



SEIR MODELLING THE DRONE DISININFECTION IMPACT ON PANDAMIC

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Abstract

The utilization of automated airborne vehicles (UAVs) is developing quickly across numerous common application spaces, including ongoing checking, giving remote inclusion, distant detecting, search and salvage, conveyance of merchandise, security and observation, exactness agribusiness, and common foundation assessment. Brilliant UAVs are the following huge transformation in the UAV innovation promising to give new open doors in corona virus sanitization operation as far as decreased dangers and lower cost. Common framework is expected to rule more than \$45 Billion market estimation of UAV utilization. In this paper, we present SEIR model to examination of before and after effects of drone disinfection and their difficulties. We likewise examine the impact on orthopaedics specialists.

Introduction

Overall Corona virus (COVID-19) has influenced the everyday existence of individuals, organizations, makers, and even the medical services area. Corona virus is an infection that spreads from individual to individual and affected worldwide life and economies. The essential manifestation of this infection is fever, dry hack, breathing issue, chills, bone and muscle torment. No immunization is accessible up until this point, and different medications have been attempted to treat the side effects. There is a prerequisite of appropriate insurances like wearing covers, the utilization of gloves, and ordinary hand washing. This COVID-19 has additionally influenced the muscular health field by which specialists are not sufficiently focusing on their customary patients. With the pandemic, there is a lack of specialists and care staff and even the ventilators, medication and other hardware and gadgets. Specialists recognize a disturbing deficiency of basic muscular health devices. 1,2 Orthopedics specialists are being redeployed for treating COVID-19 patients. This infection influences the bone and joints of the patient, and there is a necessity of necessary preparing to the muscular health network to comprehend the side effects of this sickness. Performing muscular health and injury medical procedure has become a huge test with the non-accessibility of clinic staff and activity offices. This infection makes torment the patient who gets unequipped for performing everyday functions. 3 It significantly affects the assembling of muscular health inserts, apparatuses, instruments and routine continuous exploration and development. The huge impacts of COVID-19 in the field of muscular health are appeared.

Huge quantities of assessments of clinical understudies are delayed to confine the spread of the disease. Study hall instructing is additionally suspended in practically all clinical schools, and even standard examination is likewise influenced. Because of the quick spread of this infection, worldwide exchanges have gone down with significant monetary misfortune and non-accessibility of merchandise/crude material as expected. There is an interruption of the worldwide production network and expanding danger to the life of medical services workers. 4 The medical care industry is colossally influenced and confronting numerous misfortunes. Indeed,

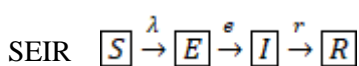
even the innovative work mission has ended to a degree. The life of patients with musculoskeletal problems with bone and joint torments is undermined. In the current situation, there is a necessity of legitimate wellbeing observing of illness and precautionary measure. There are a few answers for moderate the dangers from COVID-19, which are as under: All muscular health related gatherings can be led on the web or through sound and video call, Alert for the medical problems of future Improvement of the experience and work proficiency of muscular health surgeon, Better insurance of clinic staff, Better supporting for complex cases, Patient getting more mindful and avoid potential risk. There is a necessity of patient wellbeing at need and contamination control conventions. Some insurance should embrace, for example, close contact, cover mouth, washing of hands; and so on This infection is influencing the everyday practice of muscular health specialists. They are compelled to drop their expert visits in far off regions and even in their customary facilities. Those patients who need crisis therapy and affirmation (like injury, intense diseases and tumors and so forth) need to have a base required a clinic remain, to maintain a strategic distance from the impact of this infection on their systems.⁵ In Bhopal, non-dire methods requiring >23 h of Hospitalization (e.g., knee and hip arthroplasty, spinal deformation rectifications and so on) have been deferred or cancelled.⁶ Most of the arranged muscular health medical procedure can be securely embraced at an advantageous time and can be rescheduled for a later period. During the COVID-19 emergency, there is a need to emergency the patients and dodge pointless affirmation identified with minor injury and different illnesses.

There is likewise a requirement for not calling the patients to the emergency clinic beyond what many would consider possible, for normal registration and minor issues. Albeit non-critical facilities and surgeries should be deferred until the circumstance improves, it should be guaranteed to keep up the nature of care gave to the patients. The development of such an emergency gives an ideal open door for us to reflect and assess the utilization of novel innovations in the workplace.⁶ the patients can be directed utilizing cutting edge innovations in correspondence, e.g., Email, Whatsapp, telemedicine, computer generated reality, and holography.

We are committed to guarantee the general security of our patients and furthermore the medical clinic staff. ⁷ They have recorded the needs as per the significance of looking after crisis Medical procedure capacities, securing and saving the careful labor force, satisfying substitute careful jobs and satisfaction of exchanged non-careful jobs, whenever required. Corona virus has introduced a huge test that is delivering enormous quantities of patients quickly and the medical services suppliers should be equipped to cooperate to respond to this call to save humankind, notwithstanding putting themselves to a more serious danger of procuring this disease. On the positive side, there are a few favorable circumstances that can be inferred by the Orthopedics specialists from this catastrophe like upsetting themselves, away from the radiation openness, the occasion to complete the process of forthcoming positions like exploration, and distributions, and, above all investing quality energy with their family.

SEIR models

These models have an extra compartment for those individuals who have acquired the infection but are still not infectious to others. This is the latest period and it is often parameterized as the inverse of the incubation period. Note, however, that for many diseases, initiation of infectiousness does not necessarily coincides with symptoms. In principle, any disease described by the SIR model can also be described by the SEIR model. The decision regarding the use of one or another depends on the magnitude of the latent period in relation to the time frame of other events in the simulation.



SEIR MODELS:

$$L_{t+1} = \beta S_t \frac{(I_t + \theta)^\alpha}{N_t + n_t}$$

$$E_{t+1} = (1 - e)E_t + L_{t+1}$$

$$I_{t+1} = eE_t + (1 - r)I_t$$

$$S_{t+1} = S_t + B - L_{t+1}$$

$$R_{t+1} = N_t - (S_{t+1} + I_{t+1} + E_{t+1})$$

Let L_{t+1} number of newly infected individuals at time, E number of exposed but not infectious individuals at time t, I_{t+1} number of infectious individuals at time t, R_{t+1} number of recovered individuals at time t, β contact rate, θ number of infectious visitors, α mixing parameter (means homogeneous mixing) n number of visitors, N population ,B susceptible pool replenishment and S number of susceptible individuals

Results and discussion

Spraying of sanitizer through Drones is prioritized for Hot spots and Containment areas identified by the District Administration / Chief Medical Officer. This is followed by Isolation areas, Quarantined areas, Shelter Homes and other places where manual spraying is difficult. The areas where Drones are to be deployed is decided by a team of Health officers & Sanitary Supervisor from Bhopal Smart City. The Drone team first visits the area planned to be sanitized for the day and makes a quick visual survey of the terrain, buildings and surroundings and chalks out a flight path to be followed by the Drone figure 1 shows the area sprayed by the drone and drone in action is shown in figure 2.



Figure 2 disinfected area: Bhopal Smart City Corp.Ltd, Building – 6.6Acres



Figure 3 Drones infesting action

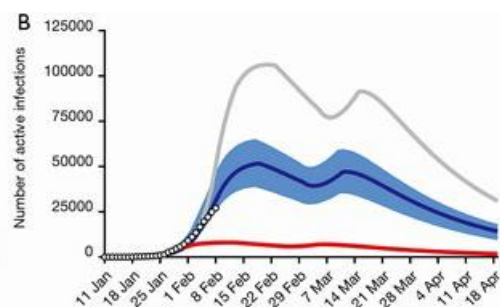


Figure 1: Dynamics of a SEIR-modeled population over time after disinfection.

The dip in the graph occurs during the drone disinfection operation. Hence drone based can be used in bringing down the number of cases.

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