

Chapter 58

Using Unmanned Aerial Vehicles to Deliver Medical and Emergency Supplies to Remote Areas

Isaac Levi Henderson

 <https://orcid.org/0000-0002-8558-1435>

Massey University, New Zealand

Savern L. Reweti

Massey University, New Zealand

Robyn Kamira

Incredible Skies Ltd, New Zealand

ABSTRACT

This chapter examines the role of unmanned aerial vehicles (UAVs) in the delivery of medical and emergency supplies to remote areas. It outlines a number of potential considerations for operators wishing to use UAVs to deliver medical and emergency supplies to remote areas. These considerations address a number of practicalities in terms of the organisation that is wishing to conduct such operations, the operations themselves, and the technology that is used for such operations. These considerations primarily stem from the nature of the international regulatory framework for unmanned aircraft operations and the peculiarities of using a UAV to deliver medical and emergency supplies. The chapter will outline some of the practicalities that have been worked through or are being worked through during a project to deliver medical and emergency supplies in Northland, New Zealand. This will provide readers with examples of some of the real-world considerations that operators face as well as outline the positive community impact that such operations can provide.

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INTRODUCTION

Thiels, Aho, Zietlow, and Jenkins (2015) argue that the speed and ability to travel over closed roads and terrain make UAVs ideal candidates for transporting medical supplies, especially given that this can likely be done at a lower cost than conventional medical transport. According to the Swiss Foundation for Mine Action (2016), 60% of humanitarian workers favour the use of UAVs in humanitarian work, with 36% of humanitarian workers considering the use of UAVs for delivery to be of the most interest. Indeed, there have been many trials of the use of UAVs to deliver medical and emergency supplies to remote areas, such as collecting the sputum samples of patients with suspected tuberculosis from remote parts of Papua New Guinea (Médecins Sans Frontières, 2014) and reducing waiting times for human immunodeficiency virus (HIV) testing in infants in Malawi (UNICEF, 2016). Unfortunately, the academic literature on the use of UAVs to deliver medical and emergency supplies is somewhat limited, especially in terms of the practicalities that must be worked through for such an operation to take place. Accordingly, this chapter provides a foundation for practitioners and researchers by working through some of these practicalities.

Due to the lack of international standardisation and the current global regulatory environment for UAV operations, a number of practicalities result from compliance issues with the use of UAVs to deliver medical and emergency supplies (Swiss Foundation for Mine Action, 2016; Thiels et al., 2015). Article 8 of the Convention on International Civil Aviation states that any aircraft capable of being flown without a pilot shall not be flown over a State without a pilot unless special authorisation has been given by that State (CASA, 2017). The complicating factor to this is that the International Civil Aviation Organisation (ICAO) is still in the process of creating a global regulatory framework for unmanned aircraft operations. Currently, there are two major groups within ICAO working towards this end. First, there is the Unmanned Aircraft Systems Advisory Group (UAS-AG), who support the Secretariat in the development of guidance material and are currently working on a common global framework for and core boundaries of unmanned aircraft system traffic management, known as UTM (ICAO, 2018b). Second, there is the Remotely Piloted Aircraft Systems Panel (RPASP) who are developing ICAO Standards and Recommended Practices (SARPs), procedures and guidance material for unmanned aircraft so that they can be integrated within the broader aviation system (ICAO, 2018a). While this work is ongoing, ICAO signatory states are without sufficient international standards to use for creating local regulatory requirements. In terms of using UAVs to deliver emergency and medical supplies, this creates the issue of a lack of standardisation across states and the issue of individual states having regulatory authorities who may be reluctant to approve or certificate such operations because they don't fit well within the current regulatory framework (i.e., a framework oriented towards manned aircraft operations). This chapter outlines a number of common considerations that arise due to compliance issues based upon current and proposed regulations in several countries (see Appendix for a list of countries and regulatory authorities).

In addition to compliance issues, practicalities arise due to the operational/technological requirements that are intrinsic to using UAVs to deliver medical and emergency supplies. To date, UAVs have been used to deliver medicine, diagnostics/production samples, defibrillators, blood, food and water, first aid kits, organs and vaccines (Krey, 2018; Scott & Scott, 2017). Claesson et al. (2016) describe some of the difficulties that arose when testing the use of UAVs to deliver automated external defibrillators (AEDs) to patients experiencing out-of-hospital cardiac arrests in rural areas. For example, they found that parachute-release methods for delivery caused uncertainty about where the AED would land due to wind-drift, and thus they found that a latch-release method was safer and more effective (this involved the UAV flying at about 3-4m and a bystander catching the AED). Scott and Scott (2017) note that one

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