The Networked Data Lab: Analysis plan for Topic 1 on shielding patients during COVID-19

Satellite analysis for Aberdeen Centre for Health Data Science

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## Background and research question

* This work builds on the research done with the Networked Data Lab on the Grampian Shielding Population.
* This work aims to answer the following research questions: 1) did healthcare use change in NHS Grampian during the COVID lockdown?, 2) was there a difference in healthcare use in people who were directed to shield from COVID compared to Grampian as a whole? And 3) were there any differences in healthcare use by illness, age, gender or deprivation?

## Aims

* COVID has disrupted many aspects of people’s healthcare. In the initial phase of the COVID response, clinics, treatment and monitoring were modified and rescheduled and more clinics were delivered remotely. Proactive planning to ensure ongoing access to healthcare is critical to support the management of underlying health conditions. People who are shielding continue to have healthcare needs for conditions that may be complex and require close monitoring.
* This analysis builds on the central analysis by placing it in the context of overall changes in care in Grampian. It explores if there were significant differences in between the two populations and explores if there were changes specific to illness type, age, gender and deprivation of patient. New data include: all-Grampian data on care usage for in-patient, out-patient, emergency, as well as specific out-patient clinic attendances, prescriptions and labs, virtual vs face-to-face care, and ad-hoc care.

## Data and data linkages

* The data for all of Grampian include daily counts and types of all attendances in 2020 for in-patient, out-patient, and emergency. Linkages for the shielding patients will build off those done for the central analysis including in-patient, out-patient, emergency, and demographics including Scottish Government measures of urban/rural and deprivation for home address area. We will also analyse prescribing, laboratory results and deaths data for the shielding population. Sample size will be ca 585,000 for Grampian and ca 16,000 for the shielding list.

## Methods

On a weekly basis for 2019 and 2020, we will describe the types of care the shielding group had, with the addition from the central analysis of: emergency type, and in-patient admission type, discharge destination, and length of stay. We will also describe the types of clinic admissions the shielding group had and how the attendances were conducted. Shielding period will be 26th March to 18th June.

We will evaluate statistical differences in 2020 for:

* (1) if the mean health care resource usage (HCRU) counts changed between Pre- and Post-lockdown phases within the Grampian population
* (2) if the mean HCRU counts changed between Pre- and Post-lockdown phase within the Shielding population
* (3) if there is a difference in the HCRU change between the Grampian and Shielding populations in lockdown change
* (4) if there is a difference in attendance type between Grampian and Shielding populations

For Shielding patients:

We will evaluate statistical differences in:

* (1) the association of age, sex, illness and SIMD on mean HCRU counts
* (2) if the mean HCRU counts changed between Pre- and Post-lockdown phase within the Shielding population (this is similar to (2) above but we will estimate from the individual level data)

Statistical methods

We will test the null hypothesis of a no difference pre-COVID and COVID phases for a specific HCRU event using a generalised linear mixed model (GLMM). The model will consider a range of statistical distributions to identify the distribution of the HCRU event. The model will incorporate phase (pre-COVID and COVID), the time points and the interaction of phase and time as fixed effects. The model will also include age and sex as other covariates. The individual patient will be considered as a random effect. We will present the estimated means with standard errors and 95% confidence intervals as well as statistical significance (p-values) based on the hypotheses investigated.

We will compare the difference of in the healthcare resource utilisation (HCRU) by the shielding group with overall Grampian patient at pre-COVID and COVID phases. To achieve this, we will analyse the weekly data on the HCRU events and fit a generalised linear model with an appropriate distribution. The model will incorporate group (Shielding and Grampian), phase (pre-COVID and COVID), the time points (week) and the interaction of group and phase as predictors. We will present the estimated means with standard errors and 95% confidence intervals as well as statistical significance (p-values) based on the specific hypotheses investigated.

## Local audience

* Our intended audience is NHS and local authority policymakers, clinician groups, and patient groups in the short-term as well as the wider academic community in the long-term.

## Dissemination plan

We will publish this analysis in an academic journal. We will also provide high-level summaries for NHS and local authority policy-makers, patient groups, as well as the Grampian public. We will submit the manuscript and all analysis code to a pre-print server, present findings at our public ACHDS seminar series, write a blog on the ACHDS website, and send a digest to the local press.