

Term Paper

on

*Drones in Healthcare and Health-Related
Services*

Submitted by

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Abstract

This Term paper provides an overview of the current and potential use of drones in healthcare and health-related services. Drones can be used for a variety of purposes in healthcare, including delivery of medicines and other medical supplies, transportation of patients, and providing real-time medical information. Drones also have the potential to be used in health-related services, such as disaster relief and food delivery. The use of drones in healthcare and health-related services is still in its early stages, and more research is needed to determine the benefits and drawbacks of this technology. However, the potential benefits of using drones in healthcare and health-related services outweigh the risks, and there is a growing demand for this type of technology.

Introduction:

Drones have proven to have exciting potential for increasing the capacity and efficiency of healthcare systems. In this paper, drones are understood as any unmanned aerial vehicle that is remotely piloted; they have been generally acclaimed for their capacity to evade many healthcare delivery challenges that hitherto impeded access to healthcare services, particularly in hard-to-reach areas or underserved environments. For instance, the transfer of blood and other medical supplies from a designated medical facility to remote areas or villages can be costly and time-consuming.

Surprisingly, a drone can pinpoint the exact location of an accident, the number of people affected, and the scope of the incident before emergency personnel arrive. Drones provide first-hand information on an accident scene in this scenario, allowing for better emergency medical services, faster response times, and lower transportation costs. The current push for innovative medical delivery is motivated by the Coronavirus (COVID-19) pandemic. The goal of the campaign is to keep human interaction to a minimum to keep the virus from spreading. Drones are thus technical instruments that can help medical workers do their tasks more efficiently and successfully, saving more lives in the process.



What medical supplies are delivered by drones from the air?

The medical supplies provided by drones are shown in this section. In order of importance, these are divided into four categories: (1) first aid kits, (2) medical aids and human body parts, (3) personal protective equipment, and (4) others. Despite the importance of the medical supplies discussed in the sub-sections below, they are a limited asset to healthcare systems, particularly in developing nations due to poor transportation (bad roads networks and limited ambulance services). As a result, the urgency with which important medical supplies must be delivered is determined by the severity of the health emergency and the geographic location.

1) Kits for first aid - (most urgent)

Bystanders could offer first aid in the event of an accident before paramedics get to the scene, which could happen anywhere in the country. The most urgent medical aid supplied by a drone is first aid delivered in an emergency. The first aid pack contains a variety of medical materials that a drone can transport to a disaster site. Medication, antibiotics, and blood samples could be among the medical items. Sudden health emergencies, such as heart attacks, can happen at any time, especially now that Africa is dealing with a double burden of diseases marked by an increase in the frequency of chronic noncommunicable diseases (NCD) such as heart disease, stroke, cancer, diabetes, and chronic bronchitis, as well as the fight against infectious diseases as COVID-19, Ebola, HIV/AIDS, Hepatitis, and malaria.

In such circumstances, drones can transport medical items such as automated external defibrillators (AEDs) faster, allowing first aid to be administered before the response team arrives.

2)medical aids and the human body - (urgent)

Drones are mostly used to deliver blood since doctors frequently require blood samples to establish a diagnosis. Drones are an alternative in certain situations since they may carry goods faster than traditional transportation systems. Transfusion is most commonly used.

Blood is essential in accidents and other medical circumstances. Blood is also necessary for medical emergencies such as pregnancy-related difficulties and conditions such as severe anemia, hypoglycemia, and brain involvement. Rwanda is a good example of a country that pioneered the use of drones to carry blood to save the lives of most women who suffer from postpartum hemorrhage. As a result, drones can assist rural health care providers in assisting pregnant women during labor. Drone-delivered blood paved the path for medical supplies like vaccines to be added.

Drone-delivered antivenom (for snake and dog bites) saves the lives of people who have been attacked by these animals, notably in Africa, where snake and dog bites are widespread. Drones aren't just used to deliver medical supplies; they're also used to transfer human body parts like the kidney.

3)personal protection equipment (need)

Drones can assist in automatic social distance inspection in public spaces in the era of the COVID-19 epidemic. During the COVID-19 outbreak, several African governments found it difficult to ensure individuals followed social distance rules. Personal Protective Equipment (PPEs) might also be delivered by drones to stop the infection from spreading. Drones provide personal protective equipment (gloves, facemasks, etc.) to emergency scenes and medical facilities. in certain countries.

4) Others – (normal)

Drugs and contraceptives for women are examples of (regular) medical goods that are not commonly regarded as urgent requirements but are delivered by drones. Pathology specimens, laboratory test samples, HIV treatments, and condoms are among the other items available.

What are the hurdles or potential roadblocks to drone-assisted delivery?

Given the misuse of drones that have tarnished their reputation, regulations may always be a bottleneck that prevents aerial distribution by drones. It is difficult to obtain legal clearance to fly a medical drone with the aviation authorities in many nations because drone laws have yet to be established. On the one hand, regulatory constraints (not allowing use) would be difficult to overcome unless drone users can demonstrate that they can operate the drone safely and avoid colliding with other flying objects or property on the ground. Regulators, on the other hand, are mostly concerned with how drones might avoid or minimize technological and privacy-related issues. So, as much as we want technology (drones) to swiftly and successfully transport medical supplies and save more lives, lives and property must be protected. Drone use should not result in the invasion of people's privacy; otherwise, human rights will be violated, which could have serious consequences.

Another issue is that in the past, drones were used for war by dropping bombs from the air, and this has left a negative impression in the minds of people in war-torn nations. In such countries, seeing a drone fly, regardless of the source, brings back unpleasant memories of death, suffering, and so on. This causes anxiety and terror. This could lead to a backlash against the use of drones in these countries.

Except for experienced professionals, hardly everyone in the public health sector is familiar with providing an AED to a patient before paramedics arrive. As a result, aerial delivery of AEDs to an emergency scene may initially increase tension as onlookers struggle to operate the AEDs on the patient. Similarly, unless you've been trained, flying a drone can be difficult. Furthermore, present delivery drones are incapable of transporting large products and flying long distances. This means that delivery drones may not be able to transport skilled personnel, making it problematic in accident scenarios where no trained medical workers are available.

Though drones have a lot of potential benefits, some people believe it would be better to invest in strengthening the traditional transportation infrastructure rather than drones in particular situations. Although there is always an enthusiastic response when drones are used for public benefit, stakeholders have highlighted concerns about value for money, privacy, and security.

What are the advantages of using medical drones?

One of the fantastic benefits of drones in the medical industry is that they have recently been used to track *Plasmodium knowlesi* malaria hosts, which suggests a potentially higher risk of infection in humans due to a large number of infected hosts. Drones also reduce reaction time and improve delivery efficiency. Furthermore, drone delivery of AEDs to an emergency scene during Covid-19 aids in infection prevention because continuous chest compressions (CCC) and early defibrillation are necessary without mouth-to-mouth respiration. Because they offer a faster response time than regular AEDs, drone-delivered AEDs have the potential to enhance patient survival in out-of-hospital cardiac arrest (OHCA). The study discovered that employing a drone in out-of-sight flights, was able to autonomously transport and deliver an AED with a substantially faster reaction time than

emergency medical services (EMS). When the public is told about drones carrying medical supplies and participating in experiments, they turn to appropriate technological innovation.

9-Health-Care Drones That Will Transform the Industry

1. Seattle's VillageReach



This Seattle-based global non-profit has partnered with Matter Net, a Silicon Valley-based drone business focused on autonomous transportation. Blood samples are being transported from outlying community hospitals to a large hospital in Lilongwe, the country's capital city, as part of a current pilot experiment.

2. Flirtey



Flirtey, a Nevada-based firm, made its own autonomous delivery of food, water, and a first aid kit, bringing drone deliveries of first aid kits and emergency drugs one step closer.

3. EHang



Lung Biotechnology PBC in the United States has agreed to create up to 1,000 units of EHang's 184 drone, the world's first autonomous drone capable of transporting a passenger. The goal is to automate the delivery of donated organs to patients across the country in times of need.

4. ZipLine



ZipLine, a San Francisco-based UAV company, signed a contract with the Rwandan government earlier this year to test transporting blood for transfusion around the country.

5. TU Delft



The TU Delft Ambulance Drone is a prototype that has a cardiac defibrillator as well as a 2-way communication radio with video. In the event of a cardiac arrest, the drone would be dispatched to the patient, and onlookers would be briefed on how to conduct CPR and begin using the automatic defibrillator until emergency personnel arrived to take over.

6. Google Drones

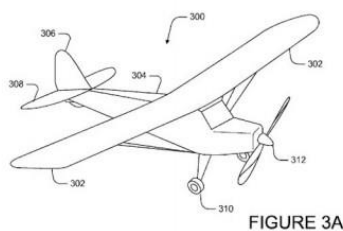


FIGURE 3A

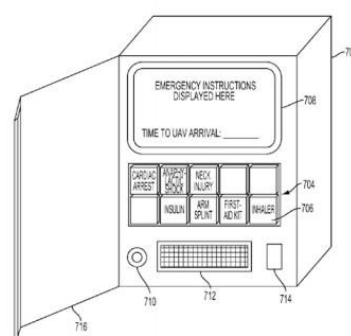


FIG. 7

In addition, Google has submitted a patent for a drone that would deliver medical assistance to persons in need. In the same way, as in the last case, the drone would arrive on the scene before an ambulance. The patent also mentioned a gadget

(or possibly a future app) that allows you to choose the type of emergency and displays the drone's estimated arrival time.

7. Project Wing



Alphabet, the parent company of Google, is also working on Project Wing, which will be utilized for disaster relief and the delivery of food, clean water, and other medical supplies. Both in the United States (partially) and Queensland, Australia, the concept has been successfully tested. The Federal Aviation Administration (FAA) gave it full authority last month to conduct full-scale testing at one of the FAA's designated sites.

8. Healthcare Integrated Rescue Operations (HiRO)



Subbarao, of Hattiesburg, Mississippi, is developing a telemedicine drone to help with the aftermath of natural catastrophes on US land. Following earlier tornadoes that left

residents trapped and inaccessible by ambulances, he envisions his drone being GPS-guided and capable of dropping off medical items.

9. Vayu Drones



Vayu Drones, which operate in Madagascar, have now successfully delivered excrement and blood samples to the country's primary laboratory for testing. Although the drone resembles an airplane, it can take off vertically, eliminating the need for a runway. It will then fly to its destination on its own.

Conclusion

This Term paper has explored the potential for drones in healthcare and health-related services. The advantages of using drones in these settings include speed, accuracy, and reduced cost. Drones can be used to quickly and accurately transport medical supplies and equipment to healthcare facilities, and they can also be used to transport patients to and from healthcare facilities. In addition, drones can be used to provide health-related services, such as delivering medication and providing healthcare information to patients. The potential for drones in healthcare and health-related services is enormous, and the applications for drones in this area are growing rapidly. Drones have the potential to improve healthcare delivery and patient care by providing faster, more accurate, and cheaper services than traditional methods. There are still some challenges that need to be addressed before drones can be widely used in healthcare and health-related services, but they have the potential to revolutionize these areas of life.

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