Assessing the effects of modeling the spectrum of clinical symptoms on the dynamics and control of Ebola

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1. Introduction

The 2014–15 Ebola outbreak in West Africa, which presented a serious threat to global public health, was declared a “public health emergency of international concern” by the WHO on August 8, 2014 (WHO, 2016). The Ebola virus is transmitted among humans through close contact with bodily fluids of infected ill and dead persons, including blood, secretions, etc. WHO Ebola Response Team (2014). Symptoms of Ebola infection vary widely, but commonly include fever, fatigue, loss of appetite, vomiting, diarrhea, and headache, as well as hemorrhagic symptoms (WHO Ebola Response Team, 2014). For the 2014–15 West African Ebola outbreak, 87% of infected individuals exhibited fever, the most commonly reported symptom. And some hemorrhagic symptoms are rarely reported (<5.7%) (WHO Ebola Response Team, 2014). This suggests that infected individuals experience a range of symptoms from mild to severe. Asymptomatic infections are quite possible, as shown in previous Ebola outbreaks (Heffernan et al., 2005; Leroy et al., 2000).

In the past year, two studies analyzed minimally symptomatic and asymptomatic ebola in the 2014–15 outbreak. Bower et al. tested 933 people in Kerry town, Sierra Leone, and found evidence of asymptomatic ebola in roughly 2.6% of the population studied. Additionally, 12% reported some symptoms and although they were undiagnosed, tested positive for Ebola antibodies (Bower et al., 2016). A slightly smaller survey by Richardson et al. on minimally symptomatic Ebola reported that up to 25% of Ebola infections may have been minimally symptomatic (Richardson et al., 2016), which