FACULTY OF POPULATION HEALTH, INSTITUTE OF HEALTH INFORMATICS

Using existing data sources during the COVID-19 pandemic to understand what was happening in care homes (VIVALDI study)

BGS Care Home Dataset event
12th September, 2023

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History of the VIVALDI study

DHSC / UKHSA funded programme of research to inform the pandemic response in care homes in England

- Started May 2020, ended March 2023
- c.350 care homes took part combining data from > 60,000 residents and staff with serial blood sampling
- Partnership between UCL ,Providers and UKHSA/DHSC
- High-quality research on rapid timescales informing policy

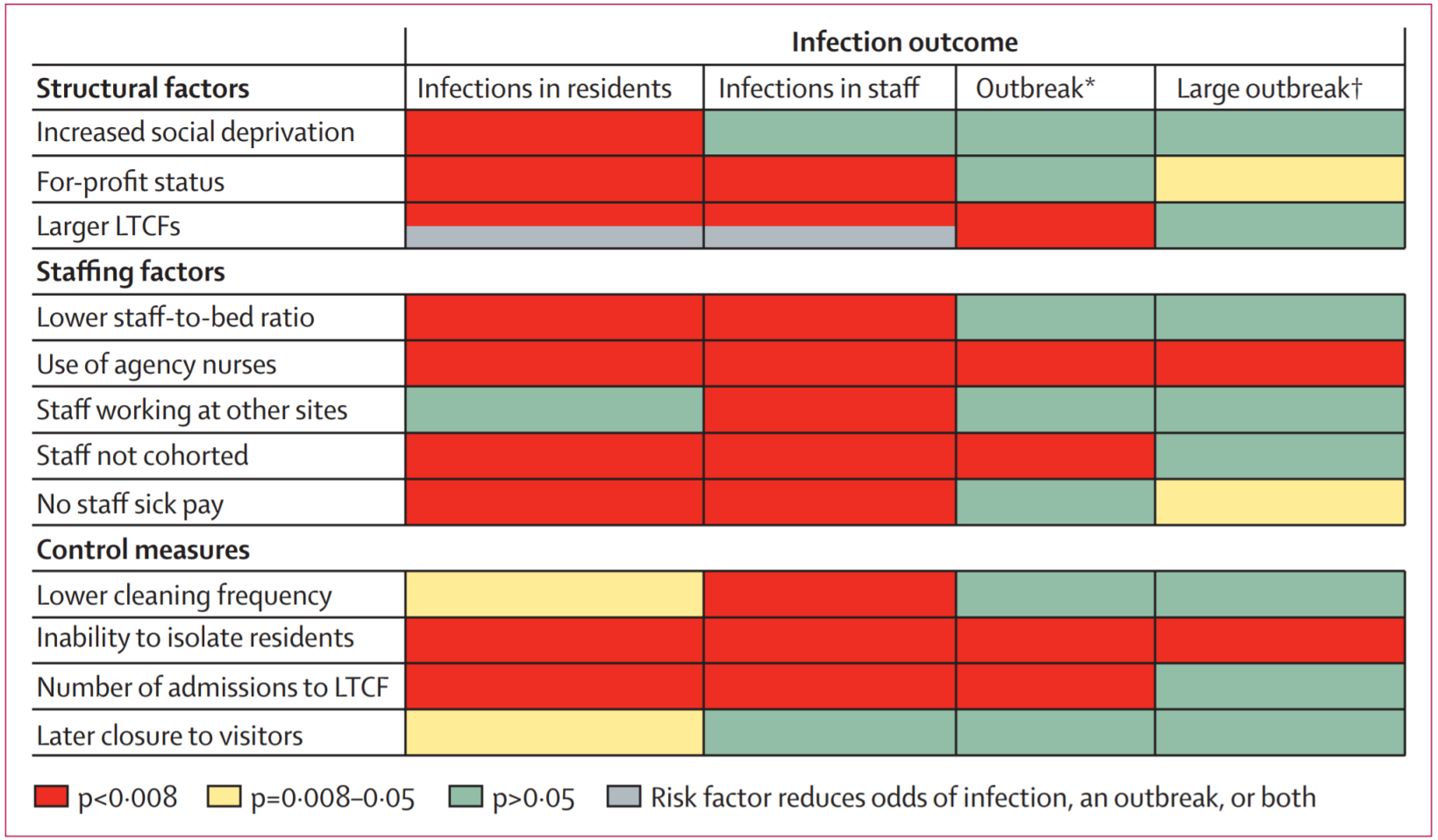
VIVALDI-1 survey of care home managers

2 key questions

- How many people in the home have been infected?
- Why are some homes getting (large) outbreaks and others are not?

- Telephone survey of care home managers (26 May – 19 June)
- Homes mainly providing dementia care or care to > 65 years
- Collaboration between UCL, ONS, DHSC and PHE/UKHSA

Main risk factors for SARS-CoV-2 infection & outbreaks



	Infection outcome			
Structural factors	Infections in residents	Infections in staff	Outbreak*	Large outbreak†
Increased social deprivation	p<0·008	p>0·05	p>0·05	p>0·05
For-profit status	p<0·008	p<0·008	p>0·05	p=0·008–0·05
Larger LTCFs	p<0·008	p<0·008	p<0·008	p>0·05
	Risk factor reduces odds of infection, an outbreak, or both	Risk factor reduces odds of infection, an outbreak, or both		
Staffing factors				
Lower staff-to-bed ratio	p<0·008	p<0·008	p>0·05	p>0·05
Use of agency nurses	p<0·008	p<0·008	p<0·008	p<0·008
Staff working at other sites	p>0·05	p<0·008	p>0·05	p>0·05
Staff not cohorted	p<0·008	p<0·008	p<0·008	p>0·05
No staff sick pay	p<0·008	p<0·008	p>0·05	p=0·008–0·05
Control measures				
Lower cleaning frequency	p=0·008–0·05	p<0·008	p>0·05	p>0·05
Inability to isolate residents	p<0·008	p<0·008	p<0·008	p<0·008
Number of admissions to LTCF	p<0·008	p<0·008	p<0·008	p>0·05
Later closure to visitors	p=0·008–0·05	p>0·05	p>0·05	p>0·05

p<0·008 p=0·008–0·05 p>0·05 Risk factor reduces odds of infection, an outbreak, or both

Proportion of people testing positive for COVID-19 in wave 1:

RESIDENTS (n=160,033): 10.5 % (9.9-11.1%)

STAFF (n=248,594): 3.8% (3.4-4.2%)

First results published 16/07/20

Shallcross et al. Lancet Healthy Longevity 2021; https://doi.org/10.1016/ S2666-7568(20)30065-9

The 'main' VIVALDI study

Created by tezar tantular from Noun Project

Blood sampling: Seroprevalence, Cellular + humoral immunity

Created by Luis Prado from Noun Project

Retrieve COVID-19 national test results

Data linkage (mortality, hospitalisations, vaccines)

- Disease burden & reinfection
- Humoral & cellular immunity
- Vaccine effectiveness
- Emergence / severity of variants
- Care home built environment
- Sample biobank (c.6000 samples)

Vaccine effectiveness of the first dose of ChAdOx1 nCoV-19 and BNT162b2 against SARS-CoV-2 infection in residents of long-term care facilities in England (VIVALDI): a prospective cohort study

Madhumita Shrotri, Maria Krutikov, Tom Palmer, Rebecca Giddings, Borscha Azmi, Sathyavani Subbarao, Christopher Fuller, Aidan Irwin-Singer, Daniel Davies, Gokhan Tut, Jamie Lopez Bernal, Paul Moss, Andrew Hayward, Andrew Copas, Laura Shallcross

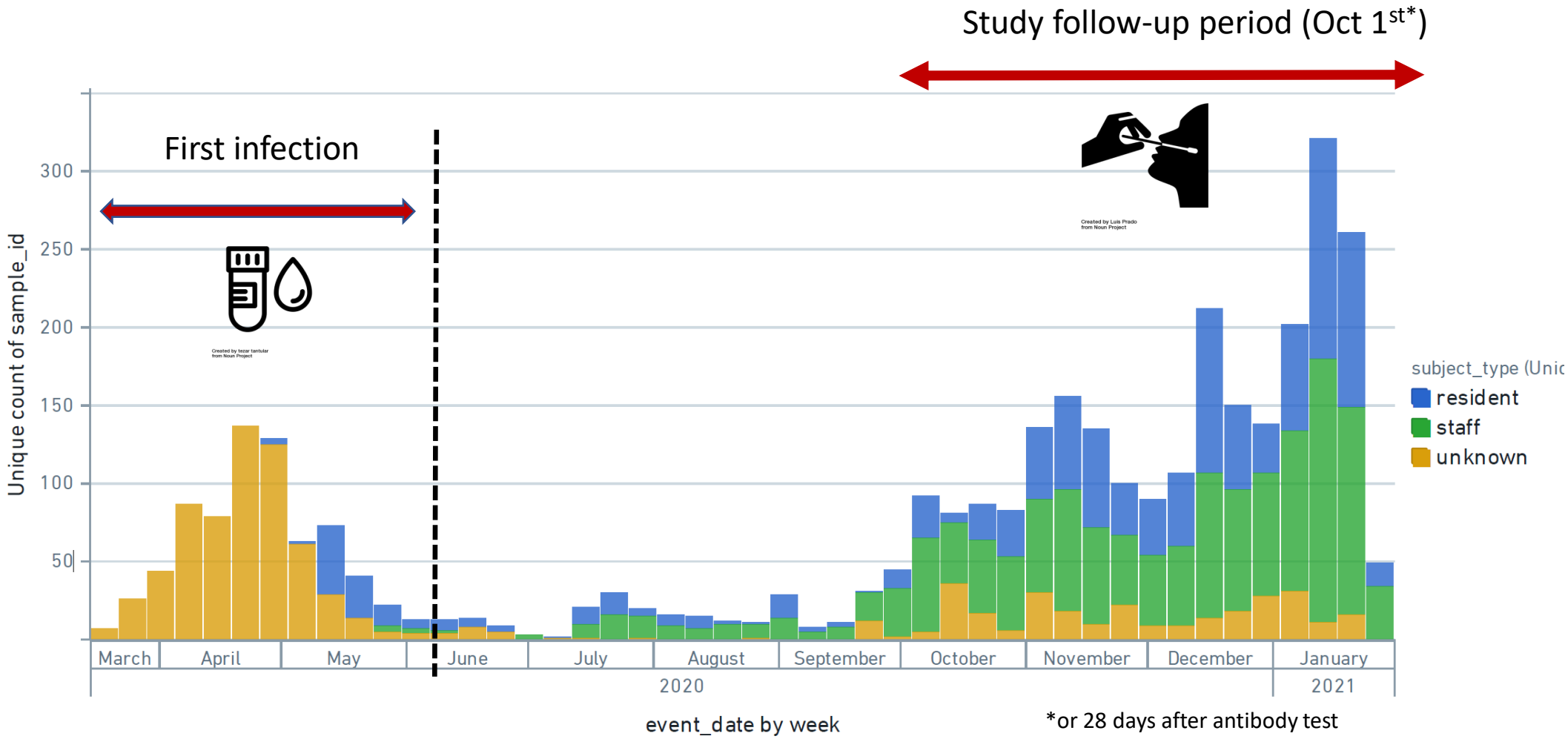
Spread of a Variant SARS-CoV-2 in Long-Term Care Facilities in England

Incidence of SARS-CoV-2 infection according to baseline antibody status in staff and residents of 100 long-term care facilities (VIVALDI): a prospective cohort study

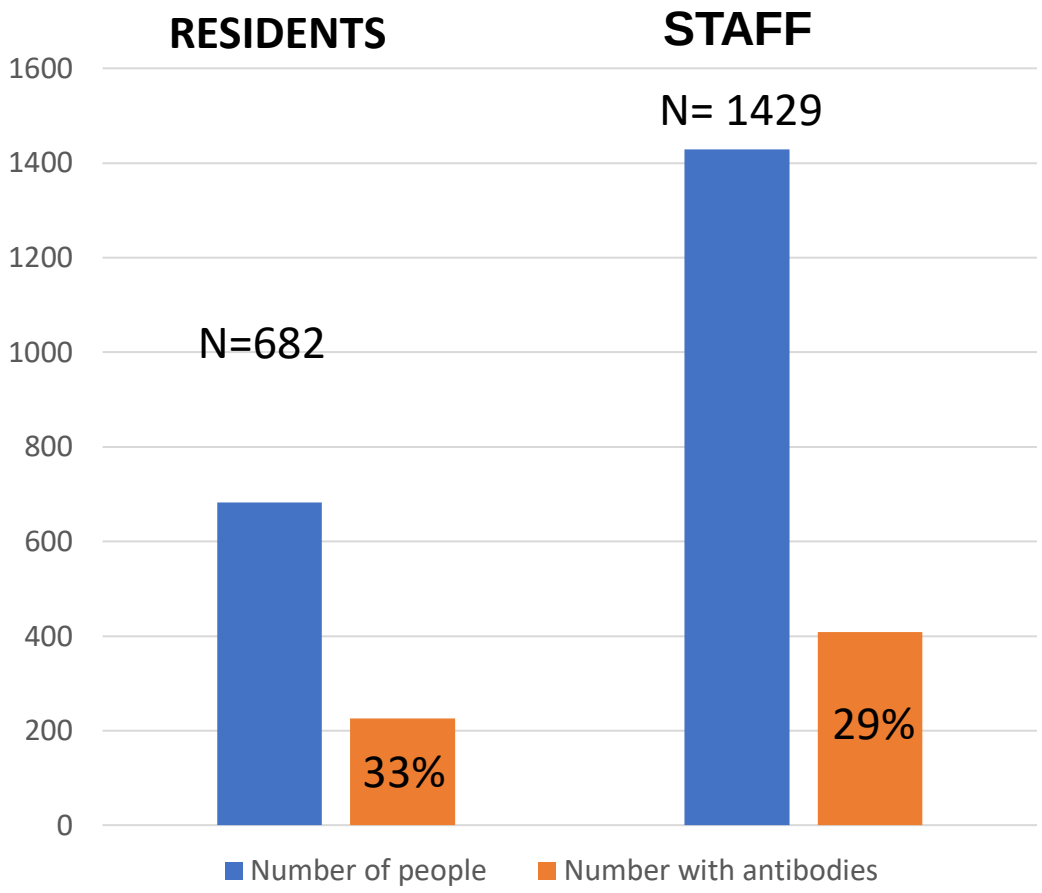
OPEN

Robust SARS-CoV-2-specific and heterologous immune responses in vaccine-naïve residents of long-term care facilities who survive natural infection

Can people get infected with COVID-19 twice? (2020/2021)

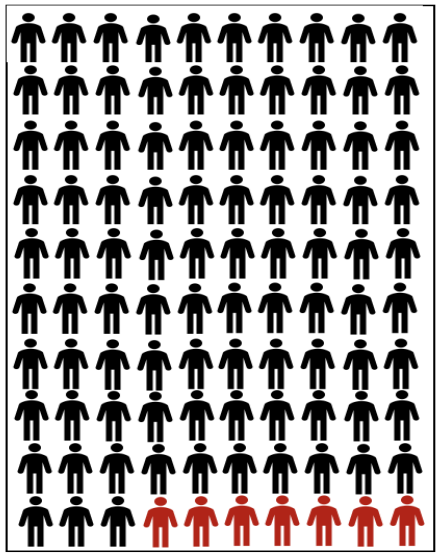


Antibody prevalence and risk of reinfection

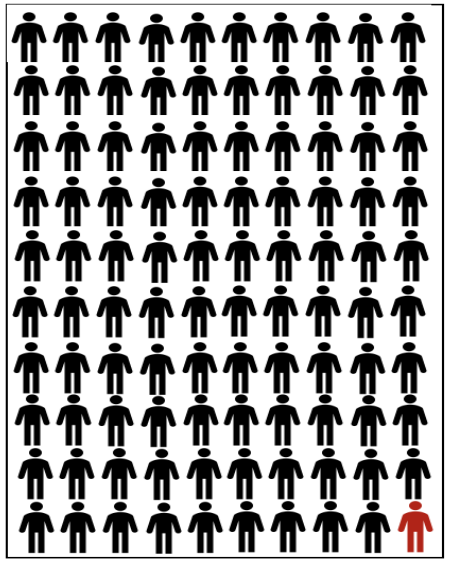


Krutikov et al. Lancet Healthy Longevity 2021

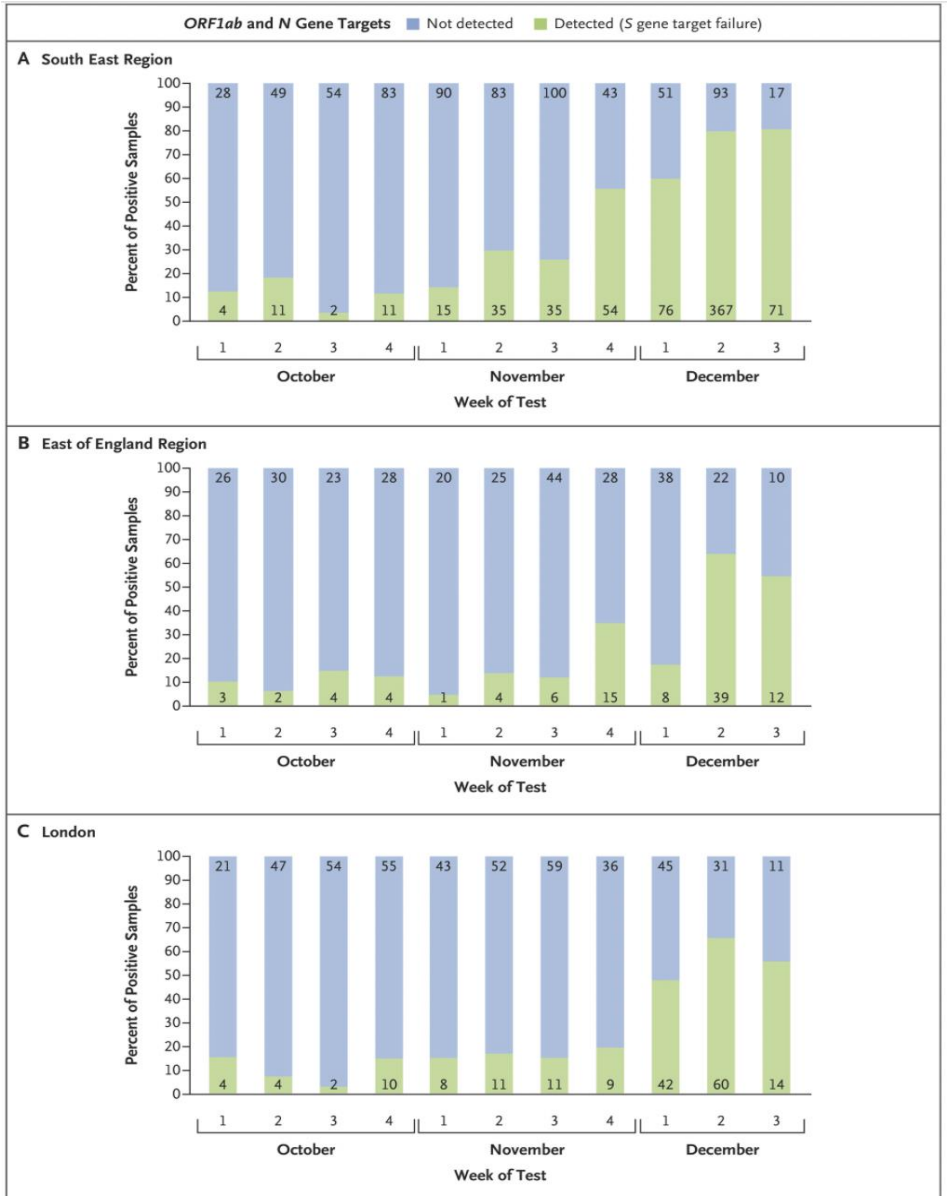
In an average month between Oct '20 and Feb '21



6.9% **antibody-negative** residents will get COVID-19



<1% of **antibody-positive** residents will get COVID-19



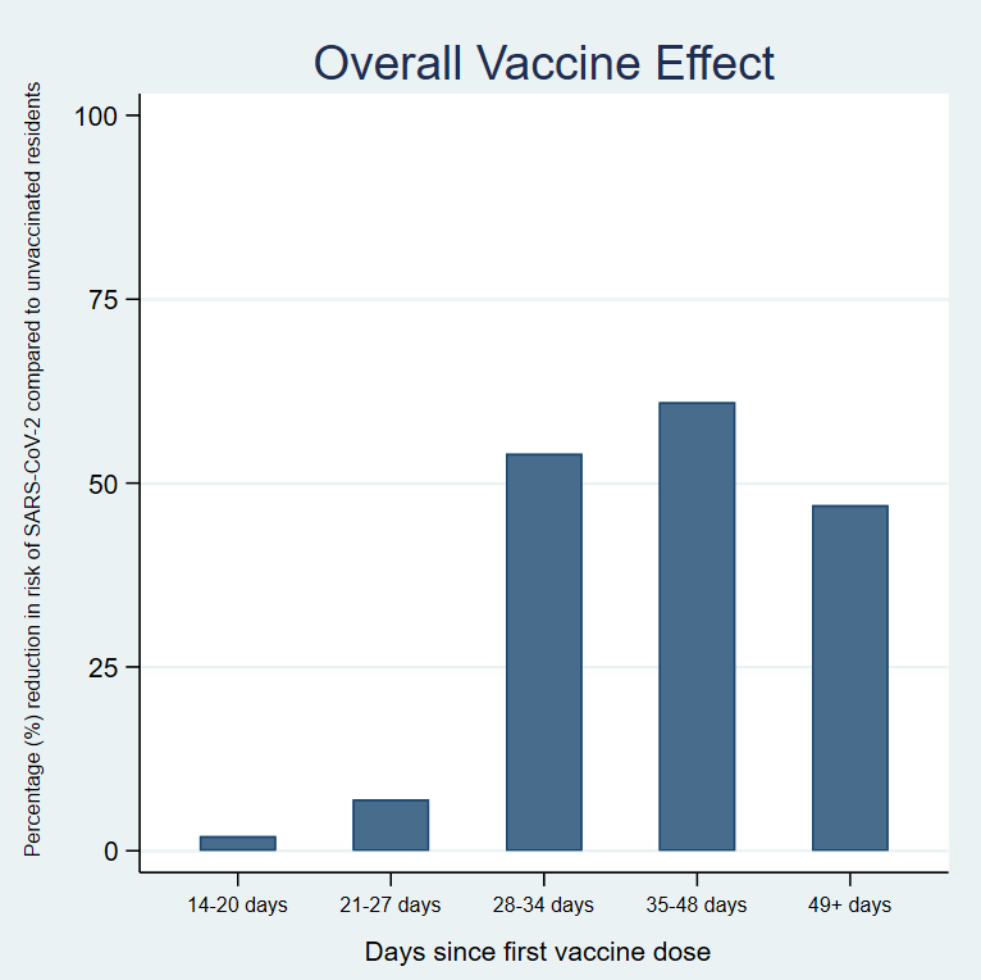
SARS-CoV-2–Positive Samples with *S* Gene Target Failure, According to Week and Geographic Region in England.

COVID-19 Variants (Alpha)

- 143,994 swab tests from care homes (single lab)
- S gene Target Failure on PCR reliable marker of B.1.1.7 / Alpha variant
- Rapid increase in Alpha variant from 12% of samples in October to 60% of samples in December 2020
- First study to show rapid spread of Alpha variant from the community into care homes

Krutikov et al. DOI: 10.1056/NEJMc2035906

Effectiveness of first dose vaccination



- 10,412 residents from 310 care homes.
- Two-thirds of residents received AstraZeneca vaccine.
- 62% reduction in the risk of infection by 35 days.
- Over an average 4 week period in December-March the risk of infection for a typical unvaccinated resident was 5.8%. This risk fell to 2.3% following one vaccine dose.

Shrotri et al. Lancet Infectious Diseases 2021; doi.org/10.1016/S1473-3099(21)00289-9

Policy impact of the VIVALDI Study

- Focus limited COVID testing capacity on staff not residents

Vivaldi showed that staff were more likely to infect residents than vice versa

- Funding staff sickness pay through the Infection control fund

Vivaldi showed the care homes that did not pay full sick pay were more likely to have infections in staff and residents

- Reducing movement of care home staff across sites

Vivaldi showed that care homes where staff frequently worked across sites were more likely to have infections in staff

- Monitoring how well vaccines work in residents and staff and need for boosters

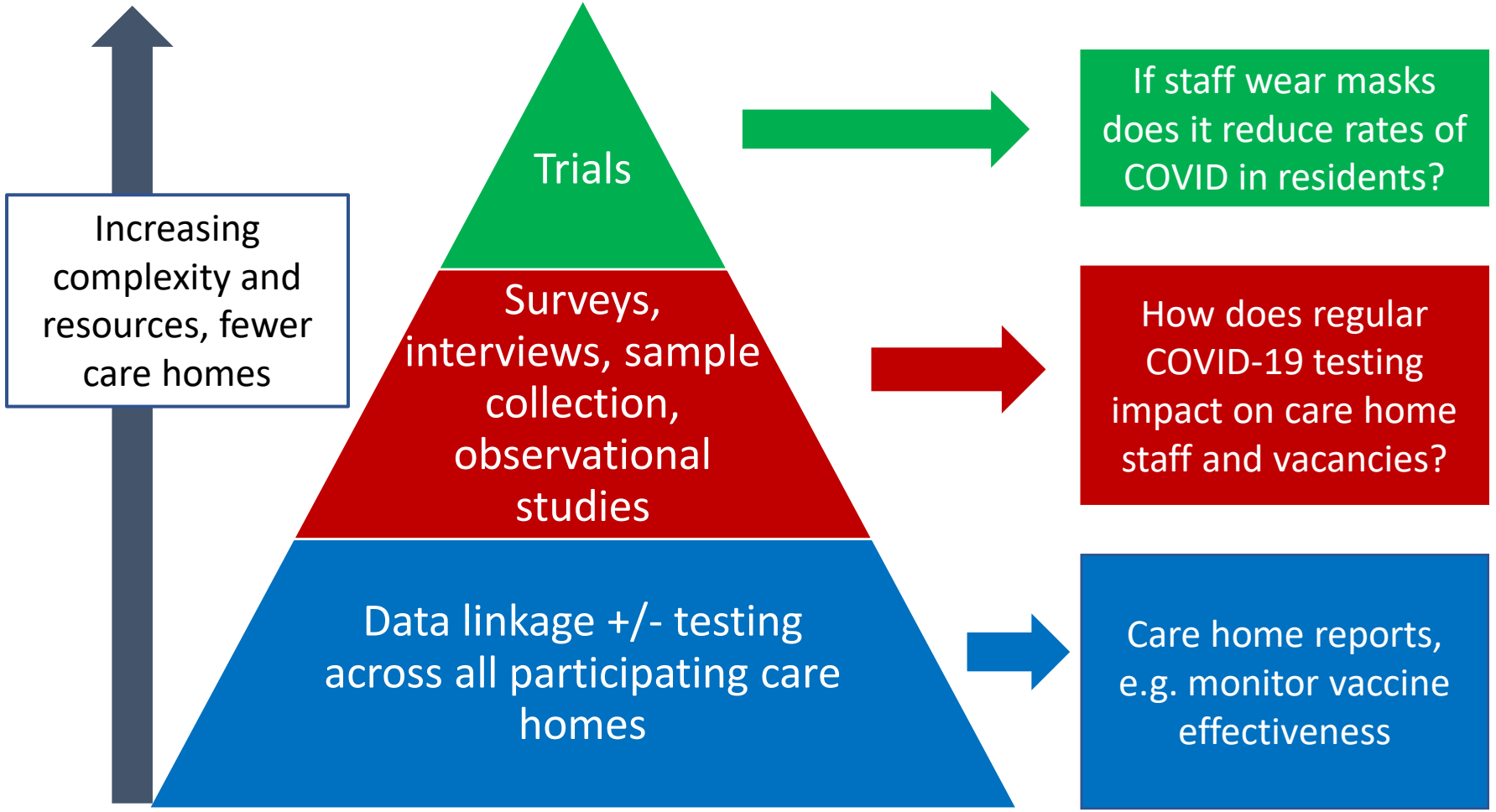
Vivaldi has been a key source of data on vaccine effectiveness in care homes

The challenge / opportunity: If we can do this work in a pandemic, imagine what could be achieved if we applied the same approach to other infections, like flu?

Create a **long-term programme of research and sentinel surveillance in care homes** which is:

- Coproduced with care providers, residents and relatives
- Has residents and families' values and priorities at its core
- Strongly informs policy and public health decision making
- Creates a positive legacy from the pandemic
- Initial focus on priority infections e.g. influenza, norovirus, antimicrobial resistance

Care home network underpinned by linked data



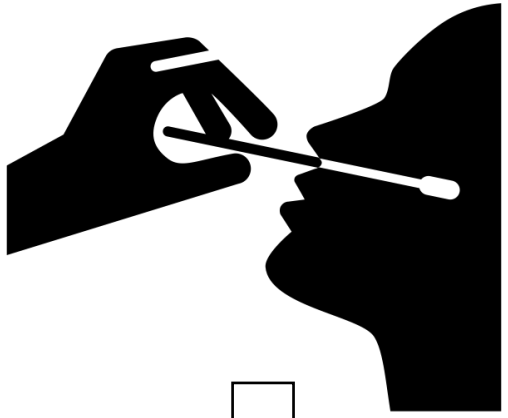
Data infrastructure makes it easier for care homes to take part in trials

Research studies can be 'layered' on top of data infrastructure to deliver studies addressing the priorities of care home stakeholders

Infection dashboards help providers to prioritise QI activities and inform investment in IPC. New metrics are co-developed to capture the broader impact of infection in care homes

Identifying residents in routine data

1. **All** care home staff and residents tested for COVID-19



Created by Luis Prado

2. Each test is labelled with the persons name, NHS number and their CQC-ID

3. Results from care home staff and residents sent electronically to NHS England and stored securely

4. NHS-numbers from test results used to link to other healthcare records that are held by the NHS e.g. hospital admissions, cause of death

5. Linked dataset used for research on COVID-19 in care home

DATA LINKAGE PROCESS ONLY PERMITTED DURING THE COVID-19 PANDEMIC

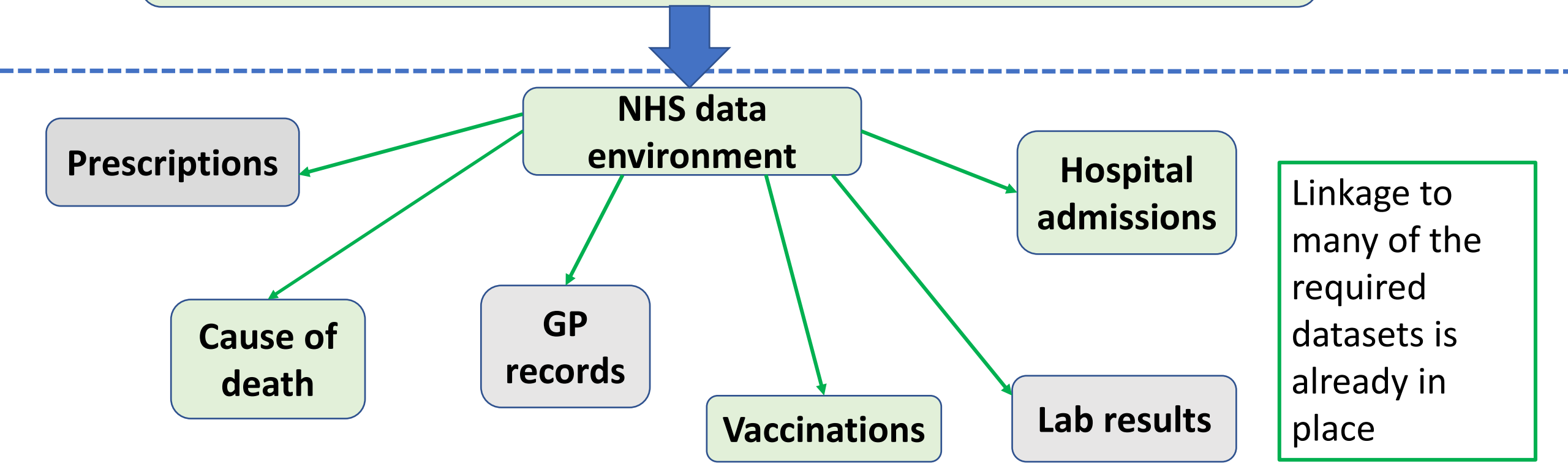
‘This project will only work if the care sector want it to happen’

- New partnership between UCL / Care England / the Outstanding Society
- Extensive engagement with residents, relatives, providers, care home staff
- **Coproduced a plan for a 12-month pilot project with stakeholders**
- High level support from UKHSA, DHSC e.g. Deborah Sturdy, CQC
- >700 care homes expressed interest in taking part

(https://theoutstandingsociety.co.uk/case-study/vivaldi-care-home-study/)

The data flows and data platform

List of NHS numbers for care home residents (extracted from digital social care records / electronic record systems in near real-time)



Linkage to many of the required datasets is already in place

Project oversight

- Data controllers: UCL, the Outstanding Society, Care England
- Data processors: NHSE, UKHSA
- Stakeholder oversight group + Data Access Committee
  - Residents/relatives and representative bodies (Care Rights UK, Use MY Data), Healthwatch
  - Providers, care home staff, representative bodies (Care England, NCF, OS)
  - Policymakers (UKHSA, DHSC, NHSE, CQC)
  - Other e.g. academia, charities

Consent and information governance

- Aim to be inclusive and give every resident the opportunity to take part
- Excluding certain types of residents severely reduces the value of the project
- Consenting every resident is not feasible (cognitive impairment, temporary residents, workload associated with consent, lack of research infrastructure in care homes)
- Seek approval from HRA Confidentiality Advisory Group to access data from residents without consent
  a. '*Service application*' to develop metrics of infection and AMR for care providers and policymakers in partnership with the UKHSA
  b. '*Research application*' to create an anonymised database for use by researchers#
- Collect minimum data required to enable data linkage (NHS numbers only)

*Applications due to be submitted on 17 Aug; # Approval from the NHS Research Ethics Committee also required

Care home infection metrics

Develop c. 10 metrics with stakeholders

- Rates of hospital admissions for common infections, e.g. respiratory, urinary, skin, gastrointestinal
- Mortality rate for common infections
- Number of outbreaks
- Duration of outbreaks (days of home closure)
- Rate of antimicrobial resistance (blood, urine)
- Rate of Antimicrobial prescribing
- Vaccine coverage e.g. COVID, influenza
- Vaccine effectiveness e.g. COVID, influenza

Key decision: **data granularity** e.g. region, ICS, provider group, care home level

Data-driven research

Observational studies starting with AMR

- Burden of AMR and antimicrobial use by age, sex, care home type, region
- Risk factors for AMR
- Modelling to explore relationship between AMR and age for different pathogens

Research database for wider use

Beyond the pilot

Data-driven cluster randomised trials e.g.

- Hydration to prevent UTI in care homes
- Multiplex PCR to reduce respiratory outbreaks
- Public health disease control measures

Progress to date and project timelines

- Funding confirmed for a 12 month pilot study
- Submission of REC / CAG applications August 2023 [outcome September]
- NHSE agreed to host platform
- Data ingestion (Dec ‘23 / Jan ’24)
- Data linkage and reporting (spring/summer 2024
- Research outputs (autumn 2024)
- Evaluate whether project is feasible and adds value to existing surveillance / research infrastructure (summer / autumn 2024)

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NIHR