The Grampian Networked Data Lab Topic 4: Intermediate Care Final Report

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## 1 Introduction

*The Critical Role of Intermediate Care*  
  
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/))

*Intermediate care in Grampian*

NHS Grampian runs bedded intermediate care in three very different types of settings.

Two types are used within Aberdeen City: 1) Rosewell House is a consultant-led NHS ward within a care home; and 2) Hospital-at-Home is a consultant-led “virtual ward” delivered in patients’ homes. The third type of intermediate care is found outside of Aberdeen City in the large, rural areas of Aberdeenshire and Moray local authorities, in the form of 15 GP-led community hospitals (Figure 1, Table 1). NHS Grampian has more community hospital than any other board in Scotland ([NHS Grampian Strategy for Community Hospitals](https://committees.aberdeencity.gov.uk/documents/s119928/HSCP.21.033_Appendix%20A%20-%20OHF%20Evaluation%20Progress%20Report%20v1.pdf)).

Due to restrictions on data sharing, this analysis does not consider intermediate care delivered in people’s homes by providers other than NHS consultants (for example care given as part of reablement, or as part of social care).

**Figure 1: Map of the NHS Grampian region showing the 17 intermediate care settings analysed in this study**

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| --- | --- | --- | --- | --- |
| C:\Users\butlej1\Downloads\download.png  **Table 1. NHSG intermediate care settings, showing their type, location, and the time-frame analysed in this study. (n.b. three community hospitals closed during the study period, and Rosewell House NHS beds opened mid-way through the study period.)** | | | | |
| Hospital Name | Type of Hospital | Local Authority | From | To |
| Aboyne Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Jun 2023 |
| Chalmers Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Jun 2023 |
| Fleming Hospital | Community Hospital | Moray | Jul 2018 | Mar 2020 |
| Fraserburgh Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Jun 2023 |
| Glen O Dee Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Jun 2023 |
| Hospital at Home | Hospital at Home | Aberdeen City | Jul 2018 | Jun 2023 |
| Insch Hospital | Community Hospital | Aberdeenshire | Jul 2018 | May 2021 |
| Inverurie Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Jun 2023 |
| Jubilee Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Jun 2023 |
| Kincardine Community Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Jun 2023 |
| Peterhead Community Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Jun 2023 |
| Rosewell House | NHS integrated care home | Aberdeen City | Jan 2021 | Jun 2023 |
| Seafield Hospital | Community Hospital | Moray | Jul 2018 | Jun 2023 |
| Stephen Cottage Hospital | Community Hospital | Moray | Jul 2018 | Jun 2023 |
| Turner Memorial Hospital | Community Hospital | Moray | Jul 2018 | Jun 2023 |
| Turriff Community Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Jun 2023 |
| Ugie Hospital | Community Hospital | Aberdeenshire | Jul 2018 | Nov 2019 |
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*What is important for intermediate care in Grampian?*

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 Patient and Public Involvement and Engagement 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 the acute setting, but who cannot be discharged due to a shortage of community-based health & social care provision, including intermediate care beds. The delayed discharge population affects the overall bed occupancy rate – which is currently at or above 100% in NHS Grampian’s two acute hospitals. 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 NHS Grampian 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.

*Aims*

Directed by our stakeholder and patient engagement, we set the aim of this study to describe annual trends in bedded intermediate-level healthcare use in older people across in NHS Grampian for the five-year period 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 (“step-up”)?**

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

**Has these measures changed over time?**

**Are there differences in these measures 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 50+ in the NHS Grampian region
2. Describe patient pathways into intermediate care in people age 50+ 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 difference in intermediate care population and pathways by patient demographics

## 2 Methods

### 2.1 PPIE and stakeholder engagement

[Please describe any processes of patient and public involvement and engagement, and how this engagement shaped the direction of your research.] [Please also describe any relevant engagement with stakeholders and the priorities raised by these stakeholders.]

*Engagement for study design*

We hosted a discussion on the proposed intermediate care analysis with the ACHDS PPIE Group 18 May 2023. Three members of the group were available to attend, one living in Aberdeen City and two in Aberdeenshire.

We introduced the topic and gave an overview of intermediate care in Grampian, the data we can access for analysis, and the priorities coming out of conversations with local clinicians and stakeholders.

The group had not heard the term ‘intermediate care’ before but were aware and had knowledge and experiences of the challenges of caring for the elderly, and of people being in hospital for extended periods of time because the necessary care and support was not available at home.

The group provided case studies:

· experience of both parents being cared for at a community hospital

· an elderly relative discharged home from hospital but even with a support package in place it wasn’t possible to stay at home so was readmitted within a few days. This raised a number of questions about how this would be reflected in the data – would it be considered 1 admission or step-down care quickly followed by step-up care, and then long-term care?

The impression within the 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 also helping reduce wait times and demand for beds in city hospitals.

The group suggested the team meet with GPs to get their perspective, which we did.

As part of the discussion the group identified questions they thought it would be important to address in the analysis:

· Are there changes in the availability and use of intermediate care facilities?

· Are there changes in how long patients stay?

· Who is using intermediate care?

· Are the characteristics of patients different across the region e.g., in urban Aberdeen City compared with rural Aberdeenshire?

· Are patients sicker now when they first engage with intermediate care compared with pre-COVID?

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

· Is access to/use/outcomes of intermediate care impacted by travel times and in areas of social deprivation?

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

This helped refine and prioritise research questions for the statistical analysis plan.

The group recognised it would be useful to have real time patient level analysis for service providers and were supportive of tools for clinical/care staff being developed in the future.

The PPIE group provided encouragement to the NDL team describing this as an important analysis ‘with an aging population and neurodegenerative problems’ to ‘answer some of the questions’ in this complex problem, and to put numbers to changes in service use to inform future planning and, ‘fit the resources to the need’.

*Engagement with the interim results*

The results of the intermediate care analysis were presented to four members of the ACHDS PPIE Group 13 March 2024 to ‘sense check’ results and interpretations.

Key messages/discussions:

· The data used is from 15 community hospitals in Aberdeenshire, 1 facility (Rosewell House) and the ‘Hospital at Home’ (H@H) Programme in Aberdeen City. This provided a cohort of over 13,000 people with a total of over 23,000 admissions/episodes between 2019-2023.

· 40% drop in Community Hospital admissions 2019-2023; more care now offered in Aberdeen City via Rosewell House and H@H.

The group felt these results reflected their sense that Community Hospitals are being closed and that the buildings are ‘run down’ so estate costs might be a factor in closures.

One of the group had experience of a family member attending a Community Hospital following a cycling accident during Covid who was referred to Aberdeen Royal Infirmary (ARI) instead.

The group were keen to understand what happened to care for people who used to be cared for in the Community Hospitals. We discussed the possibility that they stay at home longer and turn up in ARI when they reach a crisis point.

Number of patients referred to intermediate care from hospitals (step-down) has almost doubled; Referrals from GPs and wait lists are reduced; More step-down patients stay longer than 6 weeks.

Case study: a group member described experience with their father who had dementia before he died and was referred for intermediate care/respite care. This was really important for everyone in the family. The group was concerned the data suggests there is less of this type of care available.

The group asked for absolute number graphs for greater clarity for the length of stay data, which we are working on.

· Intermediate care (IC) patients are older and sicker than pre-COVID. Average age of IC patients is now over 80; more patients have a dementia/delirium diagnosis.

The group asked if this is because people are living longer, and we discussed that the numbers suggest this is not the only factor involved.

· In an open discussion on where we should provide more preventative care for the older population with dementia the group highlighted a number of issues:

The group highlighted the importance of good public transport links.

The group recognised the ‘difficulties in getting staff for social care’ and that better terms and conditions could help. Better social care provision could break the cycle.

The group discussed economy of older people being admitted to acute hospitals or for IC that ends up long-term as social care or appropriate support at home is not available.

The group recognized that the economics need to be considered but politicians are not addressing these issues because they focus on the 4-5years of their term rather than the longer-term view to improve the health of people, and there is no additional money in the budget, so the accountants/budget holders all want to hang on to the budget they have.

There was a recognition of the ‘need to invest [in preventative care] and give the time to see the impacts and have change’ on the health of the population and the NHS.

There was a recognition of the ‘highly skilled and appreciated community nurses’ and question of whether their workload has increased in view of these changes to IC.

There was a recognition that end-of-life care is becoming more medicalised (around 15% of patients are dying in Community Hospitals) and there is a need for more discussion on ‘places for people to live and be cared for in the community’ until the end of their life.

Feedback on communicating the results with the public:

The group thought the graphs in the presentation slides were very good: simple, clear, informative, and easy to read, and the opportunity to discuss the slides throughout the presentation worked well.

Recommendations for actions:

· To share discussion points with NHS/social care leads/decision makers.

· The geographical spread in Grampian came up during the discussion and further analysis of changes in rural versus urban IC, and to include deaths and 90-day outcomes for all patients is underway.

· Access to data to improve care came up throughout the discussion e.g. hospital consultants not having access to GP records for care; GP, and Social Care records not being readily available to get the complete patient journey or for research; that workforce data would also be useful. There was an acknowledgement from the group that data sharing could be useful for improved service design/delivery and for research to improve health and care. Support from the group to continue to lobby for data sharing.

· One of the group shared a case study of an elderly relative who died in IC. A space in a care home had been offered, however, he and his wife wanted to stay together but his wife didn’t qualify for the care home, so he stayed in IC setting rather than moving to the care home. This highlights the need for further discussions/qualitative research with patients and families and practitioners to understand why people are staying longer in IC and what would have improved their experiences.

· The impact of rurality and distance from IC Centre, levels of deprivation, and understanding if more patients from rural areas are now being admitted to acute care in the city hospitals are all important areas for future research.

*Engagement with the briefing report and other outputs*

The ACHDS PPIE Group will help with dissemination of the results, co-producing lay summaries, sharing the findings via their networks, co-presenting the results at conferences, and contributing to all outputs from the analysis.

### 

### 2.2 Data extraction & processing

NHS Grampian’s patient management system (TrakCare) provided the main datasets for this analysis.

Our study population was any person with an admission to one of our intermediate care settings during the five-year study period (2018-2023). Our cohort was limited to those aged 50 or over at admission.

We then synthesized the study population’s medical history by extracting, for each member of the study population, their inpatient, outpatient and emergency admissions from TrakCare from July 2013. We also extracted from [NHS Scotland’s Prescribing Information System](https://publichealthscotland.scot/our-areas-of-work/acute-and-emergency-services/prescribing-data/prescribing-information-system-pis/) all community (excludes those in hospital) prescriptions for the cohort submitted for reimbursement between end of July 2013 and the end of April 2023. Reimbursement claims happen at the months end so cover the previous month’s prescribing. Data availability at the time of extraction meant the earlier end of April 2023. This gave us a ten year medical care record for all members of our cohort.

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

In the analysis plan we stated we would use the Scottish Morbidity Records Dataset 01 that covers inpatient admissions to extract our cohort but used NHS Grampian’s inpatient dataset instead (from which the Scottish Morbidity Records Dataset 01 is derived).

Population data for constructing rates came from [National Records for Scotland mid-year population estimates](https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates). At the time of extraction 2022 estimates were not available so we used 2021’s for 2022 and 2023.

This research project was approved by the North Node Privacy Advisory Committee. Approval includes research sponsorship, ethics approval, and Caldicott research and development approval. All analysis was conducted within NHS Grampian’s health intelligence secure system and in the University of Aberdeen’s Grampian Data Safe Haven (DaSH) trusted research environment. DaSH has also provided disclosure control and released the contents of this report for publication in any setting.

### 2.3 Data analysis

#### 2.3.1 Study design

This is a retrospective observational study

#### 2.3.2 Study period

Study population defined from admissions between 1 July 2018 – 30 June 2023

Medical history defined by linkage of study population to their medical records between 1 July 2013 – 30 June 2023

#### 2.3.3 Study population

[Please indicate the study population, and any inclusion or exclusion criteria. For example, are there any age or location restrictions? Does it also include a general population cohort?]

Our population is all people in the NHS Grampian region (which covers the local authority areas of Aberdeen City, Aberdeenshire & Moray) who were age 50 or older between 1 July 2018 and 30 June 2023 and had an admission to at least one of the 17 bed-based intermediate care settings.

#### 2.3.4 Definitions of outcomes and exposures

Step-up or step-down classification was defined as follows. All continuous inpatient periods of care that featured multiple hospitals, where the community hospital was not the first hospital, were defined as step-down. We also coded any admission to an intermediate care setting that happen within 24 hours of a discharge from a Grampian hospital as step-down (excluding any readmissions from the same intermediate care setting). All other admissions were labelled step-ups and divided into 1) routine elective admissions (day cases admitted from wait-lists for minor procedures) and 2) step-ups from home or GP.

Patient morbidity and acuity was defined as

1) polypharmacy from a 1-year lookback at prescribing in the PIS record, with our measure being the number of British National Formulary sub chapters medicines being prescribed in the period.

1. routine care from a 5-year lookback at out-patient clinic types and frequency of attendances in the TrakCare record, with our measure being the number of specialties seen.
2. multimorbidity from a 5-year lookback at admission diagnostic codes from inpatient admissions, with [Elixhauser Comorbidity Index](https://cran.r-project.org/web/packages/comorbidity/index.html) being our measure.

Patient deprivation was defined as the Scottish Index of Multiple Deprivation of home area as recorded by postcode at time of admission. Patient Rurality was defined as the Urban / Rural Classification of home area as recorded by postcode at time of admission

#### 2.3.5 Statistical approaches

This is a descriptive study. Analysis is mainly by comparing numbers, proportions and rates over time periods. We used primarily monthly intervals, with disclosure control requiring us to use quarterly or half-yearly intervals for time periods with low numbers. Standardised rates were calculated using Public Health England’s “[PHEindicatormethods](https://cran.r-project.org/web/packages/PHEindicatormethods/index.html)” package in R. Competing-events survival analysis was used to calculate time to first event (death, inpatient or emergency readmission) within the 90 day period post discharge using the R package “[ggsurvfit](https://cran.r-project.org/web/packages/ggsurvfit/index.html)”. Follow-up was censored at the end of June 2023.

### 2.3.6 Methods for addressing missing data

Missing data was rare so no imputation was conducted.

## 3. Results

### 3.1 Characteristics of patients admitted to intermediate care

Overall there were 12,903 people admitted to bedded intermediate care in the past five years in NHS Grampian (Table 2).

As some of the cohort had multiple separate periods of care, the total admissions for the cohort was 23,603. Because within a single period of care some people were transferred between intermediate care hospitals, the total number of times a member of the cohort was admitted to an intermediate care setting was 24,192.

32% of the admissions were for routine elective day-case care, 24% were admissions from patients’ homes via their GP (“step-ups”) and 44% were admissions from the acute hospitals in the region (“step-downs”).

**Table 2. Characteristics of population admitted to the 17 NHSG bedded intermediate care settings 2018-2023**

| Group | Number | % |
| --- | --- | --- |
| *Cohort* | | |
| Admissions | 24192 | 100 |
| *Sex* | | |
| Female | 12841 | 53 |
| Male | 11351 | 47 |
| *Age* | | |
| 50-54 | 729 | 3 |
| 55-59 | 1042 | 4 |
| 60-64 | 1480 | 6 |
| 65-69 | 1943 | 8 |
| 70-74 | 2891 | 12 |
| 75-79 | 3903 | 16 |
| 80-84 | 4454 | 18 |
| 85-89 | 4264 | 18 |
| 90+ | 3486 | 14 |
| *Ethnic Group* | | |
| Not stated | 1429 | 6 |
| Other | 141 | 1 |
| White | 22622 | 94 |
| *IMD quintile* | | |
| 1 (least deprived) | 4732 | 20 |
| 2 | 7381 | 31 |
| 3 | 7064 | 29 |
| 4 | 3806 | 16 |
| 5 (most deprived) | 1185 | 5 |
| *Urban / Rural* | | |
| Accessible Rural Areas | 4117 | 17 |
| Accessible Small Towns | 5168 | 21 |
| Large Urban Areas | 3438 | 14 |
| Other Urban Areas | 2744 | 11 |
| Remote Rural Areas | 5281 | 22 |
| Remote Small Towns | 3420 | 14 |
| *Length of stay* | | |
| Mean (sd) | 17.4 (35.9) | NA |
| Median (iqr) | 5.9 (20) | NA |
| *Multimorbidity (elixhauser\_score)* | | |
| Mean (sd) | 8.4 (10.3) | NA |
| Median (iqr) | 6 (14) | NA |
| *No of BNF sub chapters prescribed* | | |
| Mean (sd) | 10.6 (6) | NA |
| Median (iqr) | 10 (8) | NA |
| *No of outpatient specialties* | | |
| Mean (sd) | 5.6 (3.4) | NA |
| Median (iqr) | 5 (5) | NA |

#### 3.2 Research questions

##### **3.2.1 Objective 1. Intermediate care admissions**

We measured quarterly admissions to intermediate care settings, in total across NHS Grampian and by admission route (i.e. step-up or step-down).

The overall number of admissions to intermediate care and the population rate of admission to intermediate care both decreased during the pandemic, but recovered to nearly be the same afterwards (Figures 2 and 3).

However, the patient pathways into intermediate care change drastically during the five-year study period: patients using intermediate care settings for routine elective daycase care and for step-up care from their GP decreased steeply, and never recovered. The proportion of patients coming from acute settings (step-downs) increased steeply (Figures 2 and 3).

**Figure 2: Number of admissions by patient route**

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**Figure 3: Population rate of admissions by patient route**

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##### 3.2.2 **Objective 2. Pathways into intermediate care**

We measured the patient route into intermediate care. As a proportion of admissions, patients stepping-down from acute settings into intermediate care has doubled in the past five years (Figure 4). Patients stepping-up from home into intermediate care, and patients admitted for routine care have decreased in parallel.

**Figure 4: Proportion of admissions by patient route**

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##### 3.2.3 Objective 3. **Intermediate care admissions and pathways into care across service providers**

We repeated the 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).

###### 3.2.3.1 **Individual care admissions and patient pathways in different hospital types**

Figure 4 above shows a drop in step-up and routine elective care in intermediate care in NHS Grampian. Figures 5, 6, and 7 below show that this loss of step-up and routine elective care came from dramatically lower admissions in the community hospitals (all located in the rural local authorities of Aberdeenshire and Moray). Step-up care is down by more than 2/3 in community hospitals, and routine care is down by almost ½.

While rural admissions to community hospitals were down steeply, the two Aberdeen settings (Rosewell and Hospital at Home) saw an increase in admissions. Notably, these two settings in Aberdeen provide no routine elective care, and Rosewell House provides no step-up care either, so the increase in intermediate care in Aberdeen is primarily for step-down care for patients coming from Aberdeen Royal Infirmary.

The decrease in admissions to rural community hospitals and increase in admissions in Aberdeen city cannot be seen as a transfer of care for rural patients into the city, as these care options are only available to Aberdeen residents.

**Figure 5: Number of half-yearly admissions by patient route and type of hospital**

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| **Figure 6: Rate of half-yearly admissions by patient route and type of hospital** |
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**Figure 7: Proportion of half yearly admissions by patient route and type of hospital**

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###### 3.2.3.2 **Individual care admissions and patient pathways in different local authorities**

Over the five-year study period, intermediate care admissions increased in Aberdeen City with the growth of Hospital at Home and Rosewell House. However they decreased in Aberdeenshire, with the loss of step-down and routine elective care. Admissions were unchanged in Moray (Figure 8).

These changes in admissions brought the population rate for patient pathways into intermediate in-line across the three local authorities (Figure 9). The exception is in step-up care, which now has a higher rate in Aberdeen city, and routine elective care, which is not delivered in intermediate care settings at all in Aberdeen city.

**Figure 8: Number of half yearly admissions by patient route and local authority**

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| **Figure 9: Rate of half yearly admissions by patient route and local authority** |
| **Figure 10: Proportion of half yearly admissions by patient route and local authority** |

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##### 3.2.4 **Objective 4. Differences in medical acuity in patients admitted to intermediate care**

For each patient with an admission to intermediate care, we calculated: 1) Polypharmacy one year before admission using the PIS database 2) Routine care five years before admission using the TrakCare out-patient attendance database (number of clinic types) 3) Multimorbidity five years before admission using all diagnostic codes in inpatient admissions (Elixhauser Comorbidity Index)

###### 3.2.4.1 **Medical acuity measured by polypharmacy**

We quantified polypharmacy in patients by calculating the number of different types of medicine they were prescribed in the year before their admission. We used BNF sub-chapters as a proxy for different types of medicine.

We found that patients admitted to Hospital at Home had a higher level of polypharmacy than those admitted to community hospitals or Rosewell House (median of 12 vs 10 BNF sub-chapters).

Overall, there was no increase or decrease over time in polypharmacy at admission to intermediate care. The change in the median number of BNF sub chapters medicines prescribed to the cohort was steady over the five year period, with a small increase in Hospital at Home patients ([Figure 11](#fig-objective_4a)).

**Figure 11: Median number of BNF sub chapters in all prescriptions during year before admission, by hospital type and quarter**

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###### 3.2.4.2 **Medical acuity measured by outpatient clinic attendances**

We quantified intermediate care patients’ use of routine care by measuring the number of different outpatient specialities a patient attended in the five years prior to their admission to intermediate care.

The number of outpatient specialties attended increased over time - from a median of 5 different specialties to a median of 7. Hospital at Home patients had the largest increase – doubling from 4 to 8 different specialties ([Figure 12](#fig-objective_4b))

**Figure 12: Median outpatient specialties seen in 5 years before by hospital type**

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###### 3.2.4.3 **Medical acuity measured by inpatient diagnoses (multimorbidity)**

We quantified intermediate care patients’ multimorbidity by aggregating the diagnostic codes given in all inpatient admissions in the five years prior to their admission to intermediate care, then deriving disease types and scoring them for multimorbidity using the Elixhauser Index.

Patients admitted to intermediate care had high multimorbidity scores, but there was little indication of change over time, nor of differences in patient multimorbidity across the care settings.

**Figure 13: Median multimorbidity score for intermediate care patients by hospital type**

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##### 3.2.5 **Objective 5. Characteristics of patients in intermediate care – age, sex, poverty, and rurality**

We measure patients’ demographics, including age, sex, home-area deprivation, and home-area rurality measures. We evaluated differences in patient demographics overall for intermediate care in Grampian, and by care setting and patient pathway.

We measured both annual admission rates to intermediate care stratified by age group, sex, deprivation quintile, and rurality index. We calculated an age-sex standardised rate per 1,000 population for Grampian as a whole and for each of the intermediate care settings.

###### 3.2.5.1 **Age- and sex-standardised rates of admission to intermediate care**

Mirroring the trends in raw admission numbers (Figure 2), standardised rates of admission fell during the pandemic then rebounded but not to quite the pre-pandemic rate, with the fall being in community hospitals ([Figure 14](#fig-objective_5a)).

In total, about 2% of the Grampian population had an intermediate care admission per year. Community hospitals provide the most care – admitting 1.5% of the Grampian population per year (Figure 14).

**Figure 14: Age and sex standardised annual rates of admission by type of hospital**

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###### 3.2.5.2 R**ates of admission to intermediate care by sex**

Rates of admission to intermediate care were equal between the sexes in 2023: 22 per 1000 people. There was no consistent difference in admission rates by sex over time, except in the first year of the pandemic, where rates dipped to 16 per 1000 for men ([Figure 15](#fig-objective_5b)).

**Figure 15: Annual rates of admission to intermediate care by sex**

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###### 3.2.5.3 **Rates of admission to intermediate care by age**

There is a very steep increase in admission rate as people age ([Figure 16](#fig-objective_5c)). People aged 90 and above have an admission rate of 150 per 1000 people, about thirty times higher than people age 50-54.

While admission rates in the younger age groups have fallen, but admission rates have risen in the older age groups (Figure 16).

**Figure 16: Annual rates of admission by age**

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###### 3.2.5.4 **Rates of admission to intermediate care by deprivation**

Our analysis of rates of admission to intermediate care did consistently show that people living in more deprived areas had higher admissions to intermediate care (Figure 17). However, rates were always lowest for admissions from the least deprived areas.

In 2023, admission rates for people living in the most deprived areas of Aberdeen were 27 per 1000, while rates for those living in the least deprived areas were 16 per 1000.

Limitations of this analysis are as follows: here we do not account for age differences across the deprivation quintiles – and it is known that the most deprived areas are younger on average than the least deprived. It should also be noted that as people reach old age, then tend to move into homes with family members or care homes, so their current home area deprivation level may not reflect their long-term socioeconomic situation. Finally, home-area data zones are quite geographically large in the rural local authorities in Grampian, so many not reflect individuals’ actual deprivation measures as well as for people living in the city.

**Figure 17: Annual rates of admission by home-area deprivation (1 least, 5 most deprived)**

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###### 3.2.5.5 **Rates of admission to intermediate care by** **rurality**

Rurality measures are not available by age (to restrict to age 50 and over), so we instead calculated rates relative to the proportion of NHS Grampian’s population in each of the six urban / rural classifications.

A relative rate here above one suggests admissions in that rurality level are more common than expected given an equal distribution, and less than 1 means less common.

Admissions from remote small towns (~4% of NHS Grampian’s population) were much higher than expected, while large urban areas (~38% of NHS Grampian’s population) were lower than expected (Figure 18).

Community hospitals (which are all outwith urban Aberdeen City) allowed routine elective daycase admissions, while no intermediate care setting in Aberdeen City offered those services.

**Figure 18: Proportion of admissions by urban / rural classification compared to population**

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#### 3.3 Additional analyses (not pre-specified in the analysis plan)

##### 3.3.1 **Length of stay**

Patients stepping down from acute hospitals stay more than twice as long in intermediate care as those stepping-up from home (Figure 19). As step-down patients now make up a much larger proportion of intermediate care (Figure 4), the median length of stay has increased.

Furthermore, we found that length of stay in community hospitals has increased very steeply over the past five years, as did length of stay for patients in Rosewell House. These increases are hidden by increasing numbers of admissions to Hospital at Home – where median length of stay is much lower. [We need to clear the numbers DaSH before publication]

The increasing length of stay is affected by growing numbers of patients in intermediate care who are fit to leave hospital, but who cannot because they do not have the further care available at home or in a care home (called “delayed discharges”).

We found that in NHS Grampian, community hospitals hold the majority of delayed discharge bed-days. [We need to clear the numbers DaSH before publication]

**Figure 19: Median length of stay by patient route and quarter**

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##### 3.3.2 **Referring Specialty**

In NHS Grampian, community hospitals are managed by GPs, however in the planning phase we heard that GPs felt they had less ability to step-up their own patients.

[Figure 5](#fig-objective_3a) illustrates the decline in step-ups to community hospitals, and we further analysed the specialty of the referring physician for each admission to an intermediate care setting.

We show that increasingly GPs are not the specialty admitting patients, while referrals from consultants in Acute Geriatric Medicine have risen sharply (Figure 20).

Five years ago, referrals from acute geriatricians made up only 10% of intermediate care admissions, and now they make up 40%.

**Figure 20: Proportion of admissions by specialty**

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##### 3.3.3 **Age changes**

There was also interest in whether the age profile of those using intermediate care has become older. [Figure 21](#fig-objective_add_c) and [Figure 22](#fig-objective_add_d) show that this is the case in terms of both the median age and the proportion aged 80 and over.

The median age of the whole cohort jumps from 76 to 82 at the start of the pandemic (Figure 21), related to the drop in admissions for the relative younger routine elective group in intermediate care.

Currently, more than 60% of both step-down and step-up patients are age 80+

**Figure 21: Median age of admissions by patient route and quarter**

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| **Figure 22: Proportion aged 80 or over** |
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##### 3.3.4 **Dementia and Delirium**

Given the changing and old age profile of the cohort we explored an aging specific measure of health, the incidence of dementia and delirium following [Soong et al](https://bmjopen.bmj.com/content/9/6/e026759).

Diagnoses of dementia or delirium have been rising over the past five years for both step-up and step-down patients. Currently more than half of intermediate care patients have had one of these diagnoses.

**Figure 23: Proportion diagnosed with dementia and delirium in 5 years before admission**

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##### 3.3.5 **Readmission**

Table 2 shows the proportion (cumulative incidence) of patients in each patient route whose first event after discharge was either death, an emergency or an inpatient readmission.

About a quarter of step-up and step-down patients died within 90 days, with 15% dying during their admission. This is not unexpected given their age, health profile and that some were palliative care admissions.

For both step-up and step-down patients, emergency readmissions within 90 days were high (~29%) and more common than inpatient.

Most routine elective admissions had a further inpatient admission, reflecting that they were likely to return for further routine treatment.

Table 2. Proportion of patients with readmission within 90 days of discharge from intermediate care

| Event | Proportion | 95% CI |
| --- | --- | --- |
| *Routine elective (step up)* | | |
| Death | 0.01 | 0.01-0.01 |
| Emergency | 0.06 | 0.06-0.07 |
| Inpatient | 0.71 | 0.7-0.72 |
| *Step down* | | |
| Death | 0.23 | 0.22-0.24 |
| Emergency | 0.30 | 0.29-0.31 |
| Inpatient | 0.13 | 0.12-0.14 |
| *Step up* | | |
| Death | 0.21 | 0.2-0.22 |
| Emergency | 0.26 | 0.25-0.27 |
| Inpatient | 0.22 | 0.21-0.23 |

## 4. Discussion

*The key finding from our analysis is that Grampian’s intermediate care settings now provide much less intermediate-level care, and more long-term care, dementia care, and end-of-life care.*

**Patients in intermediate care beds are now older, more acutely ill, and stay in hospital much longer**The population in bedded intermediate care in Grampian has changed substantially in the past five years. Most patients are now over age 80. Of all people age 90+ in Grampian, 20% had an intermediate care admission in 2023.

The average length of stay in intermediate care has increased steeply. Most patients in Grampian’s intermediate care settings now stay at least 3 weeks, with 30% of step-down patients staying over 6 weeks. NHSG stakeholders attribute this to a combination of less pressure to discharge compared to acute settings, and a steep rise in patients who are fit to be discharged, but are awaiting social care and care at home.

Length of stay is also longer because patients are more acutely ill. Intermediate care settings now care for far more patients with dementia or delirium. As of 2023, the majority of intermediate care patients have had recent diagnosis of dementia or delirium.

**Less preventative care and less scheduled care**  
The 15 community hospitals in the rural local authorities of Aberdeenshire and Moray make up the vast majority of Grampian’s total intermediate care beds. However, the number of patients admitted to them have dropped by 40% in the past 5 years.

In NHS Grampian, management of patient care in community hospitals is done primarily by general practioners. Our engagement with stakeholders showed that primary care providers felt that they were losing the ability to admit their own patients to community hospitals because beds were occupied by patients stepping-down from more acute hospital settings.

Our analysis showed that this is true – community hospital admissions from a primary care provider are down 70%. These referrals from a GP can be thought of as preventative – meaning they provide care in the community before the patient is acutely ill enough to warrant admission to the higher-tier hospitals.

In addition, schedule care in intermediate settings is also down steeply. Five years ago, the majority of admissions to community hospitals were scheduled daycase care for treatments like infusions. This scheduled care dropped during the pandemic and never recovered, meaning patients are either travelling to receive this care at the acute hospitals, or remain on waitlists to receive their care.

**More step-down and end-of-life care**We found that 5 years ago the majority of patients admitted to intermediate care settings were stepping-up from home on recommendation from primary care, or were admitted for scheduled care in the community hospitals. This has changed dramatically, with the majority of patients now stepping down from the acute hospitals. These step-down patients stay much longer in intermediate care compared to GP referred patients, and more likely to have their discharge delayed when they are fit to leave, because there is no follow-on assessment or care available.

A substantial proportion of Grampian’s intermediate care patients are receiving palliative care – both those stepping down from acute settings and those stepping up based on GP recommendation. We found that 15% of patients die during their stay in intermediate care, with almost 25% dying within 90 days of discharge.

**Where should preventative care happen? End-of-life care?**The key policy question that follows is: are these intermediate care beds the right settings for serious and end-of-life care? If so, where should the lost non-acute preventative and scheduled care take place?

**What data to we need to plan care?**The key data issue is: though intermediate care is delivered by Health and Social Care Partnerships, patient data is not shared between the NHS and Social Care providers. No true integrated care can take place until data for the entire patient journey can be linked. (see limitations below)

## 5. Limitations

We intentionally chose to analyse intermediate care of a type that has excellent data quality in NHS Grampian. Both the data and the linkage quality are very good. There was little missing data, and all patients have unique patient identifiers that allow straightforward linkage between data sources.

However, a limitation of this study is that it does not provide an exhaustive analysis of the types of intermediate care that are provided in the region. NHSG provides almost all the bedded intermediate care, while the three local authorities providing social care and care home care. Due to time constraints, we were not able to apply to access the three local authorities’ data. Additionally, primary care data is held by GP practices, which operate outside of the NHS data system in Scotland. This means we were unable to capture some types of GP-led bed-based intermediate care, including virtual wards that operate within Aberdeenshire. We were also unable to capture some of the less acute care at home, like respiratory and occupational therapy as that data is not part of the NHS Grampian data available for research.

## 6. Impact and dissemination

We will be publishing an academic paper on our analysis, PPIE and stakeholder engagement. Please see the associated Powerpoint presentation for an overview.

We have presented our intermediate care analysis to the following people and teams:

NHSG Health Intelligence Hospitals Team

NHSG Health Intelligence Team

NHSG & HSCP Frailty Board

NHSG Lead for Primary Care

NHSG Lead for Realistic Medicine

NHSG Head of Performance

Public Health Scotland

NHSG Public Health Coordinating Group

Aberdeen City Integrated Health and Social Care Partnership senior leadership team

NHSG Chief Executives PEL Group

## 

## 7. References

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>