

## Drones: The New Way to Transport Lab Samples?

A pilot program initiated at WakeMed Health’s medical campus in Raleigh, North Carolina could be the future of efficiently transporting medical samples or supplies. The unmanned aircraft system integration pilot program allows laboratory samples to be flown across its medical campus, via unmanned drones, to the main hospital, rather than relying on courier cars.<sup>1</sup> Drone-assisted deliveries allow the option for on-demand and same-day delivery, with potentially life-saving benefits.<sup>2</sup> In the past, WakeMed has experienced difficulties transporting laboratory samples via courier car, which often are subject to traffic delays, leading to increased costs for couriers.<sup>3</sup> Through mitigating these delays and costs, the new pilot program could directly translate to cost savings by increasing supply transportation efficiency.<sup>4</sup> This *Health Capital Topics* article will discuss this new drone program and the utilization of drone technology in healthcare settings.

Launched by the *United Parcel Service* (UPS) and Matternet, a drone startup company, this program aims to “*shift the status quo for on-demand logistics for healthcare systems in the U.S. through drone delivery networks.*”<sup>5</sup> The drones utilized, Matternet’s M2 quadcopters, are powered by a rechargeable lithium ion battery, allowing them to carry up to five pounds of samples approximately 12.5 miles.<sup>6</sup> The drone will travel along a pre-determined flight path and be monitored by a *Remote Pilot-in-Command* (RPIC) to the landing pad.<sup>7</sup> Drone utilization reduced the journey to the laboratory from 30 minutes to three.<sup>8</sup> Through this innovation, WakeMed could potentially avoid having duplicate services in their facilities by consolidating all WakeMed laboratory activities at their main hospital.<sup>9</sup> This would free up space and resources in smaller facilities, allowing their providers to see more patients.<sup>10</sup> WakeMed’s ultimate goal is to have a network connecting their three hospitals with other, smaller facilities such as imaging facilities and clinics.<sup>11</sup>

The three-year pilot program is supervised through the *Federal Aviation Administration* (FAA) and the *North Carolina Department of Transportation* (NCDOT), becoming the first revenue-generating flight in the U.S. (as sanctioned by the FAA).<sup>12</sup> In August 2018, NCDOT assisted Matternet in conducting the first round of drone testing on WakeMed’s campus.<sup>13</sup> During this program, the FAA will evaluate how this technology can be effectively integrated into operational activities, as well

as test practical applications of the technology.<sup>14</sup> The testing phase is scheduled for a minimum of two more years, and will continue to test other routes during this phase.<sup>15</sup> In addition, the testing phase will incorporate the development of evaluation criteria related to cost and efficiency.<sup>16</sup> However, this program has numerous restrictions (imposed by regulating authorities) related to payload and flight conditions.<sup>17</sup> As safety has not yet been established, certain restrictions, such as prohibiting pathology samples on flights, are in effect.<sup>18</sup>

The U.S. is not the first country to develop and test drones with the goal of improving healthcare efficiency. In 2015, Matternet initiated testing the first drone delivery system in Zurich, Switzerland, which eventually expanded to other densely populated areas of Switzerland to aid in transportation of blood and pathology samples.<sup>19</sup> In 2016, UPS partnered with Gavi (a public-private partnership dedicated to increasing immunization in lower-income countries<sup>20</sup>) and Zipline (a drone startup) to deliver blood supplies and vaccines in Rwanda.<sup>21</sup> This service assisted medical professionals in areas that had difficulties with land transportation, which prevented supplies (such as blood units during surgery<sup>22</sup>) from reaching in-need patients in time.<sup>23</sup> Remote clinics in Rwanda could order supplies via text and Zipline would air drop the delivery within approximately 15 minutes, leading to many hours saved in transportation and wait time.<sup>24</sup> In addition, drones are being created to respond to natural and other disasters. In Mississippi, researchers developed drones to deliver tele-medical kits to impacted populations, including diagnostic equipment, medical equipment, video guidance, a holographic interface, as well as medicine bins for physicians.<sup>25</sup> These kits were proven effective by military and civilian first responders in a large-scale federal disaster exercise.<sup>26</sup> In addition to transporting samples more efficiently, drones have lifesaving potential due to the faster response, potentially preventing medical trauma, such as drug delivery of EpiPens or battlefield supplies to wound care.<sup>27</sup>

Drone-assisted deliveries likely will continue to emerge and be evaluated in their application to healthcare. Through the successful application of drones in operational activities at WakeMed, this technology could expand to other areas of the U.S., and incorporate other applications, such as delivering medications to rural clinics.<sup>28</sup> Further, drones have the capability to aid providers in reaching victims who require immediate

medical attention, or even increase a provider's ability to care for elderly.<sup>29</sup> To date, ten regional programs around the U.S. have been awarded permits by the FAA to conduct various drone application trials, which could lead to increased utilization within the

healthcare field.<sup>30</sup> However, drones need more evaluation regarding: their ability to withstand weather challenges, concerns with losing medical samples, and other potential hindrances related to the efficacy of using drones in healthcare.<sup>31</sup>

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