

# BVLOS UAS operations - Portsmouth to Isle of Wight ACP-2021-02

## Project partners

This is a joint effort between Isle of Wight NHS Trust, Portsmouth Hospitals University NHS Trust, Solent Transport, University of Southampton, King's College London, Skylift, Modini, the Ministry of Defence, UKRI and Apian (the project leader).

## Project outline

The trial was conducted on behalf of Isle of Wight NHS Trust and Portsmouth Hospitals University NHS Trust to transport packages containing chemotherapy drugs between Queen Alexandra Hospital in Portsmouth and St Mary's Hospital in Newport, Isle of Wight, using uncrewed aircraft systems (UAS).

Cancer patients on the Isle of Wight are dependent on the mainland for an ever-expanding range of chemotherapy. Chemotherapy must be delivered by ground courier to Portsmouth, then ferry to the Isle of Wight, then taxi to St Mary's Hospital. Disruptions to the ferry service, including cancellations, delays and changing timetables, complicate deliveries and distract staff with additional workload. Given the short shelf life of chemotherapy, this can occasionally result in the drug being wasted. It takes up to 4 hours to transport chemotherapy from the nearest chemotherapy pharmacy manufacturing unit at Portsmouth Hospitals University NHS Trust. Reducing this to a reliable 30 minute flight is transformative, minimising wastage and treatment delays, whilst also saving staff time that can be used for direct patient care instead.

Today, chemotherapy is manufactured before the patient has been clinically assessed and confirmed to be physically able to receive treatment on the day it's due. In some cases, the patient's condition can cause the treatment to be delayed and the chemotherapy to be wasted. An on-demand UAS delivery service will potentially allow for a sequential process where manufacturing is started only until after the patient's assessment, enabling more flexibility for both the patients and clinicians.

The main focus of the trial was to deliver chemotherapy medication by UAS and to establish the protocols for this within a real-world setting, i.e. a busy, NHS environment. Other items for delivery were considered, including pathology samples, blood packs, prescriptions and medical equipment.

## Project outcomes

The project provided significant benefits to the NHS, resulting in the [world's first drone flight of chemotherapy](#) for Isle of Wight NHS Trust and the [UK's first drone delivery of prescription medicine](#) in partnership with Boots.

The project also;

- Established the medical and economic use case for the UAS delivery of chemotherapy, alongside standard operating procedures (SOPs) for end-to-end transport with a chain of custody.
- Developed frameworks for how to procure and task UAS operators with medical deliveries. These, alongside the SOPs, were endorsed by patients, pharmacists and clinicians. As such, they will accelerate the uptake of UAS logistics and provide a route to scalability in the development of future use cases. Thus, the learnings will advance healthcare and medicines access for hard to reach and excluded communities.
- Completed the first UAS delivery of prescription medicines in partnership with Boots, demonstrating the value of a medical UAS service to other healthcare providers.
- Established SOPs for end-to-end transport of pathology samples with a chain of custody.
- Established and conducted safe UAS operations from Thorney Island and the Isle of Wight, undertaking a variety of VLOS and BVLOS flights, including operations to and from a hospital helipad as well as a secondary drone landing site.
- Facilitated the recycling of otherwise redundant, but highly valuable medicines, to develop safety standards and evidence-based enabling regulations. Specifically, it has led to research into the impact of flight on sensitive medicines, successfully working with regulation to show that UAS transportation of cancer treatments is safe and improved the design of medical cargo boxes.
- Led to the submission of a peer reviewed paper, disseminating new and important knowledge concerning the mechanisms of how vibration impacts on the quality of monoclonal antibodies. These translational findings will aid the quality assurance of a wide range of medicines during their distribution from the manufacturer to the clinic.
- Provided unique opportunities for research and learning for several PhD and Masters students.
- Created a new network of researchers, engineers, clinicians, regulators, pharmacists, patients and transport experts. This has benefited and added value to their practice and research.
- Provided patients and clinicians at St Mary's Hospital with an exciting project to get involved in, with opportunities for participation, understanding and engagement that will improve the experience for all parties.
- Enabled closer collaborative working with local aviation stakeholders (e.g. HEMS, NPAS, Thorney Island Microgliding Club) to allow continuous safe operations whilst conducting uncrewed flights.

### **Improvement opportunities**

The project delivered significant insights for the NHS, and gave a better understanding of the benefits that the use of UAS can bring to its patients and staff. There were a number of key learning points that Apian will take forward to future projects;

- Flights were significantly impacted due to the extreme weather conditions that the UK experienced during Storm Dudley, Storm Eunice and Storm Franklin earlier in 2022. As a result of these meteorological conditions, the set timeframes of one of the Temporary Danger Areas (TDAs) was impacted. Therefore, we will;
  - Conduct meteorological analysis to forecast the number of flying days and ensure, within project acceptance levels, the understanding that extreme weather conditions are not always reliably forecasted.

- Continue to engage with the CAA and aviation community to integrate UAS operations without the need of segregated airspace, whilst acknowledging that TDAs may be required to help us achieve this goal.
- Feedback from the General Aviation community requested greater coordination of UAS operations and projects. Therefore, we will;
  - Coordinate future plans within the Solent region by working with the Future Transport Zone (FTZ), whose overarching strategy is to remove the need for Temporary Danger Areas, and deploy technology that will support UAS operating in non-segregated airspace.
  - Continue to support UAS community groups such as the Drone Industrial Action Group and the BVLOS forum established by NATS.
- We will continue to be open and inclusive and share a report summary of our projects (like this) where appropriate with our stakeholders.