

Will Drones Revolutionize Health Care and Create Landmark Moments in History?

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Drones are robot-like vehicles or unmanned aerial vehicles (UAVs) without any onboard crew or passengers. The word “drones” either create images of fun toys in our mind or remind us of scary items of war. The history of drones is quite amazing. They started as very simple and rudimentary barely flying objects. These then slowly and steadily have evolved into technological marvels with varied uses. The history of the making of drones dates back to 1782 when in France, the Montgolfier brothers used unmanned balloons for the first time. Thereafter, Austria in 1848 mounted bombs on 200 pilotless balloons when they tried a secret attack against Venice. In 1911, the Italians used actual drones for the first time when they attacked Libya. The term “drone” started to be used for the first time in 1935, inspired by one of the radio-controlled unmanned aircraft models, DH82B Queen Bee, used by the British as targets for training purposes.

The modern health care system is one of the greatest achievements of our human intellect and has improved the quality of people’s lives tremendously. Many people in the world are residing in rural, underdeveloped, and inaccessible places where access to basic health care is still lacking. India is a huge country with varied and difficult topography. Also, it is fraught with wide health care disparities. Hence, the need to incorporate drone delivery solutions has been recognized in India also. Drones can augment India’s health care sector with potentially massive-scale deliveries of vaccines, long-tail drugs, blood products, body samples (blood, urine, and stool), and even organs.¹ Thus, drones have developed as an emerging technology improving the delivery of vital goods and can be an important component of this future-focused health system.

Drones can increase the accessibility and speed of delivery of life-saving medications and vaccines, transport of time and temperature-sensitive diagnostics samples, transport of organs for transplants, transport of small medical devices like automated external defibrillators (AEDs) to remote locations or to out-of-hospital cardiac arrest (OHCA) patients, and sanitization of convention centers, entertainment or sports venues with safe disinfectants.²

Besides being expensive, the transportation time of some of these products is also critical. Just to quote an example, in India, if we transport a blood sample by a truck on a bad road, the blood products can be completely damaged by vibration and bouncing around on the potholed roads. Besides, blood is temperature sensitive and we have to transport within a certain temperature range. Heavy traffic congestion in metros and larger cities can also cause difficulty in transporting these products in a smooth and timely manner. Drones can be used to solve these problems as the roadways can be bypassed. Even for organ transfers, the limited

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time window (often between 4 and 36 hours) depending on the organ type to move organs from donor to patient is critical. Hence, the need for ultrafast transportation. Drones can make these organ deliveries faster, safer, and more cost-effective.

Some diagnostic tests are also time and temperature-sensitive. Therefore, when a sample is taken from a patient, it has to be sent to the lab and the test must be performed within a specific timeframe, which may be as short as 2 hours. A drone can fly fast to far-flung areas and carry quite a significant amount of load, thus enabling a time-critical diagnostic test within the expected time.

To name a few drone companies involved with health care are—Seattle’s Village Reach, Flirtey, Ehang, Zipline, Tu Delft, Google Drones, Project Wing, HiRO (Health care Integrated Rescue Operations, Vayu Drones, etc.). In Rwanda, drones of Zipline company have covered >1 million kilometers and have completed >13,000 deliveries. In Ghana, they have started to deliver COVID-19 testing materials. In 2020, the company also began cargo delivery service in the United States and have delivered PPEs and other supplies to a hospital in North Carolina. Federal Aviation Administration (FAA) has allowed beyond-line-of-sight drone deliveries in the US for the first time.³

Wingcopter, a German manufacturer also has partnered with Japan’s Nippon Airways to deliver medical supplies to the various islands of Japan. The trial decreased patient waiting time very dramatically appears promising and aims to set up commercial drone flights by 2022. A Swedish company Everdrone and TU Delft Ambulance Drone have built a drone system that delivers AEDs to the scene of cardiac arrests. AERAS, a drone company from Pittsburgh, and another American company, Perpetual Motion got the approval from the FAA to use drones to disinfect venues.

The first-ever drone delivery of a human organ was carried out last year when a University of Maryland drone delivered a kidney that was successfully transplanted into a patient suffering from a serious nephrological condition.⁴

However, the use of drones is fraught with many challenges. Perhaps the most significant challenge is not technological but the need for an agreement on a common set of regulations on operational procedures. Every country has their own set of rules and regulations regarding the use of drones. Globally, the world aviation regulators must create common regulations and rules for all countries such that every country can use the airspace as required and derive benefit from this technological advancement. Other challenges are restrictions on the size of drones, their operating range and load-carrying capacity, permissions for landing and take-offs. Besides, there are security risks which include hijacking and hacking of confidential data. The economics of drone delivery has also been questioned and whether it will be too expensive. However, the cost vs benefit needs to be considered. Also maintaining the integrity of specimens during delivery (temperature control, need for special equipment/packaging), battery life and most importantly consumer demand also has to be kept in mind.

The COVID pandemic has also triggered the use of newer technologies in health care—like the rapid increase in teleconsultation, webinars and online discussions, collection of home lab tests, etc., due to the requirement of avoiding hospitals, minimal crowding in health care facilities, and maintenance of social distancing. The demand for safe solutions inclined the use of robotic support like drones in the environment as well as in hospitals. Artificial intelligence, robotic medicine, and drones will make landmark changes in health care in the foreseeable future. Many tasks of health care performed by humans will be replaced

by these technologies and thus, there will be a reduction in human error, variability, and eventually cost. However, it is a long list of issues to be resolved before drones can become a part of our lives. Till then, they remain only an enviable and enigmatic modern technology ready to be launched for future health care.

Ministry of Civil Aviation (MoCA), Govt of India, has recently notified a Drone Policy on August 25, 2021.⁵ Keeping in mind, the potential usage of the drone during the recent COVID pandemic and entire health care system, this liberalized and enabling policy has created an environment where the use of drones can become mainstream to cover the vast geographic expanse with adequate health care coverage.

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