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Integrating viral kinetics into routine outbreak surveillance: challenges, opportunities, and lessons from COVID-19

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Viral kinetics provide crucial insights into the biology and epidemiology of infections, with direct implications for basic science, therapeutics development, and policy. The COVID-19 pandemic showcased the power of viral kinetics surveillance and modelling; however, our understanding of viral kinetics has been limited to retrospective analyses, convenience samples, and bespoke models. To strengthen responses to ongoing and emerging outbreaks, we argue that viral kinetics should be a core component of pathogen surveillance. Building upon insights gained during the COVID-19 pandemic, we review ways that continuous viral kinetic surveillance supports infectious disease response by informing epidemiological parameters, development and deployment of therapeutics, and adaptive policy design. To achieve this, various challenges must be addressed regarding data standards, study design, and communication. We advocate for the creation of a global, living library of viral kinetics data, with associated data sharing standards, modelling toolkits and on-demand epidemiological reports. Successfully integrating viral kinetics into active disease surveillance efforts will support both active outbreak response and improve the knowledge base vital for pandemic preparedness.

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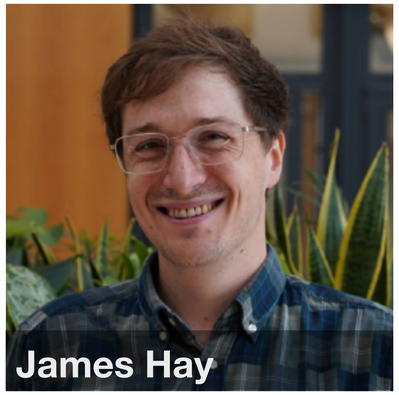

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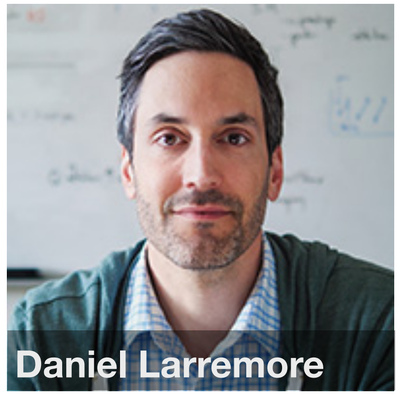

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What do we mean by viral kinetics?