A Case Study in the Eastern Cape: Drone Logistics for Chemotherapy and Pathology in Remote Healthcare

S, i, z, w, e, M, b, a, t, h, a, ,, T, h, a, n, d, i, w, e, N, k, o, s, i, ,, J, a, n, v, a, n, d, e, r, M, e, r, w, e

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Abstract

Remote clinics in the Eastern Cape, South Africa, face considerable logistical challenges in transporting time-sensitive chemotherapy drugs and pathology samples. Extended road travel over difficult terrain risks compromising drug efficacy and delays critical diagnostic results, adversely affecting patient care. This case study aimed to evaluate the operational feasibility and initial perceived impact of a drone logistics system for delivering chemotherapy drugs and pathology samples between a central hospital and remote clinics in this region. An operational research approach was employed. A drone delivery corridor was established. Data were collected on delivery times, system reliability, and temperature control for drugs. Qualitative feedback from healthcare staff regarding the service's utility and integration into existing workflows was also gathered. Drone delivery reduced the average transport time for pathology samples by 85% compared to road transport. Chemotherapy drugs were maintained within their required temperature range throughout all flights. Healthcare staff reported reduced anxiety regarding drug spoilage and valued the faster turnaround time for pathology results. The drone logistics system proved operationally feasible in this remote setting. It addressed key supply chain challenges for oncology care, demonstrating potential to improve the timeliness and reliability of essential medical deliveries. Further studies should assess long-term clinical outcomes and

cost-effectiveness. Scaling the service requires addressing regulatory approvals, community engagement, and sustainable funding models. Integration with national health logistics systems is crucial for long-term success. Medical drones, logistics, chemotherapy, pathology, remote healthcare, operational research, South Africa. This case study provides practical, real-world evidence from a rural African context on implementing drone technology to strengthen oncology supply chains, offering a model for similar underserved regions.