Using drones to deliver blood products in Rwanda

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When, in 2016, the government of Rwanda contracted the company Zipline to establish drone delivery of blood to health facilities throughout the country, there was a mix of admiration and skepticism from onlookers. Blood is a commodity that is logistically challenging because of its limited supply, short lifespan, and the stochastic demand from individual hospitals, so the need for a more efficient way to deliver blood was clear. What was less clear was whether this strategy would work, and whether investing in drone-based transportation would improve the responsiveness of blood deliveries to hospitals, as well as the management of blood components by hospitals. The answer to both questions is yes. Drone-based transportation of blood in Rwanda was significantly better than was road-based transportation in terms of both responsiveness and hospital blood management.

In *The Lancet Global Health*, Marie Nisingizwe and colleagues[1] reviewed the 12 733 blood product orders that were delivered by drones to 20 district and provincial hospitals in Rwanda over 32 months from March 17, 2017, to Dec 31, 2019. About 40% of these deliveries were emergency orders and the remaining 60% were normal standing orders. The median road-based delivery time based on Google Maps estimated driving times was 139 min (IQR 87–175), whereas the median drone delivery time was 41 min (33–49) when preparation and packaging time were excluded. The mean delivery time by drone was 49·6 min (95% CI 49·1–50·2), including order preparation and packaging time. These turnaround times from request to delivery are impressive and outperform those within many individual hospital facilities in the USA. Additionally, at 12 months, there was a 67% reduction in blood product expirations at the 20 district and provincial hospitals. Of note, the drone delivery times were real, whereas the road-based times were Google Maps estimated drive times and were therefore best-case scenarios.

At the risk of hyperbole, this paper by Nisingizwe and colleagues,[1] which describes the impact of a countrywide, 3-year drone transportation programme on clinically relevant outcomes, is what researchers working on medical drones have been waiting for, for the better part of a decade. There have been many reports on the impact of drones on various aspects of health care, including reports on the quality and stability of biological materials,[2] laboratory specimens,[3,4] automated external defibrillators,[5] and even human organs.[6] However, with few exceptions,[7] although reults have been positive, these reports have been pilot programmes that were restricted in scope. None of these reports have had the scale, scope, or real-world impact of the programme detailed in this Article.

Nevertheless, the paper has limitations. The most substantial is that it does not address what the costs of adopting drone-based transportation were. This information will be crucial for future adoptees of drone-based transportation to know when, and to what extent, to adopt this new technology. However, another view is that cost does not yet matter—that technological breakthroughs are always most expensive at their inception and tend to drop in price over time, and conversations around cost can be misleading if they become a point of focus too early. Whatever the case, future research will need to address the cost issue as the technology matures and the cost of drones becomes more predictable and generalisable.[8] That time is not yet, but this study moves us closer.

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