Institution: University College London		
Unit of Assessment: 2 – Public Health, Health Services and Primary Care		
Title of case study: Shaping UK national policy to reduce the rate of COVID-19 transmission in care homes		
Period when the underpinning research was undertaken: Between May and June 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): Dr Laura Shallcross	**Role(s) (e.g. job title):** Associate Professor, Institute of Health Informatics	**Period(s) employed by submitting HEI:** Between October 2009 and present
Period when the claimed impact occurred: 2020		
Is this case study continued from a case study submitted in 2014? No		

1. Summary of the impact

The first wave of the COVID-19 pandemic in the UK highlighted the vulnerability of care home residents and staff to the virus. Research led by Dr Laura Shallcross at the UCL Institute of Health Informatics provided critical insights into care home practices associated with infection and outbreaks. This work then informed key policy decisions regarding the care home sector: the prioritisation of limited testing capacity to focus on staff rather than residents; limiting of movement of agency staff between care homes; and provision of an infection control fund to enable staff to self-isolate when unwell. Data gathered from this research were also combined into a single interactive dashboard which continues to function as the main UK care home data tool, informing all levels of government from local authorities to 10 Downing Street.

2. Underpinning research

Research led by Dr Laura Shallcross at UCL has addressed a key challenge faced by care homes in the UK: that they lack routine surveillance of outbreaks and infections that might enable preventative measures to be taken. Since 2017, Shallcross has co-directed the GBP2m, ESRC-funded 'Preserving Antibiotics through Safe Stewardship (PASS)' research programme and led its data science work package. This project is a collaboration between Shallcross and colleagues across UCL; primary and secondary health providers; social researchers at the University of Leicester; designers at the Helen Hamlyn Centre for Inclusive Design; and one of the UK's largest care home chains, Four Seasons Healthcare. Its aim is to design antibiotic stewardship interventions that are tailored to specific healthcare settings to counteract the growing problem of antimicrobial resistance (AMR) caused by the over-use of antibiotics. Findings have so far included the identification of the most impactful interventions around behaviour and organisational change in antimicrobial stewardship in care homes (a systematic review, **[R1]**) and mapping the frequency, patterns and risk factors of antibiotic prescribing for elderly residents via a large dataset derived from the partner care home chain **[R2]**. Shallcross led the data science and research design and analysis underpinning these publications, addressing the lack of routine surveillance of care homes in the UK via a retrospective analysis of the administrative records of this large care home chain. Shallcross' work on PASS has given her unparalleled knowledge of the data available on prescribing, infection and outcomes among elderly residents via care home administrative records, and experience of working with care sector providers to access this data in an efficient and ethically sound way. As a consequence of this research, at the outbreak of the COVID-19 crisis, Shallcross and the PASS project had access to the only large-scale, individual-level infection transmission and control dataset in UK care homes.

In March 2020, Shallcross was awarded GBP200,000 from UKRI to undertake a mixed methods study to investigate SARS-CoV-2 infection and mortality in care homes using data from Four Seasons Healthcare and qualitative interviews with staff. This project was called 'COVID-19: Burden and Impact in Care Homes (CATCH-19)'. Shallcross tracked active infection,

hospitalisation and mortality rates among the elderly residents of 179 Four Seasons Healthcare long-term care facilities between March and June 2020 to identify factors associated with infection transmission and mortality. The emerging findings from this study showed that lower staffing rates and higher occupancy were the main risk factors in infection, and that actual infection rates of elderly residents within these sites was considerably higher than Department of Health and Social Care (DHSC) assumptions at the time. The study also highlighted the high mortality rate in people who were not tested for COVID-19, indicating the urgent need for a rigorous mass testing strategy in residential care settings **[R3]**.

Shallcross' work on CATCH-19 and PASS led to her being approached by Public Health England (PHE)/DHSC in Spring 2020 to lead a surveillance study in care homes that investigated COVID-19 infection, immunity and its duration in English care homes. The VIVALDI-1 study focused on care homes in England that mainly provided dementia care, or care to residents aged >65 years. There were two main objectives: to estimate the proportion of staff and residents who had been infected with COVID-19 since the start of the pandemic; and to identify risk factors for infection and outbreaks in care homes.

Between 26 May and 19 June 2020, 95% of all care home managers were contacted by researchers from Ipsos MORI, and 56% (5126/9081) agreed to participate, with 160,033 residents and 248,594 staff becoming involved. The estimated proportion of residents and staff who reported being infected between 1st March and June 19th was 10.5% (95% CI: 9.9-11.1%) and 3.8% (95%: 3.4-4.2%) respectively. A total of 2,724 (53.1%) care homes had at least one case [**R4**].

The likelihood of infection and/or outbreaks was reduced in facilities that paid sickness pay, that had cohorted staff (i.e. where staff caring for infected residents did not care for other residents), that did not employ agency staff, and which had higher staff to resident ratios. The likelihood of infection and outbreaks was increased in facilities with higher numbers of admissions, poor compliance with isolation, 'for profit' status, and lower frequency of cleaning in communal areas.

The most significant implications of these findings were:

- Half of the care facilities surveyed had no known cases and therefore remained very vulnerable to outbreaks.
- Reducing transmission from staff required: a) provision of financial support to the workforce to incentivise testing and self-isolation when sick; and b) investment to reduce reliance on agency staff and to increase staff to bed ratios.
- Available evidence supported the use of disease control measures such as cohorting and isolation.

Transmission from residents was associated with the number of admissions to the facility, highlighting the need to test and isolate new and returning residents **[R5]**.

3. References to the research

[R1] Crayton E., Richardson M., Fuller C., Smith C., Liu S., Forbes G., Anderson N., Shallcross L., Michie S., Hayward A., Lorencatto F. (2020). 'Interventions to improve appropriate antibiotic prescribing in long-term care facilities: a systematic review'. *BMC Geriatr.* **20**(1), 237. DOI: 10.1186/s12877-020-01564-1. PMID: 32646382; PMCID: PMC7350746

[R2] Smith, C. M., Williams, H., Jhass, A., Patel, S., Crayton, E., Lorencatto, F., Michie, S., Hayward, A. C., Shallcross, L. J., & Preserving Antibiotics through Safe Stewardship group (2020). 'Antibiotic prescribing in UK care homes 2016-2017: retrospective cohort study of linked data'. *BMC health services research*, **20**(1), 555. DOI: 10.1186/s12913-020-05422-z

[R3] Peter Dutey Magni, Haydn Williams, Arnoupe Jhass, Greta Rait, Fabiana Lorencatto, Harry Hemingway, Andrew Hayward, Laura Shallcross. (2020). 'Covid-19 infection and attributable mortality in UK Long Term Care Facilities: Cohort study using active surveillance and electronic

records (March-June 2020)'. July 2020 (Preprint). medRxiv 2020.07.14.20152629; DOI: 10.1101/2020.07.14.20152629

[R4] Laura Shallcross, Danielle Burke, Owen Abbott, Alasdair Donaldson, Gemma Hallatt, Andrew Hayward, Susan Hopkins, Maria Krutikov, Katie Sharp, Leone Wardman, Sapphira Thorne. (2020). 'Factors associated with SARS-CoV-2 infection and outbreaks in long-term care facilities in England: a national cross-sectional survey'. *The Lancet Healthy Longevity*, **2**(3), e129 – e142 (available online 11 February 2021). DOI: 10.1016/S2666-7568(20)30065-9.

[R5] 'Vivaldi-1: COVID-19 care homes study report' (published 3 July 2020) https://www.gov.uk/government/statistics/vivaldi-1-coronavirus-covid-19-care-homes-study-report

4. Details of the impact

There are approximately 410,000 older people (>65) resident in UK care homes, all of whom are significantly vulnerable due to mental and/ or physical ill-health. They are cared for by a residential adult care sector that is diverse and complex: there are 11,300 care homes for the elderly alone, 95% of which are independent providers and 80% of which operate only one site.

Initial UK Government COVID-19 guidance for the adult care sector stated that no special measures need be taken, and that *"it is very unlikely that anyone in a care home will be infected"* **[S1].** By the beginning of April 2020, modelling from the University of Manchester and DHSC based on early care home COVID-19 infections showed this assumption to likely be unsound: a prevalence of 75% was projected if policy remained unchanged. On the basis of her earlier research, Shallcross was asked in early May 2020 to work with NHS England, the Office for National Statistics (ONS) and DHSC to set up the VIVALDI-1 study and provide a robust evidence base with which to plan a response to protect this large, varied and highly vulnerable care sector and its residents. Shallcross' research was initiated explicitly to supply the critical epidemiological data needed to identify the likely most effective policy measures for protecting care home residents and staff [**S2**].

Shallcross presented the study's findings **[R4], [R5]** and their implications to the government's Scientific Advisory Group for Emergencies (SAGE) Social Care working group in June 2020. These findings were provided directly to senior UK decision makers in the Department of Health and Social Care, SAGE, and 10 Downing Street, thus delivering crucial insights into the risk factors driving the first wave of the pandemic. The Chair of the UK Government Social Care Sector COVID-19 Support Taskforce writes in a letter that: "*this research influenced my views on how to protect care home staff and residents from COVID-19. The research findings informed recommendations that were published in the Social Care Sector Taskforce's report, and subsequently largely accepted by Government and translated into practice through the Adult Social Care COVID-19 Winter Plan.*" [**S2**]

Referring to the early policy influence of VIVALDI-1, UK Government Chief Scientific Adviser Sir Patrick Vallance wrote in a testimonial letter to the Provost of UCL:*"This work informed key policy decisions in June/July 2020 regarding the frequency of care home testing, and strategies to reduce the spread of infection as detailed below:*

- ***Whether limited testing capacity should be used for staff or residents, and which care homes to prioritise for testing.*** *VIVALDI-1 showed that per capita people in small care homes were equally as vulnerable [as those in large ones] and this changed the proposed testing strategy so that all care homes were tested, not just large care homes, as testing capacity increased.*
- ***Limiting movement of staff between care homes.*** *VIVALDI-1 […] results had a major impact on policy decisions/discussions with the care sector about how to ensure sufficient staffing ratios whilst limiting the number of staff who work across multiple sites.*
- ***Payment of staff sickness pay to ensure that staff could self-isolate when unwell.*** *Findings from VIVALDI-1 supported the decision to establish the Infection Control Fund*

(ICF)… This has led to a substantial increase in the proportion of care homes that report paying sickness pay to their staff." **[S3]**

Implementing the recommendations of the VIVALDI-1 report: impacts of testing, staffing and sick pay in the adult residential care sector.

Testing strategy in care homes: Shallcross' research directly informed the current approach of mass weekly testing for all staff in all homes (currently hundreds of thousands of tests a week). Each of the [TEXT REDACTED FOR PUBLICATION] positive tests between 29 June and 31 December 2021 among care home staff and residents represented a case that could have led to a dangerous outbreak in at least one residential care setting, in every instance infecting many of the UK's most vulnerable people, placing extra burden on healthcare systems and potentially resulting in deaths, as shown in UK national COVID-19 Pillar 1 and 2 test results **[S4].**

Take up of Infection Control Fund (ICF) support for the residential care sector and workforce: The ICF is a GBP6m fund to support adult social care providers, to reduce transmission within the sector and increase workforce resilience **[S5]**. The ICF was targeted at two of the VIVALDI-1 recommendations to minimise COVID-19 transmission in residential adult care: that movement of care workers between sites should cease, and that worker sick pay should be topped up by government. It was deployed in two tranches: the first (of GBP300m) ran until 23 July 2020, and the second half of the funding was released on 24 July 2020. In the period to 23 July 2020, GBP257,601,441 had been allocated by English local authorities to 14,156 residential care providers, and of that figure 24.7% (across 8,411 providers) had been spent on limiting worker movement between sites. A further 18.72% (across 7,898 providers) had been used to pay staff full wages following a positive COVID-19 test **[S6]**. As noted by several of the corroborating sources here, without Shallcross' research and the VIVALDI-1 project neither of these factors in COVID-19 transmission in care homes would have been identified and prioritised, and the scale of the problem (as evidenced by the majority of care providers making use of the ICF for these purposes) would not have been apparent. On 18 September 2020, the UK Government published the 'Adult Social Coronavirus Winter Care Plan 2020-2021', in which the ICF was extended until March 2021, with an extra GBP546m available **[S1].**

Ongoing impacts of VIVALDI-1 on DHSC's response to COVID-19
In addition to providing an evidence base for key policy decisions, the VIVALDI-1 study also contributed improved data-gathering and reporting mechanisms around COVID-19 testing in care homes. VIVALDI-1 linked information derived from care homes to the UK national COVID-19 testing Pillar 2 results that were being collected through the national care home testing programme. Shallcross and her colleagues were the only team who were accessing and analysing Pillar 2 data in this way. In mid-2020, Shallcross realised the potential of this data, which could be used to monitor SARS-CoV-2 prevalence in care home staff and residents by region and over time. She started producing short reports based on the dashboard for DSHC. These reports were presented to the DHSC Adult Social Care team and to Ministers via the Data Debrief Group, chaired by the DHSC Director of COVID-19 Response. The interactive dashboard was being used up to the end of the REF 2021 period and beyond by DHSC to monitor the burden of infection in care homes, explore factors associated with outbreaks and mortality, and is shared with local directors of public health. The Director of the Adult Social Care Team at DHSC states: [TEXT REDACTED FOR PUBLICATION] **[S7].**

The insights into COVID-19 infection in care homes have also directly informed vaccination policy and shaped the recommendations of the Joint Committee on Vaccination and Immunisation in December 2020 to prioritise the vaccination of care home residents and residential care home staff **[S8]**. In November 2020, the government further recognised the importance of the VIVALDI-1 project by announcing plans to expand the study and provide an even more detailed picture of COVID-19 infection in care homes **[S9]**.

The Director of Strategy for Private Testing, DHSC, concludes: *"As a direct result of [Dr Shallcross's] findings, and thanks to intelligent and diplomatic pressure from [her], SAGE and DHSC changed their advice, and rolled out mass repeat weekly testing of staff across all care homes for the >65s in England. […] Motivated by public service, [Dr Shallcross] showed real intellectual and moral bravery in her approach, and it is increasingly clear that her actions are likely to have contributed to saving many hundreds of lives."* **[S10]**

The impact of the VIVALDI-1 study – the speed with which it was established and its effectiveness in shaping and informing policy – has been recognised in its 2021 nomination for a Civil Service Award.

5. Sources to corroborate the impact

[S1] Foster, D and Harker, R. 'Coronavirus: Adult Social Care key sources and issues'. Briefing Paper 9091. House of Commons Library. 9 December 2020.

[S2] Letter from Chair of Social Care Sector Covid-19 Support Taskforce

[S3] Testimonial letter from Chief Scientific Adviser to the Government of the United Kingdom to Provost of UCL, 20 November 2020

[S4] Pillar 1 & 2 test results data 29 June – 31 December 2021, DHSC (CONFIDENTIAL)

[S5] Coronavirus (COVID-19): care home support package. DHSC. Updated 11 January 2021. https://www.gov.uk/government/publications/coronavirus-covid-19-support-for-care-homes/coronavirus-covid-19-care-home-support-package

[S6] ICF Tranche 1 spend allocation data by Local Authority, DHSC

[S7] Email from Director of DHSC Adult Social Care Team.

[S8] Joint Committee on Vaccination and Immunisation: advice on priority groups for COVID-19 vaccination, 2 December 2020. https://www.gov.uk/government/publications/priority-groups-for-coronavirus-covid-19-vaccination-advice-from-the-jcvi-30-december-2020/joint-committee-on-vaccination-and-immunisation-advice-on-priority-groups-for-covid-19-vaccination-30-december-2020

[S9] DHSC press release, 19 November 2020: https://www.gov.uk/government/news/expanded-study-tests-immune-response-of-care-home-staff-and-residents?

[S10] Testimonial Letter from Head of Strategy, Private Testing, Department of Health and Social Care, 18 December 2020