

OR30-04: Autonomous Drone Delivery of Insulin

Derek O’Keeffe. *University Hospital Galway*

Spyridoula Maraka. *University of Arkansas for Medical Sciences*

Derek Timothy O’Keeffe, MB BCH BAO PhD¹, Kevin Johnson, PhD², Spyridoula Maraka, MD, MS³.

¹University Hospital Galway, Galway, Ireland, ²University of Limerick, Ireland, Limerick, Ireland,

³University of Arkansas for Medical Sciences, Little Rock, AR.

Unmanned aerial vehicles (UAVs) or drones have become ubiquitous in modern society, predominantly as recreational tools (e.g. racing, photography). However, their use to transport medical products is still nascent, with the best examples seen in emerging economies with underdeveloped infrastructure due to local terrain such as East African jungles or the South Pacific islands. A case in point is the drone operator Zipline, which has pioneered the delivery of blood products in Rwanda since 2016.¹ Therefore UAVs have potential in disaster relief operations where there is often significant disruption of health systems [2]. After Ireland experienced Storm Ophelia (Cat 3 Hurricane) in 2017 and then Storm Emma (Winter Blizzard) in 2018, many of our patients with Diabetes had issues with insulin supplies as they remained housebound due to subsequent flooding/snowdrifts. Diabetes Mellitus is one of the world’s most common chronic diseases with approximately 400 million people affected. Insulin is often needed to achieve and maintain glycemic control and therefore is considered a lifesaving medication for patients with diabetes.³ Consequently, in order to ensure an adequate insulin supply method for patients, after a sentinel weather event, we developed a UAV delivery solution using a vertical take-off and landing (VTOL) Wingcopter 178 drone which we operated under beyond visual line of sight (BVLOS) conditions. After a lengthy planning process, we ensured compliance with all Irish (European) Aviation Aerospace regulations. In addition we complied with regulations surrounding the dispensing of prescribed fridge medications. We had our maiden flight on September 13, 2019 from Galway, Ireland to the Aran Islands (20Km each way) delivering insulin from the pharmacist to the patient’s clinician. This represents the first documented autonomous delivery of insulin for a patient with diabetes.

1. Ackerman E, Strickland E. Medical delivery drones take flight in east africa. *IEEE Spectrum*. 2018 Jan 1;55(1):34-5.

2. Rabta B, Wankmüller C, Reiner G. A drone fleet model for last-mile distribution in disaster relief operations.

International Journal of Disaster Risk Reduction. 2018 Jun 1;28:107-12. 3. da Rocha Fernandes J, Ogurtsova K,

Linnenkamp U, Guariguata L, Seuring T, Zhang P, Cavan D, Makaroff LE. IDF Diabetes Atlas estimates of 2014 global

health expenditures on diabetes. *Diabetes Research and Clinical Practice*. 2016 Jul 1;117:48-54.