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Hospital and Ambulance Service Use by People in their Final Year of Life in Northern Ireland

SUMMARY REPORT
2026

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Further Information

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Contents

Abbreviations

Abbreviation	Definition
BHSCT	Belfast Health and Social Care Trust
BSO	Business Services Organisation
CAD	Computer aided dispatch
ED	Emergency department
GP	General Practitioner
GRO	General Register Office
HBS	Honest Broker Service
HCN	Health and Care Number
HCP	Healthcare professional
HSC	Health and Social Care
ICD-10	International Classification of Diseases 10th Revision
LOS	Length of stay
MDM	Multiple deprivation measure
MPDS	Medical priority dispatch system
NHSCT	Northern Health and Social Care Trust
NI	Northern Ireland
NIAS	Northern Ireland Ambulance Service
NIRAES	Northern Ireland Regional Accident and Emergency System
OPCS-4	Classification of Interventions and Procedures version 4
PAS	Patient Administration System
PEoLC	Palliative and end of life care
PPI	Patient and public involvement
QUB	Queen's University Belfast
SEHSCT	South Eastern Health and Social Care Trust
SeRP	Secure e-Research Platform
SHSCT	Southern Health and Social Care Trust
WHSCT	Western Health and Social Care Trust

Executive summary

Rising chronic illness and an aging population are increasing demand for end of life care in Northern Ireland (NI). Many people require use of hospitals and emergency services in their final months, highlighting the need for better coordination and patient-centred care. However, there is an important gap in understanding how people in their last year of life use acute healthcare services such as the Northern Ireland Ambulance Service (NIAS), Emergency Departments (EDs) and hospitals.

This report was funded by Marie Curie and produced as a collaboration between Queen's University Belfast (QUB) and NIAS. We report findings from population-based healthcare data on hospital and ambulance use for people in their last year of life in NI (Figure 1).

For hospital admissions and ED attendances, this report used anonymised Health and Social Care (HSC) data, linked to death records from the General Register Office for all deaths* in NI between 2014 and 2023. Data were obtained from the Honest Broker Service (HBS), the secure data environment for HSC NI.

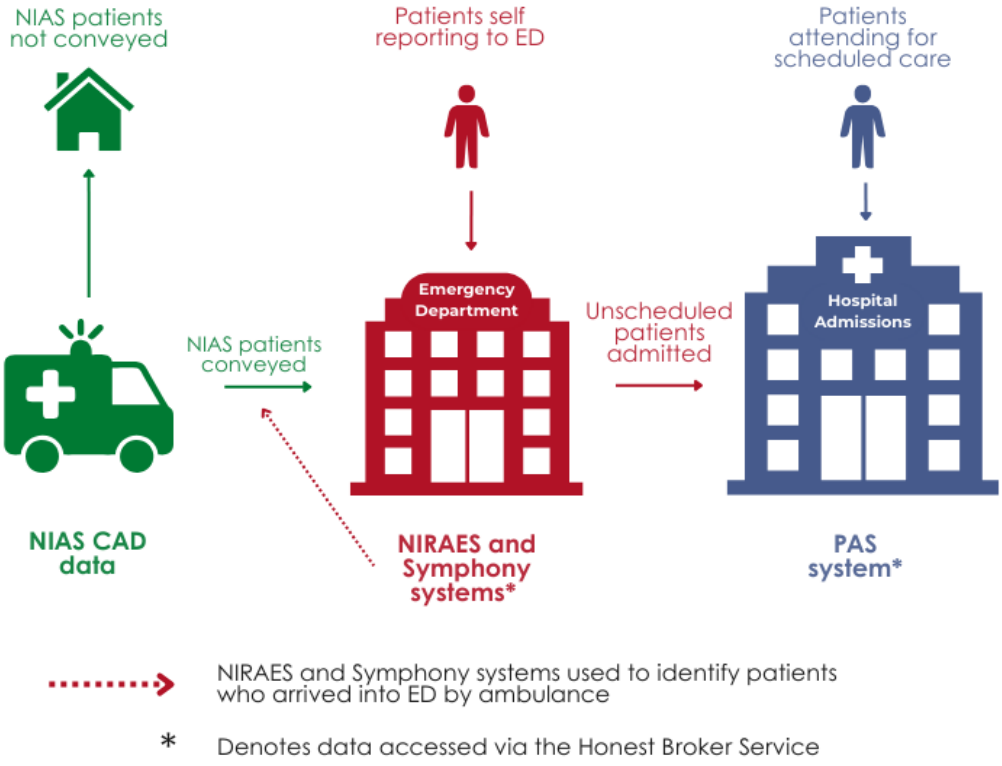
Ambulance service data was compiled by a keyword search of 999 call records which were used to identify people receiving palliative and end of life care (PEoLC) at the time of the 999 call.

This report also provides system-level cost estimates for hospital, ED and ambulance service use by people in their final year of life in NI.

Our findings show that many people in their last year of life attended ED or were admitted to hospital, often multiple times. This included admissions in both the emergency and elective (planned) settings, with frequent involvement of the ambulance service. This report explores patterns of care, identifies gaps and provides a foundation for future service planning.

**Note: the hospital data included all people who died, regardless of cause of death or underlying health conditions, and were not limited to people receiving palliative or end of life care.*

Figure 1: Population-based healthcare data sources used in the study along the patient pathway



NIAS: Northern Ireland Ambulance Service; ED: Emergency Department; CAD: Computer aided dispatch; NIRAES: Northern Ireland Regional Accident and Emergency System; PAS: Patient administration System

Key findings

Hospital activity

1. Of the 161,375 people who died in NI from 2014-2023, **82.1% had at least one hospital admission** in their last year of life. There was a total of 607,034 hospital admissions among individuals in their last year of life, an **average of 3.8 admissions per person**. Of these admissions, 47.9% were elective day cases, 46.0% were emergency admissions, while the remainder were elective inpatient (4.2%) and other (1.9%).

2. Admissions among individuals in their last year of life accounted for **10.5% of all NI hospital admissions** (10.0% of elective day cases and 11.1% of inpatient admissions) during the 2014-2021 financial years.

3. The annual number of hospital admissions for patients in their last year of life increased from 58,860 to 62,166 from the 2014-2021 financial years, representing a **0.7% increase per annum**.

4. The most common reasons for emergency admission in the last year of life for people who died in Northern Ireland from 2014-2023 were **infection** (30.2%), **cancer/metastatic disease** (10.3%), **respiratory causes** (9.2%), and

cardiac causes (8.5%). Individuals in their last year of life had, on average, 1.7 emergency admissions per person. The majority (90.2%) of emergency admissions had a longer stay in hospital (defined ≥24 hours) hours, with an average length of stay of 13.8 days.

5. **One in two** (51.0%) of emergency admissions were from **males**, and **people aged 80 and older** (49.9%). Emergency admissions were more common in deprived areas of NI, with 22.3% occurring in the most deprived areas compared with 17.9% in the most affluent areas. Northern and Belfast Health and Social Care Trusts made up the greatest proportion of emergency admissions (24.7% and 22.7% respectively).

6. Of the 161,375 people who died in NI from 2014-2023, **eight in ten** (81.6%) had **at least one ED attendance** in their last year of life. There was a total of 364,484 ED attendances among individuals in their last year of life, an **average of 2.3 attendances per person.** Two in three ED attendances **(67.8%) resulted in emergency admission** to a hospital ward. **Over two thirds (68.2%) of patients arrived at ED by ambulance. Three in five (59.3%)** ED attendances occurred **out of hours** (outside 9am-5pm Monday to Friday). The most **common primary reason** for **attending ED** was **infection** (20.6%).

Ambulance service use

7. In terms of ambulance service usage by people identified as receiving palliative or end of life care, nearly **1 in 4 (24.0%)** emergency calls came from areas of **highest deprivation**.

Approximately **1 in 5 (19.2%)** emergency calls occurred in the morning between **9am and 11am** and **57.1%** of all calls occurred **out of normal working hours**.

Over half **(58.3%)** of people who interacted with NIAS were **transferred to hospital** by ambulance with **30.8%** being **referred or discharged** by a NIAS clinician and **10.9%** having **died** at scene.

It is estimated that **19.9% of the NIAS emergency workload relates to people in their last year of life**; however, this includes deaths not directly related to palliative or end of life care i.e. death from sudden causes such as trauma or cardiac arrest.

Costs

8. Emergency and acute care for people in the final year of their life generated an estimated **£1.73 billion** in health-system costs for people dying between 2014 and 2023. **Hospital admissions dominated expenditure (85%)**, with **ambulance (9%)** and **ED (6%)** costs comprising a smaller share.

Expenditure was concentrated in **prolonged emergency inpatient stays** (90.2% were longer than 24 hours), demonstrating that system pressure and costs at the end of life are driven more by length of stay than by the high volume of short-stay, day case, or ED activity

1. Introduction

Changes in health, such as an aging population and a rise in chronic illness, are increasing the demand for palliative and end of life care (PEoLC). In 2024 there were 18,050 deaths in Northern Ireland (NI). Most deaths occurred in hospital (46%), followed by at home (31%), in care homes (17%), and in hospices (3%).[1] By 2040, the number of deaths in Northern Ireland (NI) are predicted to increase from 2018 by 46%. More people are also expected to die in the community by 2040, with 47% - 55% of deaths predicted to occur in people's own homes or care homes.[2]

Palliative care provision is diverse, reflecting the wide range of diseases, prognoses, and stages along the patient journey. Generalist palliative care is commonly delivered through primary care services, including General Practitioners (GPs), district nursing and community pharmacy. Specialist palliative care is primarily provided by multidisciplinary teams of specialist nurses, doctors, and pharmacists, who are often based in hospices and hospitals with varying levels of community outreach. The involvement of multiple providers across different sectors - such as public sector healthcare Trusts, independent hospices, and private/public social care services - can result in patients experiencing gaps in service provision.

Providing good quality end of life care is an increasing challenge for health service planning, especially in the context of increasing numbers of PEoLC patients with complex needs in an already stretched health and social care system. One of the key strategic priorities for PEoLC in NI is improved coordination of care between providers, to facilitate the best possible supportive care for patients.[3] This aligns with the plan from the Department of Health for a new neighbourhood model of integrated care, to enable more care to be delivered within communities across NI.[4]

Reports from the NI Cancer Registry in 2015 and 2023 showed that many people who died from cancer used emergency healthcare services near the end of their lives: over half accessed ambulance services (57%) or visited an ED (53%) in the last three months of life,[5] and almost three in four (74.2%) had an emergency hospital admission in the last year of their life, with nearly one in three admitted in the final 28 days.[6] There was a significant cost associated with unscheduled care use during the end of life period.[7]

Ambulance services and EDs provide 24-7 care, often focused on acute management. It is recognised that ambulance staff frequently work with limited information about end of life patients and must make time-critical decisions about their care,[8] but there is little evidence about the timing and frequencies of callouts, or why transfers to hospital at the end of life occur. It is important to note that many ambulance conveyances and hospital attendances at the end of life are necessary and appropriate.

There is an urgent need to better understand how people receiving PEoLC use healthcare services,

including the patterns of hospital admissions, ED attendances, and contact with ambulance services. Equally important is understanding the clinical decision-making that shapes these pathways, how patient and family preferences influence care choices, and how existing referral routes determine access to generalist and specialist palliative care. We hope this work will be the first step in identifying gaps where future intervention could be implemented to better streamline emergency care, providing better quality PEoLC for individuals and their families, and at the same time helping to reduce pressure on a chronically over-burdened health system.

This document presents an overview of hospital and ambulance service use in the last year of life for people who died in NI, using routinely collected Health and Social Care (HSC) data. The project commenced in September 2025 and ended in January 2026.

2. Methods

2.1. Data sources

Hospital data

The hospital data presented in this report were accessed through the Honest Broker Service (HBS), the main Trusted Research Environment for accessing Healthcare Related Service User Data for analysis in Northern Ireland. The HBS provides anonymised patient data from the Regional Data Warehouse, held within Business Services Organisation (BSO), for approved research projects in line with data privacy regulations. All HBS processes are in line with UK General Data Protection Regulation (UK GDPR), confidentiality requirements and the ICO's Codes of Practice. The project application and data request was reviewed by the HSC Data Access Committee.

Death registration data from the General Register Office (GRO) was used to create a cohort of all individuals who died in NI between 1st January 2014 and 31st December 2023, and to determine the dates of their final year of life. Their Health and Care Numbers (HCNs, a unique personal identifier for healthcare systems in NI since 2007) were used to link the GRO data to:

- Inpatient admission and discharge data from the Patient Administration System (PAS)
- ED patient record systems (Symphony and Northern Ireland Regional Accident and Emergency System [NIRAES]).

Once the research team gained necessary approvals from HBS, the anonymised patient data was made available, via the UK Secure e-Research Platform (SeRP), for analysis of all inpatient hospital episodes and ED attendances for people in their last year of life. All HBS outputs were subject to statistical disclosure control to protect patient confidentiality.

Demographic variables were available from GP registration data. More detail on data sources, and data collection processes can be found in Appendix 1.

Ambulance service data

A keyword search of the Northern Ireland Ambulance Service (NIAS) 999 call records held within the computer automated dispatch (CAD) system was undertaken to find people who were identified as receiving PEoLC at the point of the 999 call.

Data collected spanned a three-year period (1st January 2022 to 31st December 2024) and was pseudonymised by the NIAS data analytics and engineering team before release to the research team for analysis. NIAS data was not linked to HBS hospital episode datasets. More detail can be found in Appendix 2.

2.2. Data analysis

Descriptive statistical analysis was conducted using software tools (STATA and R) to summarise key

characteristics, trends, and distributions within the datasets.

As linking the NIAS data to the HBS dataset was beyond the scope of this project, it was not possible to identify all individuals in their last year of life who accessed the ambulance service. Consequently, the numbers reported for overall ambulance service use represent estimates. Similarly, estimates have been provided for the costs of hospital and ambulance service use in the last year of life. More detail is available in the relevant sections of this report.

2.3. Public involvement

Members of a Patient and Public Involvement (PPI) group brought together for this work, contributed to all stages of the project, from study design through to dissemination. A combination of in-person and online PPI workshops were held in July, October, November, and December 2025 to review progress and discuss interim findings. In addition, weekly project meetings were open to all PPI members.

The contributions of the PPI members, informed by their lived experiences, were invaluable to the successful delivery of the project.

3. Hospital use by people in their final year of life

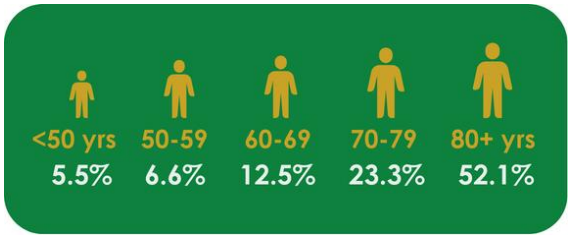
3.1. Overview

Estimates in this report are not expected to match published official statistics exactly due to differences in definitions, time periods, linkage methodology, and disclosure controls.

There were 161,375 deaths between the 1st January 2014 and 31st December 2023, with 50.8% of deaths occurring in females and 49.2% in males.

One in twenty (5.5%) deaths occurred in people under the age of 50, while 1 in 3 (35.8%) deaths occurred in people between the ages of 60 to 79 years, and over 1 in every 2 (52.1%) deaths occurred in people aged 80+ years old (Figure 2).

Figure 2. Age distribution of people that died in Northern Ireland from 2014-2023



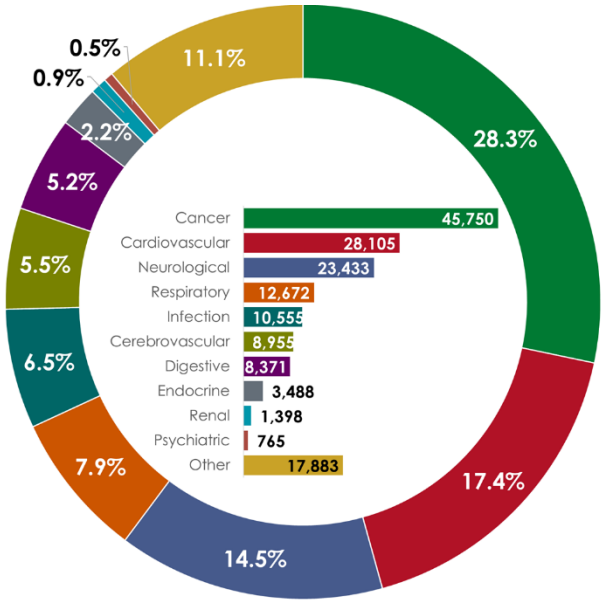
The most common causes of death in NI from 2014 to 2023 were:

- cancer (28.3%)
- cardiovascular disease (17.4%)
- neurological disease (14.5%; including dementia)
- respiratory disease (7.9%)

Collectively these four causes represented nearly 7 in 10 (68.1%) of all deaths occurring in NI over the 10-year period (Figure 3).

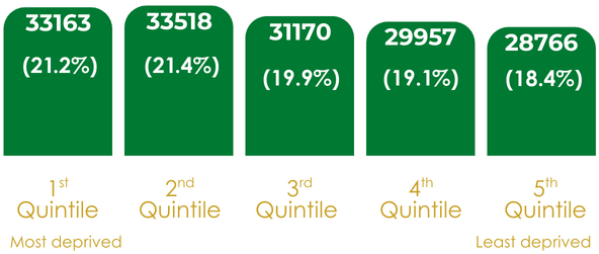
Around two thirds of people who died (66.9%) were classed as living in an urban area and one third (33.1%) lived in a rural area (based on postcode of residence at time of death).

Figure 3. Primary cause of death in Northern Ireland from 2014-2023



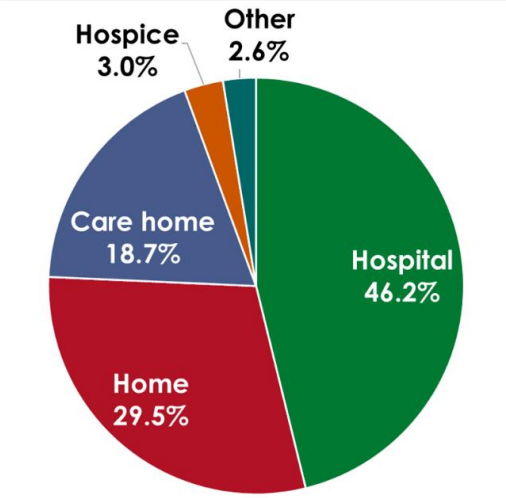
Slightly more people who died between 2014-2023 lived in the most deprived areas (21.2%) when compared to those living within the least deprived areas (18.4%) in NI (Figure 4).

Figure 4. Number of deaths in Northern Ireland from 2014-2023 by multiple deprivation measure quintiles.



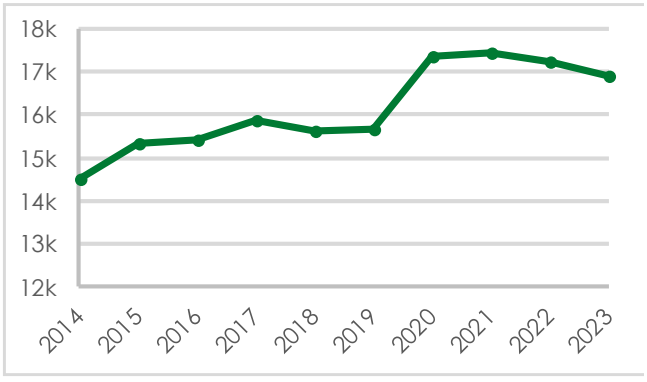
Almost half of deaths occurred in hospital (46.2%), with a similar proportion (48.2%) occurring in the community, either at home (29.5%) or in a care home (18.7%). A small number of deaths (3.0%) occurred in a hospice (Figure 5).

Figure 5. Place of death in Northern Ireland from 2014-2023



The number of deaths per year in NI from 2014 to 2023 displayed an increasing trend*, with 14,524 people dying in 2014, and 16,902 in 2023 (Figure 6).

Figure 6. Trend in the annual number of deaths in thousands (k) in Northern Ireland from 2014-2023



**An analysis of the impact of COVID on hospital, ED and ambulance use is beyond the scope of this report.*

3.2. Hospital admissions

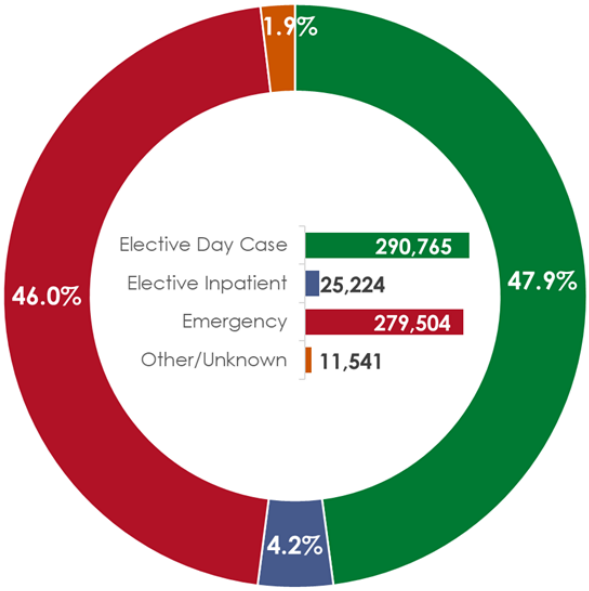
Admissions to hospital are categorised as:

- elective (planned) day case
- elective (planned) inpatient (one overnight stay or more)
- emergency (unplanned) inpatient
- other/unknown

Of the 161,375 patients who died in NI between 2014 and 2023:

- 82.1% of them had at least one hospital admission in the year before their death, equating to 607,034 hospital admissions in total (or 3.8 admissions per each end-of-life patient).
- Of all hospital admissions, 47.9% (n=290,765) were elective day cases, closely followed by emergency admissions (46.0%, n=279,504), with much smaller proportions for elective inpatient (4.2%) and episodes with other or unknown admission types (1.9%) (Figure 7).
- The annual number of hospital admissions for patients in their last year of life increased from 58,860 to 62,166 from the 2014-2021 financial years, representing a 0.7% increase per annum.
- For the financial years 2014-2021, admissions of people in their last year of life accounted for 10.5% of all NI hospital admissions.

Figure 7. Type of hospital admissions for people in their last year of life who died in Northern Ireland 2014-2023



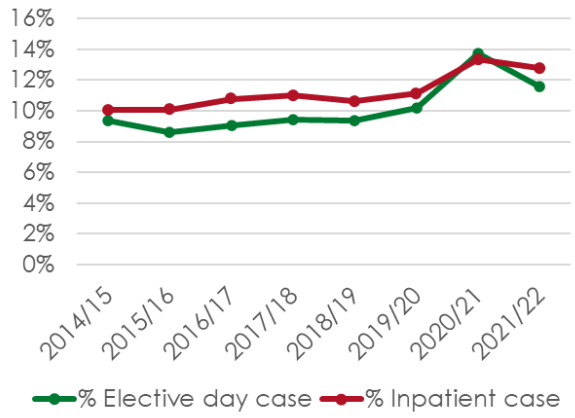
3.3. Trends over time

These trends have been calculated according to financial year rather than calendar year.

The number of emergency admissions among people in the last year of life in NI increased steadily from 26,310 in the 2014/15 financial year to 28,988 in the 2021/22 financial year. The majority of these were long stay emergency admissions (defined as greater than or equal to 24 hours), which increased from 23,921 in 2014/15 to 26,378 in 2021/22.

Elective day case attendances increased from 28,138 in the 2014/15 financial year to 30,090 in the 2021/22 financial year. In contrast, elective inpatient admissions of greater than 1 day fell considerably, from 3,437 to 1,795 over the same period. This decrease indicates a shift away from traditional inpatient stays toward day case management for planned procedures, suggesting that more patients are receiving scheduled treatment without requiring overnight admission.

Figure 8. Trend in the proportion (%) of Northern Ireland hospital admissions in the last year of life by financial year, for i) day case (elective) and ii) inpatient admission (emergency and elective)

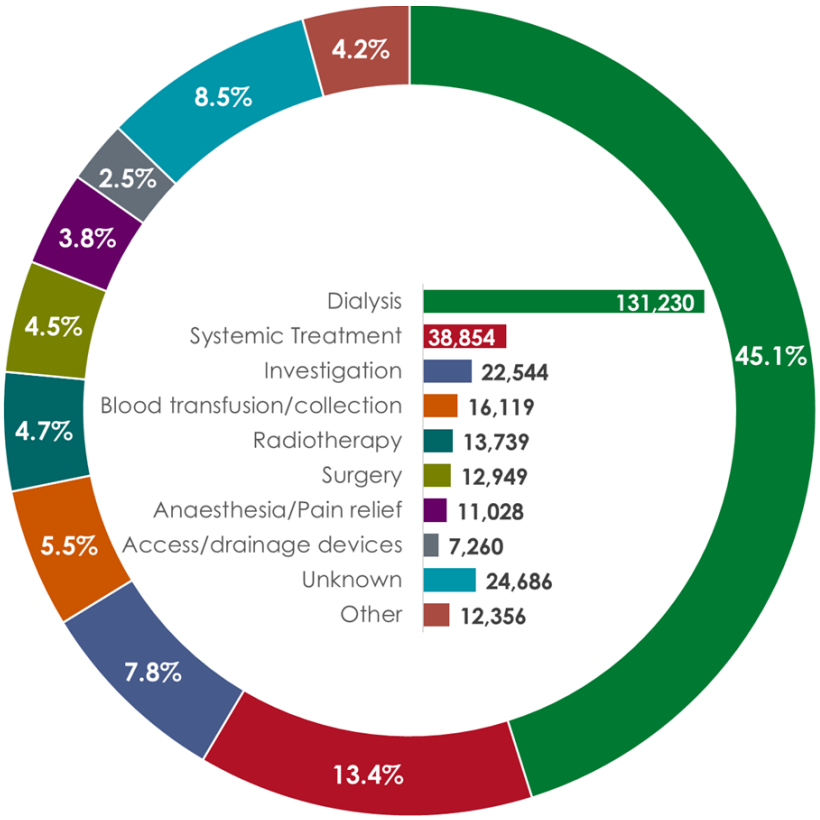


Trends in the proportion of day case (elective) and inpatient admissions (emergency and elective) to hospital in Northern Ireland arising from patients in the last year of life from the 2014/15 to 2021/22 financial years are shown in Figure 8. Patients in their last year of life comprised approximately 10.0% of all NI elective day cases, and 11.1% of all NI inpatient cases; this peaked in 2020/21 to 13.7% and 13.3% respectively.

3.4. Elective day cases

Procedures for elective day case admission to hospitals were classified into broad categories based on Classification of Interventions and Procedures version 4 (OPCS-4) codes.

Figure 9. Elective day case procedures for people in their last year of life who died in Northern Ireland from 2014-2023



Of the 290,765 elective day case episodes for people in their last year of life who died in NI from 2014-2023, the most common procedures were (Figure 9):

- dialysis for renal patients (45.1%)
- systemic treatment (including chemotherapy and hormone therapy) (13.4%)
- investigation (7.8%)
- blood transfusion or blood collection (5.5%)

A more detailed list of procedure frequency and proportions is available in Appendix 3 Table 9.

3.5. Emergency admissions

The data presented in this section relates to emergency admissions only: patients who were admitted to a hospital ward as an emergency, rather than a planned elective admission. Note that an emergency admission to hospital could be via an ED, or via direct admission to a ward under certain specialties.

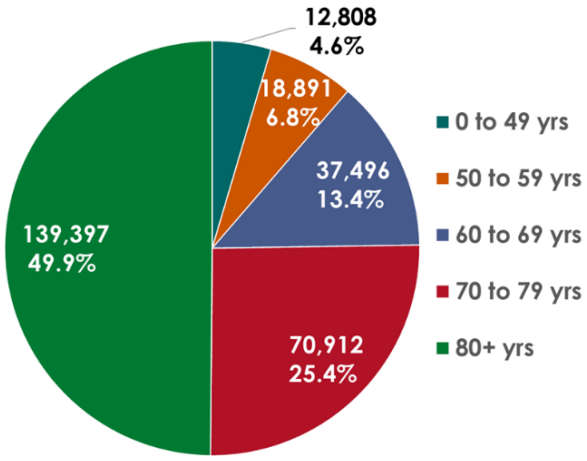
Three in four (77.0%) people who died between 2014 and 2023 had at least one emergency admission in their last year of life.

There were a total of 279,504 emergency admissions occurring in the last year of life from 161,375 individuals who died in NI from 2014-2023, representing a mean number of 1.7 emergency admissions per person.

A slightly higher proportion of emergency admissions occurred in males (51.0%) than in females (49.0%).

One in two (49.9%) emergency admissions were in people aged 80 years and over, with 1 in 4 (25.4%) emergency admissions occurring in people aged 70 to 79 years, and 1 in 10 (11.4%) occurring in people aged under 60 years (Figure 10).

Figure 10. Proportion of emergency admissions in the last year of life by age group for people who died in Northern Ireland from 2014-2023



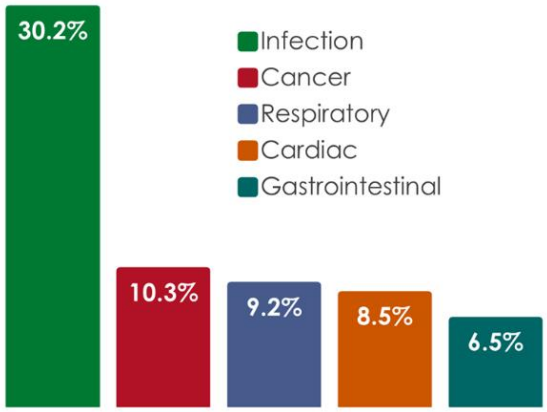
Emergency admissions were more common in deprived areas of NI, with 22.3% occurring in the most deprived quintile compared with 17.9% in the least deprived quintile (see Appendix 3 Table 10).

The Northern HSC Trust (NHSCT) and Belfast HSC Trust (BHSCT) made up the greatest proportion of emergency admissions with 24.7% and 22.7% of admissions respectively (see Appendix 3 Table 10).

The most common reasons for emergency admission in the last year of life were (Figure 11):

- infection (30.2%)
- cancer/metastatic disease (10.3%)
- respiratory symptoms (9.2%)
- cardiac symptoms (8.5%)
- gastrointestinal & hepatobiliary symptoms (6.5%)

Figure 11. Top five reasons for emergency admission in the last year of life for people who died in Northern Ireland from 2014-2023



A full breakdown of reasons for emergency hospital admission is provided in Appendix 3 Table 11.

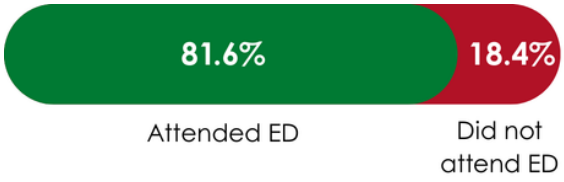
Of the 279,504 emergency admissions, only around 1 in 10 (9.8%) had a short stay in hospital of less than 24 hours. The majority (90.2%) of emergency admissions had a longer stay in hospital of more than or equal to 24 hours, with an average length of stay of 14.0 days in females, 13.7 days in males, and 13.8 day for all-persons.

3.6. ED attendance

Of the 161,375 people who died in NI between 2014 and 2023, there were 364,484 ED attendances occurring in people in their last year of life, representing 2.3 attendances per person. Eight in ten (81.6%) people had at least one ED attendance in the last year of their life (Figure 12).

People who died at older ages were more likely to have attended ED. Attendance proportions were highest among those aged 70–79 years (84.6%) and 80 years and over (81.4%), compared with younger groups: 73.8% for those under 50 years and 78.6% for those aged 50–59.

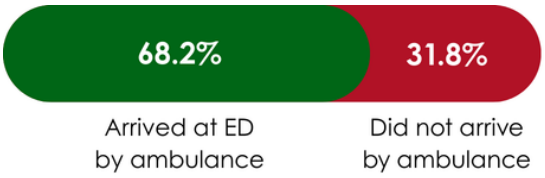
Figure 12. Proportion of people who died in Northern Ireland from 2014-2023 who attended an Emergency Department in their last year of life



ED attendances may end with discharge or admission to a hospital ward. Of all 364,484 ED attendances, 67.8% resulted in an emergency admission to hospital, according to ED data.

Over half (59.3%) of ED attendances occurred out of hours (outside 9am-5pm Monday to Friday). Overall, about 2 in 3 (68.2%, n=248,418) ED attendances arrived by ambulance (Figure 13). Ambulance use increased strongly with age, from 47.1% among those aged 0 to 49 years arriving by ambulance, to 77.9% among those aged 80 years and over. There were no differences in proportions of people arriving by ambulance by level of deprivation or by HSC Trust.

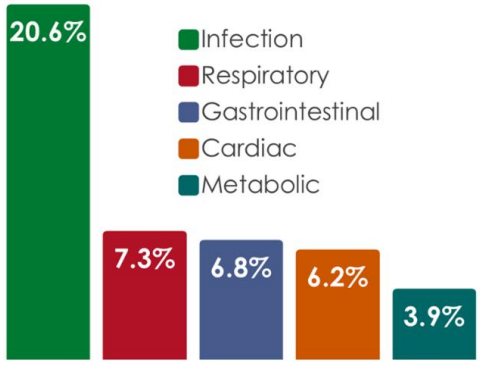
Figure 13. Proportion of ED attendances that arrived via ambulance



The reasons for attendance to ED were explored for three of the five hospital Trusts in Northern Ireland who use Symphony software (Belfast, Northern and Western HSC Trusts; 61.3% of all ED attendances), which amounted to 223,287 ED attendances occurring in the last year of life for people who died from 2014-2023. The most common reasons for ED attendance (Figure 14) were:

- infection (20.6%)
- respiratory symptoms (7.3%)
- gastrointestinal symptoms (6.8%)
- cardiac symptoms (6.2%)
- metabolic symptoms (3.9%)

Figure 14. Top five reasons for ED attendances in the last year of life for people who died in Northern Ireland from 2014-2023 and recorded in Symphony software



Appendix 3 Table 13 has a more detailed breakdown of the reason for ED attendance.

4. Ambulance Service use

4.1. Overview

All information relating to 999 calls received by NIAS are stored on the computer aided dispatch (CAD) system. A keyword search of CAD records (including terms such as "palliative" and "end of life") was conducted to find individuals identified by Emergency Medical Dispatchers (EMDs) as receiving PEoLC at the time of the 999 call.

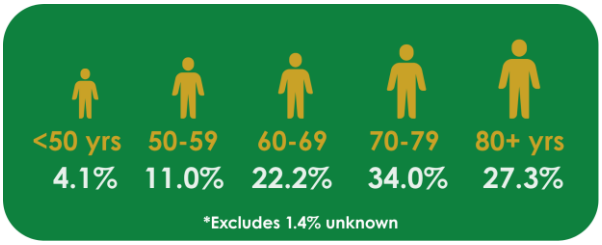
This method was dependent on callers informing the EMDs that the ambulance was required for someone receiving PEoLC. As a result, cases in which PEoLC status was identified later and noted on patient records by ambulance clinicians on scene will not have been captured in the dataset analysed here. Reviewing individual patient records to identify such cases was beyond the scope of this project.

The team acknowledges that the NIAS dataset represents only a small proportion of patients receiving PEoLC who interact with the ambulance service. For further information on the data extraction strategy used within CAD, see Appendix 2.

4.2. Characteristics

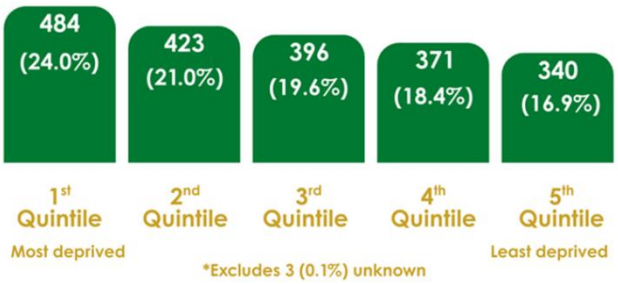
A total of 2,017 CAD records were identified through the keyword search as people receiving PEoLC over the 3-year period (01/01/2022 – 31/12/2024). Most patients were aged 70 years or over (61.3%, n=1,236, Figure 15). The overall mean age was 73 years for males and 74 years for females. Half (50.1%) were male and 45.0% female, with 5% missing data.

Figure 15. Age distribution of individuals receiving PEoLC



Almost a quarter (24.0%) of the 999 calls came from areas of higher deprivation, corresponding to the 1st multiple deprivation measure (MDM) quintile (Figure 16).

Figure 16. Multiple deprivation measures for call locations of individuals receiving PEoLC



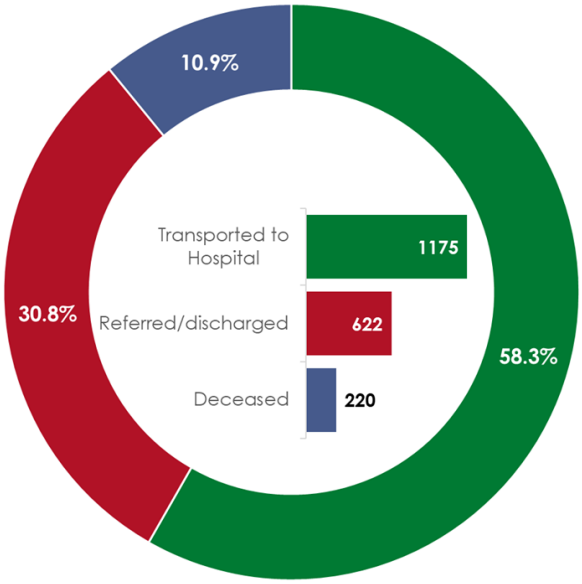
The five most common primary reasons for calling 999, as reported by the caller, were:

- breathing difficulties (19.0%)
- cardiac/respiratory arrest (11.4%)
- falls (9.3%)
- weakness / unwell (8.9%)
- unconscious / fainting (6.6%)

For full list, see Appendix 4 Table 15.

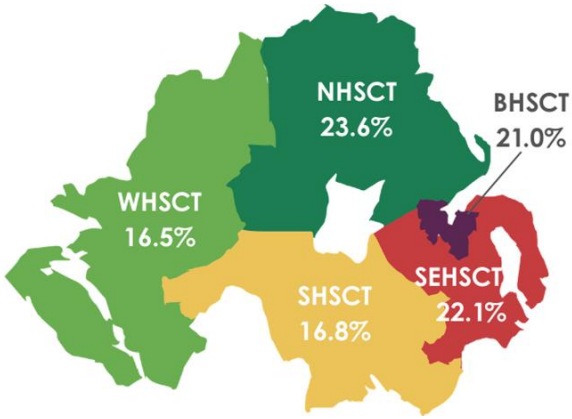
The majority (58.3%) of calls resulted in the person being brought to hospital by ambulance (Figure 17).

Figure 17. Outcomes for individuals receiving PEoLC following their interaction with NIAS



A further 30.8% of people were able to remain at home as they had been assessed and either discharged or referred on to other services by NIAS clinicians and 10.9% had died at scene.

Figure 18. Emergency calls per HSC Trust



The largest proportion of 999 calls originated in the Northern HSC Trust (NHSCT)and the smallest from the Western HSC Trust (WHSCT), in line with the estimated population figures for NI per HSC Trust (Figure 18).

BHSCT had the highest proportion of calls originating from the most deprived areas with 47.4% falling within quintile 1, followed by WHSCT (31.9% quintile 1).

The highest referral or discharge rate of 37.1% was seen in the WHSCT, followed by the SHSCT with a rate of 33.7%.

4.3. Call origin

Most calls were made by the individual or families themselves, with 33.7% (n=679) of calls being generated by healthcare professionals (HCP) such as doctors, nurses and other allied healthcare professionals (Figure 19).

Figure 19. Source of calls

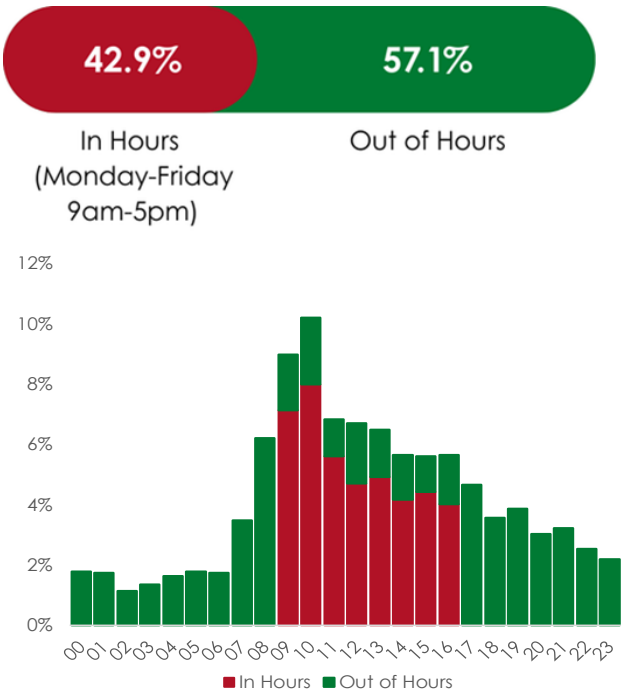
These proportions remained similar when analysed by sex, deprivation and call location groups. In terms of age, almost 1 in 2 (48.8%) of people under 50 years old had a call for an ambulance initiated by an HCP compared to 1 in 3 (32.9%) of those aged 50 years and older.

Among HCP initiated calls, more than 4 in 5 (85.7%) resulted in a hospital transfer compared with under half (44.3%) of calls originating from the family or the person themselves.

4.4. Call timings

Over half (57.1%) of the 999 calls were received by NIAS during the out of hours period. The highest proportion (19.2%) of calls occurred in the morning between 09:00 and 11:00 (Figure 20).

Figure 20. Percentage of 999 calls per time of day



When analysed for age, sex, deprivation and call location groups, the proportions of calls during 9am-5pm remained similar. Further details are presented in Appendix 4.

4.5. Estimate of overall ambulance use by people in their last year of life

Between 2020 and 2024, NIAS responded to an annual average of 189,788 emergency incidents generated from 999 phone calls. The average proportion of people transported to ED by NIAS during the same period was 65.8%, meaning 124,817 people were brought to ED and 64,971 people either remained at scene or were transported to a location other than ED each year.

As the death registration data was not linked to the NIAS dataset, it was not possible to identify when a person was in their last year of life and had an interaction with the ambulance service. Therefore, information available from ED records was used to provide an estimate of overall ambulance service use.

Using the 10-year HBS dataset, the average number of people in their last year of life who arrived at ED by ambulance was 24,842 per year. Assuming this number represents the 65.8% proportion of people that NIAS transported to ED, we estimate that the additional number of people in their last year of life who contacted NIAS each year but were not transported to ED was 12,912.

It is estimated there were 37,754 interactions with NIAS by people in their last year of life per year which represents 19.9% of the total NIAS emergency workload.

This figure should be interpreted as a possible overestimate of palliative and end of life care activity within NIAS, as the HBS dataset includes all deaths, including those due to acute and unexpected causes.

5. Healthcare Service expenditure for people in the final year of life

5.1. Overview

This section provides estimates of the system-level costs of hospital, ED and ambulance service use by people in their final year of life in Northern Ireland. These estimates are intended to inform health service planning and policy discussion, rather than to represent precise patient-level costs.

The analysis takes a health and social care system perspective to quantify the health service use by people in the final 12 months of life. The analysis uses the data as described earlier in the report.

Costs are estimated for inpatient hospital care, ED attendances, and ambulance services only. Costs for community care, primary care, hospice services, and social care are not collated or included in this report.

5.2. Costing approach

NHS average costs for each type of service use were applied to the data and multiplied by the number of calls/attendances/admissions.

All costs are reported in 2023/24 prices (£), as shown in Table 1 and Table 2. This price year was chosen to reflect the most recent year of activity in the data. Fixing a single price year avoids the effects of inflation across the study period making the results easier to interpret for service planning.

Hospital use was categorised into five mutually exclusive episode types:

- Elective inpatient admissions
- Emergency inpatient admissions with short length of stay (LOS) (<24 hours)
- Emergency inpatient admissions with long LOS (≥24 hours)
- Other admissions (uncertain or inconsistent classification)
- Same-day / day case episodes (LOS=0 days)

Emergency admissions were costed for short- and long-stay episodes, as defined in the NHS costing standard. In the records we found activity coded as "Other admissions" which were retained in total counts but were not costed due to a lack of detail.

Same-day (LOS=0 days) episodes which comprise a mixture of patient care procedures were explored only through sensitivity analysis (Section 5.4). ED attendances were costed separately using an average cost per attendance.

All ambulance contacts were assigned to one of three cost defined service types:

- Hear and treat
- See and treat
- See, treat and convey

(see Appendix 5 for further details.)

Ambulance costs were estimated indirectly by applying the observed conveyance rates from the NIAS data in Figure 17 to the ED attendances

arriving by ambulance. Total ambulance activity was then back calculated using the observed NIAS conveyance proportions, - that is a see, treat and convey rate of 58.3%.

Table 1. Unit cost assumptions applied in summary costing analysis (2023/24 £)

Service Component	Activity Classification	Unit Cost (£)	Source / Rationale	Notes
Hospital admissions	Elective inpatient admission	6,215	Unit Costs of Health & Social Care 2024	Uniform elective proxy
	Emergency admission, short stay (<24h)	792	Unit Costs of Health & Social Care 2024	Low bed-day intensity
	Emergency admission, long stay (≥24h)	5,134	Unit Costs of Health & Social Care 2024	Primary bed-day driver
	Other admissions	Not costed	Classification ambiguity	Activity only
	Same-day / day case episode	Not costed - in the base-case	Heterogeneous activity	Sensitivity only
Emergency Department	ED attendance	273	Unit Costs of Health & Social Care 2024	Avoids double counting
Ambulance service	Hear & Treat	66	Unit Costs of Health & Social Care 2024	Imputed
	See & Treat	327	Unit Costs of Health & Social Care 2024	Imputed
	See & Convey	459	Unit Costs of Health & Social Care 2024	% use derived from NIAS reported data and applied in imputation of full volume activity

Note: Costs expressed in 2023/24 prices (£). Gross-costing approach using summary activity data.

5.3. Hospital bed-day use and cost drivers

For people who died between 2014 and 2023, the combined hospital, ED and ambulance combined service care use in the final year of life was associated with an estimated £1.73 billion (or £1,730 million) in total health-system costs under the conservative base-case analysis (i.e. excluding day case activity).

Hospital admissions accounted for most of the expenditure (£1.47 billion; 85% of total system costs), with additional costs from ED attendances (£99.5 million, 6% of total system costs) and ambulance service activity (£163.3 million, 9% of total system costs), see Figure 21.

Within hospital care, emergency long-stay admissions (≥24 hours, n=252,074) were the dominant driver of both bed-day use and costs, accounting for £1.29 billion between 2014 and 2023, with a mean LOS of13.8 days. Elective admissions contributed £156 million, while emergency short-stay admissions accounted for £21.7 million.

Although same-day / day case episodes represented a substantial proportion of hospital activity volume (n=290,946 episodes; 46% of all hospital episodes), they contributed little to overall bed-day use.

This concentration of costs indicates that length of stay, rather than admission frequency alone, is the primary determinant of hospital costs in the final year of life.

5.4. Sensitivity analysis: same-day / day case episodes

Same-day (LOS=0) episodes were comprised of a heterogeneous mix of activity which is typically planned (elective), including renal dialysis, systemic cancer treatment delivery, radiotherapy, transfusions, minor procedures, and generic day case care. To cost accurately would require much more patient care detail than was available in the data. Therefore, these episodes were excluded from the base-case analysis.

In a structured sensitivity analysis, however, by observing the proportions of common primary procedures of day case episodes in the data, and attaching standard unit costs, a weighted or blended cost per unit day case episode was derived, which we applied to the same-day episode case volume. The cost and proportions used for these assumptions are shown in Table 2.

Under the primary sensitivity scenario, which reflected a less complex radiotherapy delivery cost, the blended cost was £444 per episode, generating an additional £128.9 million in hospital costs. This increased total hospital costs from £1.47 billion to £1.60 billion, and total system costs from £1.73 billion to £1.86 billion.

Using an alternative, more complex radiotherapy delivery cost assumption produced a very similar increase (£129.6 million), indicating that findings were robust to plausible variation in procedure-level unit costs.

Appendix 5 provides further detailed costing data.

Even under sensitivity assumptions, same-day episodes accounted for approximately 8% of total hospital costs, despite representing nearly half of hospital episodes by volume.

Emergency long-stay admissions remained the dominant cost driver in all scenarios.

Figure 21. Distribution of Final Year of Life Health System Costs between 2014 and 2023 as estimated in 2023/24-unit costs (£)

Hospital admissions: ~£1.47bn
ED attendances: ~£99.5m
Ambulance (imputed): ~£163.3m
Day cases: ~£129m

Combined system total
£1.73bn
(£1.86bn including day cases)

Approximate shares of total system cost:
Hospital: ~85%
ED: ~6%
Ambulance: ~9%

Table 2. Sensitivity analysis: same-day / day case episode costing assumptions

Same-day Activity Category	Share of LOS=0 Episodes	Unit Cost (£)	Cost Source / Proxy
Renal dialysis	45.0%	193	Unit Costs of Health & Social Care 2024
Systemic treatment admin (chemo proxy)	13.0%	356	NHS Reference Costs Code = SB97Z
Surgical day case (generic)	12.0%	1,031	Unit Costs of Health & Social Care 2024
Transfusion	5.0%	387	NHS Reference Costs / (Code = SA44A)
Radiotherapy fraction	5.0%	*266 / 313	NHS Reference Costs Code = SC23Z / SC31Z
Pain service (outpatient proxy)	4.0%	230	Unit Costs of Health & Social Care 2024 Outpatient procedure avg
Drains / minor procedures	2.5%	230	Unit Costs of Health & Social Care 2024 Outpatient procedure avg
Residual / unmapped	13.5%	1,031	Unit Costs of Health & Social Care 2024 Generic day case

Note: Same-day episode costing used for sensitivity analysis only; excluded from base-case.
**Primary base-case analysis assumed lower radiotherapy cost.*

5.5. Modelling potential resources released through LOS reduction

Rather than estimating cash-releasing savings directly, this analysis focuses on illustrating where the bulk of health service resource for people in their last year of life is presently directed. In this respect, the study identified long stay unplanned emergency admissions as an area where service changes could have a maximum impact on releasing health service resource for alternative and improved models of care.

Across the study population, mean length of stay for long stay (≥24 hours) emergency admissions in the final year of life was 13.7 days for males and 14.0 days for females, indicating that hospital bed use is driven by sustained inpatient stays rather than short, planned or day case episodes of care. This reinforces that hospital costs in the final year of life are driven more by long duration of occupancy following an emergency admission.

Given these observed durations, even modest proportional reductions in average length of stay among emergency long-stay admissions would be expected to have a meaningful impact on total bed-day use at population level. For example, a reduction of one day in average length of stay among this group would represent a non-trivial release of bed capacity across the system.

This interpretation is intended to illustrate order of magnitude, not to estimate achievable reductions. Quantifying the extent to which length of stay could be safely reduced would require detailed patient-level pathway analysis for admission drivers, along with explicit consideration of alternative care provision, such as community and specialist palliative services and advanced care planning.

6. Conclusion

6.1. Main findings

This report describes the interactions of people in their last year of life with the health service, including hospital, ED and ambulance service contact, in Northern Ireland for the first time. The study findings fill an important regional evidence gap by providing an overview of health system use at the end of life for the whole Northern Ireland population. By understanding how health services are used in the final year of life, we can identify opportunities for pathways that move towards more patient-centred, coordinated care.

It is important to note that many ambulance callouts, ED attendances and hospital admissions are appropriate, as acute services provide essential care. These services play a vital role in managing sudden deterioration, complex symptoms and potentially reversible conditions at the end of life. Therefore, the study findings should not be interpreted as suggesting that all or most emergency episodes are avoidable, but rather as an opportunity to reflect on current resource use and patterns of care.

A fuller understanding of the suitability of current pathways and potential alternatives requires more in-depth patient level analysis, including patient experiences and outcomes. However, our study findings will enable policymakers to understand current service use, identify areas for improvement, allocate resources appropriately, and develop community models of care in line with the Health and Social Care NI Reset Plan.[4]

Our data reveal a high proportion of people in their last year of life have an ED attendance and/or hospital admission, and many have more than one such episode. Of all ED attendances by people in their last year of life, around two thirds resulted in hospital admission, and the average length of stay for a long (≥24 hour) emergency admission was around 14 days.

Hospital attendances and admissions will include people with acute issues requiring inpatient care, people attending for planned procedures and people who could potentially be cared for at home but for whom the right support is not available in the community. Ensuring the right care in the right place is essential for individuals in the last year of life. With appropriate community-based specialist and general palliative care, many more people could potentially remain at home instead of being admitted to hospital.

In terms of ambulance service use, the main reasons for calling 999 were in keeping with acute issues, such as breathing difficulties, falls or a reduced level of consciousness. Nearly sixty percent of calls resulted in the person being brought to hospital by ambulance. One third of people were able to remain at home after assessment by ambulance clinicians, highlighting the essential role of

paramedics and emergency medical technicians in helping to avoid unnecessary hospital admissions.

The data demonstrates that people in the last year of life comprise a substantial proportion of the work of NIAS. It is important that NIAS staff such as paramedics and emergency medical technicians receive education in palliative care and have access to referral pathways for people approaching the end of life in the community. This can help improve patient experience, reduce unnecessary hospital admissions, and ensure access to end of life care support.

This analysis demonstrates that health system expenditure in the final year of life is driven primarily by prolonged emergency inpatient care, rather than by high-volume, low-intensity activity such as day case care or ED attendance alone. From a service-planning perspective, initiatives aimed at preventing avoidable emergency admissions, supporting earlier discharge where clinically appropriate, and strengthening community-based palliative and end of life care are likely to have the greatest impact on hospital bed capacity and system pressures.

The most common causes of death in Northern Ireland from 2014 to 2023 were cancer, cardiovascular disease and neurological disease (including dementia), and these cover many medical conditions which typically progress over time. Conditions such as these offer opportunities for anticipation of end of life needs, such as advance care planning, referral to appropriate services, and support for individuals and families, to potentially reduce unnecessary hospital attendances and admissions.

6.2. Limitations

As linking the NIAS data to the HBS dataset at the patient level was beyond the scope of this project, it was not possible to identify all individuals in their last year of life who accessed the ambulance service. Consequently, the summary numbers reported for overall ambulance service use are estimated indirectly (see Section 5.2).

Cost estimates are based on this summary data and average unit costs and therefore should be interpreted as indicative rather than exact. In addition, community and hospice care costs were not included. As a result, total end of life cost could be underestimated.

It is possible that some healthcare interactions in the last year of life are not directly related to palliative or end of life care but could represent people who die from sudden causes such as trauma or cardiac arrests. However, additional analyses exploring shorter periods of time before end of life was beyond the scope of this project.

6.3. Implications for Future research

This report provides the first population-based data for use of acute healthcare services in Northern Ireland by people in the last year of life. Further research could explore service use by people in the last 3 or 6 months of life, and examine

differences between characteristics such as age, sex, deprivation level, Trust and calendar year in more detail.

This project was primarily focused on hospital and ambulance use by people in the last year of life. Research is needed on the community aspect of end of life care in Northern Ireland, including the structure of services and referral pathways. This would provide an overview of all care pathways for PEoLC individuals, to better understand ways to improve integration and coordination of care.

Finally, our PPI representatives highlighted the need for research to go beyond the data, to evaluate patient and caregiver perspectives and attitudes towards PEoLC. Providing a platform for the patient voice and exploring the lived experience of end of life care will complement the data presented and ensure that future improvements are both meaningful and grounded in what matters most to patients and their families.

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Appendix 1: Methods (Hospital data)

Data Sources

Department of Health statistics

The Department of Health for Northern Ireland publishes hospital activity statistics (available here) on an annual basis to document hospital admissions. These were used to calculate the proportion of hospital use attributable to people in their final year of life.

Inpatient and Emergency Department Hospital data

The HBS is the trusted research environment for HSC NI, hosted within the HSC Regional Business Services Organisation (BSO). It allows approved researchers to access anonymised patient level data either in person in the Safe Haven environment or online through a Secure e-Research Platform (SeRP).

All researchers must undertake Safe Researcher training and be awarded Office for National Statistics accredited researcher status before they are approved to access data through the HBS. All research projects are required to submit an application for approval by the HBS Data Access Committee. As this project required use of datasets already available, via the HBS, within the Regional Data Warehouse, additional NHS ethical approval was not required.

To get data for all inpatient and ED hospital episodes in the last year of life, a cohort of all individuals who died in NI between 2014 and 2023 was first established from death registration data available from the General Register Office (GRO), and was then linked to:

- Inpatient admission and discharge data from the Patient Administration System (PAS)
- Emergency patient record systems
    - Symphony, used by Belfast, Northern and Western HSC Trusts (covers approximately 60% of the NI population)
    - Northern Ireland Regional Accident and Emergency System (NIRAES) used by Southern and South Eastern HSC Trusts (covers approximately 40% of the population).

Description of Datasets

GRO death data includes:

- **Cause of death groups** (infection, cancer, cardiovascular, cerebrovascular, respiratory disease, digestive disease, neurological, renal, endocrine, other). Trained personnel within the HBS grouped cause of death into the categories contained in Appendix 1 Table 3 below based on International Classification of Disease 10th revision (ICD-10) codes.
- **Date of death.** We were unable to access actual date of death due to the sensitive nature of this information. However, to achieve the aims of our project including calculating hospital bed days, we required access to date information. After discussions with HBS staff we reached a solution by applying date perturbation to date of death and all dates relating to hospital episodes (inpatient admission and discharge dates, and ED attendance dates) with an agreed deviation of days (+/- 7 days) to allow us to assess seasonal variability whilst preventing disclosure of the true date of death.
- **Place of death.**

Hospital episode datasets used PAS and ED datasets (Symphony and NIRAES).

- **PAS** contains the information related to hospital admissions (both elective and emergency) such as admission type, arrival date and time, primary and secondary diagnoses, treatment received (OPCS-4 codes) and discharge date and time.
- **Symphony** and **NIRAES** data contain information related to ED attendances such as arrival date and time, method of arrival (i.e. via ambulance or own transport), primary and secondary diagnoses, treatment received (OPCS-4 codes), discharge date and time, and discharge method (discharged or admitted to hospital ward).

GP registration data was used to capture the following key demographic variables:

- sex and age group,
- deprivation quintile (based on NI multiple deprivation measure 2017, NISRA)[9],
- urban rural status and HSC Trust of residence according to usual place of residence
- calendar year of death.

Table 3. Cause of death grouping (based on ICD-10 codes)

Cause of Death Grouping	ICD-10 Codes		
Infection (including sepsis)	A00-A09 A15-A19 A20-A28 A30-A49 A50-64 A65-A69 A70-A74 A75-A79 A80, A82-89 A92-A99 B00-B09 B15-B19	B20-B24 B25-B34 B95-B98 G00-G09 J00-J06 J09-J18 J20-J22 J36 J85-J86 K65, K67 K75.0 K81	L00-L08 M00-M03 N08.0 N10 N11 N16.0 N29.0 N29.1 N30.0 N39.0 T81.4
Cancer (including in situ, benign tumours and tumours of uncertain behaviour)	C00-C97 D00-D09 D10-D36 D37-D48		
Cardiovascular (including ischaemic heart disease, hypertensive heart disease)	I00-I02 I05-I09 I10-I15	I20-I25 I26-I28 I30-I52	I70-I79 I80-I89 I95-I99
Cerebrovascular (including ischaemic and haemorrhagic stroke)	I60-I69		
Respiratory disease	J (excluding J00-J06, J09-J18, J20-J22, J36, J85-J86) J30-J35 J37-39 J40-J47	J60-J70 J80-J84	J90-J94 J95-J99
Digestive disease (including liver disease, ulcers of digestive tract and colitis)	K (excluding K65, K67, K75.0, K81) K00-K14 K20-K31 K35-K38 40-K46	K50-K52 K55-K64 K66 K70-K74	K75.1-K75.9 K76, K77 K80, K82-87 K90-K93
Neurological (including dementia, Alzheimer's, Parkinson's, Huntington's and multiple sclerosis)	A81 F00-F05 G (Excluding G00-G09) G10-G14 G20-G26 G30-G32 G35-G37	G40-G47 G50-G59 G60-G64	G70-G73 G80-G83 G90-G99

Cause of Death Grouping	ICD-10Codes		
Renal	N00-N39 (excl. N08.0, N10, N11, N16.0, N29.0, N29.1, N30.0, N39.0)		
	N00-N07	N17-N19	N30.1-N30.9
	N08.1-N08.8	N20-N23	N31-N3
	N12-N15	N25-N28	N39.1-39.9
	N16.1-N16.8	N29.8	
Endocrine (including diabetes mellitus)	E00-E07	E20-E35	E65-E68
	E10-E14	E40-E46	E70-E90
	E15-E16	E50-E64	
Other (including haematology, ear/nose/throat, genitourinary (excluding renal), psychiatric, skin and musculoskeletal systems, accidents and injuries including falls)	B35-B49	F60-F69	M30-M36
	B50-B64	F70-F79	M40-M54
	B65-B83	F80-F89	M60-M79
	B85-B89	F90-F98	M80-M94
	B90-B94	F99-F99	M95-M99
	B99	H00-H59	N40-N51
	D50-D53	H60-H95	N60-N64
	D55-D59	L10-L14	N70-N77
	D60-D64	L20-L30	N80-N98
	D65-D69	L40-L45	N99-N99
	D70-D77	L50-L54	O00-O99
	D80-D89	L55-L59	P00-P96
	F06-F09	L60-L75	Q00-Q99
	F10-F19	L80-L99	00-R99
	F20-F29	M05-M14	S00-S99
	F30-F39	M15-M19	T (excl. T81.4)
	F40-F48	M20-M25	All V, X, Y, Z, U
	F50-F59		

Trends in Hospital Use

The requested data for people who died over a 10-year period was sufficient to look at trends, whilst at the same time investigating recent data to ensure findings are relevant to current clinical practice. We created variables to count the number of episodes per financial year to calculate hospital use attributable to people in their last year of life as a proportion of overall use in NI. Trends in numbers of admissions or attendances range from 2014 to 2021 for two reasons:

i) to estimate end of life admissions or attendances occurring in a particular year, it is necessary to have 12 months follow-up after that year's end,

ii) it was necessary to use financial years to align with NI hospital activity.

Combining these two reasons meant that the most recent complete financial year was 2021/22.

Please note, it was only possible to access data up to the end of 2023 as Encompass NI was introduced in the South Eastern HSC Trust in November 2023. This was a major NI HSC initiative to create a single, unified electronic patient record system for the entire region and was introduced to replace the separate systems such as PAS, Symphony and NIRAES.

Handling of data issues

Hospital episodes - weekends and bank holidays

As date perturbation was applied to all admission and discharge dates, we also requested a variable to flag if hospital attendance had occurred at the weekend or during a bank holiday. This enabled us to investigate hospital usage both during the normal working day and out of hours.

Dealing with multiple rows per hospital episode in PAS data

The PAS generated duplicate rows of data for the same patient admission following different interactions with medical staff or change of ward. This posed a challenge when calculating number of admissions. To deal with this, we generated code that combined the duplicate rows into a single row while identifying the true admission and final discharge and retaining key information across the multiple entries. Separate admissions and ED attendances for an individual patient were defined as non-overlapping periods of days.

Definitions

- **ED attendance:** represents individuals who attended an ED in their last year of life for emergency care, and who may have been discharged from ED or admitted to hospital for further treatment.

- **Emergency (unplanned) inpatient:** represents individuals in their last year of life who had a method of admission classified as an emergency and were admitted to a ward for acute medical care. Most of these cases had an inpatient stay of 24 hours or more. A small proportion of these individuals (<5%) had a stay of less than 24 hours.

- **Elective (planned) day case:** represents individuals who were admitted to a ward for a planned medical procedure, but who went home on the same day as admission. The method of admission was recorded as elective and stay duration as 0 days. Also included were 'method of admission patients' classified as 'Other' with stay duration of 0 days.

- **Elective (planned) inpatient:** represents individuals who were admitted to a ward for a planned medical procedure and who had at least one overnight stay in hospital. The method of admission was recorded as elective and stay duration as 1+ days.

- **Other/unknown admission type:** represents individuals who had other or unknown methods of admission so could not be assigned to elective or emergency categories.

Grouping procedure - codes into categories

- Dr Victoria Child and Dr Ashleigh Russell used OPCS-4 procedure codes to group primary procedure for elective day case admissions into the procedure categories (Appendix 1,Table 4).

- ICD-10 codes were used to group reason for emergency admissions into categories (Appendix 3, Table 11).

- ICD-10 codes and free text reason (if ICD-10 code not available) were used to group reason for ED attendance (Symphony data only) into categories (Appendix 3, Table 13).

Table 4. Procedure categories for day case admissions using OPCS-4 codes

Procedure Categories	Comment
Renal Dialysis	
Systemic Treatment	Includes chemotherapy and hormone therapy
Investigation	Includes scope, biopsy/sample, imaging, surgical and other
Transfusion/blood donation/venesection	Renamed 'blood transfusion and collection'
Radiotherapy	
Surgery and endoscopic intervention	Includes Eye, Gastrointestinal, Skin, Respiratory, Orthopaedic, ENT, Vascular, Dental, other, Renal & Urinary and Brain & CNS
Anaesthesia/Pain Relief	
Drains/Catheters/Stents/Shunts /Dilation	Mainly within cardiac, gastrointestinal and urinary systems, (renamed 'Access/drainage devices')
Unknown procedure	

Procedure Categories	Comment
Other	Contains: Unspecified intervention on brain IV infusion/injection Ventilation Instillation of therapeutic substance into organ Correction of a cardiac arrhythmia Gynaecological procedure Administration of medication/nutrition Removal of calculus (stones) from organ Rehabilitation Washout/Irrigation of organ Injection in eye

Appendix 2: Methods (NIAS data)

This section summarises the data extraction method used to identify the 999 calls relating to people recognised as receiving PEoLC at the point of the call.

A retrospective review was undertaken to examine 999 emergency calls made to NIAS over a 3-year period from 01/01/22 to 31/01/2024. NIAS uses the Medical Priority Dispatch System (MPDS) to triage calls, and the computer aided dispatch (CAD) System as the operational platform to manage these calls. Data were extracted from CAD using a threefold search strategy:

- A list of key words was used to search the free text functions in CAD where the caller had specifically mentioned that the patient was 'end of life', 'terminal' or 'palliative' and spelling variations of these phrases.
- CAD was searched to locate dispatch codes specific to end of life conditions.
- CAD was searched to find all calls where a patient had received a specific referral to a palliative care pathway.

(See Appendix 2, Table 5 for detail on search inclusion criteria).

Exclusion criteria were applied to the 'CallStopReason' data field in the extraction process to ensure duplicate and erroneous calls were not included (see Appendix 2, Table 6 for full list of criteria).

A total of 35 variables were extracted from CAD for each record for the purpose of this study (see Appendix 2, Table 7 for list of variables).

Table 5. CAD search criteria

Date Range: 01/01/2022 - 31/12/2024 Field Searched	Search Criteria	Description of Criteria	Notes
MPDS Code	09O01x	CARDIAC OR RESPIRATORY ARREST / DEATH - EXPECTED DEATH unquestionable (x through z) (Terminal illness)	Caller has confirmed patient is terminally ill and should not be resuscitated
	09O01y	CARDIAC OR RESPIRATORY ARREST / DEATH - EXPECTED DEATH unquestionable (x through z) (DNAR/DNR Order)	Caller has confirmed patient has a Do Not Attempt Resuscitation (DNAR) in place and should not be resuscitated
	09O01z	CARDIAC OR RESPIRATORY ARREST / DEATH - EXPECTED DEATH unquestionable (x through z) (Advanced Directive)	Caller has confirmed patient has an advanced directive and should not be resuscitated
	09D02	CARDIAC OR RESPIRATORY ARREST / DEATH - OBVIOUS or EXPECTED DEATH questionable.	Caller has confirmed patient is not breathing but is not certain if CPR should be carried out/thinks they may beyond any help but cannot confirm. This code also included non-end of life patients.
	09D02x	CARDIAC OR RESPIRATORY ARREST / DEATH - OBVIOUS or EXPECTED DEATH questionable (Terminal Illness)	Caller has confirmed patient has a terminal illness but is not certain if CPR should be carried out.
	09D02y	CARDIAC OR RESPIRATORY ARREST / DEATH - OBVIOUS or EXPECTED DEATH questionable (DNR Order)	Caller has confirmed patient has a DNAR but is not certain if CPR should be carried out.
	09D02z	CARDIAC OR RESPIRATORY ARREST / DEATH - OBVIOUS or EXPECTED DEATH questionable (Advance Directive)	Caller has confirmed patient has an advanced directive but is not certain if CPR should be carried out.

Field Searched	Search Criteria	Description of Criteria	Notes
What's the Problem (free text field)	palliative	All potential variations of spellings of the word "palliative" found in free text fields in CAD	Will detect patients who are known by the caller to be receiving palliative care
	cancer, oncology, chemotherapy, ca pt, ca, tumour, immunotherapy, radiotherapy	All potential variations of spellings and words related to "cancer" found in free text fields in CAD	Will detect patients who are known by the caller to have some form of cancer history
	terminal, terminally ill, terminal illness	All potential variations of spellings of the word "terminal" excluding those relating to a location e.g. "train terminal" found in free text fields in CAD	Will detect patients who are known by the caller to be terminally ill
	end of life, eol	All potential variations of spellings or phrases of the term "end of life"	Will detect patients who are known by the caller to be end of life stage
Destination ward / hospital	oncology, chemo, cancer or radiotherapy in the name	Any ward patients are scheduled to be brought to which are cancer specific wards	Will detect patients being directly admitted to a ward with a potentially life-limiting condition
	Northern Ireland Cancer Centre, Bridgewater, B/Water, Belvoir Park, "Mandeville Unit", "MacDermott Unit", "Sperrin Suite", "Laurel House"	Any cancer specific hospitals or units' patients are scheduled to be brought to	Will detect patients being directly admitted to a ward with a potentially life-limiting condition
CallStopReason	palliative care referral	Patients referred to a palliative care team	Will detect any patient referred to a palliative care team following clinician assessment

Table 6. Exclusion Criteria

Field Name	Criteria	Reason
CallStopReason	Call entered in error	The call was created accidentally or contains incorrect information, so it does not represent a genuine incident requiring inclusion.
	Call for information only	No clinical response or operational activity was required; the contact was purely informational and not part of service demand.
	Handled by another ambulance trust	Another ambulance service had full responsibility for managing the incident, so it should not be counted within NIAS activity.
	Duplicate call	Multiple records exist for the same incident; duplicates must be removed to avoid inflating activity or performance figures.
	Test call	Calls made for system testing or training do not represent real patient events and therefore should not be included in incident reporting.
	Aborted or cancelled journey	The response did not proceed (e.g., cancelled before arrival), meaning no full incident or patient contact occurred for inclusion.

Table 7. Extracted variables

Field Name	Description
CallNumber	Incident number assigned to call.
DateCallCommenced	Date the call was received by control.
TimeStampT1	Time the call was connected/first answered (T1 timestamp).
DespatchCode	Category or code assigned for dispatch.
DespCodeDescription	Text description of the dispatch code.
WhatsTheProblem	Free-text description of the caller's initial reported problem.
GovtStdTOC	Time of call used for government performance reporting.
PrePQALookupChiefComplaint	Chief complaint recorded during initial triage before Pre Question Assessment (PQA).
OutOfPerfReason	Reason why the incident fell outside performance standards.
MainpatientSex	Sex/gender of the main patient.
MainpatientAge	Age of the main patient.
CallStopReason	Reason the call was closed or stopped within the CAD system.
DestinationHospital	Hospital selected or attended for patient conveyance.
DHA	Designated hospital area/division assigned to incident.
MainpatientAddressPostCode	Postcode of the patient's location or residence.
MethodOfCall	How the call was received (999, GP referral, inter-agency, etc.).
ChiefComplaint	Primary clinical complaint identified during triage.
InitialChiefComplaint	Chief complaint recorded at first clinical assessment.
OtherAgencyOutComeCodeCSD	Outcome code when a control room clinician resolved the call.
OtherAgencyOutComeDescriptionCSD	Outcome description when a control room clinician resolved the call.
RP.PrePQALookupChiefComplaint	Chief complaint recorded for the responding resource before PQA.
RP.TimeAllocated	Time the resource was allocated to the incident.
RP.TimeMobile	Time the resource went mobile/en-route.
RP.TimeAtScene	Time the resource arrived on scene.
RP.PickupClinic	Whether a clinic pickup point was used.
RP.PickupClinicFreeText	Free-text description of the pickup clinic location.
RP.ActualClinicAttended	Clinic actually attended.
RP.HospitalAttended	Hospital physically attended by the responding unit.
RP.GEOZonePostCode	Geographical zone of incident based on postcode.
RP.TimeLeftScene	Time the resource departed the scene.
RP.TimeAtDest	Time the resource arrived at the destination.
RP.TimeClear	Time the resource became clear for another incident.
RP.TimeHandover	Time patient handover was completed.
ResponsePQ	Performance qualifier for response reporting.
ResponsePQ (groups)	Grouped response performance categories.

Appendix 3: Hospital data

This section provides further detailed information from the hospital dataset contained in this report.

Table 8. Characteristics of people who died in Northern Ireland from 2014-2023

Characteristics	Category	N	Column %
Sex	Male	79,379	49.2
	Female	81,996	50.8
Age category at death (years)	0 to 49	8,887	5.5
	50 to 59	10,730	6.6
	60 to 69	20,136	12.5
	70 to 79	37,521	23.3
	80+	84,101	52.1
Deprivation quintile (% of known quintile)	Quintile 1 - Most deprived	33,163	21.2
	Quintile 2	33,518	21.4
	Quintile 3	31,170	19.9
	Quintile 4	29,957	19.1
	Quintile 5 - Least deprived	28,766	18.4
	Missing (% of total)	*4,801*	*3.0*
HSC Trust of residence (% of known HSC trust)	Belfast	33,953	21.7
	Northern	40,741	26.0
	South Eastern	30,908	19.7
	Southern	27,797	17.8
	Western	23,175	14.8
	Missing (% of total)	*4,801*	*3.0*
Place of death	Hospital	74,491	46.2
	Care home	30,195	18.7
	Hospice	4,895	3.0
	Home	47,666	29.5
	Other	4,128	2.6

Table 9. Number of primary procedures of elective day case attendances in the last year of life for people who died in Northern Ireland from 2014-2023, based on OPCS-4 codes

Procedure	n	Column %
Dialysis	131,230	45.1
Systemic Treatment	38,854	13.4
Investigation (includes biopsy/sample, imaging, scope, surgical, other)	22,544	7.8
Transfusion/blood donation/venesection (renamed Blood transfusion and collection)	16,119	5.5
Surgery (includes brain/CNS, dental, ENT, eye, gastrointestinal, orthopaedic, respiratory, skin, urinary, vascular, endoscopic intervention, other)	12,949	4.5
Radiotherapy	13,739	4.7
Anaesthesia/Pain relief	11,028	3.8
Drains/Catheters/Stents/Shunts/Dilation (renamed Access/Drainage devices)	7,260	2.5
Unspecified intervention on brain*	5,725	2.0
IV infusion/injection*	2,286	0.8
Ventilation*	2,095	0.7
Instillation of therapeutic substance into organ*	663	0.2
Correction of cardiac arrhythmia*	258	0.1
Gynaecological procedure*	233	0.1
Administration of medication/nutrition*	177	0.1
Removal of calculus (stones) from organ*	85	<0.1
Rehabilitation*	63	<0.1
Washout/irrigation of organ*	38	<0.1
Injection – eye*	29	<0.1
Unknown	24,686	8.5
Other*	704	0.2

*Included in the "Other" group in Figure 9

Table 10. Number of hospital emergency admissions in the last year of life for people who died in Northern Ireland from 2014-2023 by individual characteristics

Characteristics	Category	n	Column %
Sex	Male	142,608	51.0
	Female	136,896	49.0
Age category at death	0 to 49	12,808	4.6
	50 to 59	18,891	6.8
	60 to 69	37,496	13.4
	70 to 79	70,912	25.4
	80+	139,397	49.9
Deprivation quintile (% of recorded quintile)	Quintile 1 - Most deprived	60,712	22.3
	Quintile 2	58,230	21.4
	Quintile 3	53,654	19.7
	Quintile 4	50,574	18.6
	Quintile 5 - Least deprived	48,649	17.9
	Missing (% of total)	*7,685*	*2.7*
HSC Trust of residence (% of recorded HSC Trust)	Belfast	61,754	22.7
	Northern	67,126	24.7
	South Eastern	56,827	20.9
	Southern	46,435	17.1
	Western	39,677	14.6
	Missing (% of total)	*7,685*	*2.7*

Table 11. Primary reason for emergency admissions in the last year of life for people who died in Northern Ireland from 2014-2023

Admission Reason	n	Column %
Infection	84,304	30.2
Cancer/Metastatic disease	28,712	10.3
Respiratory	25,610	9.2
Cardiac	23,714	8.5
Gastrointestinal & hepatobiliary	18,245	6.5
Renal/Urinary	11,313	4.0
Metabolic	10,738	3.8
Injury	13,855	5.0
Haemorrhage	6,482	2.3
Cerebrovascular	5,370	1.9
Functional Decline	4,733	1.7
Neurological	4,340	1.6
Altered mental status/Cognitive Impairment	4,068	1.4
Pain	3,232	1.2
Vascular	2,192	0.8
Poor oral intake	1,915	0.7
Syncope/Collapse	1,769	0.6
Adverse event	1,676	0.6
Sepsis	1,317	0.5
Ascites	663	0.2
Other	3,914	1.4
Unknown	21,342	7.6

Table 12. Number of ED attendances in the last year of life for people who died in Northern Ireland from 2014-2023, by characteristics

Characteristics	Category	n	Column %
Sex	Male	188,578	51.7
	Female	175,906	48.3
Age category at death	0 to 49	21,920	6.0
	50 to 59	25,959	7.1
	60 to 69	48,065	13.2
	70 to 79	90,122	24.7
	80+	178,418	49.0
Deprivation quintile (% of recorded quintile)	Quintile 1 - Most deprived	79,314	22.4
	Quintile 2	75,829	21.4
	Quintile 3	70,543	19.9
	Quintile 4	67,445	19.0
	Quintile 5 - Least deprived	61,089	17.2
	Missing (% of total)	*10,264*	*2.8*
HSC Trust of residence (% of recorded HSCTrust)	Belfast	77,079	21.8
	Northern	97,250	27.5
	South Eastern	69,206	19.5
	Southern	62,734	17.7
	Western	47,951	13.5
	Missing (% of total)	*10,264*	*2.8*

Table 13. Primary reason for attendance to an Emergency Department in the last year of life for people who died in Northern Ireland 2014-2023 as recorded in the Symphony ED system (covering three HSC trusts in Northern Ireland)

Attendance Reason	n	Column %
Infection	46,101	20.6
Respiratory	16,316	7.3
Gastrointestinal & hepatobiliary	15,118	6.8
Cardiac	13,880	6.2
Injury (Includes burn, foreign body, head/brain, minor, soft tissue, traumatic, other, fracture/dislocation)	19,578	8.8
Metabolic	8,700	3.9
Renal/Urinary	7,556	3.4
Haemorrhage	6,534	2.9
Cerebrovascular	5,237	2.3
Neurological	3,784	1.7
Functional Decline	2,763	1.2
Cancer/Metastatic disease	2,728	1.2
Vascular	2,574	1.2
Pain	2,000	0.9
Syncope/Collapse	1,737	0.8
Poor oral intake	1,048	0.5
Ascites	505	0.2
Died on arrival/in ED	493	0.2
Adverse event	447	0.2
Other (Includes dental, obstetrics/gynaecology, dermatology, haematology, eye, ear/nose/throat, rheumatology, orthopaedic, mental health, men's health, tendonitis/arthritis/joint, minor, other, change dressing/plaster, onward referral)	42,300	18.9
Unknown	23,888	10.7

Table 14. Numbers of people who died in 2014-2023 in Northern Ireland, along with the number of Emergency Department attendances and admissions to hospital in their last year of life, by HSC Trust of residence.

	Trust of Residence[3]											
	Belfast		Northern		South Eastern		Southern		Western		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Total patients per in HSC Trust, based on place of residence	33,953		40,741		30,908		27,797		23,175		156,574	
Ever had a PAS episode[1] (% of total patients):												
No PAS episode	5,732	16.9	7,381	18.1	5,229	16.9	5,372	19.3	4,198	18.1	27,912	17.8
Elective day case attendance[2]	859	2.5	1,139	2.8	807	2.6	801	2.9	661	2.9	4,267	2.7
Elective inpatient admission	490	1.4	833	2.0	433	1.4	445	1.6	400	1.7	2,601	1.7
Emergency admission short stay (<24 hours)	1,160	3.4	1,248	3.1	1,049	3.4	1,062	3.8	967	4.2	5,486	3.5
Emergency admission long stay (≥24 hours)	25,592	75.4	29,758	73.0	23,247	75.2	19,979	71.9	16,829	72.6	115,405	73.7
Inpatient admissions	120	0.4	382	0.9	143	0.5	138	0.5	120	0.5	903	0.6
Ever had an attendance at an ED:												
Yes (% of total patients)	27,773	81.8	33,733	82.8	25,201	81.5	22,699	81.7	18,543	80.0	127,949	81.7
Total number of ED attendances	77,079		97,250		69,206		62,734		47,951		354,220	
Attendances qualified by (% of total ED attendances):												
Transfer by ambulance	53,277	69.1	66,459	68.3	46,815	67.6	42,211	67.3	33,012	68.8	241,774	68.3
Out of hours	45,480	59.0	57,943	59.6	39,361	56.9	37,689	60.1	29,421	61.4	209,894	59.3
Followed by hospital admission	52,429	68.0	64,131	65.9	48,455	70.0	43,724	69.7	31,579	65.9	240,318	67.8
Total numbers of admissions	133,586		153,868		119,099		98,671		84,276		589,500	
Admissions by (% of total admissions):												
Elective day case attendance[2]	63,640	47.6	75,954	49.4	55,892	46.9	47,022	47.7	39,795	47.2	282,303	47.9
Elective inpatient admission	5,695	4.3	6,867	4.5	4,240	3.6	3,711	3.8	3,860	4.6	24,373	4.1
Emergency admission short stay (<24 hours)	6,400	4.8	5,383	3.5	5,185	4.4	4,638	4.7	4,887	5.8	26,493	4.5
Emergency admission long stay (≥24 hours)	55,354	41.4	61,743	40.1	51,642	43.4	41,797	42.4	34,790	41.3	245,326	41.6
Inpatient admissions	2,497	1.9	3,921	2.5	2,140	1.8	1,503	1.5	944	1.1	11,005	1.9
Number of nephrology-related hospital day attendances (% of total hospital day attendances)	32,654	51.3	40,062	52.7	23,969	42.9	17,388	37.0	14,089	35.4	128,162	45.4
Mean duration of long stay emergency admission (days)	13.7		13.4		14.8		13.0		14.4			

[1] Patients with multiple PAS episodes are attributed a single classification based on a hierarchy firstly on emergency, elective, or "other" type of admission and secondly on < or ≥ 24 hours duration of admission; EoL patients classified by most resource-requiring admission they ever had.

[2] "Other/unknown" type of episode with <24 hours stay included in elective day case attendance.

[3] 4,801 patients (3.0% of total, 10,264 emergency attendances (2.8% of total), and 17,534 hospital admissions (2.9% of total) could not be attributed to a Trust due to lack of postcode information.

Appendix 4 : NIAS data

This section provides a detailed breakdown of the NIAS dataset contained in this report.

Appendix 4, Table 15 gives a more comprehensive view across the 3-year period.

Appendix 4, Table 16 contains the demographic characteristics of the sample according to the origin of the 999 call i.e. whether the call was made by an HCP or the individual themselves (or family member / friend / carer / other).

Appendix 4, Table 17 contains the demographic characteristics of the sample according to the whether the 999 call was made during the hours of Monday to Friday, 9am to 5pm (in hours) or not (out of hours).

Appendix 4, Table 18 provides a breakdown of the characteristics of the sample by HSC Trust.

Table 15. Northern Ireland Ambulance Service use by people identified as receiving palliative and end of life care per year

	2022 (*n* =605, *30.0%*)		2023 (*n* = 664, *32.9%*)		2024 (*n* = 748, *37.1%*)		Total (*n* = 2,017)	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Age Group (years)								
< 50	25	*4.1*	25	*3.8*	32	*4.3*	**82**	***4.1***
50 - 59	70	*11.6*	78	*11.7*	74	*9.9*	**222**	***11.0***
60 - 69	135	*22.3*	158	*23.8*	154	*20.6*	**447**	***22.2***
70 - 79	220	*36.4*	221	*33.3*	244	*32.6*	**685**	***34.0***
80 +	144	*23.8*	178	*26.8*	229	*30.6*	**551**	***27.3***
Unknown							*30*	*1.4*
Gender								
Female	270	*44.6*	298	*44.9*	339	*45.3*	**907**	***45.0***
Male	300	*49.6*	333	*50.2*	377	*50.4*	**1010**	***50.1***
Unknown							*100*	*5.0*
HSC Trust of Call Location								
Belfast	131	*21.7*	133	*20.0*	160	*21.4*	**424**	***21.0***
Northern	132	*21.8*	164	*24.7*	181	*24.2*	**477**	***23.6***
South Eastern	131	*21.7*	135	*20.3*	180	*24.1*	**446**	***22.1***
Southern	105	*17.4*	119	*17.9*	114	*15.2*	**338**	***16.8***
Western	104	*17.2*	113	*17.0*	112	*15.0*	**329**	***16.3***
Unknown							*3*	*0.1*
MDM Quintiles Call Originated in								
Quintile 1 - Most deprived	148	*24.5*	167	*25.2*	169	*22.6*	**484**	***24.0***
Quintile 2	118	*19.5*	150	*22.6*	155	*20.7*	**423**	***21.0***
Quintile 3	124	*20.5*	123	*18.5*	149	*19.9*	**396**	***19.6***
Quintile 4	103	*17.0*	119	*17.9*	149	*19.9*	**371**	***18.4***
Quintile 5 - Least deprived	110	*18.2*	105	*15.8*	125	*16.7*	**340**	***16.9***
Unknown							*3*	*0.1*
Time Call Made								
Office Hours (Mon-Fri 9-5)	271	*44.8*	318	*47.9*	277	*37.0*	**866**	***42.9***
Out of Hours	334	*55.2*	346	*52.1*	471	*63.0*	**1151**	***57.1***
Primary Reasons for Call								
Breathing problems	114	*18.8*	131	*19.7*	138	*18.4*	**383**	***19.0***
Cardiac or respiratory arrest	52	*8.6*	57	*8.6*	121	*16.2*	**230**	***11.4***
Falls	51	*8.4*	63	*9.5*	73	*9.8*	**187**	***9.3***
Weakness/unwell	45	*7.4*	73	*11.0*	61	*8.2*	**179**	***8.9***
Unconscious / fainting	47	*7.8*	36	*5.4*	50	*6.7*	**133**	***6.6***
End of life care	32	*5.3*	49	*7.4*	47	*6.3*	**128**	***6.3***
Haemorrhage / lacerations	27	*4.5*	41	*6.2*	35	*4.7*	**103**	***5.1***
Infection	28	*4.6*	30	*4.5*	35	*4.7*	**93**	***4.6***
Chest pain	22	*3.6*	32	*4.8*	31	*4.1*	**85**	***4.2***
Abdominal pain	21	*3.5*	20	*3.0*	26	*3.5*	**67**	***3.3***
Other	166	*27.4*	132	*19.9*	131	*17.5*	**429**	***21.3***
Call Outcomes								
Transported to hospital	378	*62.5*	419	*63.1*	378	*50.5*	**1175**	***58.3***
Referred or discharged	171	*28.3*	184	*27.7*	267	*35.7*	**622**	***30.8***
Deceased	56	*9.3*	61	*9.2*	103	*13.8*	**220**	***10.9***

Table 16. Northern Ireland Ambulance Service use by people identified as receiving palliative and end of life care per call source

	HCP (*n* =679, 33.7%)		Person / Family (*n* = 1338, 66.3%)		Total (*n* = 2,017)	
	n	%	*n*	%	*n*	%
Age Group (years)						
< 50	40	*5.9*	42	*3.1*	**82**	***4.1***
50 - 59	91	*13.4*	131	*9.8*	**222**	***11.0***
60 - 69	161	*23.7*	286	*21.4*	**447**	***22.2***
70 - 79	208	*30.6*	477	*35.7*	**685**	***34.0***
80 +	167	*24.6*	384	*28.7*	**551**	***27.3***
Unknown					*30*	*1.5*
Gender						
Female	281	*41.4*	626	*46.8*	**907**	***45.0***
Male	311	*45.8*	699	*52.2*	**1010**	***50.1***
Unknown					*100*	*5.0*
HSC Trust of Call Location						
Belfast	146	*21.5*	278	*20.8*	**424**	***21.0***
Northern	157	*23.1*	320	*23.9*	**477**	***23.6***
South Eastern	155	*22.8*	291	*21.7*	**446**	***22.1***
Southern	109	*16.1*	229	*17.1*	**338**	***16.8***
Western	112	*16.5*	217	*16.2*	**329**	***16.3***
Unknown					3	*0.1*
MDM Quintiles Call Originated in						
Quintile 1 - Most deprived	160	*23.6*	324	*24.2*	**484**	***24.0***
Quintile 2	132	*19.4*	291	*21.7*	**423**	***21.0***
Quintile 3	138	*20.3*	258	*19.3*	**396**	***19.6***
Quintile 4	133	*19.6*	238	*17.8*	**371**	***18.4***
Quintile 5 - Least deprived	116	*17.1*	224	*16.7*	**340**	***16.9***
Unknown					3	*0.1*
Call Outcomes						
Transported to hospital	582	*85.7*	593	*44.3*	**1175**	***58.3***
Not transported (Referred, discharged or deceased)	97	*14.3*	745	*55.7*	**842**	***41.7***

Table 17. Northern Ireland Ambulance Service use by people identified as receiving palliative and end of life care per working hours

	Working Hours (*n* =866, 42.9%)		Out of Hours (*n* = 1,151, 57.1%)		Total (*n* = 2,017)	
	n	%	*n*	%	*n*	%
Age Group (years)						
< 50	31	*3.6*	51	*4.4*	**82**	***4.1***
50 - 59	105	*12.1*	117	*10.2*	**222**	***11.0***
60 - 69	210	*24.2*	237	*20.6*	**447**	***22.2***
70 - 79	279	*32.2*	406	*35.3*	**685**	***34.0***
80 +	227	*26.2*	324	*28.1*	**551**	***27.3***
Unknown					*30*	*1.5*
Gender						
Female	375	*43.3*	532	*46.2*	**907**	***45.0***
Male	426	*49.2*	584	*50.7*	**1010**	***50.1***
Unknown					*100*	*5.0*
HSC Trust of Call Location						
Belfast	193	*22.3*	231	*20.1*	**424**	***21.0***
Northern	224	*25.9*	253	*22.0*	**477**	***23.6***
South Eastern	198	*22.9*	248	*21.5*	**446**	***22.1***
Southern	129	*14.9*	209	*18.2*	**338**	***16.8***
Western	122	*14.1*	207	*18.0*	**329**	***16.3***
Unknown					*3*	*0.1*
MDM Quintiles Call Originated in						
Quintile 1 - Most deprived	209	*24.1*	275	*23.9*	**484**	***24.0***
Quintile 2	158	*18.2*	265	*23.0*	**423**	***21.0***
Quintile 3	176	*20.3*	220	*19.1*	**396**	***19.6***
Quintile 4	173	*20.0*	198	*17.2*	**371**	***18.4***
Quintile 5 - Least deprived	150	*17.3*	190	*16.5*	**340**	***16.9***
Unknown					*3*	*0.1*
Call Outcomes						
Transported to hospital	597	*68.9*	578	*50.2*	**1175**	***58.3***
Referred or discharged	201	*23.2*	421	*36.6*	**622**	***30.8***
Deceased	68	*7.9*	152	*13.2*	**220**	***10.9***

Table 18. Northern Ireland Ambulance Service use by people identified as receiving palliative and end of life care per HSC Trust

	Belfast (n=424, 21.0%)		Northern (n=477, 23.6%)		South Eastern (n=446, 22.1%)		Southern (n=338, 16.8%)		Western (n=329, 16.3%)		Total* (n=2,014, 99.9%)	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Age Group (years)												
< 50	13	3.1	17	3.6	17	3.8	16	4.7	18	5.5	**81**	**4.0**
50 - 59	53	12.5	56	11.7	47	10.5	37	10.9	29	8.8	**222**	**11.0**
60 - 69	121	28.5	109	22.9	78	17.5	74	21.9	64	19.5	**446**	**22.1**
70 - 79	130	30.7	158	33.1	165	37.0	126	37.3	106	32.2	**685**	**34.0**
80 +	102	24.1	128	26.8	134	30.0	78	23.1	109	33.1	**551**	**27.4**
Unknown											29	1.4
Gender												
Female	203	47.9	208	43.6	206	46.2	147	43.5	143	43.5	**907**	**45.0**
Male	206	48.6	232	48.6	219	49.1	177	52.4	174	52.9	**1008**	**50.0**
Unknown											99	4.9
Time Call Made												
Office Hours (Mon - Fri 9 - 5)	193	45.5	224	47.0	198	44.4	129	38.2	122	37.1	**866**	**43.0**
Out of Hours	231	54.5	253	53.0	248	55.6	209	61.8	207	62.9	**1148**	**57.0**
Call Initiator												
Healthcare Professional	146	34.4	157	32.9	155	34.8	109	32.2	112	34.0	**679**	**33.7**
Person / family / other	278	65.6	320	67.1	291	65.2	229	67.8	217	66.0	**1335**	**66.3**
Call Outcomes												
Transported to hospital	256	60.4	272	57.0	275	61.7	193	57.1	179	54.4	**1175**	**58.3**
Referred or discharged	116	27.4	142	29.8	125	28.0	114	33.7	122	37.1	**619**	**30.7**
Deceased	52	12.3	63	13.2	46	10.3	31	9.2	28	8.5	**220**	**10.9**

** Excludes 3 cases with unknown HSC Trust location*

Appendix 5: Costing data

Overview

This appendix documents the costing assumptions applied, including unit cost sources, classification decisions, and sensitivity analyses undertaken to test the robustness of results. The costing approach was designed to be transparent, reproducible, and appropriate to the summary nature of the available data.

Sensitivity analysis for same-day (LOS=0) episodes

A structured sensitivity analysis was conducted to assess the potential cost impact of same-day hospital episodes. These episodes were distributed across a procedural mix based on observed hospital coding patterns and supported by free-text clinical review (Appendix 1, Table 4), identifying the most common same-day activities in the final year of life.

To estimate costs, a weighted (blended) unit cost was derived by assigning each procedure type a proportion reflecting its frequency within this mix. The procedural categories included renal dialysis, systemic cancer treatment administration, radiotherapy delivery, transfusions, outpatient procedures, and generic day case activity. Each category was matched to an appropriate published unit cost, and these were combined proportionately to generate an overall average cost per same-day episode.

Two alternative assumptions for radiotherapy delivery costs were tested (£266 versus £313 per episode) to reflect uncertainty in treatment complexity. These assumptions were applied to summary same-day episode counts to generate cost estimates for day case activity at £128.9 m and £129.6m, respectively. These estimates are used solely for sensitivity analysis and are not included in the base-case estimates. Final totals (Appendix 5, Tables 19 & 20), which include the overall cost of day case estimate, present the more conservative radiotherapy delivery cost applied.

Interpretation

Sensitivity analyses were conducted to assess robustness rather than to generate alternative base-case estimates. Across all scenarios, emergency long-stay admissions remained the dominant driver of hospital and system costs, confirming that conclusions regarding length of stay and bed-day drivers were not sensitive to assumptions about same-day activity.

Summary hospital, ED and ambulance costs (base-case and sensitivity)

Appendix 5, Table 19 presents summary hospital activity and costs in the final year of life under the conservative base-case assumptions and the structured sensitivity analysis where proportionate structured cost assumptions, based on day case procedures as detailed in Appendix 1, Table 4 – were applied to same-day (LOS=0) episodes. Table 20 extends this to total system costs, incorporating ED and ambulance service activity.

Table 19. Summary of hospital activity and costs in the final year of life

Admission Category	Number of Episodes	Base-Case Unit Cost (£)	Base-Case Total Cost (£m)	Day Case (Sensitivity) Unit Cost (£)	Total Cost (£m) Including Day Case Estimates (£m)
Elective admissions	25,224	6,215	156	-	156
Emergency short stay (<24h)	27,430	792	21.7	-	21.7
Emergency long stay (≥24h)	252,074	5,134	1,294.1	-	1,294.1
Other admissions	11,541	Not costed	–	Not costed	–
Same-day / day case episodes (LOS=0)	290,765	Not costed	–	444 (blended)	128.9
Total hospital costs	–	–	**1,472.64**	–	**1,601.63**

Notes: Base-case estimates exclude same-day (LOS=0) episodes and "other admissions" due to classification uncertainty. Sensitivity estimates apply a proportional procedural mix to same-day episodes, applying a lower conservative radiotherapy cost rate, generating a blended unit cost of £444. Totals may not sum exactly due to rounding.

Table 20. Total system costs in the final year of life: base-case and day case (sensitivity analysis) reported in (2023/24 £)

Cost Component	Base-case Cost (£m)	Total Cost Including Day Case Estimates (£m)
Hospital admissions	1,472.64	1,601.63
ED attendances (n= 364,484)	99.5	99.5
Ambulance service activity	163.2	163.2
Total system cost	**1,735.37**	**1,864.37**

Ambulance costs reflect modelled total ambulance activity, with conveyed arrivals anchored to observed ED ambulance arrivals (n=248,418). Hear & Treat and See & Treat volumes are imputed based on NIAS base-case conveyance proportions (58.3%). Totals calculated using full precision; category totals rounded for presentation.

For more information

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