EAHM INNOVATION AWARD 2019
DRONES IN ACTION FOR PUBLIC HEALTH

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1. INTRODUCTION

The EOC group operates several hospitals spread throughout the region of Ticino. In the city of Lugano there are two active hospitals with a total of 320 beds. In the smaller hospital, there is an emergency unit and a small blood-testing laboratory, but this is not open around the clock. For this reason, blood samples from patients in the emergency unit are being transported to the main hospital's blood-testing laboratory, which operates 24/7. Previously, these transport operations were handled by using taxis, which are time-consuming, cost-intensive, inefficient and not environmentally friendly. In order to change this situation, the EOC Group has partnered with Swiss Post. They have launched a project that represents a worldwide premiere using autonomous drones to solve this problem in an ecological and efficient way. In the coming years the Swiss Post plans to implement this solution also with other hospital groups in Switzerland. The following challenges are posed by the previous transport method of "taxi on demand":

2. Availability / SLA

No service level agreement is in place and could be defined. Taxis are booked by telephone when needed. Availability depends on current capacity and is not guaranteed.

2.1. Time

The time needed by taxi transportation represents a loss in treatment quality for the patient. The earlier a diagnosis can be made, the better. Booking a taxi and waiting for it to arrive takes time and so does the journey through the congested streets and traffic lights of the city. If a taxi is not available, this can cause even greater delays. The drone transport takes always 5 minutes independently of the traffic conditions.

2.2. Costs

Like all the healthcare industry, EOC is under an increasing cost pressure. The blood transport costs arise from the sum of the price of the taxi trip *and* the process costs.

3. MATERIALS AND METHODS

The solution is to use a transport drone to link the two hospitals. This drone flies completely autonomously from Hospital Italiano (smaller hospital) to Hospital Civico. Flying speed of the drone is approx. 70 Km/h and the drone has a payload capacity of 2 Kg. Landing stations for take-off and landing have been installed at both hospitals. The flight route has been carefully chosen to minimize the risk of damage in case of an emergency landing. For instance, daytime flights do circumnavigate the University campus, as there are often large gatherings of students during this time.

4. RESULTS AND DISCUSSION

The transport drone addresses the primary challenges posed by the previous "Taxi method". It facilitates a more efficient logistics process with major benefits for both the hospital and the patients. All this using the newly available autonomous drone technology as well as the newly developed regulatory frame.

4.1. Availability / SLA

The drone is available immediately and at all times. If it cannot be deployed due to severe weather conditions or other similar reasons, arrangements for a taxi transport are automatically organised.

4.2. Process

The initiation costs are reduced significantly. It is no longer necessary to order a taxi by phone and wait for it to arrive; the drone can be launched at any time at the touch of a button on a smartphone.

4.3. Time

The time required for transportation is reduced by up to 70%. This is due to the short flight time (currently approx. 5 minutes) and to the fact that the drone is available immediately at all times.

4.4. Costs

Process costs are lowered by up to 80%, and the prices for transportation itself are already marginally lower than the costs for a taxi.

4.5. Environmental impact

The ecological aspect should not be underestimated. A taxi journey involves shifting around 1.5 tonnes in weight and a driver from one hospital to the other in order to transport a load of less than 1 kg of blood samples. Whereas the drone weighs around 10 kg and can carry the same quantity of blood samples between hospitals.

Figure 1: Location of the hospitals in Lugano (excerpt from Tagesschau report)

Figure 2: Swiss Post's drone landing

Figure 3: A deployed drone above the Ospedale Civico in Lugano