SPI-M inquiry – Christopher Overton, University of Manchester

Prior to the pandemic, I was a PhD student at the University of Liverpool, working on modelling population dynamics, including evolution and epidemics. I submitted my thesis on 31st January 2020. From 3rd February 2020 I started as a research associate at the University of Manchester working in infectious disease modelling. With the emergence of COVID-19, my project was changed to COVID-19 research. In the early stages, I was not a member of SPI-M directly, but contributed through Professors Pellis, House and Hall at the University of Manchester. My contributions were mostly related to time delay distributions, describing the distribution of time between epidemiological events for COVID-19, for example the time it takes a patient to develop symptoms after infection, the time from infection to hospital admission (or other healthcare seeking behaviour), the time from infection to death, and hospital length of stay. Three peer-reviewed publications summarising the contributions from these early days are:

- Pellis, L., Scarabel, F., Stage, H.B., Overton, C.E., Chappell, L.H., Fearon, E., Bennett, E., Lythgoe, K.A., House, T.A., Hall, I. and University of Manchester COVID-19 Modelling Group, 2021. Challenges in control of COVID-19: short doubling time and long delay to effect of interventions. *Philosophical Transactions of the Royal Society B*, *376*(1829), p.20200264.
- Vekaria, B., Overton, C., Wiśniowski, A., Ahmad, S., Aparicio-Castro, A., Curran-Sebastian, J., Eddleston, J., Hanley, N.A., House, T., Kim, J. and Olsen, W., 2021. Hospital length of stay for COVID-19 patients: Data-driven methods for forward planning. *BMC Infectious Diseases*, *21*(1), pp.1-15.
- Overton, C.E., Stage, H.B., Ahmad, S., Curran-Sebastian, J., Dark, P., Das, R., Fearon, E., Felton, T., Fyles, M., Gent, N. and Hall, I., 2020. Using statistics and mathematical modelling to understand infectious disease outbreaks: COVID-19 as an example. *Infectious Disease Modelling*, *5*, pp.409-441.

From July 2020, I was seconded from the university to Manchester University NHS Foundation Trust. I was based in the clinical data science unit, and tasked with developing a model for forecasting hospital admissions based on patient length of stay. We created a model that was rolled out to all hospitals in the North West, to inform their planning of upcoming bed demand. As part of this, reports were provided to SPI-M by Professor House on patient length of stay and the dynamics of hospital acquired COVID-19 infections. These models were particularly useful with the winter 2020 waves taking off earlier in the North West. During this time, I was also part of the SPI-M medium-term projections working group, who met weekly to present the results from hospital forecasting models developed by many groups across the country, where I contributed a regional/national hospital forecasting model developed with Professor Pellis at University of Manchester. The results of this work are summarised in the paper:

- Overton, C.E., Pellis, L., Stage, H.B., Scarabel, F., Burton, J., Fraser, C., Hall, I., House, T.A., Jewell, C., Nurtay, A. and Pagani, F., 2022. EpiBeds: Data informed modelling of the COVID-19 hospital burden in England. *PLoS computational biology*, *18*(9), p.e1010406.

I was also a member of the SAGE Social Care working group (SCWG), led by Professor Hall. As part of this group, I developed a method for analysing the real-time risk of death for positive COVID-19 cases in care homes. This was reported weekly to the SCWG and the Cabinet Office taskforce. The results of this work are summarised in the paper:

- Overton, C.E., Webb, L., Datta, U., Fursman, M., Hardstaff, J., Hiironen, I., Paranthaman, K., Riley, H., Sedgwick, J., Verne, J. and Willner, S., 2022. Novel methods for estimating the instantaneous and overall COVID-19 case fatality risk among care home residents in England. *arXiv preprint arXiv:2202.07325*.

After finishing the secondment, I returned to the university but maintained an honorary post at Manchester University NHS Foundation Trust. In Spring 2021, the Delta variant started to spread in the UK. Initial outbreaks were primarily in the North West, around Bolton and Blackburn with Darwen.

Due to my connections with the NHS in these regions, I was invited to become a member of SPI-M, where I shared qualitative reports from NHS colleagues verbally in the weekly SPI-M meetings. I also participated in analyses of the growth rate, spatial distribution, and replacement dynamics of the Delta variant, with the findings summarised in the paper:

- Challen, R., Dyson, L., Overton, C.E., Guzman-Rincon, L.M., Hill, E.M., Stage, H.B., Brooks-Pollock, E., Pellis, L., Scarabel, F., Pascall, D.J. and Blomquist, P., 2021. Early epidemiological signatures of novel SARS-CoV-2 variants: establishment of B. 1.617. 2 in England. *MedRxiv*.

In November 2021, I left the University of Manchester to join UK Health Security Agency. I continued to be a member of SPI-M, however my contributions after joining UKHSA form part of the evidence base collected by UKHSA, rather than independent academic contributions. Detail on these contributions will be provided in the inquiry response from UKHSA.