

Hospitals could soon use drones to deliver life-saving medical supplies

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Jeff Street, a drone engineer (left), and Dr. Timothy Amukele, director of clinical laboratories, with their multi-rotor drone at Johns Hopkins Bayview Medical Center in Baltimore, Maryland, December 27, 2016. They are testing drone technology for transporting blood quickly. Photo: Amy Davis/Baltimore Sun/TNS

BALTIMORE, Md. — Aerial drones could one day ferry life-or-death medical supplies between hospitals, thanks to Johns Hopkins Medicine researchers. They have figured out how to keep blood, medications and vaccines consistently cool during the flights.

Interest in the use of the unmanned aerial vehicles has surged in recent years. Companies, including retail giant Amazon, are exploring the use of the aircraft to efficiently and cheaply carry goods. Drones can go above traffic, through bad weather and to otherwise hard-to-reach areas.

Plan Takes Off

“If the blood somehow was changed or destroyed in transport, then none of it matters,” said Dr. Timothy Amukele, a pathologist and director of the Hopkins Bayview Medical Center’s clinical laboratories. He spent 18 months on a team perfecting refrigeration on drones.

Amukele published findings in the journal *Transfusion* in November that showed no biological change to blood packed in refrigerated coolers during test flights. The drone flights lasted about 26 minutes and covered 12 miles at 328 feet above ground.

Amukele hopes to begin sending lab samples and other materials between the Bayview campus and Johns Hopkins Hospital less than three miles away. He still needs buy-in from neighbors who might hear buzzing overhead. He also needs approval from the Federal Aviation Administration, which recently issued regulations involving drones.

Other Baltimore-area hospitals and eventually farther-flung medical facilities could be looped in, enabling them to share limited medications and blood products. The flights could also make advanced lab testing more accessible. Eventually, Amukele envisions emergency workers requesting pints of blood to be delivered to the scene of accidents and natural disasters.

Privacy Concerns Over Use

“Drones may become a realistic option,” said Ian Weston, executive director of the American Trauma Society, an organization of care providers for serious injuries.

Rapid delivery of supplies by drone would save lives when patients can’t be taken quickly to a hospital by ambulance or helicopter, Weston said.

He said patients in 90 percent of the country can get to a trauma hospital within 60 minutes. That is known as the all-important “golden hour.” It was first described by Dr. R. Adams Cowley, for whom the Maryland Shock Trauma Center is named.

Communities likely would support use of drones for life-saving medical supplies, just as they have embraced helicopters, Weston said. Drones with cameras are already used to view large fires and accident scenes, he noted. However, more widespread use could prompt privacy and security concerns. In some other countries, drones have been used for surveillance. They are also used by militaries to fight wars.

Questions remain about drone capabilities and what the FAA would allow. The agency now bans drones over 55 pounds, flying faster than 100 miles per hour or higher than 400 feet, and the pilots operating them remotely must be certified. More paperwork is needed to fly over certain places and distances.

Solving the refrigeration problem, however, at least makes drone use possible, Weston said. But he and others warned that more trials will be needed to show if drones are better than other delivery options.

"An Issue Of Risks, Benefits And Costs"

Dr. Thomas M. Scalea, Shock Trauma’s physician-in-chief, said the Hopkins researchers answered a big question about “if we could do it, but now we have to ask if we should do it.”

Drones might not be worth pursuing yet if they often crash or miss their mark, don't improve patient outcomes or cost a lot to operate. Scalea said he'd like to see whether drones could help hospitals share resources. However, he cautioned officials to resist the temptation to just run with the new technology.

"It's an issue of risk, benefits and costs," Scalea said. "If you could devise an incredibly reliable way to deliver what you want to deliver and be quicker than going on the roads, and you could make it as cheap as driving, then you've got something. We're a little ways away from that." He added that at least now, "it's possible to ask the questions."

There might not be widespread need for blood at accident scenes because it's still most important to get patients to the hospital, said Scalea and Dr. Peter P. Taillac. Taillac is a professor of emergency medicine at the University of Utah School of Medicine.

Emergency workers are more likely to turn to blood-clotting advances such as freeze-dried plasma that can be rehydrated with saline. Blood might be needed if patients are stuck in the field or when natural disasters result in many victims, Taillac said.

Bringing Help To Remote Areas

He sees other uses for drones, however, such as on-demand access to expensive and rarely used drugs, such as an antidote to rattlesnake bites. He also noted some Canadian university students are developing another use. It is a system to deliver automatic external defibrillators, or AEDs, directly to bystanders to use on heart attack patients.

"What are all the niches we can fill?" he said. "There are probably more than 100."

Other groups, including the medical aid group Doctors Without Borders, are already exploring drone use in the field. The group worked with the California-based company Matternet in 2014 to send samples via drone from patients with suspected tuberculosis. The drones went from remote health centers in the Pacific island nation of Papua New Guinea to a hospital in Kerema, a regional capital. Officials are exploring ways to send back results and treatments.

Matternet also has said it would develop drone systems in the Dominican Republic and Malawi to send medical tests and blood samples from remote villages to labs. The flights would bypass muddy roads and dangerous waters.

A San Francisco-based company called Zipline is working with the government of Rwanda in central Africa to parachute blood products to remote areas from drones. The firm plans eventually to expand to other products and countries.