Networked Data Lab

Analysis plan for Topic 4: Intermediate Care

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## Research rationale and objectives

The Scottish Government states:

“Scotland is facing some radical changes in the way health and social care is delivered. Our plans for the integration of adult health and social care will ultimately improve the outcomes for our most vulnerable citizens by improving the quality, efficiency and financial sustainability of health and social care services.

To achieve these ambitions we must deliver person-centred community-based services that will help people to live healthy, independent lives in the way they want, where they want, and when they want.

Intermediate Care and rehabilitative services have a vital role to play in delivering these objectives. In particular, Intermediate Care can help shift the balance of care away from hospital and can reduce the need for alternative, longer-term care services, such as home care, or permanent admission to a care home.”

(Scottish Government’s *Maximising Recovery, Promoting Independence: An Intermediate Care Framework for Scotland*

<https://www.gov.scot/publications/maximising-recovery-promoting-independence-intermediate-care-framework-scotland/>)

We conducted a series of stakeholder engagement events with: the NHS Grampian Clinical Board, Health Intelligence, Director of Primary Care, the Public Health teams, and the Aberdeen Centre for Health Data Science PPIE group to determine the most pressing questions for intermediate care.

At the systems level, the most pressing concern in NHS Grampian is the rising population of people who are medically fit for discharge from hospital, but who cannot be discharged due to a shortage of community-based health & social care provision, including intermediate care (“delayed discharge”). The delayed discharge population affects the overall bed occupancy rate – which is currently at 100% in NHS Grampian. High bed occupancy has a clear effect on patient outcomes, causing delays in patient ‘flow’ through the system which can result in delayed diagnosis and treatment. Currently, the Health Intelligence team monitors the size of this delayed discharge population closely, but no further analysis has been conducted about causes of delay and their relationship to proposals for solutions. Feedback from primary care specialists centred on a perceived loss of bed space for preventative step-up care in intermediate settings due to occupancy by step-down and delayed discharge patients – which would lead to greater acute sector admissions and further care bottlenecks. Health Intelligence highlighted their lack of time and resource to conduct data linkage studies into delayed discharge bottlenecks and intermediate care, indicating this would be an excellent space for NDL research.

The impression within the PPIE group was that where possible the NHS tried to provide ‘person centred care’ for people locally, recognising this was better for patients, families, and recovery. Local care can also help to reduce wait times and demand for beds in city hospitals. The group agreed this is an important topic ‘with an aging population and neurodegenerative problems’ and this analysis would be useful for informing NHS/Care service planning.

Stakeholders’ suggestions of useful research topics include:

• Changes in the use of intermediate care facilities 5 years ago compared with 2023

• How has length of patient stay changed over time? Are there now more people staying longer than 6 weeks, and staying in intermediate care facilities long-term?

• Are there now fewer beds available for GPs to refer to for step-up care?

• Are there differences across the region in urban vs rural settings - Aberdeen City vs Aberdeenshire?

• Who is using intermediate care? Are the characteristics of the patients different across the region - Aberdeen City vs Aberdeenshire?

• How access to/use/outcomes of intermediate care is impacted by travel times and by social deprivation?

• Do patients now have more complex health needs (‘are they sicker?’) when they first engage with intermediate care compared with five years ago?

• Outcomes after discharge – where to and who is readmitted/further admissions?

**Aims**

The aim of this study is to describe annual trends in intermediate-level healthcare use in older people across the healthcare system in Grampian between 2018 and 2023, and to examine differences in use between sub-populations and service providers.

The goal of the research is to answer the following questions:

**Who receives intermediate care?**

**What proportion of intermediate care is preventative?**

**What are the medical needs of the patients?**

**Has this changed over time?**

**Are there differences across care locations?**

Using anonymised, population-scale, individual-level linked NHS and government data, the objectives of this study are to:

1. Describe the incidence of intermediate care use in people age 65+ in the NHS Grampian region
2. Describe patient pathways into intermediate care in people age 65+ in the NHS Grampian region over time
3. Measure differences in intermediate care population and pathways into care between service providers
4. Measure differences in intermediate care population and pathways into care by patient medical acuity
5. Measure differences in intermediate care population and pathways by patient demographics

## Data and data linkages

**Study population**

The population for this study will be all people in the NHS Grampian region (which covers the local authority areas of Aberdeen City, Aberdeenshire & Moray) who were age 65 or older between 1 July 2018 and 30 June 2023 and had an admission to a bed-based intermediate care setting. This includes people who became 65 years of age at any point during the study period.

**Datasets**

For the study population defined above, we will extract records from the following databases. All databases include the entire NHS Grampian population for the study period.

For patient healthcare analysis:

Prescribing Information System (PIS) – all prescriptions dispensed in the community

TrakCare – out-patient appointments and attendances

Scottish Morbidity Records Dataset 01 (SMR01) – in-patient and day case admissions

National Register Scotland Death Records

For patient demographic characteristics:

National Health Service Central Register (CHI Register) – birthdate, sex, home address data zone

Scottish Index of Multiple Deprivation – 40 measures of deprivation for the home area

Scottish Government Urban / Rural Classification – measure of rurality of home area

National Records Scotland Population Estimates – counts of population over time by age, sex and deprivation

**Dataset variables used**

The population receiving intermediate care will be defined as: any person with admission to any of the 15 community hospitals, Rosewell House, or Hospital at Home in the SMR01 database at any time during the 5-year period who was age 65+.

Step-up or step-down classification will be defined from the source of admission in the intermediate care SMR01 admission record (step-down will be an admission from any acute hospital and step-up will be any other source, such as place of residence).

Patient morbidity and acuity will be defined by a suite of measures:

1) polypharmacy from a 1-year lookback at prescribing in the PIS record;

2) routine care from a 5-year lookback at out-patient clinic types and frequency of attendances in the TrakCare record;

3) multimorbidity from a 5-year lookback at diagnostic codes from inpatient admissions.

Patient sex will be defined from the CHI register.

Patient deprivation will be defined from the Scottish Index of Multiple Deprivation of home area in the CHI Register.

Patient Rurality will be defined from the Urban / Rural Classification of home area in the CHI Register.

**Please specify which of these datasets result from new linkages**

None of the datasets are currently linked, all linkages will be new. All linkages will be made by Community Health Index (CHI), which is a unique identifier for individuals, which is recorded in most hospital-based health records in Scotland.

**Data access**

Data extraction from the databases above and anonymisation of patient records will be done by the Grampian Data Safe Haven (DASH) team. Researchers will access, link, and analyse the anonymised patient-level data on the DASH secure server. Permission for this research will be from the North Node Privacy Advisory Committee, which has authority to grant approval from university Research Governance and Ethics; and NHS Research & Development and Caldicott Guardian

## Statistical methods

**3.1** **Study design**

This is a retrospective observational study

**3.2** **Study period**

1 July 2018 – 30 June 2023

**3.3** **Study population**

The population for this study will be all people in the NHS Grampian region (which includes the local authorities of Aberdeen City, Aberdeenshire & Moray) who were age 65 or older between 1 July 2018 and 20 June 2023, who had an admission to any bedded intermediate care setting (any of the 15 community hospitals, Rosewell House, or Hospital at Home).

**3.4 & 3.5** **Definitions of outcomes and exposures and statistical approaches**

**Objective 1**

**Describe incidence of intermediate care use in people age 65+ in the NHS Grampian region**

From the SMR01 in-patient dataset, we will measure monthly admissions to intermediate care settings, in total across NHS Grampian and by admission route (i.e. step-up or step-down). We will present raw counts and incidence per 1,000 population age 65+ in Grampian from the National Population Estimates.

**Objective 2**

**Describe patient pathways into intermediate care in people age 65+ in the NHS Grampian region over time**

From the SMR01 in-patient dataset, we will measure the proportion of intermediate care admissions per month that are stepping down from an acute hospital setting as part of a continuous stay, in total across intermediate care settings in NHS Grampian. The proportion will be relative to the total intermediate care admissions (objective 1).

**Objective 3**

**Measure differences in intermediate care population and pathways into care between service providers**

We will repeat the monthly admissions analysis and patient pathways into intermediate care analysis as described in Objective 1 and Objective 2, but stratified by location of service providers two ways: 1) by individual care settings (i.e. for each specific community hospital) and 2) aggregated by local authority (Aberdeen City, Aberdeenshire, Moray). In case of small numbers, admissions will be grouped into quarters or years.

**Objective 4**

**Measure differences in intermediate care population and pathways into care by patient medical acuity**

For each patient with an admission to intermediate care, we will calculate the following:

1) Polypharmacy 1 year before admission using the PIS database

2) Routine care 5 years before admission using the TrakCare out-patient attendance database (number of clinic types)

3) Multimorbidity 5 years before admission using all diagnostic codes in inpatient admissions in the SMR01 database (Elixhauser Comorbidity Index)

For each measure of acuity, we will then calculate the monthly median across all patients in intermediate care: 1) in total for all care locations in NHS Grampian and 2) stratified by service provider.

**Objective 5**

**Measure differences in intermediate care population and pathways into care by patient demographics**

For each patient with an admission to intermediate care, we will calculate the following:

1. Age at admission and sex
2. Home Area deprivation from the CHI register linked to the Scottish Index of Multiple Deprivation
3. Rurality from the CHI register linked to the Urban/Rural classification

We will then measure annual admission rates to intermediate care stratified by age group, sex, deprivation quintile, and rurality index. We will calculate an age-sex standardised rate per 100,000 population for Grampian as a whole and for each of the intermediate care settings. (<https://www.scotpho.org.uk/media/1400/phi-standardisation-guidance-v21.docx>)

**3.6** M**issing data**

All individuals in the population will be included, and any missing demographic and clinical values that occur in the extracted data will be presented in summaries. Due to disclosure control requirements, any analysis that results in groups of less than 5 people will be aggregated after analysis, at the time of publication.

**3.10** Li**mitations**

There are no accessible data for any intermediate care provided by the local authorities or by the private sector which includes most lower-acuity intermediate care. This analysis includes only bed-based intermediate care.

## Governance

**Data access process**

Data extraction from the databases listed above and anonymisation of patient records will be done by the Grampian Data Safe Haven (DASH) team. NDL researchers will access and link the anonymised patient-level data on the DASH secure servers.

**Ethics approval and consent to participate**

Permission for linkage and use in research will be from the North Node Privacy Advisory Committee, which has authority to grant approval from university Research Governance and Ethics; and NHS Research & Development and Caldicott Guardian. No patient consent is required.

## Impact, dissemination and engagement

Hospital bed over-occupancy and delayed discharge due to lack of intermediate care are a primary concern for both local and national decision-makers. Currently no analysis is available describing the patient population in intermediate care and their medical needs.

Both locally and nationally, expanded services in the community are required, as up to 20% of emergency admissions can be avoided with the right care in place (<https://www.england.nhs.uk/wp-content/uploads/2023/01/B2034-delivery-plan-for-recovering-urgent-and-emergency-care-services.pdf>). Joined-up care for older people living with frailty is a priority, requiring a scaling up of community response, meaning the right people help you get the care needed, without requiring an avoidable admission to hospital. To do this, there is a priority on the use of ‘virtual wards’, which allow people to be safely monitored from home, allowing staff to care for more patients over the longer term.

Locally, we will present these results to the Health and Social Care Partnership, Operation Home First, the NHS Grampian Executive Team and Clinical Board, the NHS speciality teams for: Flow Navigation Centre, Frailty Pathway, and Unscheduled Care. Nationally, we will share publicly our analysis and the underlying software developed, and present to NHS Scotland Health Intelligence and Public Health Scotland. We will also publish our analysis as an academic journal article, and share it with NHS, Public Health, and academic audiences at conferences.

## Appendix

Scottish Government Policy on Independent Living

<https://www.gov.scot/policies/independent-living/intermediate-care/>

Scottish Government Policy on Maximising Recovery, Promoting Independence: An Intermediate Care Framework for Scotland

<https://www.gov.scot/publications/maximising-recovery-promoting-independence-intermediate-care-framework-scotland>

Scottish Health and Social Care Partnerships Intermediate Care Atlas Report

<https://ihub.scot/media/1848/intermediate-care-atlas_july18.pdf>

NHS Grampian Operation Home First Portfolio Evaluation Report

<https://committees.aberdeencity.gov.uk/documents/s122392/HSCP.21.075_Appendix%20A_Operation%20Home%20First%20-%20Portfolio%20Evaluation%20Report%20-%20June%202021.pdf>

NHS Grampian strategy for community hospitals

<http://www.moray.gov.uk/minutes/archive/XC20041216/communityhospitalsstrategyapp1.pdf>

NHS England Deliver Plan for Recovering Emergency and Urgent Care Services

<https://www.england.nhs.uk/wp-content/uploads/2023/01/B2034-delivery-plan-for-recovering-urgent-and-emergency-care-services.pdf>

NHS Scotland National Data Catalogue

<https://www.ndc.scot.nhs.uk/National-Datasets/>