Technical appendix: Descriptive analysis of hospital admissions from care homes and hospital discharges to care homes

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About this technical appendix

This technical appendix provides supplemental information on the methodology used for the analysis presented in the Health Foundation briefing *Adult social care and COVID-19. Assessing the impact on social care users and staff in England so far*.

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Data sources and linkage

Hospital admissions from care homes and hospital discharges to care homes cannot be reliably identified in administrative data from the Secondary Uses Service (SUS), a national database of all inpatient admissions funded by the NHS in England. This is because the source of admission and discharge destination for permanent care home residents is frequently recorded as 'Usual place of residence'.

The Improvement Analytics Unit (IAU), a partnership between NHS England and NHS Improvement and the Health Foundation, previously developed a linked dataset[1] that allows us to estimate the number of hospital admissions and discharges for permanent residential and nursing care home residents across England. The methodology relies on access to information on residential patient addresses, which are initially collected by general practices and stored in the master patient index (MPI), a patient-level register sourced from the National Health Application and Infrastructure Services (NHAIS).

Using address information from monthly MPI extracts, care home residents can be identified by assigning Unique Property Reference Numbers (UPRN) to patient addresses and to addresses of care homes registered with the Care Quality Commission (CQC) and comparing them. All processing of address information, and subsequent linkage of patient information, was carried out by the National Commissioning Data Repository (NCDR) and the analysis of the linked dataset used 'pseudonymised' information in a secure environment hosted by the Health Foundation. All data accessed by the Health Foundation are anonymised in line with the Information Commissioner's Office (ICO)'s code of practice on anonymisation. Validation of the methodology and a detailed description of data flows and linkages can be found in previous IAU publications.[2]

The analysis dataset contained the following tables, which are linked at record level:

1. **Longitudinal record of permanent care home resident information**, also referred to as the minimal master patient index (MMPI). This table contains demographic information and is produced on a monthly basis on the first Sunday following the 13th day of the month, up to April 2020 and dating back to August 2014. It also allows us to determine the month in which a person entered a care home and the month they left a care home, but the date the data extract was created might not match the exact date a resident moved in or out of a care home. It also contains a pseudonymised care home identifier, which allows linkage to information on care home characteristics.

2. **Inpatient hospital provider spells** from SUS, a national person-level database closely related to the widely used Hospital Episode Statistics (HES), up to the end of April 2020. A spell is defined as a single period of care under one consultant (typically a patient's entire stay in a hospital) and is made up of at least one episode and ends on hospital transfer, discharge or the patient's death. Spells were created from episodes using validated methodology.[3]

3. **Longitudinal record of the characteristics of care homes regulated by the CQC**, which are refreshed on a monthly basis up to March 2020, dating back to 2015. This table contains the dates when care homes opened and closed, as well as information on care home type, capacity and specialties. Nursing homes are defined as care homes that provide nursing care to some or all residents. It should be noted that the CQC registry is not designed for research purposes, nor is it properly validated.

Identifying admissions from care homes and discharges to care homes

The methodology described relies on address records and therefore is likely to only identify residents who live in care homes on a permanent basis. In addition, there can be delays in registering address changes with general practices and with the NHAIS. Therefore, early parts of care home stays might be missed if patients did not update their address with their GP immediately. To increase the likelihood of capturing admissions and discharges for patients that moved to a care home more recently, as well as for patients who were admitted to care homes for a limited period for recuperation and/or rehabilitation, we also considered the source of admission and discharge destination recorded in SUS, similar to methodology used in a recent analysis by NHS England.[4] Please note that NHS England has since revised its methodology. A copy of the original methodology dated 6 June 2020 is available on GitHub.[5]

Since there might be differences in the completeness and accuracy of the source of admission and the destination of discharges fields in SUS, the number of admissions and discharges from and to care homes identified using this method might not be directly comparable.

The source of admission for a given hospital spell was set to 'care home' or 'other' using the following logic:

- If the patient had a care home resident flag in the MMPI on the date of admission, it was set to 'care home'. This was determined by matching the spell start date to the time period covered by each monthly MMPI extract.
- If the source of admission in SUS was recorded as 'care home', 'temporary accommodation' or 'hospice' (ADMISORC is 29, 54, 65, 69, 85, 86 or 88), it was set to 'care home'.
- If any of the above applied, but the administrative category on admission was 'private patient' (ADMINCAT is 2), it was set to 'other'.
- All other cases were set to 'other'.

Hospital discharges were excluded from the analysis if the patient died in hospital (DISDEST code 79, 'Not applicable – patient died or still birth'). For all other hospital discharges, the discharge destination for a given hospital spell was set to 'care home' or 'other' using the following logic:

- If the patient had a care home resident flag in the MMPI on the date of discharge (spell end date), it was set to 'care home'. This was determined by matching the spell end date to the time period covered by each monthly MMPI extract.
- If the destination on discharge in SUS was recorded as 'care home', 'temporary accommodation' or 'hospice' (DISDEST is 29, 54, 65, 85 or 88), it was set to 'care home'.
- It was set to 'other' if any of the above applied, but it also met at least one of the following criteria:
  - the administrative category on admission was 'private patient' (ADMINCAT is 2)
  - the discharge was a transfer to another hospital provider (DISDEST is 51, 52 or 53)
  - the spell was unfinished (DISDEST is 98)
  - the destination on discharge was one of the following: repatriation from high-security psychiatric hospital; penal establishment – court or police station; NHS other provider – high security psychiatric, medium secure unit, ward for general patients or the younger physically disabled, ward for maternity patients or neonates, ward for patients who are mentally ill or have learning disabilities; local authority foster care; non-NHS run hospital – medium secure unit; non-NHS run hospital (DISDEST is 30, 37, 38, 48, 49, 50, 66, 84 or 87).
- All other cases were set to 'other'.

After creating totals of the daily number of hospital admissions from care home and hospital discharges to care homes, 7-day moving averages were calculated between 1 January 2015 and 30 April 2020. The daily averages of admissions and discharges between 1 February 2020 and 30 April 2020 were then indexed to the average of the same day between 2015 and 2019.

Hospital admissions from care homes were additionally sub-set by method of admission, which was assigned according to the following logic:

- It was set to 'emergency' if the method of admission in SUS was 21, 22, 23, 24, 25, 28, 2A, 2B, 2C or 2D.
- It was set to 'elective' if the method of admission in SUS was 11, 12 or 13.
- All other cases were set to 'other'.

Hospital admissions were determined to have COVID-19 as primary cause if the primary ICD-10 diagnosis code was U07.1 or U07.2, according to World Health Organization definitions.[6]

Sub-setting admissions and discharges by care home type

Admissions from care homes and discharges to care homes identified according to the methodology described were further subset by the type, broadly categorised by whether the care home provided nursing care to at least some residents, referred to as a nursing home, or only personal care, referred to as a residential care home. This was only possible for admissions/discharges of residents with a care home resident flag in the MMPI, as these could be linked to care home characteristics provided by the CQC through a pseudonymised care home identifier. Admissions/discharges of care home residents identified via fields in SUS only were assigned 'unknown care home type'.

The mapping of registered care homes to patient addresses is not exact and residents are sometimes matched to several care home identifiers. This frequently occurs when care home characteristics change, which can appear in the CQC data as one care home closing and another care home with a new identifier opening. Multiple care home matches for a given resident were resolved by taking into account the 'care home open' and 'care home close' date recorded in the CQC care home characteristics table and only filtering for care homes that were open during the relevant time period. In rare cases, where residents were matched to several care homes that were open at that point in time, a care home was chosen at random. If no care home was listed as open during the relevant time period, 'unknown care home type' was assigned.

Code availability

All analysis code used to create the charts for this briefing using open data[7] and patient-level data[8] can be found on GitHub.

References

1. Wolters A, Santos F, Lloyd T, Lilburne C, Steventon A. *Emergency admissions to hospital from care homes: how often and what for?* Health Foundation; 2019 (www.health.org.uk/publications/reports/emergency-admissions-to-hospital-from-care-homes).
2. Conti S, Gori C, Caunt M, Steventon A. *The impact of providing enhanced support for Sutton Homes of Care residents*. Health Foundation; 2018 (www.health.org.uk/publications/the-impact-of-providing-enhanced-support-for-sutton-homes-of-care-residents).
3. Health and Social Care Information Centre. Methodology to create provider and CIP spells from HES APC data. HSCIC; 2014 (https://webarchive.nationalarchives.gov.uk/20180328130852tf_/http://content.digital.nhs.uk/media/11859/Provider-Spells-Methodology/pdf/Spells_Methodology.pdf).
4. NHS England. Supplementary Information: Hospital Discharges to Care Homes. NHS; 2020 (www.england.nhs.uk/statistics/statistical-work-areas/supplementary-information).
5. The Health Foundation Analytics Lab. Methodology for estimating the numbers of patients discharged from hospitals into care homes. GitHub; 2020 (https://github.com/HFAnalyticsLab/COVID19_care_homes/blob/master/doc/NHSE_Methodology_v2020-06-06.pdf).
6. World Health Organization. COVID-19 coding in ICD-10. WHO; March 2020 (www.who.int/classifications/icd/COVID-19-coding-icd10.pdf?ua=1).
7. The Health Foundation Analytics Lab. COVID-19 social care open data. GitHub; 2020 (https://github.com/HFAnalyticsLab/COVID19_social_care_open_data).
8. The Health Foundation Analytics Lab. COVID-19 risk and health care needs of care home residents in England. GitHub; 2020 (https://github.com/HFAnalyticsLab/COVID19_care_homes).

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