LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

Dr Kathleen M O'Reilly
Associate Professor
PD
Irrelevant & Sensitive

London School of Hygiene & Tropical Medicine
Keppel Street, London WC1E 7HT
PD www.lshtm.ac.uk

01-Nov-2022

Dear Tim Suter,

Ref: M2/SAGE/KOR

Firstly, I sincerely apologise for the delay in getting back to you with your request. Personal Data Personal Data e, and was not able to concentrate on tasks for very long. I have now recovered and am therefore providing my response to your questions at this late juncture.

In response to your preliminary request:

1. I have an BSc in Biology (Warwick), a MSc in Applied Statistics (Oxford) and a PhD in mathematical modelling of infectious diseases (Warwick). My area of specialism is the use of mathematical and statistical models to understand and control infectious diseases. I have worked on a number of 'disease problems', including those in veterinary medicine and human diseases. For the last 10 years I have spent much of my academic career working on polio eradication. I has been an acadmic at LSHTM since 2019, prior to this time I have had positions at Imperial College London and Glasgow University. My 'top 5' publications are below:

    - Morvan, Mario; Jacomo, Anna Lo; Souque, Celia; Wade, Matthew J; Hoffmann, Till; Pouwels, Koen; Lilley, Chris; Singer, Andrew C; Porter, Jonathan; Evens, Nicholas P; **... O'Reilly, Kathleen** (2022) An analysis of 45 large-scale wastewater sites in England to estimate SARS-CoV-2 community prevalence. Nature Communications, 13 (1). p. 4313. ISSN 2041-1723 DOI: https://doi.org/10.1038/s41467-022-31753-y
    - Macklin, GR; **O'Reilly, KM**; Grassly, NC; Edmunds, WJ; Mach, O; Santhana Gopala Krishnan, R; Voorman, A; Vertefeuille, JF; Abdelwahab, J; Gumede, N; +9 more... (2020) Evolving epidemiology of poliovirus serotype 2 following withdrawal of the serotype 2 oral poliovirus vaccine. Science (New York, N.Y.), 368 (6489). pp. 401-405. ISSN 0036-8075 DOI: https://doi.org/10.1126/science.aba1238
    - **O'Reilly, KM;** Cori, A; Durry, E; Wadood, MZ; Bosan, A; Aylward, RB; Grassly, NC; (2015) A New Method for Estimating the Coverage of Mass Vaccination Campaigns Against Poliomyelitis From Surveillance Data. American journal of epidemiology, 182 (11). pp. 961-970. ISSN 0002-9262 DOI: https://doi.org/10.1093/aje/kwv199
    - **O'Reilly, Kathleen M**; Durry, Elias; ul Islam, Obaid; Quddus, Arshad; Abid, Ni'ma; Mir, Tahir P; Tangermann, Rudi H; Aylward, R Bruce; Grassly, Nicholas C; (2012) The effect of mass immunisation campaigns and new oral poliovirus vaccines on the incidence of poliomyelitis in Pakistan and Afghanistan, 2001-11: a retrospective analysis. Lancet, 380 (9840). pp. 491-498. ISSN 0140-6736 DOI: https://doi.org/10.1016/S0140-6736(12)60648-5

- **O'Reilly, Kathleen M;** Chauvin, Claire; Aylward, R Bruce; Maher, Chris; Okiror, Sam; Wolff, Chris; Nshmirimana, Deo; Donnelly, Christl A; Grassly, Nicholas C; (2011) A statistical model of the international spread of wild poliovirus in Africa used to predict and prevent outbreaks. PLoS medicine, 8 (10). e1001109-. ISSN 1549-1277 DOI: https://doi.org/10.1371/journal.pmed.1001109

2. I was a member of the SPI-M-O, from approximately late 2020 to when it was stopped. My involvement was 'distant' in nature. My involvement was in the analysis and interpretation of wastewater data to inform understand of the COVID-19 pandemic. I was not a member of SAGE.
3. In response;
    a. I had heard through informal networks that wastewater (WW) data was being developed as a surveillance source in response to the pandemic. I do not remember whether I contacted Prof Graham Medley directly, or whether he contacted me. I was interested in supporting development of best practice because of my experience with WW data and interpretation in my work in polio eradication, and already had good relationships with colleagues in PHE who had previously worked in this area. Leading on from initial discussions, it was apparent that my expertise would be valued, and so I was seconded to UKHSA 1 day a week from approximately January 2021 until 31 September 2022. My main activities were in supporting analysis and interpretation of WW data specific to COVID-19.
    b. There were a few informal discussions with other members of the SPI-M-O team, especially Dr Leon Danon (Bristol University), whom I met with almost weekly as part of the wider WW analysis discussions. A presentation was made to the wider SPI-M-O team on the 12-05-2021, another UKHSA colleague made a presentation and I helped answer questions from the SPI-M-O team.
    c. The main question I was tasked with was what role WW data could / should have in understanding infection prevalence in the population. While WW data is comparatively cheap to collect when compared to cross-sectional surveys and is not prone to biases in under-reporting, WW data is a relatively new field of science and it's use has not been satisfactorily validated for use in public health. Working with UKHSA colleagues, we therefore decided that analysis to support validation during the COVID-19 pandemic was the best course of action, as this would then help public health experts make decisions on the extent to which WW data should be used. The main output of this work is the publication detailed in (1) by Morvan et al (2022). We illustrated that with some statistical modelling applied to the data, WW is able to capture SARS-CoV-2 infection prevalence within populations with a good accuracy. However, this analysis focussed on the Alpha variant; as new variants emerged the repeatability of our findings were brought into question. I met weekly with colleagues from UKHSA, and part of this included the discussion and answering of further WW and COVID-19 questions that they had.
4. I am not aware that I contributed to any SAGE or SPI-M-O documents
5. Related articles (please note that for several articles not mentioned here I was a member of the CMMID working group. In these instances my involvement was minimal):
    a. Morvan, Mario; Jacomo, Anna Lo; Souque, Celia; Wade, Matthew J; Hoffmann, Till; Pouwels, Koen; Lilley, Chris; Singer, Andrew C; Porter, Jonathan; Evens, Nicholas P; … **O'Reilly, Kathleen**

(2022) An analysis of 45 large-scale wastewater sites in England to estimate SARS-CoV-2 community prevalence. Nature Communications, 13 (1). p. 4313. ISSN 2041-1723 DOI: https://doi.org/10.1038/s41467-022-31753-y

b. **O'Reilly, Kathleen M;** Allen, David J; Fine, Paul; Asghar, Humayun; (2020) The challenges of informative wastewater sampling for SARS-CoV-2 must be met: lessons from polio eradication. The Lancet. Microbe, 1 (5). e189-e190. ISSN 2666-5247 DOI: https://doi.org/10.1016/S2666-5247(20)30100-2

c. **O'Reilly, Kathleen M;** Sandman, Frank; Allen, David; Jarvis, Christopher I; Gimma, Amy; Douglas, Amy; Larkin, Lesley; Wong, Kerry LM; Baguelin, Marc; Baric, Ralph S; +4 more... (2021) Predicted norovirus resurgence in 2021-2022 due to the relaxation of nonpharmaceutical interventions associated with COVID-19 restrictions in England: a mathematical modeling study. BMC medicine, 19 (1). 299-. ISSN 1741-7015 DOI: https://doi.org/10.1186/s12916-021-02153-8

6. In response, my view is that the SPI-M-O provided excellent advice for decision makers in how to respond to the COVID-19 pandemic in order to understand the epidemiology, minimise the loss of life and disease burden. The circumstances under which individuals worked was extremely demanding, especially when evidence to support decision making was required within a few days of making the request.
    a. The SPI-M-O group included a large number of academics and people from other groups (eg. PHE/UKHSA) with a diverse skillset and expertise. The structure and methods of communication ('raising hands' in Teams, use of the chat, and opportunities for questions) meant that there was opportunity for all members to critique what was being presented in a professional manner. I was particularly impressed by the opportunities given for early career researchers / people outside of the immediate field – I think this prevented too much 'group think' which was important to prevent.
    b. Individuals who had the skillset and/or expertise could submit their analysis to questions set. This was great.
    c. It felt reasonably well resourced. I was able to request the UKHSA secondment and this supported the research that I did. The secondment was charge at the same daily rate as my LSHTM salary. I am aware that many people worked outside of their work contracts (ie. for free) and did not expect or receive any financial compensation.
    d. It felt like the advice given was clearly articulated and was timely.
    e. It felt like groups worked well together.
    f. The support provided by "GO Science" team was very good – it meant the scientific team could concentrate on research questions, the Go Science team focussed on logistics.
7. I remain eternally grateful to the scientific advice provided by the SAGE and SPI-M-O group – the recommendations given just prior to Christmas 2021 (that households should not mix prior or during Christmas 2021) likely saved my family from a COVID-19 fatality. Rather than our usual celebrations across three households we exchanged gifts outside our houses and had a smaller household-only Christmas dinner. 2 of the 3 households did not get COVID-19 that Christmas. Unfortunately, my father did acquire COVID-19 between Christmas and NYE, and was hospitalised (West Middlesex, London) on NYE. He survived, but intensive care was very traumatic for him and he suffered from PTSD and continued to have health problems for about 1 years afterwards. Had we had a 'usual Christmas', I am certain that more

of us would have caught COVID-19. Had others in the community mixed as normal, I am certain that the hospital would have been overwhelmed, and my fathers care would have suffered, he could have died. The care provided by the hospital was good; no one could visit my father, but instead we provided daily messages and a photo for him to read which was delivered to his bed each day. After he recovered, he said these messages saved his life. For several months prior and at the time, I felt like the advice given by the Government was not consistent with the epidemiology, and I needed to emphasize the personal risks and precautions to my family to protect them.