



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

the rash has cleared, and for contacts of a confirmed case to isolate for 21 days after exposure.

Rapid point-of-care diagnostics will be an important tool for controlling the spread of infection. Here, we report the characteristics of a prototype lateral flow assay that uses a cocktail of four monoclonal antibodies specific for Old World orthopoxviruses.³ The monoclonal antibodies do not recognise New World orthopoxviruses or members of the *Parapoxvirus*, *Leporipoxvirus*, or *Suipoxvirus* genera.³

Few lateral flow assays were available for preliminary testing using sucrose gradient-purified Modified Vaccinia Ankara in assay sample buffer. Initial titration established a sensitivity limit of between 10^{4.5} and 10⁵ plaque-forming units (appendix p 1). Testing conducted in clinical sample buffer, taken from a standard COVID-19 rapid test kit (BBI Solutions, Crumlin, UK), showed the same sensitivity limit. Testing in human saliva resulted in approximately 1 log reduction in sensitivity. However, if saliva was diluted 1:4 (v/v) in clinical sample buffer the reduction in sensitivity was around 0.5 log. Considering the high concentration of monkeypox virus and the antigen expected on skin and in oral lesions, the sensitivity limit of this assay should be applicable to virus detection in a clinical setting.

Our data show the potential of this lateral flow assay for rapid sensitive detection of *Orthopoxvirus*, which needs to be urgently confirmed with clinical samples from patients with monkeypox. Vaccinia and cowpox viruses are associated with the *Orthopoxvirus* genus known to infect humans. However, these infections are very rare and have a different clinical presentation to monkeypox. Consequently, by corroborating with clinical presentation, the lateral flow assay could provide a powerful point-of-care diagnostic for monkeypox, which will enhance disease control efforts.

MWC received funding from the US FDA to provide materials for this research. PH received the tecoviramat drug from Siga Technologies for an expanded access protocol for monkeypox treatment in Central African Republic. All other authors declare no competing interests.

David O Ulaeto, Steve G Lonsdale, Stephen M Laidlaw, Graeme C Clark, Peter Horby, *Miles W Carroll
miles.carroll@ndm.ox.ac.uk

Chemical, Biological and Radiological Division, Defence Science and Technology Laboratory, Salisbury, UK (DOU, SML, GCC); Pandemic Sciences Institute, Nuffield Department of Medicine, Oxford University, Oxford OX3 7BN, UK (SGL, PH, MWC)

- 1 Adler H, Gould S, Hine P, et al. Clinical features and management of human monkeypox: a retrospective observational study in the UK. *Lancet Infect Dis* 2022; published online May 24. [https://doi.org/10.1016/S1473-3099\(22\)00228-6](https://doi.org/10.1016/S1473-3099(22)00228-6).
- 2 UK Health Security Agency. Monkeypox cases confirmed in England—latest updates. 2022. <https://www.gov.uk/government/news/monkeypox-cases-confirmed-in-england-latest-updates> (accessed June 27, 2022).
- 3 Ulaeto DO, Pulford D, Smith J, et al. Differential recognition of orthopoxviruses by antibodies to vaccinia IMV proteins. XIII International Poxvirus and Iridovirus Symposium; Sept 2–6, 2000 (abstr P29).

Crown Copyright © 2022 Published by Elsevier Ltd. All rights reserved.

Is the UK prepared for seasonal influenza in 2022–23 and beyond?

Non-pharmaceutical interventions for COVID-19 have resulted in very low levels of circulating influenza globally. However, now that these pandemic control measures have been abandoned in the UK, the return of influenza as a major public health issue appears inevitable. There has been a rapid rise in influenza A notifications in Australia, which started earlier than usual and as of writing are tracking at record high numbers (figure). These data from Australia help predict what is to come in the northern hemisphere in the winter of 2022–23.

As of June 19, 2022, 85% of influenza cases in Australia were due to influenza A (H3N2),¹ which is known to cause more severe epidemics.² The sharp increase in cases was probably

driven by relaxation of measures put in place to mitigate the COVID-19 pandemic and the low proportion of the population vaccinated against influenza. In addition, there has been little natural influenza infection for the past 2 years. As a result, herd immunity against currently circulating viruses is probably substantially lower compared with previous years, a situation exacerbated by the entire cohort of children younger than 2 years who have never been exposed to influenza.

Uptake of the seasonal influenza vaccine has been declining in Australia and the UK, including in those at risk of severe disease, such as pregnant women and children.^{3,4} Influenza vaccination rates also dropped in UK health-care workers from 77% in 2020–21 to 61% in 2021–22, when the vaccine was offered concomitantly with the COVID-19 booster.³ Public attention is focused on COVID-19 and potential autumn booster vaccinations, and safety concerns and mistrust of COVID-19 vaccines might result in enhanced hesitancy towards the influenza vaccine. Barriers to vaccination should be addressed by engaging with communities, including members of minority ethnic groups, and training vaccinators to emphasise the safety and efficacy of coadministering COVID-19 and influenza vaccines.

The measures taken to control the COVID-19 pandemic have created new challenges for managing seasonal influenza. The Australian data provide a warning for an earlier and more severe influenza season in the northern hemisphere. The UK Joint Committee on Vaccination and Immunisation decision to remove those aged 50–64 and 11–15 years from the groups eligible for the 2022–23 influenza vaccine should be reconsidered.⁵ Children are responsible for most influenza transmission, as in Australia, where 10–14 year olds currently have one of the highest infection rates.¹

See Online for appendix



Published Online
August 3, 2022

[https://doi.org/10.1016/S1473-3099\(22\)00503-5](https://doi.org/10.1016/S1473-3099(22)00503-5)

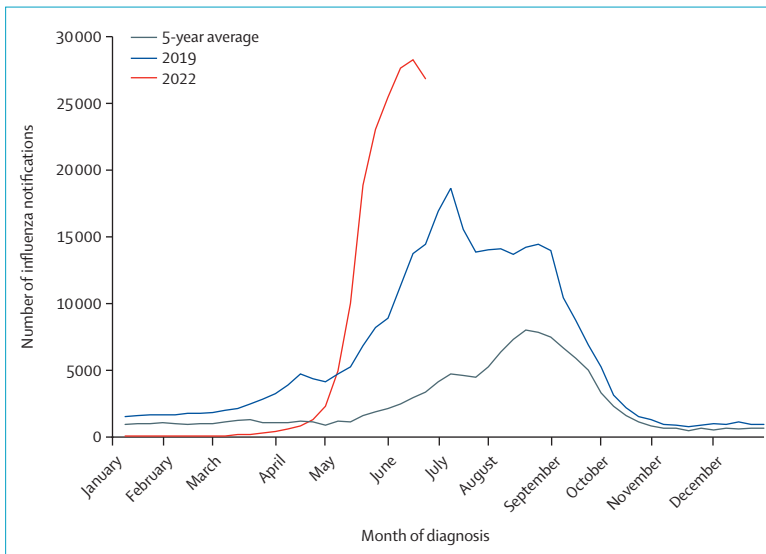


Figure: Notifications of laboratory-confirmed influenza in Australia

The 5-year average is based on notifications from Jan 1, 2017, to June 19, 2022. The figure was adapted from the Australian Government Department of Health and Aged Care.¹

Therefore, vaccinating children aged 11–15 years is particularly important. However, for this to be effective, vaccine campaigns should start early and disparities in the vaccination of groups at high risk of infection (eg, health-care workers and children) must be addressed.

DP reports a doctoral research fellowship from the National Institute for Health and Care Research. IB reports shares in CSL. SGS reports support from WHO “to conduct a systematic review, appraisal and grading of evidence on repeat seasonal influenza vaccination” and the National Institutes of Health (R01AI141534); OptumLabs research credits through the University of California (no funding received, but access to data granted for 1 year); participation in advisory boards (no remuneration received) for influenza vaccines at Seqiris and Sanofi; serving as an unpaid member of the WHO Strategic Advisory Group of Experts on Immunization Working Group on Influenza from 2017 to 2021; being, since 2011, an observer or

invited member of the National Influenza Surveillance Committee (unpaid); and funding to her employer, the WHO Collaborating Centre for Reference and Research on Influenza, for the development of influenza vaccines from Sanofi and International Federation of Pharmaceutical Manufacturers and Associations. TWC reports consulting fees from Biofire/BioMerieux, QIAGEN, Cepheid, Sanofi, and Roche/Shionogi; payment from QIAGEN, Biofire/BioMerieux, and Janssen for a diagnostics educational event and presentations at conferences; participating on a data and safety monitoring board for Roche/Shionogi for an influenza antiviral trial; and receiving equipment from Biofire/BioMerieux and QIAGEN for independent trials of respiratory virus diagnostics. JWT and MP report an investigator-led grant paid to their institution from Sanofi, outside the submitted work. MP reports grants paid to their institution, from Gilead Sciences and consulting fees from QIAGEN, outside the submitted work. All other authors declare no competing interests.

*Joshua Nazareth, Daniel Pan,
Christopher A Martin, Ian Barr,*

*Sheena G Sullivan, Iain Stephenson,
Amandip Sahota, Tristan W Clark,
Laura B Nellums, Julian W Tang,
*Manish Pareek
mp426@le.ac.uk*

Department of Respiratory Sciences, University of Leicester, Leicester, UK (JN, DP, CAM, JWT, MP); Department of Infection and HIV Medicine (JN, DP, CAM, IS, AS, MP) and Department of Clinical Microbiology (JWT), University Hospitals of Leicester NHS Trust, Leicester, UK; The Peter Doherty Institute for Infection and Immunity, Melbourne, VIC, Australia (IB, SGS); School of Clinical and Experimental Sciences, University of Southampton, Southampton, UK (TWC); Lifespan and Population Health, School of Medicine, University of Nottingham, Nottingham, UK (LBN)

- 1 Australian Government Department of Health and Aged Care. Australian influenza surveillance report—no 06—fortnight ending 19 June 2022. June 24, 2022. <https://www1.health.gov.au/internet/main/publishing.nsf/Content/ozflu-surveil-no06-22.htm> (accessed June 30, 2022).
- 2 Hansen CL, Chaves SS, Demont C, Viboud C. Mortality associated with influenza and respiratory syncytial virus in the US, 1999–2018. *JAMA Netw Open* 2022; **5**: e220527.
- 3 UK Health Security Agency. National flu immunisation programme 2022 to 2023 letter. 2022. <https://www.gov.uk/government/publications/national-flu-immunisation-programme-plan/national-flu-immunisation-programme-2022-to-2023-letter> (accessed June 30, 2022).
- 4 Van Buynder PG, Newbound A, MacIntyre CR, Kennedy AT, Clarke C, Anderson J. Australian experience of the SH21 flu vaccination program during the COVID-19 vaccine program. *Hum Vaccin Immunother* 2021; **17**: 4611–16.
- 5 Joint Committee on Vaccination and Immunisation. Reimbursable vaccines and eligible cohorts for the 2022/23 NHS Seasonal Influenza (flu) Vaccination Programme. 2022. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1081646/Tripartite_annual_flu_letter_2022_to_2023_V2.pdf (accessed June 30, 2022).