technology and investing firm 2THEDGE, South Plains College, and Texas organ and tissue procurement organization, LifeGift.

“It’s a collaboration between the university and industry,” Sizer said. “Our mission is to leverage commercial drones to transport critical cargo within a drone corridor network, and to build a national network of drone corridors that are out of line of sight.”

“Out of line of sight” means that the drone will fly in a space that is not easily accessed by the public. Here, the pilot will fly the drone at 500- to 7,000-foot elevation, navigated from a distance, from their home base.

“These drones are not what you buy at a BestBuy, but can have a wingspan of 20 feet and carry up to 200 pounds in payload,” Sizer said. “We see the commercializable opportunities to move medications, lab samples, and different supplies needed for healthcare, so patients don’t have to travel to get them, and personnel will not be required to drive those items to or from TTUHSC.”

Creating a sustainable model for transporting donated organs to recipients remains a top priority, he said, “to do it more efficiently, most cost-effectively, and more predictably because if an organ doesn’t get delivered in time, it can be unusable.”

Sizer’s team understands the

pressing need since TTUHSC serves 108 Texas counties, 58 of which are medically underserved, and it serves border counties in New Mexico, southeastern Colorado, and western Oklahoma. Residents may drive to the hospital an average distance of 103 miles one-way.

“We also graduate more healthcare providers than any other health science center in the state,” he said of TTUHSC. “When they go out to these rural locations, the UAS model really could help support them and their patients.”

Drones’ Commercial Applications Abound

The global industry has certainly taken notice. Drone delivery has become a priority initiative in countries including China, Japan, Australia, France, Germany, Russia, South Korea, and the United Kingdom.

Technological research and consulting firm Gartner predicts exponential growth and said that in 2026, more than one million drones will be carrying out retail deliveries, up from 20,000 today.

UPS, FedEx, Domino’s, and Walmart are just a few companies set on incorporating drones into their regular retail delivery protocols. Drone designer and manufacturer Zipline has joined Walmart in that endeavor, which promises to also deliver drugs as Zipline has already done in Rwanda and Ghana.

Earlier this year, according to the *Associated Press*, Zipline announced it was delivering

medical supplies in the Goto Islands of Japan, destined for local hospitals and pharmacies. Zipline Chief Executive Keller Rinaudo said drones have already transported blood supplies, insulin, and cancer treatment.

For emergency physician and drone expert Jeremy Tucker, DO, of Kailua Kona, Hawaii, a main focus is “the compelling nature of helping humanity with healthcare.”

“Remote populations can realize significant advantages to healthcare delivery with drone use,” he said. “There will be much more package volume that is non-healthcare, i.e., retail, but the per-package delivery fees should be similar or even a slight premium for healthcare versus non-healthcare.”

The Centers for Disease Control and Prevention says almost nine out of ten Americans live within five miles of a community pharmacy, but for those who don’t, drones can sure help.

Higher, Longer, Further

A person who needs to drive a long distance to pick up a prescription must factor in time and the cost of gas, said Tucker. “Drones not only fill the bill, but can help people who may not drive, such as the elderly—an important case use for rural healthcare.”

A rural hospital might not have enough blood when a patient presents with a massive gastrointestinal bleed, for example, or a patient is a difficult crossmatch. “We don’t want to wait a day or so, and the

use of a UAV may not require transferring that patient," he said.

Tucker co-founded Airbox Technologies, and its "world's first smart drone delivery-capable mailbox that's temperature controlled."

"Drones might drop packages that are susceptible to weather, dogs, children, and theft," he said, "and this provides drone delivery with a secure endpoint."

Tucker is also chief medical officer for New Frontier Aerospace, with sights set on high-speed, rocket-powered automated delivery of healthcare, cargo, and people.

"We envision delivering critical first aid supplies, flying quickly from Florida to Haiti, with thousands of pounds, for disaster victims in remote areas."

Drones in rural healthcare mean "higher, longer, further," said Tucker. "Companies will continue to push the envelope, with power sources including bigger batteries, that are also more efficient, such as hydrogen powered. There are also hybrid solutions."

In the fall of 2020, Volansi, a Silicon Valley drone delivery innovator, launched a commercial drone delivery program to deliver cold chain medicines in rural North Carolina in a custom cargo box.

The drone connected pharmaceutical giant Merck's

manufacturing site in Wilson, North Carolina with Vidant Healthplex-Wilson, a Vidant Health clinic.

Then, in the spring of 2021, it completed two successful flights between Hatteras and Ocracoke Island in the state's Outer Banks, proof that substantial time could be saved in the air versus trying to drive emergency supplies in hazardous road conditions, such as when roads are washed out.

"Merck was interested in exploring innovative technologies to expand their delivery options to better serve the healthcare community," said Amanda Krantz, Volansi's head of business development and partnerships, who oversees the Merck program.

Charting a Clear Path

"When delivering to a rural area, with medical supplies, medicine, or defibrillator machines, we have to consider how we send those directly to a person," said Jerry Hendrix, director of UAS Research Programs at UAH, and a team member with Calamaio.

"Maybe a neighborhood has a kiosk, for example," he said. "We see a lot of research in that area and initially it's going to happen on a case-by-case basis, with FAA approval based on safety."

"In the next five to ten years, I think the opportunity is to focus on where drones can serve critical needs as well as how to incorporate them into existing courier or logistics systems so both the technology and business models are ready when the air space opens up," said Krantz.

Identifying how unmanned aircraft can solve medical supply chain gaps remains a priority, said Calamaio.

"We must first identify barriers and areas of congestion, then we can see how drones may help to alleviate those problems—they don't have to follow roadways, which can be restrictive or time consuming to travel. We must also address operational safety and regulatory compliance."

His team focuses on how the FAA will define regulatory pathways and identify technologies to usher in safe and more complex types of operations, "likely reliant on the kinds of UAS traffic management (UTM) solutions."

With no turnkey UTM solution now, they experiment with low-altitude UAS deliveries with a scalable obstacle avoidance system on campus, Calamaio said.

"UAS can be preprogrammed and automated for autonomous take-off and landing, but can't yet fly fully autonomously to their destination," Hendrix said.

The Future of 'Tech-Enabled' Nurses

UAH's UAS team also supports initiatives around "tech-enabled nurses," and collaborates with the university's College of Nursing, Calamaio said.

They completed a series of simulations which included a pregnant mother at a rural facility, at risk for preterm labor, where a drone delivered needed medication, and are doing another that involves an overdose scenario and a drone delivering naloxone in a rural location.

'Tech-enabled' means not only engaging with telehealth services,

such as wireless networks to monitor vital signs, radios and other communications devices, but also "knowing how to conduct oneself around a drone delivery system, to load and unload payloads, test kits and other medical supplies," he said.

"Nurses and medical professionals are busy enough, skilled, and don't necessarily need to become drone pilots to feel comfortable around this emerging technology."

As drone advocates wish things would "speed up," Krantz said working within the confines of regulations to keep everyone safe is critical.

"The FAA has established several programs and governing bodies to research, address, and maintain safe regulations for drones and drone operators," Krantz said.

These include organizations like the former Drone Advisory Committee, now the Advanced Aviation Advisory Committee, and the BEYOND program.

"While we and others in our industry would love to see regulations move more quickly in favor of the drone industry, I believe the regulations will continue to open up as the technology advances to make it safe to fly over people," she said.

"In the meantime, we can continue to make progress towards actually running a business by finding and piloting concepts where real value is delivered rather than receiving your hamburger by drone in your backyard." ●

