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RING VACCINATION FOR THE MITIGATION OF EBOLA IN DEMOCRATIC REPUBLIC OF CONGO

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On 1 August 2018, the Ministry of Health of the Democratic Republic of the Congo (DRC) declared a new outbreak of Ebola virus disease (EVD) in North Kivu Province. Interim results from the Guinea Ebola ring vaccination trial suggest high efficacy of the rVSV-ZEBOV vaccine [1]. These findings opened the door to the use of ring vaccination strategies in which the contacts and contacts of contacts of each index case are promptly vaccinated to contain future Ebola virus disease outbreaks. To provide a numerical estimate of the effectiveness of ring vaccination strategies we introduce a spatially explicit agent-based model to simulate Ebola outbreaks, structurally similar to previous modelling approaches [2, 3], and informed with detailed epidemiological data on reproduction number, key time periods, and risk factors [4]. We find that ring vaccination can successfully contain an outbreak for values of the effective reproduction number up to 1.6 [5]. Through an extensive sensitivity analysis of parameters characterising the readiness and capacity of the health care system, we identify interventions that, alongside ring vaccination, could increase the likelihood of containment. In particular, shortening the time from symptoms onset to hospitalisation to 2-3 days on average through improved contact tracing procedures, adding a 2km spatial component to the vaccination ring, and decreasing human mobility by quarantining affected areas might contribute increase our ability to contain outbreaks with effective reproduction number up to 2.6 [5]. These results have implications for the control of Ebola and other emerging infectious disease threats.

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