Table S1

Parameter	Description	Value	Prior bounds	Units
$\log_{10} R_0$	basic reproduction number	$\log_{10} 4.9$	$[0, 3]$ [1, 2, 3, 4, 5, 6]	
$\log_{10} r$	initial viral growth rate	$\log_{10} 6.56$	$[0, 2]$ [1, 2, 3, 4, 5, 6]	day^{-1}
$\log_{10} \delta_I$	infected cell decay rate	$\log_{10} 2$	$[-1, 2]$ [7]	day^{-1}
$\log_{10}(\delta_{Vinf} - \delta_{Vtot})$	difference between infectious and total virion decay rates	$\log_{10} 2$	$[-2, 2]$ [8]	day^{-1}
$\log_{10} \delta_{Vtot}$	total virion decay rate	$\log_{10} 8$	$[0, 2]$ [7]	day^{-1}
$\log_{10} T_0$	initial number of target cells	$\log_{10}(7 \times 10^7)$	$[7, 8]$ [8]	target cell
$\log_{10} g$	target cell regrowth rate	$\log_{10} 0.8$	$[-10, 0.5]$ [9, 10, 11, 12, 13]	day^{-1}
$\log_{10} p_{Vratio}$	ratio of production of total to infectious virions	$\log_{10}(4 \times 10^4)$	$[0, 6]$	
$\log_{10} \alpha$	the number of RNA copies/100μL of nasal wash corresponding to one virion	$\log_{10} 0.01$	$[-3, -1]$	RNA copies/100μL virion^{-1}
$\log_{10} \gamma$	the initial ratio of total to infectious virions	$\log_{10}(4 \times 10^4)$	$[0, 5]$	
$\log_{10} V_{inf0}$	the number of infectious virions upon exposure	$\log_{10} 1$	$[0, 3]$	virion
$\log_{10} \beta$	infectivity parameter	$\log_{10}(5 \times 10^{-7})$	$[-12, -4]$ [7]	virion^{-1} day^{-1}
$\log_{10} p_{Vinf}$	production rate of infectious virions by infected cells	$\log_{10} 12.6$	$[-6, 6]$ [7]	virion infected cell^{-1} day^{-1}

References

[1] Handel A, Longini Jr IM, Antia R. Neuraminidase inhibitor resistance in influenza: assessing the danger of its generation and spread. PLoS Comput Biol. 2007;3(12):e240. doi:10.1371/journal.pcbi.0030240.

[2] Miao H, Hollenbaugh JA, Zand MS, Holden-Wiltse J, Mosmann TR, Perelson AS, et al. Quantifying the early immune response and adaptive immune response kinetics in mice infected with influenza A virus. J Virol. 2010;84(13):6687–6698. doi:10.1128/JVI.00266-10.

[3] Pawelek KA, Huynh GT, Quinlivan M, Cullinane A, Rong L, Perelson AS. Modeling within-host dynamics of influenza virus infection including immune responses. PLoS Comput Biol. 2012;8(6):e1002588. doi:10.1371/journal.pcbi.1002588.

[4] Saenz RA, Quinlivan M, Elton D, MacRae S, Blunden AS, Mumford JA, et al. Dynamics of influenza virus infection and pathology. J Virol. 2010;84(8):3974–3983. doi:10.1128/JVI.02078-09.

[5] Smith AM, Perelson AS. Influenza A virus infection kinetics: quantitative data and models. Wiley Interdiscip Rev Syst Biol Med. 2011;3(4):429–445. doi:10.1002/wsbm.129.

[6] Baccam P, Beauchemin C, Macken CA, Hayden FG, Perelson AS. Kinetics of influenza A virus infection in humans. J Virol. 2006;80(15):7590–7599. doi:10.1128/JVI.01623-05.

[7] Petrie SM, Butler J, Barr IG, McVernon J, Hurt AC, McCaw JM. Quantifying relative within-host replication fitness in influenza virus competition experiments. J Theor Biol. 2015;382:259–271. doi:10.1016/j.jtbi.2015.07.003.

[8] Petrie SM, Guarnaccia T, Laurie KL, Hurt AC, McVernon J, McCaw JM. Reducing uncertainty in within-host parameter estimates of influenza infection by measuring both infectious and total viral load. PLoS ONE. 2013;8(5):e64098. doi:10.1371/journal.pone.0064098.

[9] Möhler L, Flockerzi D, Sann H, Reichl U. Mathematical model of influenza A virus production in large-scale microcarrier culture. Biotechnol Bioeng. 2005;90(1):46–58. doi:10.1002/bit.20363.

[10] Handel A, Longini Jr IM, Antia R. Towards a quantitative understanding of the within-host dynamics of influenza A infections. J R Soc Interface. 2010;7(42):35–47. doi:10.1098/rsif.2009.0067.

[11] Lee HY, Topham DJ, Park SY, Hollenbaugh J, Treanor J, Mosmann TR, et al. Simulation and prediction of the adaptive immune response to influenza A virus infection. J Virol. 2009;83(14):7151–7165. doi:10.1128/JVI.00098-09.

[12] Hancioglu B, Swigon D, Clermont G. A dynamical model of human immune response to influenza A virus infection. J Theor Biol. 2007;246(1):70–86. doi:10.1016/j.jtbi.2006.12.015.

[13] Bocharov GA, Romanyukha AA. Mathematical model of antiviral immune response III. Influenza A virus infection. J Theor Biol. 1994;167(4):323–360.