

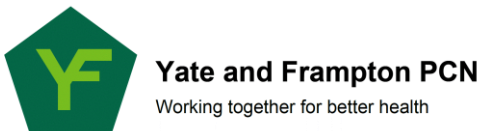
Yate & Frampton PCN Frailty Pathway

Evaluation Report

Working in collaboration with



West of England Academic Health Science Network (AHSN) is one of fifteen AHSNs working to transform lives through innovation.



The Yate and Frampton primary care network (PCN) is a network of general practices based in Bristol



The NHS consists of various organisations working together to provide a variety of health and care services for patients and carers.



Contents

Executive summary	6
Context	6
Key results	6
Recommendations	7
1. Introduction	8
1.1. Context and background	8
1.2. Pathway overview	10
1.3. Purpose of the evaluation	12
2. Methodology	13
2.1. Logic model	13
2.2. Evaluation questions	13
2.3. Metrics	15
2.4. Cohorts	17
2.5. Geographical scope	17
2.6. Qualitative data	18
<i>Staff survey</i>	18
<i>Patient survey</i>	18
2.7. Quantitative data	19
2.8. Health economics	19
<i>General approach</i>	19
<i>Key data sources</i>	19
<i>Choice of analysis and methodology</i>	20
<i>Inflation adjustment</i>	20
<i>Benefit streams</i>	21
<i>Cost streams</i>	21
<i>Discounting</i>	22
<i>Scenario modelling</i>	22
<i>Sensitivity analysis</i>	23
<i>Break-even analysis</i>	23
<i>Assumptions</i>	23



3.	Results	25
3.1.	Qualitative findings	25
	<i>Patients</i>	25
	<i>Staff</i>	28
3.2.	Quantitative findings	33
	<i>Pathway data</i>	34
	<i>GP data</i>	35
	<i>Hospital data</i>	36
3.3.	Health economics results	38
	<i>Scenario 1: Actual Impact During Evaluation Period</i>	38
	<i>Scenario 2: Estimated model impact extrapolated to full year</i>	40
	<i>Scenario 3: model impact per year for 80% housebound uptake</i>	42
	<i>Scenario 4: Estimated model impact per year based on 100% of care coordinator capacity</i>	45
4.	Discussion	48
4.1.	Qualitative analysis	48
	<i>Access to care and services</i>	48
	<i>Personalised care</i>	49
	<i>Isolation</i>	50
	<i>Impact for patients</i>	51
	<i>Integrated care</i>	52
	<i>Spread</i>	53
	<i>Patient satisfaction</i>	54
	<i>Staff satisfaction</i>	54
4.2.	Quantitative analysis	55
	<i>Access to care and services</i>	55
	<i>Impact for patients</i>	55
	<i>Impact on capacity</i>	56
4.3.	Health economics	56
	<i>Removing physician associate cost</i>	58
5.	Limitations	60
5.1.	Qualitative analysis	60
	<i>Limitations of the patient survey</i>	60



	<i>Limitations of the staff survey</i>	60
5.2.	Quantitative analysis	61
5.3.	Health economics	62
	<i>Common limitations of health economic modelling</i>	62
	<i>Limitations relating specifically to the frailty model</i>	62
6.	Recommendations	63
	<i>Metrics and data collection</i>	63
	<i>Counterfactual group comparison</i>	63
	<i>Care coordinator role</i>	64
	<i>Communication</i>	64
	<i>Surveys and interviews</i>	64
	<i>Additional benefits</i>	65
7.	Concluding remarks	65
8.	References	67
	Appendices	69
	Appendix A: Frailty medical deficits	69
	Appendix B: Patient identification and prioritisation	70
	Appendix C: Frailty visit	71
	Appendix D: Logic model	72
	Appendix E: Order of prioritisation	73
	Appendix F: Health Economic benefit stream calculations	74
	Appendix G: Health Economic cost stream calculations	76
	Appendix H: Health Economic optimism bias application	77
	Appendix I: Health Economic sensitivity analysis methodology	78

Executive summary

Context

Research suggests that housebound and frail patients are less likely to access the care they need and are more likely to feel isolated than other patients. Yate & Frampton PCN have implemented a new frailty pathway which is aimed at better supporting these frail patients, by considering a more holistic and person-centred approach ensuring individuals get the care they need.

The new pathway involves care coordinators visiting patients in their homes and discussing what matters to them, ensuring they are involved in decisions relating to their healthcare needs. This proactive and anticipatory approach aims to empower patients to take control of their health as well as avoiding unnecessary secondary care attendances or admissions.

Unity Insights was commissioned by West of England AHSN to perform a service impact evaluation including a health economic analysis of the new frailty pathway introduced by the PCN.

Further details about the evaluation approach have been included in the Methodology section of the report.

Key results

- Only 6.7% of patients offered the service declined
- The new service was well received by patients, with no negative feedback arising from the survey
- All patients who completed the survey agreed the service felt personalised, that they felt listened to, and involved in decisions about their care
- 66% of patients who experience isolation reported feeling less isolated due to the new pathway
- 89% of staff were either satisfied or very satisfied with their job
- Urgent and non-urgent GP contacts increased whereas GP home visits and nurse appointments reduced
- During the 6 month evaluation period (Scenario 1) the difference between the benefits minus costs (Net Present Value (NPV)) was -£40k with a Benefit Cost Ratio (BCR) (benefits / costs) of 0.4, against a break-even of 1
- A reduction in non-elective length of stay resulted in a secondary care non-cash releasing saving of £18k
- A reduction in non-elective admissions resulted in a secondary care non-cash releasing saving of £13k

Recommendations

- Explore the types of non-elective admissions for patients to better understand cost savings and avoidable admissions
- Define and capture metrics related to the physician associates' role on the pathway
- For further evaluation, having data available for the counterfactual group (those not on or have rejected the new pathway) will be key in getting a clear understanding of the impact between the two cohorts
- Dedicate additional time towards improving how the service communicates both internally and externally, including following up on staff feedback, reinforcing awareness with internal services, and building an understanding of the pathway amongst external services
- The care coordinators have not been able to visit the number of patients per day that was originally planned for the

pathway. Reasons for this are unknown, however may be related to working patterns, inability to visit patients early in the morning due to carers being with the patient or the care coordinators spending more time with patients. In order for the pathway to be cost effective this needs to be understood and addressed

- Whilst the patient feedback from the survey was very positive, the sample size was small. Therefore, a recommendation is to continue to collect these survey responses with the expectation being that further feedback provided as to how the service could be improved
- The service offering evolved during the evaluation, meaning it is worth considering if any additional benefits could be captured for a further evaluation. An example could be carbon savings or a reduction in medicine wastage

1. Introduction

1.1. Context and background

Frailty is a term often used to describe the physical and mental resilience of an individual and is associated with their general ability to overcome illness. Often experienced by older people, 'being frail' is a particular state of health which requires people to have access to high quality and well-planned care to help prevent and rapidly respond to any arising health issues (Age UK, 2020). Frailty defines the group of people who are at higher risk of falls, disability, hospital admissions or the need of long-term care (NHS England, 2013).

In the UK, an estimated 10% of adults aged over 65 live with frailty, a figure which rises to between 25% and 50% for those aged over 85 (Age UK, 2020). Falls are also common amongst older adults, with more than one in three people over the age of 65 suffering a fall each year, leading to serious injuries and sometimes even death. The cost incurred from hip fractures alone are estimated at £6 million per day, or £2.3 billion per year (NHS England, 2023).

Different methods to assess frailty exist, but one of the most widely used is the Rockwood Score, also known as the Clinical Frailty Scale (Rockwood & Theou, 2020). While the Rockwood score provides a useful tool for rapid assessment of individual cases, the electronic Frailty Index (eFI) is recommended and widely used by NHS England as a population-based tool which can be applied at scale. This technique is a form of population health management which can be implemented to define and assess frailty demographics over a specified area, enabling statistical analysis of frail populations to help identify geographical areas requiring additional support (NHS England, 2022). Following eFI identification, individual patient records are typically reviewed and validated by clinicians using methods such as the Rockwood score.

The eFI has been widely used across the NHS in England since changes to the general practice contract in 2017/18 introduced a requirement for practices to identify patients over the age of 65 who may be moderately or severely frail. This is aimed at providing increased support targeted at older people who are at heightened risk of ill health (NHS England, 2022). Frailty is scored in the eFI as four categories from 'Fit' to 'Severely frail', based on 36 medical deficits and validated in around 900,000 patient records (NHS England, 2022). These medical deficits are pre-defined and range from signs and symptoms to disease states, disabilities, and abnormal laboratory values. A description of each eFI category is displayed in Figure 1 and a list of all 36 medical deficits can be found under Appendix A: Frailty medical deficits.

Fit	0 – 4 deficits	Few or no long-term conditions usually well controlled
Mild frailty	5 – 8 deficits	May need help with personal activities
Moderate frailty	9 – 13 deficits	May have mobility problems or require help with activities such as washing or dressing
Severe frailty	14+ deficits	Often dependent on personal carers and have a range of long-term conditions

Figure 1: Graphic defining each eFI category including their respective number of deficits.

The identification of frail populations requiring additional support helps facilitate early intervention for health issues, supporting the NHS Long Term Plan (LTP) by increasing integrated community care as an alternative to hospital care (NHS England, 2019). The NHS LTP focuses on improving the NHS by offering additional funding to public health services, in ways which will maximise the return on investment to transform care services in the long term. One of the key focus areas of the plan is to improve how care is delivered for older people through the introduction of the Aging Well Programme, which is made up of three key elements (NHS England and NHS Improvement, 2021):

- 1. Urgent community response:** A two-hour standard for urgent community response, with a two-day standard for reablement and a single point of access for urgent community response utilising 111.
- 2. Enhanced health in care homes:** Enhanced support and better co-ordinated care, reablement, and rehabilitation.
- 3. Anticipatory care:** Helping people with complex needs stay healthy and functionally able.

The Aging Well Programme contributes to the LTP by improving how primary, secondary and community health services are integrated, while helping provide a person-centred care service where patients get appropriate support for their individual needs (NHS England, 2022). This tailored approach is designed to support independent living, helping people stay healthier for longer, with the aim to reduce the overall burden on NHS services. Improving how services are integrated and promoting resilience amongst older and/or frail patients is expected to reduce barriers to care provision, while ultimately improving the patient’s quality of life.

When promoting resilience and removing barriers to care provision, the ‘wider determinants of health’ model originally developed by Dahlgren & Whitehead describes the key mechanisms by which various factors can affect an individual’s ability to manage their physical and mental health, and how the two are closely inter-linked (G. Dahlgren, M. Whitehead, 1993). The model looks at the broader socioeconomic, cultural, and environmental conditions which impact people’s daily life, and shows how individual lifestyle factors in addition to ‘constitutional factors’ such as age and

genetics all contribute towards overall health (Public Health England, 2018). This relationship suggests that addressing an individual's wider health and social needs can be key to developing medical resilience to promote the self-management of health. The model by Dahlgren and Whitehead is displayed below in Figure 2.

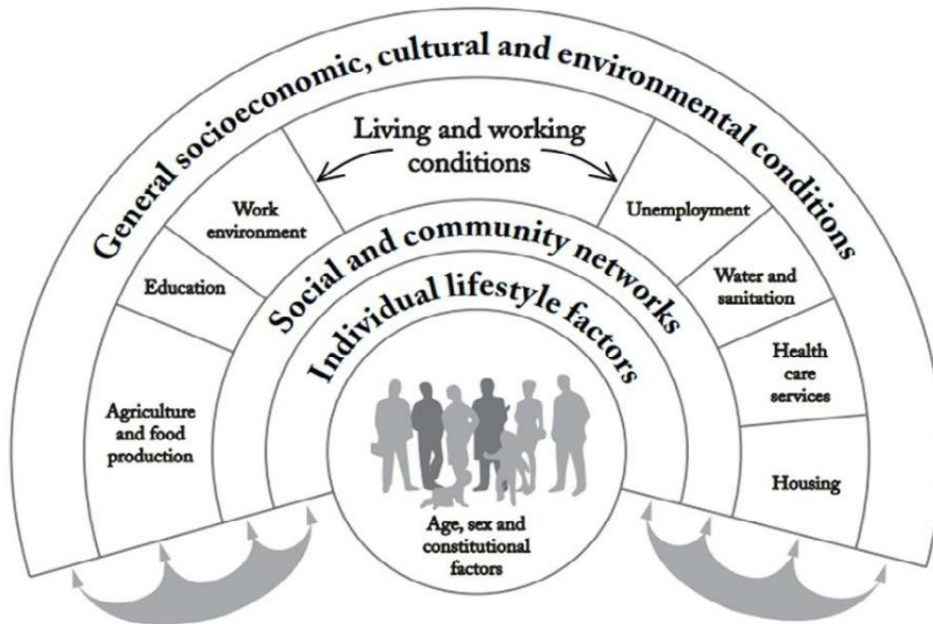


Figure 2: The Dahlgren and Whitehead model describing the wider determinants of health.

1.2. Pathway overview

Yate and Frampton Primary Care Network (Y&F PCN) have proposed a new frailty care pathway aimed at providing additional support for patients who are identified through population health management as moderately or severely frail with a focus on those patients that are housebound. This new frailty pathway is designed to support these patients by offering a personalised approach to care by catering the service to meet individual needs. To achieve this, the pathway encourages shared decision making (SDM) to empower patients to have more control over their care plan, with more focus on addressing what matters to them.

Individuals requiring additional support are highlighted at scale through the implementing of population health management, by using the eFI in combination with individual assessment of identified cases. The new pathway endeavours to support these people by addressing their health and social care needs which may otherwise be overlooked in the existing care model. It aims to promote early detection and intervention and encourage self-management for at risk patients. A flow diagram showing the patient identification process can be found in Appendix B: Patient identification and prioritisation.

Once patients have been identified, a letter is sent to them introducing the service and this is then followed up with a phone call to arrange a visit. During the visit a relaxed, informal discussion should take place with the intention to build a relationship with the patient. Assessments appropriate to the patient are then performed and if necessary, onward referrals are made to other services as listed in Table 1. A flow diagram showing the frailty visit process can be found in Appendix C: Frailty visit.

Table 1: Example of types of onward referrals

Possible referrals	
Audiology	Long-term condition community matrons
Dietician	Occupational Therapy
District Nurses	Opticians
For discussion at Frailty MDT	Physiotherapy
GP or Physician Associate for clinical issues	Social Services

To deliver this new care pathway, Y&F PCN have recruited new dedicated staff, such as care coordinators, with physician associates seconded from practices to support existing GPs and paramedics. These new dedicated staff will be responsible for delivering most of the patient-facing service by completing home visits and urgent appointments, aiming to increase the capacity for GPs by reducing the number of GP home visits and other urgent callouts.

A summary of key project activities includes:

- Identifying and recruiting people at risk of being moderately or severely frail using population health management tool eFI to boost anticipatory care
- Designing a new shared care plan template to establish individual goals for patients
- Recruiting and training new dedicated staff including care-coordinators and physician associates to deliver the new care service
- Providing training to new and existing staff on shared decision making and personalised approaches to care to upskill the workforce
- Constructing an anticipatory care PHM review using data from five GP practices to help identify additional patients at risk of deterioration to enable the frailty team to intervene early

1.3. Purpose of the evaluation

After receiving funding from the Ageing Well Programme, Y&F PCN and the West of England AHSN together embarked on a competitive bidding process and commissioned Unity Insights to independently evaluate the new frailty service offering. The evaluation intends to assess how the pathway has performed against its key objectives, including enhancing anticipatory care and providing more holistic and personalised approach to supporting frail patients in managing their health. These objectives are summarised in more detail in the Pathway overview, and are contextualised in terms of the evaluation in the Evaluation questions section.

To understand whether the pathway has been successful, both qualitative and quantitative methods have been implemented to obtain evidence around how the pathway has performed against a range of patient and system benefits. These methods include both a patient and staff survey, in addition to the analysis of quantitative data for primary and secondary care.

Additionally, a key activity of the evaluation will be estimating the economic impact of the pathway using a health economic modelling approach, producing a cost-benefit analysis to inform the projected return on investment across a range of scenarios. This approach considers both the pathway as it is currently implemented, in addition to forecasting impact following scale-up across a greater patient population.

The range of analytical techniques implemented as part of the evaluation are anticipated to support local providers and commissioners with decisions regarding further investment into the pathway, using results from the evaluation to understand the return on investment of the pathway, in addition to the social benefits experienced by the pathway cohort.

2. Methodology

2.1. Logic model

A workshop was facilitated by the evaluators in April 2022 to develop a logic model for the evaluation, using input from a range of key stakeholders including staff from the Y&F PCN, including care coordinators, general practitioners (GPs), a GP practice manager, in addition to the project team from the West of England AHSN. The workshop reviewed short, medium, and long-term outcomes and benefits of the new frailty pathway. The outcomes of this workshop provided the foundation for conducting the evaluation, by shaping and informing the evaluation questions and helping define and prioritise key metrics. The outcomes from the workshop were summarised and presented as a graphic in Appendix D: Logic model.

2.2. Evaluation questions

The following questions were proposed to provide a framework to execute the evaluation, helping explore the desired impact of the pathway and identify potential benefits. These were initially defined by Unity Insights and submitted in the evaluation plan following approval from the West of England AHSN and Y&F PCN. Questions were split by process, impact, and value for money (VFM).

1. Does the new pathway support and enable SDM and personalised care for frail and housebound patients across Y&F PCN? **(Process)**
2. What is the social impact of the new pathway? **(Impact)** *Possible questions to include but not limited to:*
 - a. Does it improve patients access to services?
 - b. Do patients feel more supported by the care workforce?
 - c. Does it enable patients to take control of their healthcare needs?
 - d. Do patients feel less isolated?
 - e. What has been the biggest impact for patients?
3. What is the economic impact of the new pathway?
 - a. Is there a valid economic case for the new Frailty pathway? **(VFM)**
 - i. Efficiency – does the solution save time for clinical and non-clinical staff?
 - ii. Effectiveness – is there a reduction in GP appointments, A&E attendances, non-elective admissions, unnecessary referrals to secondary care, etc.?



- b. Do patients involved in the new frailty pathway (*intervention*) have a lower level of healthcare resource utilisation than patients that reject the new frailty pathway appointment? (*counterfactual*) **(Impact)**
- 4. What are the enablers and barriers to wider adoption of the new Frailty pathway? **(Process/ Impact)**
 - a. Are there mechanisms in place within the current system that allow for future spread? If not, what would need to be introduced?
 - b. Does the new care pathway work better for some patients than others?
 - c. Does the new care pathway better enable cross-collaboration within the teams involved in the new pathway and the delivery of integrated care?
 - d. How is the new frailty pathway accepted and perceived?
- 5. What is the impact of the project on the healthcare professional's confidence and job satisfaction? **(Impact)**
 - a. Care coordinators
 - b. Paramedics
 - c. Physician Associate



2.3. Metrics

Table 2: Metrics defined in the evaluation plan linked to the relevant evaluation questions and data sources.

Evaluation question	Evaluation metric	Sources of data collection	Evaluation type
3	Releasing time/capacity for GP practices staff (GP, admin staff)	Staff survey	Impact, VFM
1,2	Increase in the provision of personalised care	Patient and staff survey	Process, Impact
3	Reduction in A&E attendances and admissions	Patient record audit	Impact, VFM
3	Reduction in non-elective admissions	Patient record audit	Impact, VFM
3	Reduction in falls	Patient record audit	Impact, VFM
3	Reduction in requests for urgent GP visits and out of hours GP care	Patient record audit	Impact, VFM
1,2	Reduction in patient isolation	Patient survey	Impact
1,2	Increased percentage of patients reporting that they feel listened to, that their voice is heard	Patient survey	Process, Impact
1,2,4	Improved patient activation (knowledge, confidence, and skills)	Patient survey	Process, Impact,
1,2,4	Improved patient awareness of the services available to them (through guidance and signposting to community services, social services, tertiary sector initiatives)	Patient survey	Process, Impact
2,4	Improve patient's self-management of their health	Patient survey	Process, Impact



Evaluation question	Evaluation metric	Sources of data collection	Evaluation type
1	Improved process to identify patients requiring support	Staff survey	Process, Impact
1,4,5	Freedom to act for care coordinators, ability to dedicate time to patient visits and support	Staff survey	Process, Impact
4	Build stronger clinical relationships across organisations	Staff survey	Process, Impact
4,5	Enhanced knowledge, skills, and job satisfaction across PCN team	Staff survey	Process, Impact
1,2,5	Building a personal relationship with patients via regular interactions and continuity of contact	Patient and staff survey	Process, Impact
4,5	Staff and patient satisfaction about the pilot	Patient and staff survey	Process, Impact

2.4. Cohorts

The cohorts identified as key targets for the new frailty care pathway include people identified by the eFI as moderately to severely frail following validation of individual cases by GPs. While the pathway is designed to include all patients who fall within these categories, the pathway pilot in Y&F PCN only includes patients who are considered severely frail and housebound, including those with dementia, registered to a GP practice within the PCN. Patients are prioritised in order of the severity of their needs, seeing patients with the highest degree of frailty first. For the scope of the pilot, this is limited to housebound patients, however, the pathway is intended to extend to lower priority groups should it be adopted at a wider scale. Table 13 in Appendix E: Order of prioritisation shows the other groups defined in the pilot which may be offered support on the pathway depending on how the service evolves and expands.

2.5. Geographical scope

Currently, the pilot of the new frailty care pathway is operating across five GP practices located within the Y&F PCN in south Gloucestershire, with the intention to scale-up across a wider geographical area. This depends on decisions made and the allocation of funds by local authorities regarding the adoption of the pathway, as influenced by the findings of this evaluation. Areas considered to be potential targets for expansion of the pathway include Inner City and East (ICE) Bristol, North and West Bristol, South Bristol, North Somerset – Weston, Worle and Villages, and North Somerset – Woodspring.

The five practices which have launched the new service, along with their respective go-live dates, are shown in Table 3. The go-live date is defined as the date the first contact was made to recruit patients.

Table 3: Practices located in the Y&F PCN showing the date the pathway went live.

Practice Name	Go-live date
Courtside Surgery	7 th February 2022
Frome Valley Medical Centre	1 st August 2022
Kennedy Way	1 st August 2022
West Walk	7 th September 2022
Wellington Road	10 th October 2022

2.6. Qualitative data

Qualitative insights for the evaluation were mostly collected through the distribution of surveys. These surveys were designed for both patients and staff to capture a range of qualitative insights around how the pathway is perceived to be performing, what impact the pathway has on both staff and patients, and what changes could be made to improve the service being delivered. Both surveys were designed to address specific metrics as outlined in Table 2, and results were analysed using Microsoft Excel.

Staff survey

The staff survey was designed in Survey Monkey and distributed via email as a hyperlink. The link was sent to the clinical lead for the pathway who is also a GP principle at Courtside Surgery, who forwarded the link to relevant staff. There are three care coordinators (2 full-time equivalents) and one physician associate involved in the pathway, therefore, an N/A option was added to questions to enable a wider range of responses from staff with different job roles, allowing these members to skip questions they felt did not apply to them.

Any member of staff who was considered to be working on or are actively involved in the pathway was invited to complete the survey, including some GPs if a significant amount of their work was focused on the pathway. The survey was open between the 1st of November 2022 and the 13th of January 2023 and yielded 11 responses; the exact number of invites sent out is not known given how it was distributed.

Patient survey

Given that the cohort of patients in the pilot are severely frail and housebound, some have either limited access to the internet or restricted capacity to complete a survey online. Therefore, both an online survey created on Survey Monkey, and a printable version was produced.

Paper responses were provided by the care coordinators during home visits and filled out by the patient either at that moment or after the care coordinator had left, then added to a sealed envelope and either posted or collected by the care coordinator before they left. Responses were delivered back to the practice and collated by the practice admin by scanning and sending them to Unity Insights by email, where they were manually typed up for analysis.

The online patient survey was open between the 7th of December 2022 and the 3rd of February 2023 and received six responses, however, two were excluded due to non-completion, leaving a total of four responses. The paper version was sent out to care coordinators for distribution on the 9th of December 2022 with a cut-off date of the 31st of January, however this was extended to the 16th of February to allow more responses to be included. This resulted in 13 responses after an unknown number of patients were approached to participate, totalling 17 across both paper and online surveys.

The online and paper responses to patients surveys were combined and analysed together, given that the structure and contents were consistent across both.

2.7. Quantitative data

To obtain quantitative data for the evaluation, a unique code was attached to the digital health record of patients enrolled onto the frailty care pathway, enabling data handlers to search for data relating specifically to that cohort. This aggregated data was shared via email and came from two primary sources:

- **GP data** – the GPs electronic patient record (EPR) system EMIS
- **Hospital data** – the ‘shared data set’ database managed by the integrated care board (ICB)

GP data was provided by One Care (One Care, 2023) the GP federation for Bristol, North Somerset & South Gloucestershire (BNSSG) and secondary care data was provided by NHS Bristol, North Somerset & South Gloucestershire ICB. Two different timelines of data were received by the evaluator, the ‘baseline data’ pre-dating the roll-out of the frailty pathway, and ‘evaluation data’ collected for the same group of patients during the pilot to enable a before and after comparison.

- **Baseline period:** June 2021 – November 2021
- **Evaluation period:** June 2022 – November 2022

Other operational data relating to the pathway was sent directly from the frailty team by email. This includes contact data, such as letters sent and number of visits, and actions, such as number of referrals.

2.8. Health economics

General approach

This evaluation produced an ex-post (based on actual results rather than forecasts) appraisal of the new frailty pathway, estimated through available data and best existing evidence. The appraisal is in line with ‘The Green Book’ (HM Treasury, 2022). The HM guidance is applied throughout the public sector to ensure consistent estimation of costs and benefits in cost-benefit appraisals. In recent years, the framework has been supplemented by several departmental or sectorial ‘external supplementary guidance’ documents (HM Treasury, 2022).

Key data sources

Evidence used to form the current evaluation was sourced from primary care and secondary care datasets, academic research, and statistics from relevant public-sector bodies. The main unit cost databases that were used to source data include:

- PSSRU’s ‘Unit Costs of Health and Social Care 2021 (Jones & Burns, Personal Social Services Research Unit, 2021)

- Unit cost database (Greater Manchester Combined Authority [GMCA], 2022)

Other sources used include Hospital Episode Statistics, National cost collection database, General Practice organisational and population data. Further detail can be found in the Assumptions section.

Choice of analysis and methodology

Cost-benefit analysis

A cost-benefit analysis (CBA) aims to determine whether the economic value of an intervention can justify the service's costs by comparing the cost of two or more alternatives and reviewing the return on investment (ROI) based on a static model of the world. Savings are estimated from the perspective of the UK's society. It is not possible to include all costs and benefits within the appraisal, however, the service's effects should be considered and outcomes that are most likely to determine the difference between alternative options should be included within the appraisal.

Monetisation

To realise economic outcomes, benefit and cost streams must be monetised. Outcomes can be categorised as either direct (NHS related outcomes), indirect (to other public sector organisations), or social outcomes (wider UK society).

Optimism bias

Optimism bias (OB) is defined as “the tendency for a project's costs and duration to be underestimated and/or benefits to be overestimated” (Mott MacDonald, 2002) as found by historical UK government reviews on public sector procurement. To account for these 'optimistic' estimates, the model applies OB correction factors in response to the level of uncertainty in the data or assumptions used within the model.

Unity Insights' approach to optimism bias is presented in Appendix H: Health Economic optimism bias application. This is an adaptation of the model created by the Greater Manchester Combined Authority (GMCA) Research Team (formerly New Economy; HM Treasury, Public Service Transformation Network & New Economy, 2014). The GMCA model is featured in the supplementary guidance of HM Treasury's Green Book and offers a robust and prudent approach to economic analysis (HM Treasury, 2022). In addition to the optimism bias factors applied at the benefit and cost stream level, a further factor of 15% is applied to reduce the benefits and increase the costs. This additional factor is included as an extra level of prudence to ensure that the model does not misrepresent the impact of the intervention.

Inflation adjustment

Adjusting for inflation removes the general effects of inflation and presents costs and benefits included within the appraisal in 'real' base year prices rather than in nominal prices (i.e., the first year of the project). Within this appraisal a Gross Domestic Product (GDP) deflator of 2% has been used to convert nominal to real values. Various rates were applied depending on data which were

sourced from the Office for Budget Responsibility forecast (The economy forecast; Inflation Q1, 2022) and (HM Treasury, 2022).

As the inflation rate used is based on the forecast above as was available at the time of the evaluation, it does not consider the higher inflation rate experienced in the UK post 2022 Q1.

Benefit streams

As part of this appraisal, the following benefits have been included:

- 1. Increasing capacity for GPs (urgent + non-urgent GP contacts):** it is anticipated that care coordinators making home visits to patients to help them take control of their health will lead to fewer GP visits, freeing up capacity.
- 2. Reduction in GP home visits:** it is anticipated that care coordinators making home visits to patients to help them take control of their health will lead to fewer GP home visits, freeing up capacity.
- 3. Reduction in practice nurse appointments:** it is anticipated that care coordinators making home visits to patients to help them take control of their health will lead to fewer practice nurse appointments due to patients taking a more active role in their care.
- 4. Reduction in A&E attendances:** patients taking a more active role in managing their health may result in fewer A&E visits.
- 5. Reduction in non-elective (NEL) admissions:** non-elective hospital admissions are where a patient is admitted to hospital for reasons which were not previously planned, e.g. after attending A&E. It is hoped that this will reduce for those patients who are on the new pathway.
- 6. Reduction in non-elective (NEL) length of stay:** this is the period between admission and discharge and the unit of measurement is a bed day. It is hoped that this will reduce for those patients who are on the new pathway.

The calculation and data used to monetise these benefit streams are presented in more details can be found in Appendix F: Health Economic benefit stream calculations.

Cost streams

As part of this appraisal, the following costs have been included:

- 1. Cost of care coordinators:** considers recruitment costs for newly hired care coordinators
- 2. Cost of physician associates:** considers recruitment costs for seconded physician associates

After a discussion with the project team, the cost of staff training was initially identified as a cost to the new service, however it was determined that most of the training was provided for free and therefore was not included.

Details of the calculations for each of the cost streams can be found in Appendix G: Health Economic cost stream calculations.

Discounting

Discounting is a technique that enables the comparison of costs and benefits on a consistent basis and accounts for the concept of ‘social time preference’ (i.e., it allows costs and benefits that occur at different time periods to be compared on a “present value” basis). Discounting is applied to all future costs and benefits and is not applied retrospectively.

A discount rate of 3.5% is applied to benefits to deflate outcomes to real terms and reflect the changing value of healthcare within GDP (HM Treasury, 2022). For social outcome streams linked to welfare or utility values (e.g., QALYs), a discount rate of 1.5% is applied as this excludes the change in expected growth per capita over time and only considers health and life effects.

Scenario modelling

Four different scenarios have been modelled to help understand the effects, benefits, and costs, of the new frailty pathway at differing scales and levels of optimisation.

It is important not only to understand the impact which has been achieved, but also to analyse the potential of future impact. To achieve this, four scenarios were developed as detailed in Table 4 below.

Table 4: Health economic analysis scenarios

Scenario	Description
Scenario 1: Actual impact during evaluation period	Impact based on the evaluation data between June 22 – November 22
Scenario 2: Estimated model impact extrapolated to full year	Annualised view of evaluation data
Scenario 3: Estimated model impact per year for 80% uptake	Impact if 80% of housebound patients were on the pathway
Scenario 4: Estimated model impact per year for 100% of care coordinator capacity	Potential impact based on 100% of the Care coordinators capacity

Scenario 1 is modelled solely using data from the project itself.

Scenario 2 annualises data from scenario 1.

Scenario 3 looks to understand the impact should the pathway enrol 80% of the patients who have a 'housebound' flag on the GP system.

Scenario 4 looks to understand the impact if the care coordinators were at 100% capacity which equates to three patients a day with one being a new patient to the pathway.

Sensitivity analysis

A degree of uncertainty in the estimates of the model is accounted for by using sensitivity analysis. It is important to note that the sensitivity differs from optimism bias in that it is applied on each individual assumption or input in the model, rather than by benefit or cost stream as in the case of optimism bias. Unity Insights uses a Monte Carlo simulation to conduct the sensitivity analysis. This modelling technique simulates the impact of the expected variance in key variables on the output of interest, in this case the net present value return on investment. Further details on how this is applied are included in Appendix I: Health Economic sensitivity analysis methodology.

Break-even analysis

In simple terms a break-even analysis is performed to identify the point at which an intervention becomes cost neutral, i.e., when costs plus benefits equal 0. This has been performed using the inputs and assumptions for scenario four, with outputs in the results section.

Assumptions

Staff costs

- Care coordinator and physician associate salary costs were provided by Y&F PCN and include onboarding costs.

Number of staff

- Care coordinator whole time equivalent (FTE) 2.0 – provided by Y&F PCN
- Physician associate FTE 1.1 – provided by Y&F PCN

Primary care costs

- The cost of a GP per appointment was sourced from (Jones & Burns, Personal Social Services Research Unit, 2021) and includes both the direct care staff and qualification costs.
- The cost of a GP home visit was sourced from a conversation with the project lead who is an experienced principal GP. Although a high optimism bias is assigned, it was agreed that it is a more reasonable figure than the value sourced from literature that was last recorded in 2014/15.
- The cost of a practice nurse was sourced from (Jones & Burns, Personal Social Services Research Unit, 2015) and was calculated by dividing the hourly rate of face-to-face contact with the average duration of contact.

Secondary care costs

- The average A&E attendance (all scenarios) cost was sourced from (Greater Manchester Combined Authority [GMCA], 2022).
- NEL admission costs were obtained from the National Schedule of NHS costs (NHS England, 2021). These were calculate based on the average NEL admission costs for the two most likely trusts for Y&F patients to be admitted as indicated by the projects clinical lead. Those trusts being North Bristol NHS Trust and University Hospitals Bristol and Weston NHS Foundation Trust.

Model assumptions

- Costs of healthcare interventions were assumed to increase in line with the NHS cost inflation index (NHSCII) for pay and prices (Jones & Burns, Personal Social Services Research Unit, 2021) and have been applied to all treatment and health service costs.
- Personnel costs such as care coordinator and physician associate salaries were assumed to increase in line with NHSCII for pay (Jones & Burns, Personal Social Services Research Unit, 2021).
- Scenario 1 – 6 month evaluation period – June 2022 to November 2022.
- Scenario 2 – Scenario 1 doubled.
- Scenario 3 – was based on if 80% of the total patients recorded as housebound on the Y&F PCN register. This figure was provided by the project team, and it is acknowledged that this figure will fluctuate; but for the purposes of the health economic modelling, it was assumed to be a static number in year one (2022) and to increase in line with the UK population (Mid-year) - growth rate of 0.7% per year over years two and three.
- Scenario 4 – was based on the number of new patients care coordinators could see if they were at 100% capacity minus holidays, sick days, and any training requirements. The same population growth rate as in Scenario 3 was assumed.
- Care coordinator capacity – Through discussions with the clinical lead it was agreed that per FTE care coordinator, three patients per day could be seen.
- Proportion of new patients seen – Through discussions with the clinical lead it was agreed that the ratio of new to follow-up patients would be 1:2. This means that for every new patient seen there would be two patients followed-up. This is important as the impact of the pathway is modelled on new patients only.
- Capacity reduction factor – It was calculated that staff per FTE would have six weeks of leave, one week of sickness and one week of training per year. This leaves 44 weeks where patients can be seen. Appointment capacity in the model had been reduced to 85% (44/52).

3. Results

3.1. Qualitative findings

Qualitative insights into the performance of the new pathway were captured from the surveys distributed to patients and staff, which included a mixture of multiple choice and free text responses. Results from the survey are split by patients and staff below.

Patients

Information relating to the purpose of the survey was provided to patients who were asked to give informed consent before participating in the survey.

Multiple choice

For the multiple-choice questions, patients were first asked to indicate which practice in the Y&F PCN they were registered at; results from this question are presented in Figure 3. Patients were also asked to indicate the extent to which they agreed with a number of statements relating to the care they have received via the new frailty pathway. Response options ranged from 'Strongly disagree' to 'Strongly agree' and are ranked by number of 'strongly agree' responses. Results from this question are presented in Figure 4.

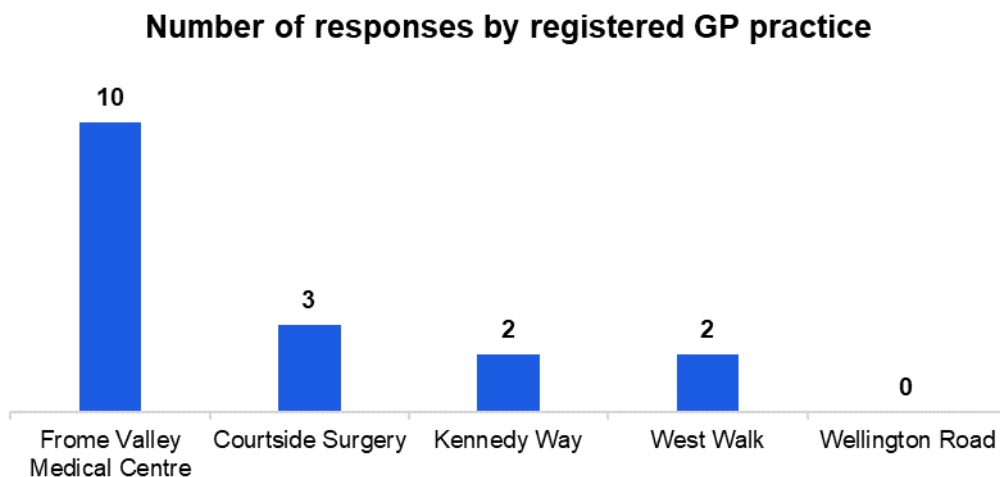


Figure 3: Chart showing the breakdown of GP practices in the Y&F PCN where respondents are registered.

The extent to which respondents agree with different statements relating to the care they received on the new frailty pathway

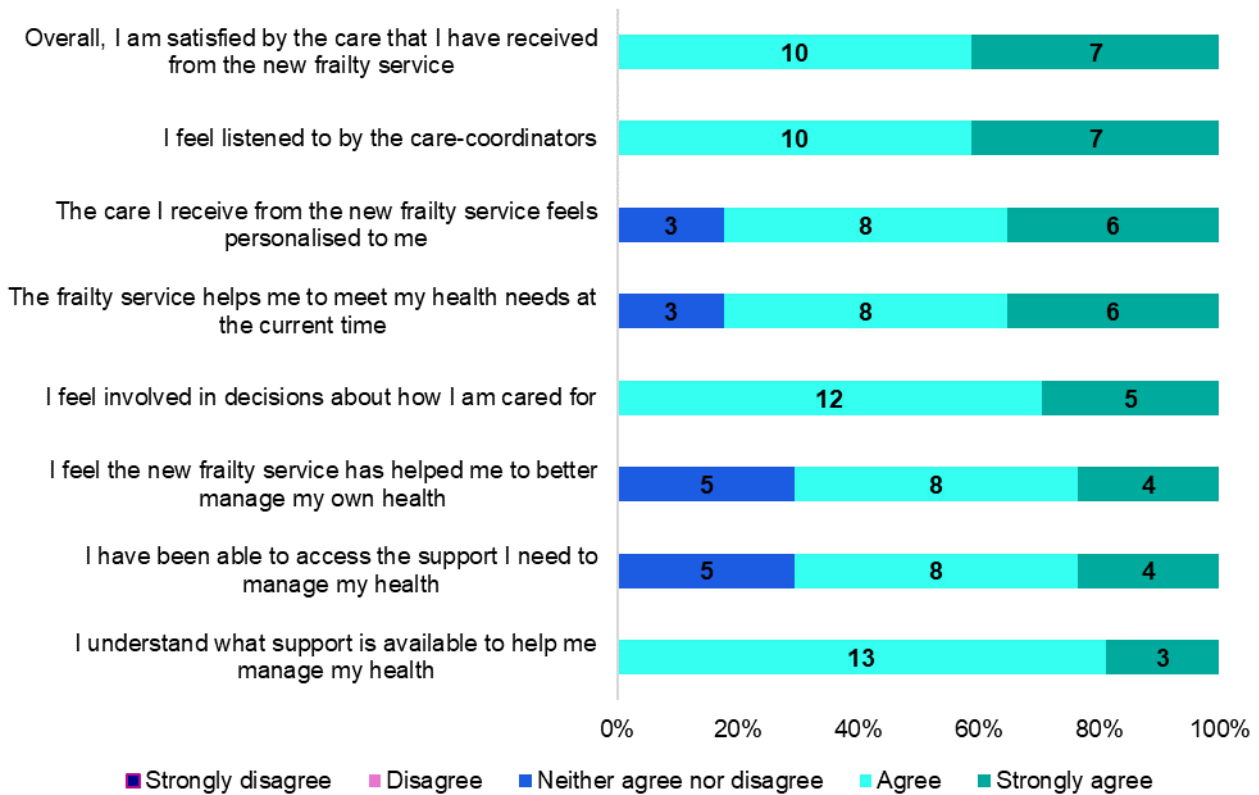


Figure 4: Stacked chart showing the extent that respondents agree with different statements relating to their care on the new frailty pathway.

Results from Figure 4 show an overall positive response, with no service users indicating that they disagree with any of the statements. For all statements, the majority of responses were ‘agree’ or ‘strongly agree’, with the two highest scoring statements being that patients are overall satisfied by the care they have received, and that they feel listened to by the care-coordinators. A more detailed Interpretation of the results can be found in the Discussion section.

Additionally, respondents were asked to indicate whether they have frequently felt isolated in the last 6 months, and if so, whether the new frailty care pathway has helped reduce their feeling of isolation. Results from these questions are presented in Figure 5 and Figure 6 respectively.

Proportion of patients who frequently felt isolated in the past 6 months

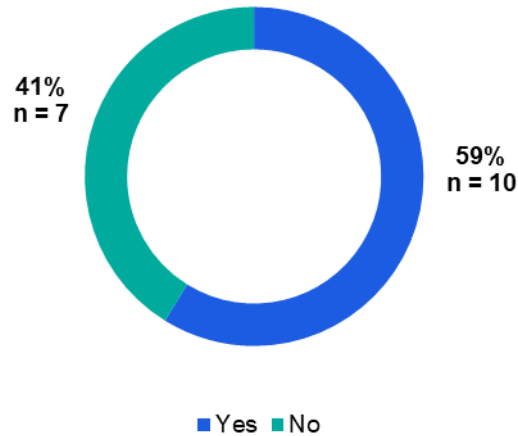


Figure 5: Chart showing the proportion of patients who frequently felt isolated in the last 6 months. 'n' indicates the number of responses for each answer option.

Responses indicating how the new frailty pathway has impacted isolation for patients who indicated they felt isolated

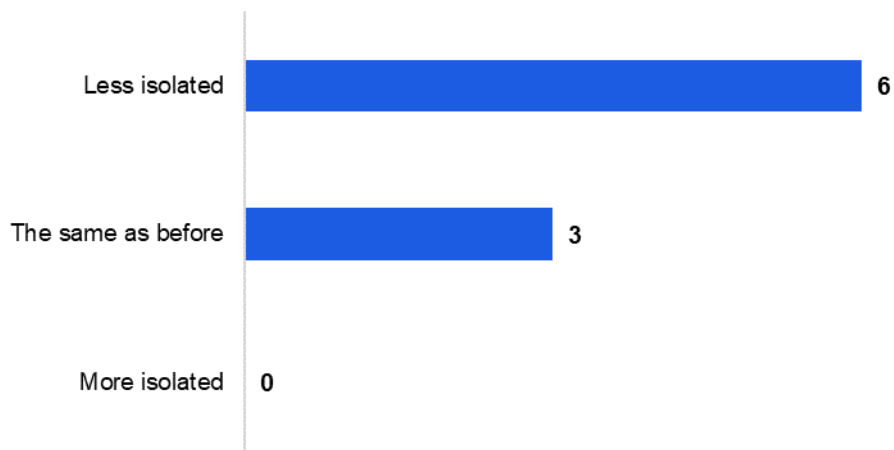


Figure 6: Chart showing how the new frailty pathway has impacted the patients' feeling of isolation for those who indicated that they frequently felt isolated in the last 6 months.

Results from Figure 5 and Figure 6 suggest that the pathway is having a positive impact on reducing the service users feeling of isolation, with 6 out of 9 respondents to the question presented in Figure 6 stating that the pathway reduced their feeling of isolation. These results are interpreted in more detail in the *Discussion* section.

Free text

The free-text responses from the patient survey provided respondents with the option to skip the question if they did not have anything else to add. Patients were asked to comment on what they thought was good about the new frailty service, to which 14 of the 17 respondents added comment, with all comments indicating a positive response. Some of the key quotes to emerge from the responses are presented below:

“Fantastic coordinated professionals all comes to render the appropriate services to vulnerable patients!! Thank you all.”

“It's nice to have someone to come and visit and are able to spend time with you.”

“I think it's a good service, they meet all my needs”

When asked to add comment about how the service could be improved, none of the 17 respondents had any suggestions. There were some comments, however, with one respondent noting that it was “too soon to say” and another noting that they “have all details [they] asked for”.

The final question asked if there was anything else the patients would like to add, to which three of the 17 respondents added further comment, all of which were positive. One respondent noted the following:

“This has been very helpful to me, leading me in the right directions. This department must help many people to cope.”

Staff

Multiple choice

The staff survey began with multiple choice questions, starting with asking respondents what their job title was, including an ‘Other (please specify)’ option, which had two responses, both of which were from practice managers. Results from this question are presented in Figure 7. The staff were then asked to indicate how satisfied they were with different aspects of their role, with five response options ranging from ‘Very dissatisfied’ to ‘Very satisfied’ plus the addition of an ‘N/A’ response resulting in six options in total. Results are displayed as a stacked bar chart in Figure 8.

Staff were also asked to what extent they agreed with a number of statements relating to their work on the frailty pathway. Five response options ranging from ‘Strongly disagree’ to ‘Strongly agree’ were provided, with the additional option to select ‘N/A.’ Results from this question are presented in Figure 9.

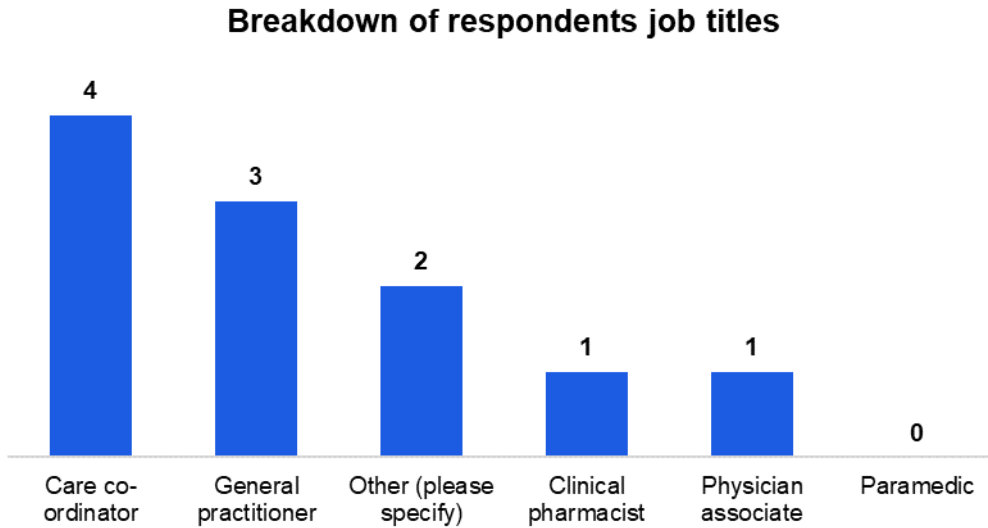


Figure 7: Chart showing a breakdown of the respondents’ job titles.

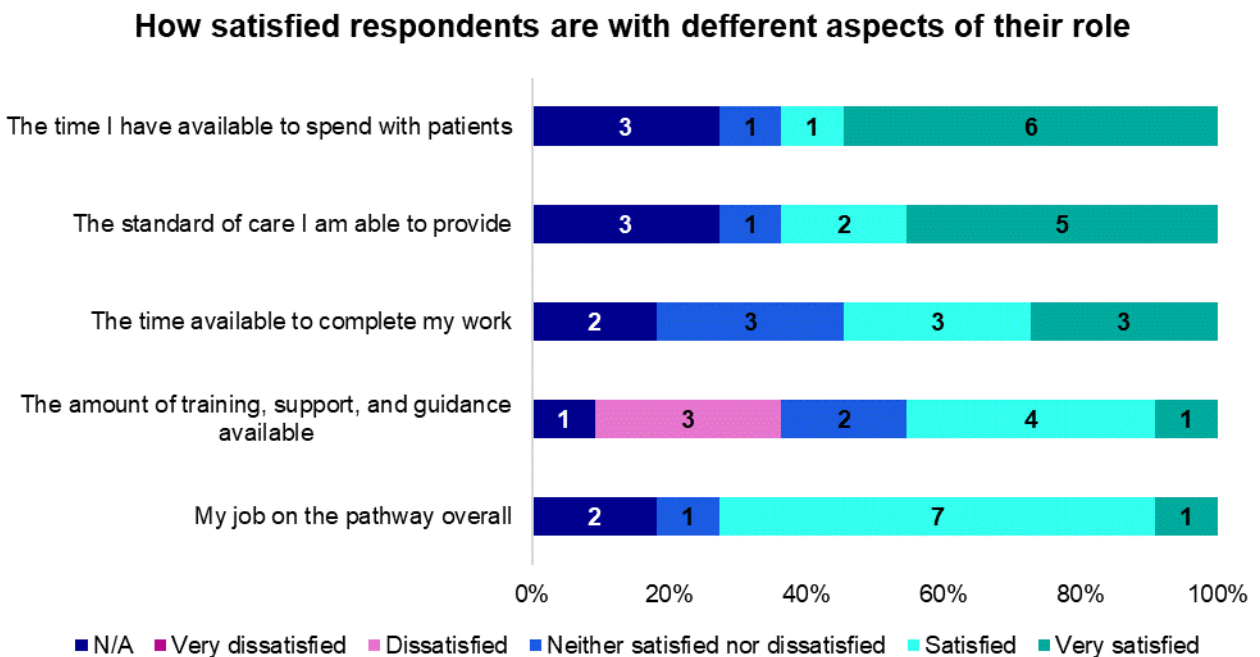


Figure 8: Stacked chart showing how satisfied respondents were with different aspects of their role. The N/A option was included to allow responses from staff to whom not all questions were relevant.

The extent to which respondents agreed with different statements relating to their work on the new frailty pathway

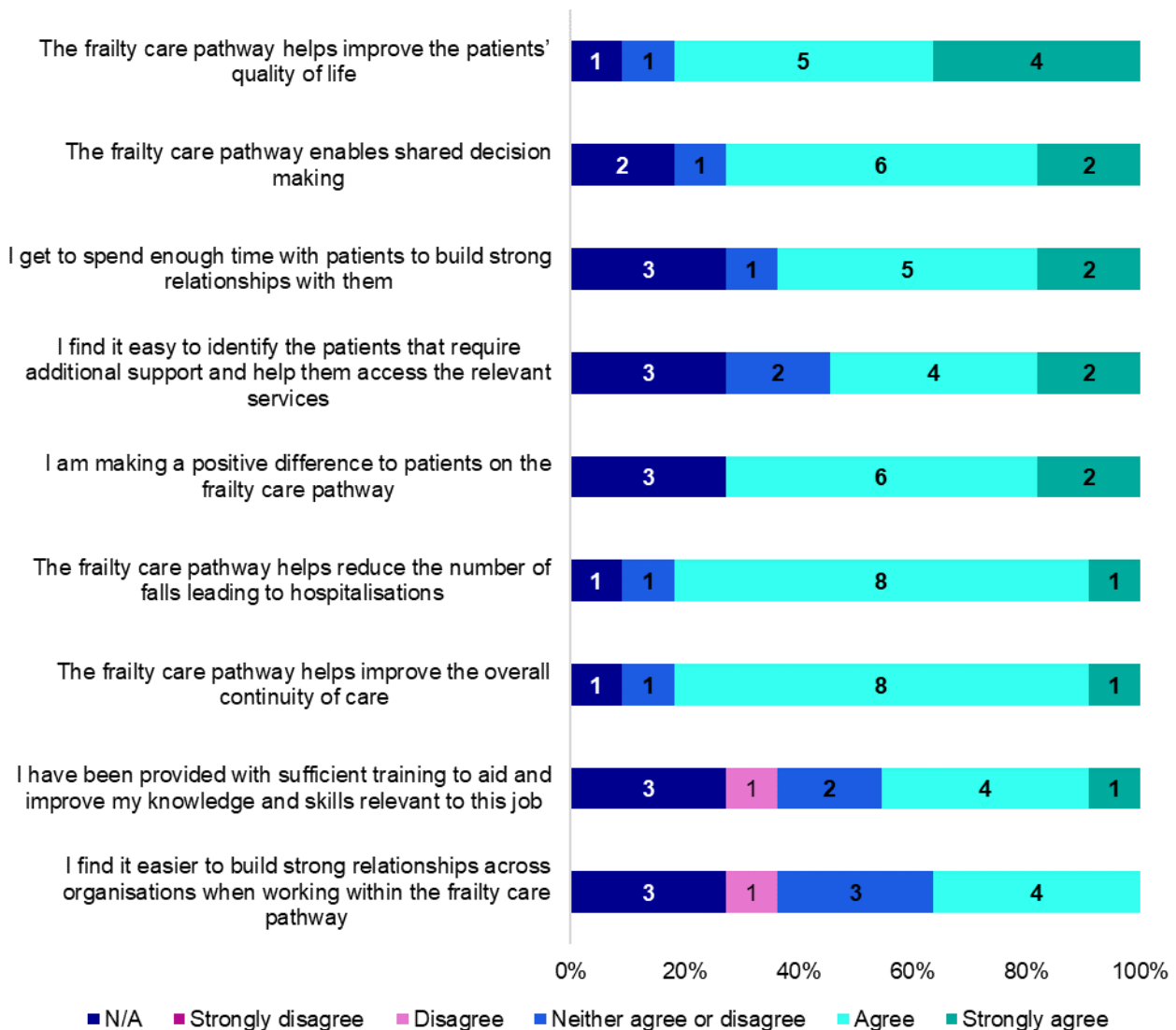


Figure 9: Stacked chart showing the extent to which respondents agreed with different statements regarding their role on the new frailty pathway. The N/A option was included to allow responses from staff to whom not all questions were relevant.

Overall, responses to questions presented in Figure 8 indicate an overall positive satisfaction rating across different job elements, with just one question receiving three 'dissatisfied' responses around the amount of training, support, and guidance available. Results for Figure 9 are also mostly positive with most respondents agreeing or strongly agreeing to the statements, with some more positive than others. Interpretation of these results is expanded further in the Discussion section.

Free text

To analyse the free-text responses for the staff survey, key themes were identified for each question, assigning each response to one or more themes to identify patterns across the responses.

For the first of the free-text questions, respondents were asked to comment on what was good about the new frailty pathway, to which all 11 responding staff provided comment. The themes identified for this question, along with the number of responses covering each theme, is presented in Figure 10, with some key quotes presented below to provide further insight into the comments from the staff.

“Gives the elderly and frail an opportunity to have more support and access services they need to carry on being independent and reduce any further hospital admissions.”

“I believe patient's benefit greatly from this holistic approach to patient care.”

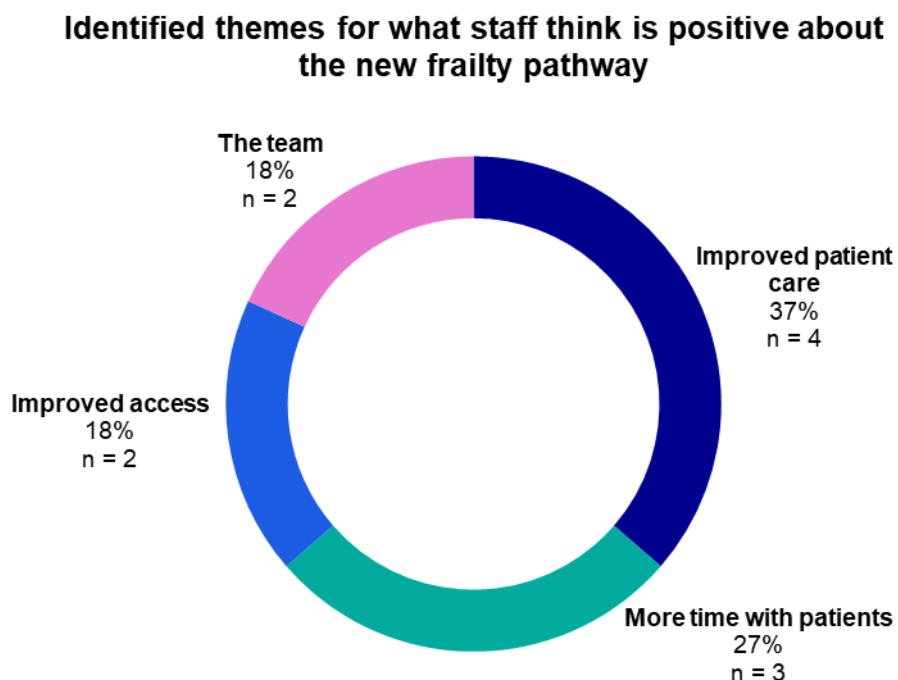


Figure 10: Identified themes for responses relating to positive feedback of the pathway, including the number of responses for each theme. The number of responses assigned to each theme is represented by ‘n’.

The staff were then asked to comment on how the frailty pathway could be improved, to which 9 out of 11 respondents provided feedback, with the other two responding “unsure” and “nothing to add currently”. Out of the 9 responses, key themes were identified and presented in

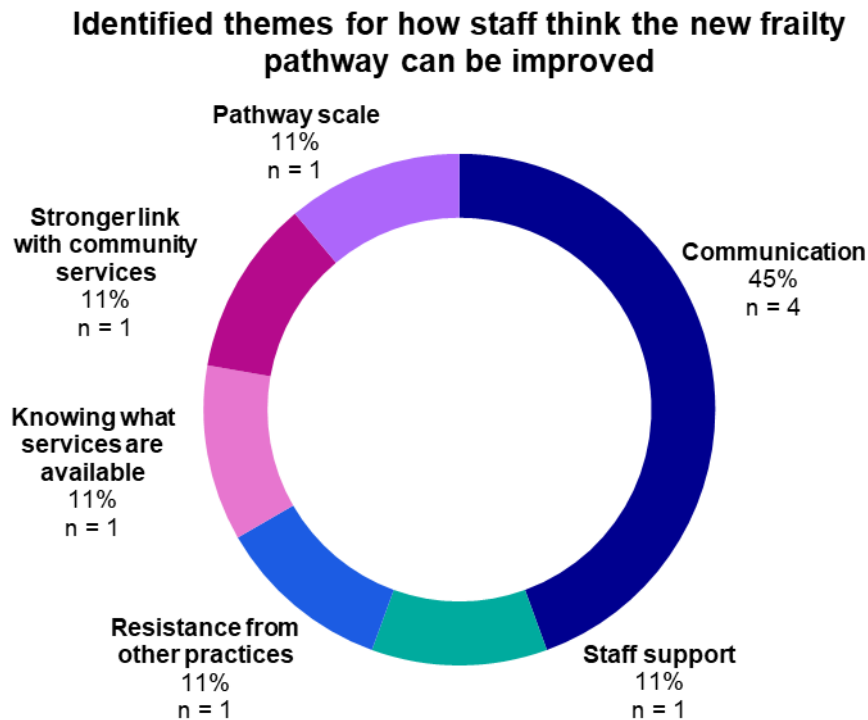


Figure 11: Chart showing identified themes for responses relating to how the pathway could be improved, including the number of responses for each theme. The number of responses assigned to each theme is represented by ‘n’.

with the most common being ‘communication’. Key quotes from some of the responses are presented below to provide further insight.

“I think we need to strengthen the review of their medical problems and link in more strongly with community services”

“some practices are reluctant to work with the frailty team”

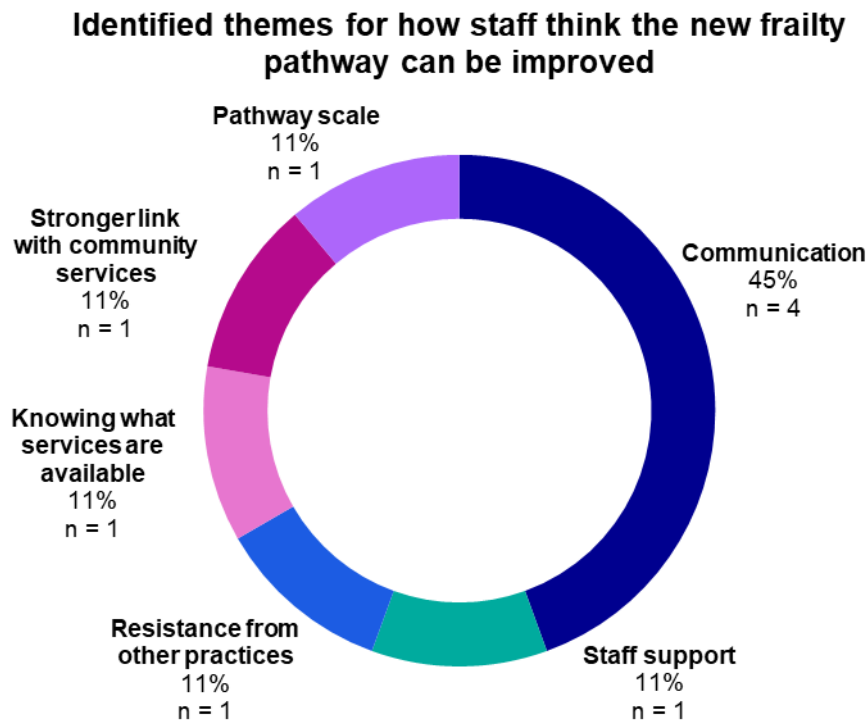


Figure 11: Chart showing identified themes for responses relating to how the pathway could be improved, including the number of responses for each theme. The number of responses assigned to each theme is represented by ‘n’.

Communication was identified as a key theme for 4 out of 9 responses to the question about what could be improved about the pathway, highlighting communication as a key area for improvement. The five other themes were spread across five different responses, as shown in Figure 11. Recommendations provided by the responding staff include defining and explaining roles to the wider primary care team, increasing interaction with local services, and communicating and working together with community teams. Another response also noted that communication needed to be clearer.

The final free-text question asked staff members if they wanted to add further comment. Only four of the 11 respondents added comments, with no consistent theme across all responses. One comment noted that it's "still early stages of the pathway being put into action", and another stating that it is "Questionable whether it is cost effective".

3.2. Quantitative findings

The quantitative data received as part of the evaluation is split between pathway data, obtained directly from the frailty team, GP data obtained as an extract from the EMIS system and hospital data sourced from the ICB's 'shared data set'. A baseline and evaluation period have been defined to compare how healthcare usage has changed for the cohort group during the new pathway pilot.

Further information regarding the source of the data and the method for comparison can be found in the Quantitative data section of the Methodology.

Both the GP and hospital data describing patient contacts with clinical staff have primarily been used as inputs into the health economic model, however, results are presented below to provide insight into the impact of the pathway.

Pathway data

To understand the activity and uptake of the frailty pathway, staff at the Y&F PCN track data on the GP practices EMIS system relating to contacts and actions. Data is collected by all staff working on the pathway and is combined across all GP practices within the PCN, and includes data such as referral volumes, the total number of contacts made and the number of patients rejecting treatment. This data helps understand the acceptability of the new pathway from the perspective of patients, quantifying the uptake of the new service across the PCN.

Data relating to the contacts made by staff are presented in Table 5, while actions by care coordinators are summarised in Table 6.

Table 5: Activity and uptake figures collected by staff for the new frailty pathway.

Contacts	
Letters Sent	208
Contact Made / Visit	149 (71.6%)
Service Refused	14 (6.7%)
Awaiting Response or Service Deferred	45 (21.6%)

Table 6: Actions taken by care coordinators for patients on the new frailty pathway.

Actions	
Referral - Internal	35 (23.5%)
Referral - External	39 (26.2%)
Care Co-Ordinator actions only	75 (50.3%)

The group of patients which have declined the service offered to them by the frailty service is described here as the counterfactual group. This is represented in Table 5 by 'service refused', making up 14 patients or 6.7% of patients sent an invite letter, and does not include those awaiting response or service deferred which is 45 patients or 21.6% of those contacted.

GP data

An extract of GP data was agreed by the PCN and provided to Unity Insights via One Care, the GP federation. This was used to account for the different types of primary care contacts made by patients on the new frailty pathway. These contacts are aggregated across the entire cohort group and are split by either baseline or evaluation period, shown here as 2021 and 2022, respectively. This data is presented in Figure 12, showing how contacts have changed during the evaluation period.

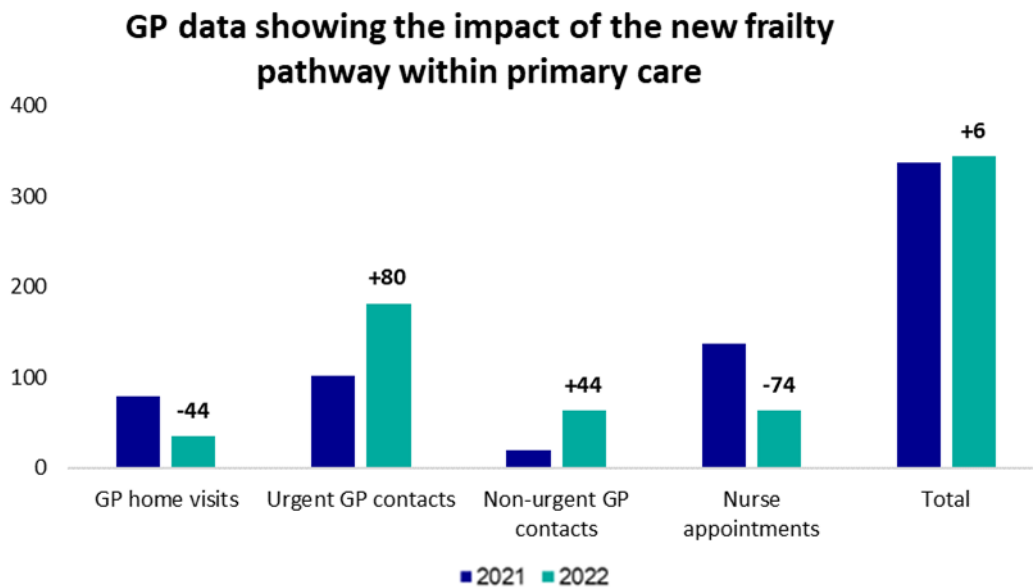


Figure 12: Chart showing the number of contacts made by the cohort of patients enrolled onto the new frailty pathway before and after implementation.

The chart shows that while total contacts have increased slightly, the number of GP home visits and nurse appointments have decreased, however, the number of urgent and non-urgent GP contacts have increased, making it difficult to gauge the cost effectiveness of the pathway without further analysis. Modelling outputs are displayed in Health economics results and results presented in Figure 12 are interpreted in more detail in the Discussion section.

Hospital data

Additional data from secondary care was required to understand the impact of the pathway on public services beyond primary care. Like the GP data, the hospital data was primarily used for the health economic model to assess the cost effectiveness of the pathway, however, it is also presented here for context. Hospital data was obtained from the ICB’s ‘shared data set’ database for the cohort of 100 patients that were able to be matched to the new frailty pathway, looking at how contacts have changed before and after the introduction of the pathway. The data for secondary care contacts is presented in Figure 13, and Figure 14 shows the number of unique patients contributing to those contacts. Data representing the average number of contacts in secondary care for patients enrolled on the pathway before and after implementation is presented in Figure 15. Data showing the number of falls includes both injury and non-injury falls.

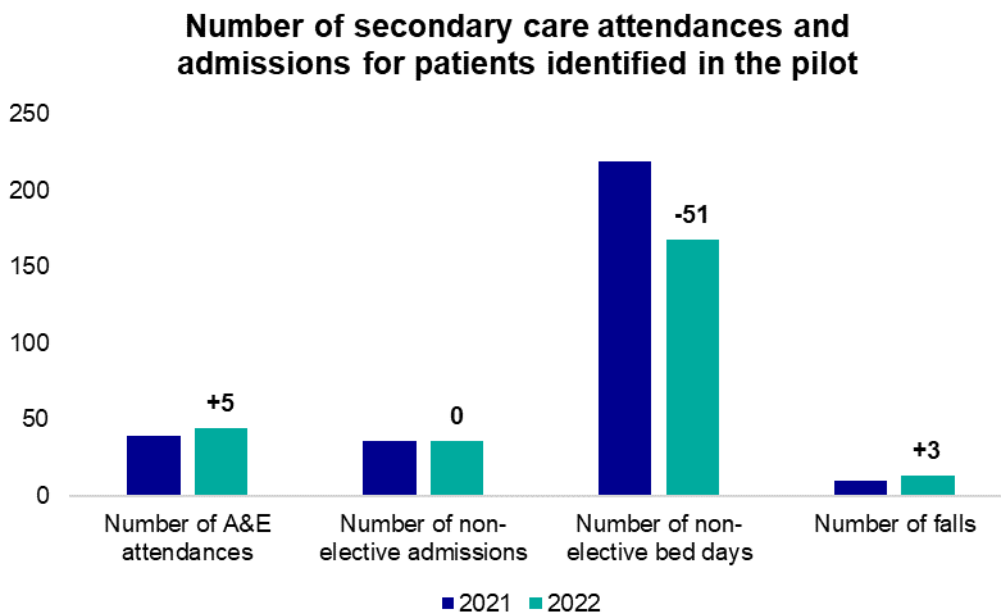


Figure 13: Chart showing the change in secondary care contacts between the baseline period in 2021 to the evaluation period in 2022. Data labels show the change in numbers from 2021 to 2022.

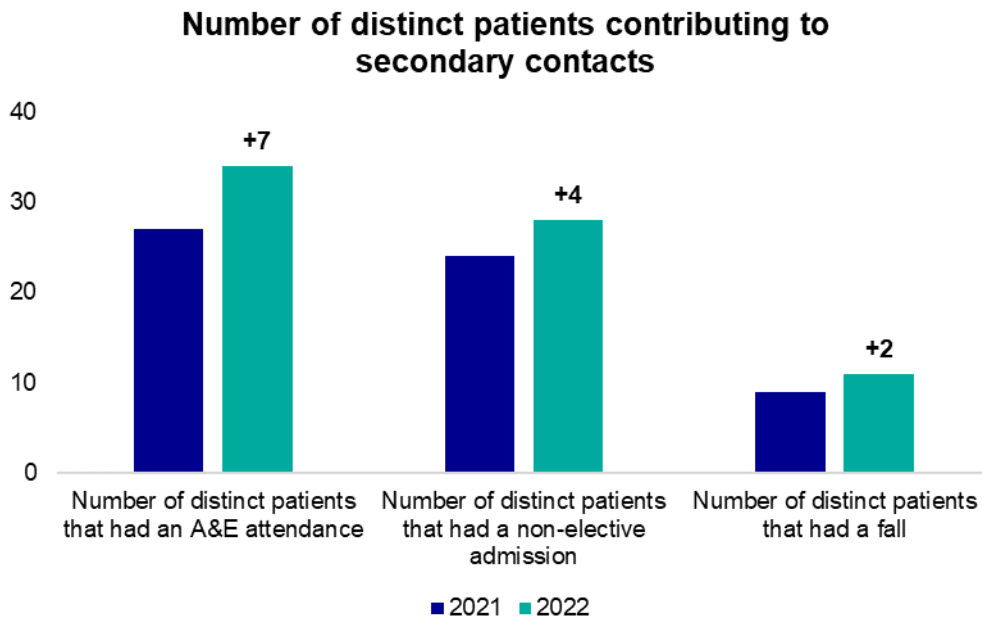


Figure 14: Chart showing the change in number of distinct patients who contributed to secondary care contacts from the baseline period in 2021 to the evaluation period in 2022. Data relating to the number of non-elective bed days was not available and hence is not included.

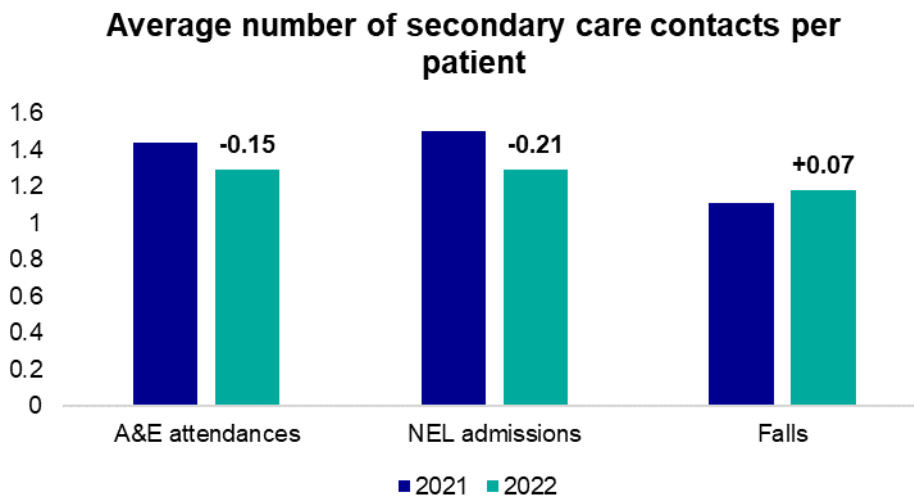


Figure 15: Chart showing the change in the average number of secondary care contacts per patient from the baseline period in 2021 to the evaluation period in 2022.

The outcomes from the health economic modelling informed by the data presented in Figure 13, Figure 14 and Figure 15 are presented in the Health economics results, and further analysis and interpretation of the results can be found in the Discussion section.

3.3. Health economics results

Scenario 1: Actual Impact During Evaluation Period

The results of the health economic analysis are shown in Table 7. Overall, the greatest saving is in the reduction in the non-elective length of stay, while the change in “increasing capacity for GPs” is a dis-benefit.

Table 7: Health economic results for the 6 months of the evaluation period. Impacts have been expressed as a mean impact with respective ranges indicated for the total NPV. Figures in italics represent the potential sensitivity ranges at the 90% CI.

Scenario 1: Actual Impact During Evaluation Period Jun 22 - Nov 22 (£ represented as net present value in 2022 figures)		in-year (2022/23)
Benefits		
1.1 Increasing capacity for GPs (urgent + non-urgent gp contacts)		-£7k
1.2 Reduction in GP home visits		£2k
1.3 Reduction in nurse appointments		£1k
1.4 Reduction in A&E attendances		£1k
1.5 Reduction in non-elective (NEL) admissions		£13k
1.6 Reduction in non-elective length of stay		£18k
Total Benefits		£28k
Costs		
Total Costs		£68k
NPV		
Total NPV		-£40k <i>(-£44k to -£37k)</i>
Total BCR		0.4
*The figures above have been rounded to the nearest whole pound for presentation and as such totals may not sum		

Benefit cost ratio

The benefit cost ratio (BCR) shows the relationship between the relative costs and benefits of a project. If the BCR is greater than 1.0 then the project is expected to deliver a positive NPV. For the 6-month evaluation period this was 0.4, which means £0.40 of benefit was created for every £1 spent which shows that overall, costs outweighed the benefits shown.

Sensitivity results

As discussed in Sensitivity analysis section in the methodology, both the quality and ages of sources lead to uncertainty which can impact its accuracy. By assigning a sensitivity grade to each of the sources used (see Appendix I: Health Economic sensitivity analysis methodology), and running 10,000 simulations, a bell curve of possible value outcomes can be created. Figure 16 indicates that the total NPV could vary between -£44k and -£37k at the 90% confidence interval, with a mean expected impact of -£40k.

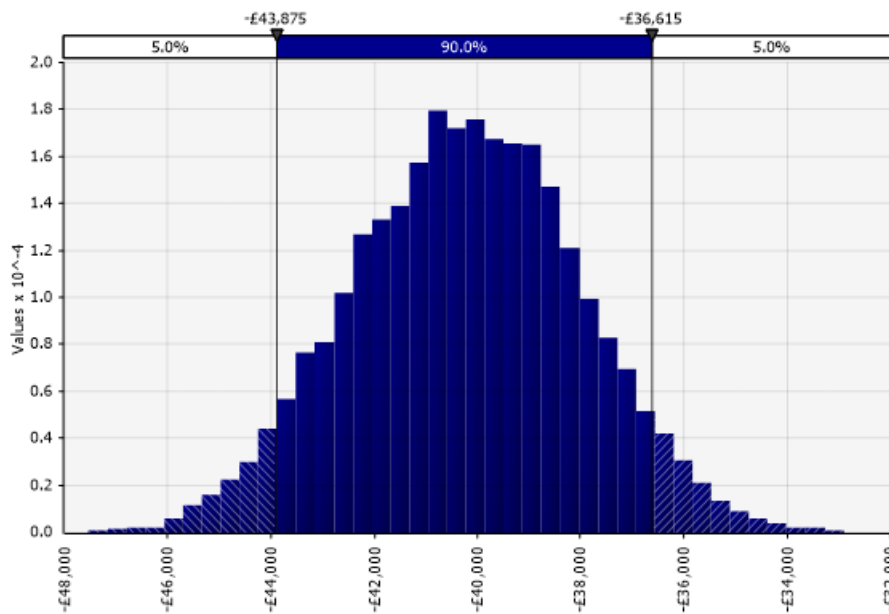


Figure 16: Scenario 1 - Bell curve of in-year value estimate.

Tornado analysis

Having completed the sensitivity, it is also possible to identify which elements create the greatest variability in the output, this is visualised in Figure 17. This can be a useful tool in identifying the key elements which drive the impact of the intervention.

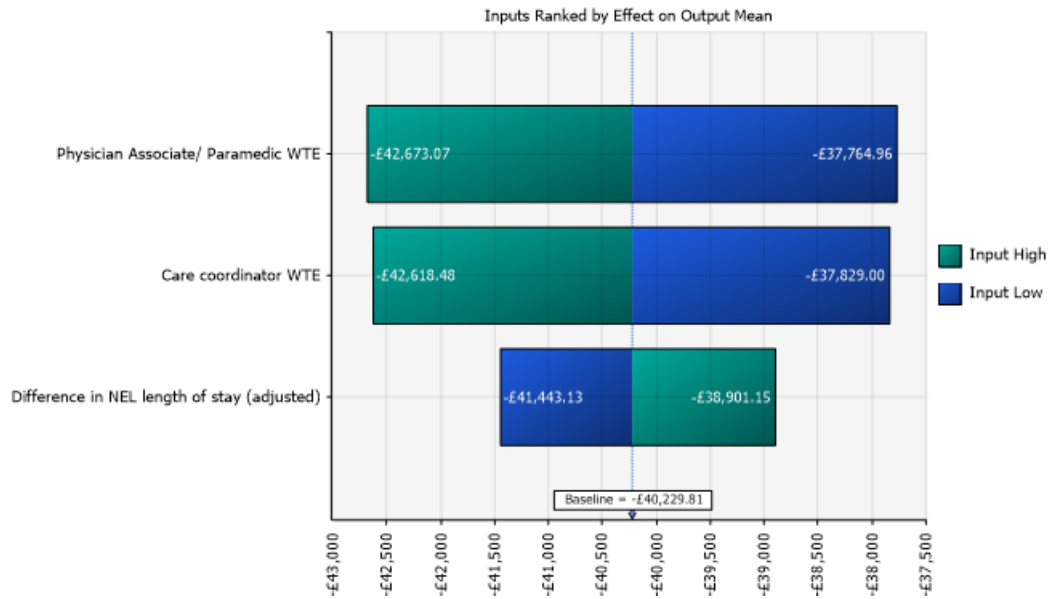


Figure 17: Scenario 1 - Tornado chart showing elements of greatest variability.

Scenario 2: Estimated model impact extrapolated to full year

The results of the health economic analysis are shown in Table 8. As found in scenario 1, the greatest saving is in the reduction in the non-elective length of stay, while the change in “increasing capacity for GPs” is a dis-benefit.

When forecasting an expected benefit, growth rates are applied to known variables to forecast their change over time. This was an ex-ante analysis using data collected during the evaluation period.

Table 8: Health economic results extrapolated to 12 months using the evaluation period data. Impacts have been expressed as a mean impact with respective ranges indicated for the total NPV. Figures in *italics* represent the potential sensitivity ranges at the 90% CI.



Scenario 2: Estimated Model Impact to full year (Jun 22 - May 23) (£ represented as net present value in 2022 figures)	2022/23	2023/24	2024/25	3-year (2022/23 - 2024/25)
Benefits				
2.1 Increasing capacity for GPs (urgent + non-urgent gp contacts)	-£14k	-£13k	-£13k	-£40k
2.2 Reduction in GP home visits	£3k	£3k	£3k	£10k
2.3 Reduction in nurse appointments	£1k	£1k	£1k	£4k
2.4 Reduction in A&E attendances	£2k	£2k	£2k	£7k
2.5 Reduction in non-elective (NEL) admissions	£26k	£25k	£24k	£74k
2.6 Reduction in non-elective length of stay	£37k	£35k	£34k	£106k
Total Benefits	£56k	£54k	£51k	£161k
Costs				
Total Costs	£136k	£132k	£127k	£395k
NPV				
Total NPV	-£80k	-£78k	-£76k	-£234k
	<i>(-£89k to -£71k)</i>	<i>(-£86k to -£69k)</i>	<i>(-£84k to -£68k)</i>	<i>(-£260k to -£208k)</i>
Total BCR	0.4	0.4	0.4	0.4
*The figures above have been rounded to the nearest whole pound for presentation and as such totals may not sum				

Benefit cost ratio

As seen in scenario 1 the BCR shows the relative benefit for every pound spent. Looking over the whole 3-year time span for the annualised 6-month evaluation period this was 0.4. This means £0.40 of benefit was created for every £1 spent which shows that overall, costs outweighed the benefits shown. As a result of scenario 2 being annualised data, the BCR is the same as scenario 1.

Sensitivity results

Figure 18 indicates that the total NPV across the 3 years could vary between -£260k and -£208k at the 90% confidence interval, with a mean expected impact of -£234k.

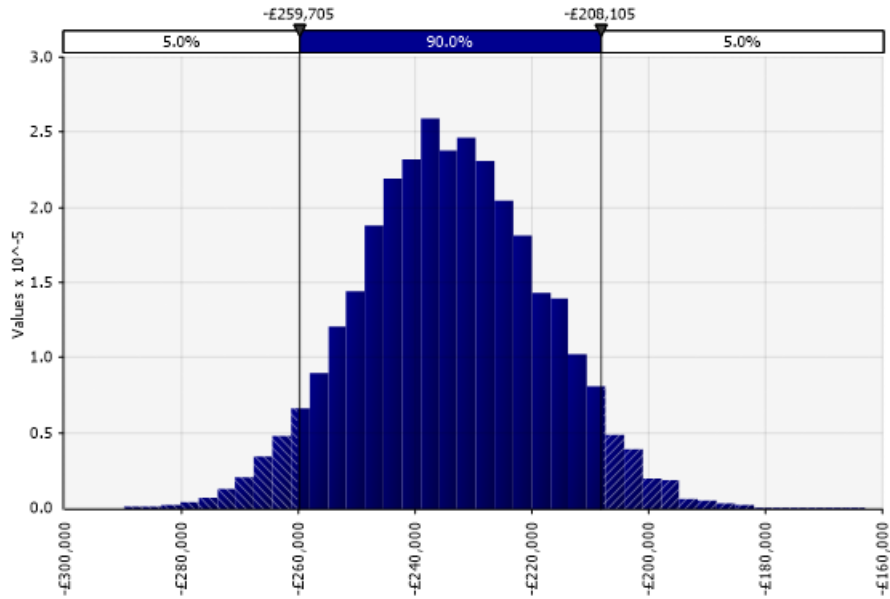


Figure 18: Scenario 2 - Bell curve of 3-year value estimate.

Tornado analysis

Figure 19 shows which elements create the greatest variability in the model.

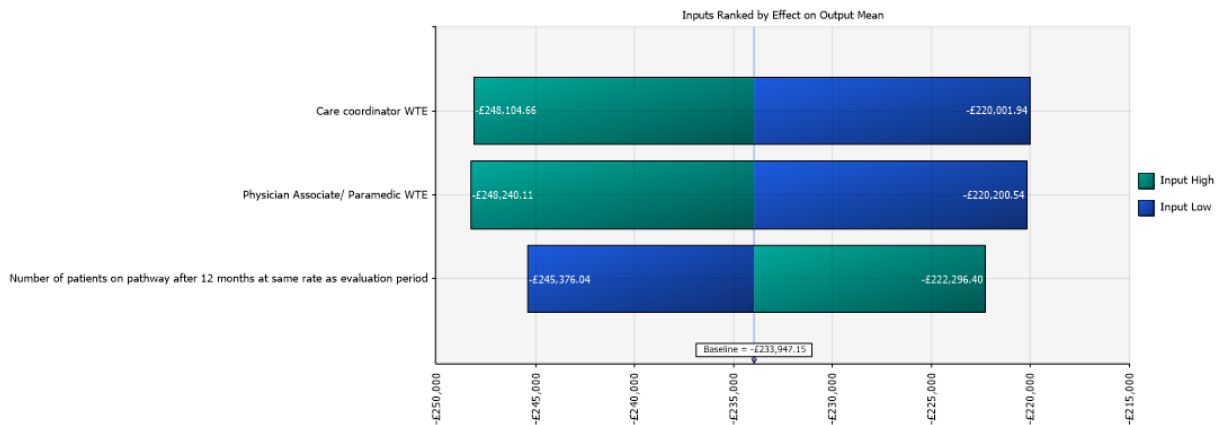


Figure 19: Scenario 2 - Tornado chart showing elements of greatest variability.

Scenario 3: model impact per year for 80% housebound uptake

The results of the health economic analysis are shown in Table 9. As found in scenarios 1 and 2, the greatest saving is in the reduction in the non-elective length of stay, while the change in “increasing capacity for GPs” is a dis-benefit.

Table 9: Health economic results extrapolated to 12 months and modelled based on 80% of housebound patients joining the pathway using the evaluation period data. Impacts have been expressed as a mean impact

with respective ranges indicated for the total NPV. Figures in italics represent the potential sensitivity ranges at the 90% CI.

Scenario 3: Estimated Model Impact from Jun 22 - May 23 for 80% uptake (£ represented as net present value in 2022 figures)	2022/23	2023/24	2024/25	3-year (2022/23 - 2024/25)
Benefits				
3.1 Increasing capacity for GPs (urgent + non-urgent gp contacts)	-£18k	-£18k	-£17k	-£54k
3.2 Reduction in GP home visits	£4k	£4k	£4k	£13k
3.3 Reduction in nurse appointments	£2k	£2k	£2k	£6k
3.4 Reduction in A&E attendances	£3k	£3k	£3k	£9k
3.5 Reduction in non-elective (NEL) admissions	£35k	£33k	£32k	£100k
3.6 Reduction in non-elective length of stay	£50k	£48k	£46k	£144k
Total Benefits	£76k	£73k	£70k	£219k
Costs				
Total Costs	£136k	£132k	£127k	£395k
NPV				
Total NPV	-£60k	-£59k	-£57k	-£177k
	<i>{-£71k to -£49k}</i>	<i>{-£69k to -£48k}</i>	<i>{-£67k to -£47k}</i>	<i>{-£206k to -£145k}</i>
Total BCR	0.6	0.6	0.5	0.6
*The figures above have been rounded to the nearest whole pound for presentation and as such totals may not sum				

Benefit cost ratio

Looking over the entire 3-year time span, the BCR totals 0.6 showing that overall, costs outweighed the benefits shown. Whilst still negative, this scenario is more cost effective than scenarios 1 and 2.

Sensitivity results

Figure 20 indicates that the total NPV could vary between -£206k and -£145k at the 90% confidence interval, with a mean expected impact of -£177k.

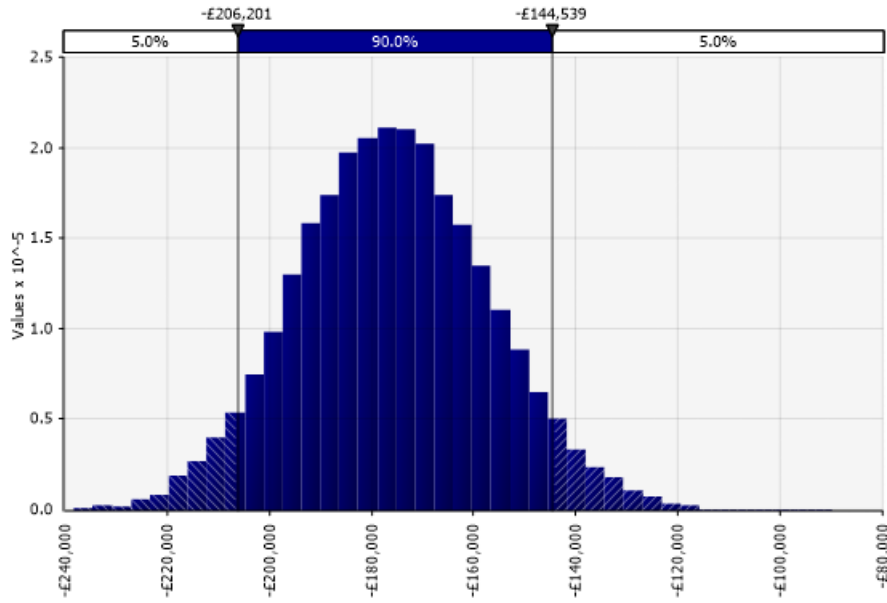


Figure 20: Scenario 3 - Bell curve of 3-year value estimate.

Tornado analysis

Figure 21 shows which elements create the greatest variability in the model.

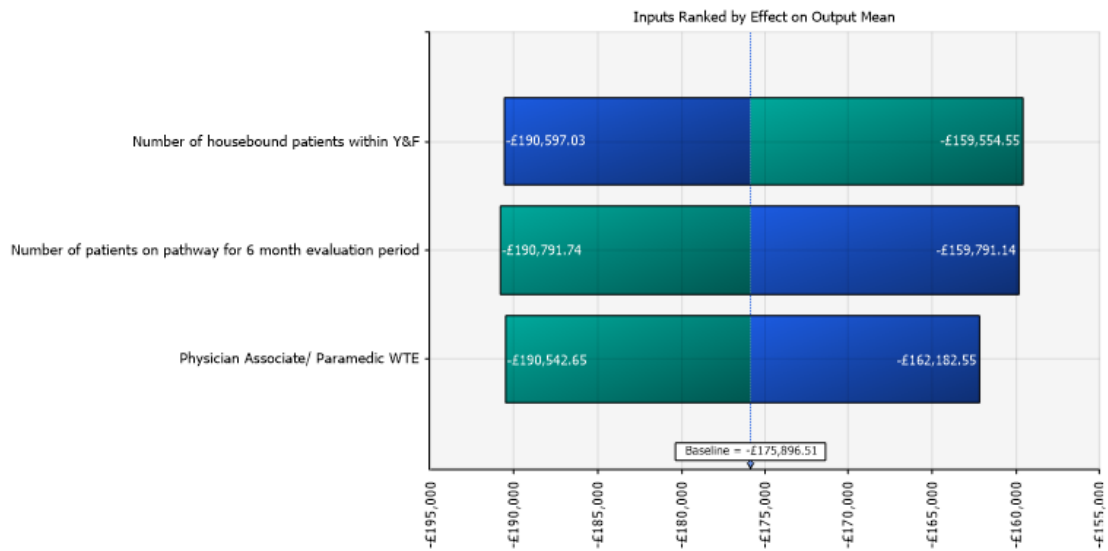


Figure 21: Scenario 3 - Tornado chart showing elements of greatest variability.

Scenario 4: Estimated model impact per year based on 100% of care coordinator capacity

The results of the health economic analysis are shown in Table 10. As found in the three previous scenarios, the greatest saving is in the reduction in the non-elective length of stay, while the change in “increasing capacity for GPs” is a dis-benefit.

Table 10: Health economic results extrapolated to 12 months and modelled based on 100% of available care coordinator capacity using the evaluation period data. Impacts have been expressed as a mean impact with respective ranges indicated for the total NPV. Figures in italics represent the potential sensitivity ranges at the 90% CI.

Scenario 4: Estimated Model Impact from Jun 22 - May 23 for 100% of care coordinator capacity (£ represented as net present value in 2022 figures)	2022/23	2023/24	2024/25	3-year (2022/23 - 2024/25)
Benefits				
4.1 Increasing capacity for GPs (urgent + non-urgent gp contacts)	-£30k	-£29k	-£28k	-£87k
4.2 Reduction in GP home visits	£7k	£7k	£7k	£21k
4.3 Reduction in nurse appointments	£3k	£3k	£3k	£10k
4.4 Reduction in A&E attendances	£5k	£5k	£5k	£15k
4.5 Reduction in non-elective (NEL) admissions	£56k	£54k	£52k	£162k
4.6 Reduction in non-elective length of stay	£81k	£78k	£75k	£233k
Total Benefits	£123k	£118k	£113k	£353k
Costs				
Total Costs	£136k	£132k	£127k	£395k
NPV				
Total NPV	-£14k	-£14k	-£14k	-£42k
	<i>(-£28k to £2k)</i>	<i>(-£28k to £1k)</i>	<i>(-£28k to £0k)</i>	<i>(-£84k to £3k)</i>
Total BCR	0.9	0.9	0.9	0.9
*The figures above have been rounded to the nearest whole pound for presentation and as such totals may not sum				

Benefit cost ratio

Looking over the entire 3-year time span, the BCR totals 0.9 showing that overall, costs outweighed the benefits shown. Whilst still negative, this scenario is the most cost effective of the four scenarios.

Sensitivity results

Figure 22 indicates that the total NPV could vary between -£84k and £3k at the 90% confidence interval, with a mean expected impact of -£42k.

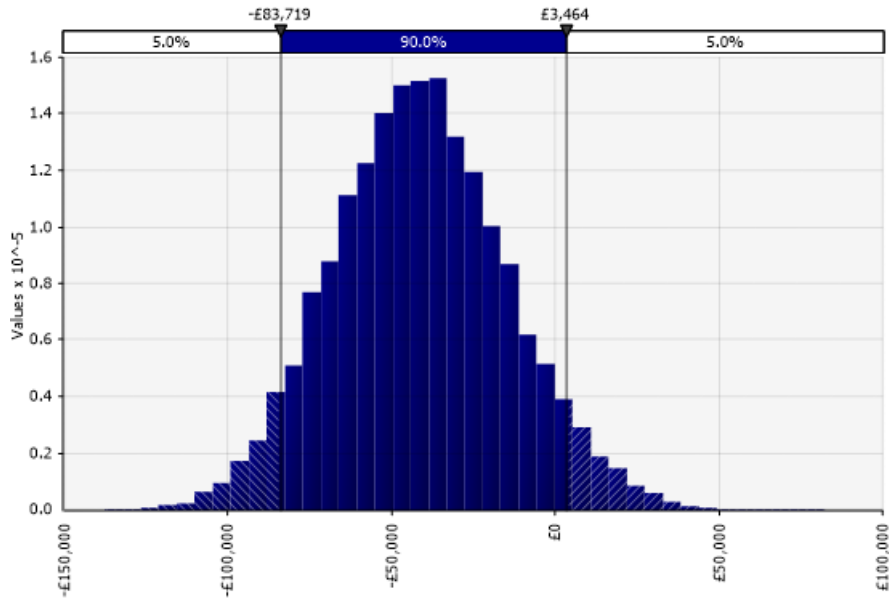


Figure 22: Scenario 4 - Bell curve of 3-year value estimate.

Tornado analysis

Figure 23 shows which elements create the greatest variability in the model.

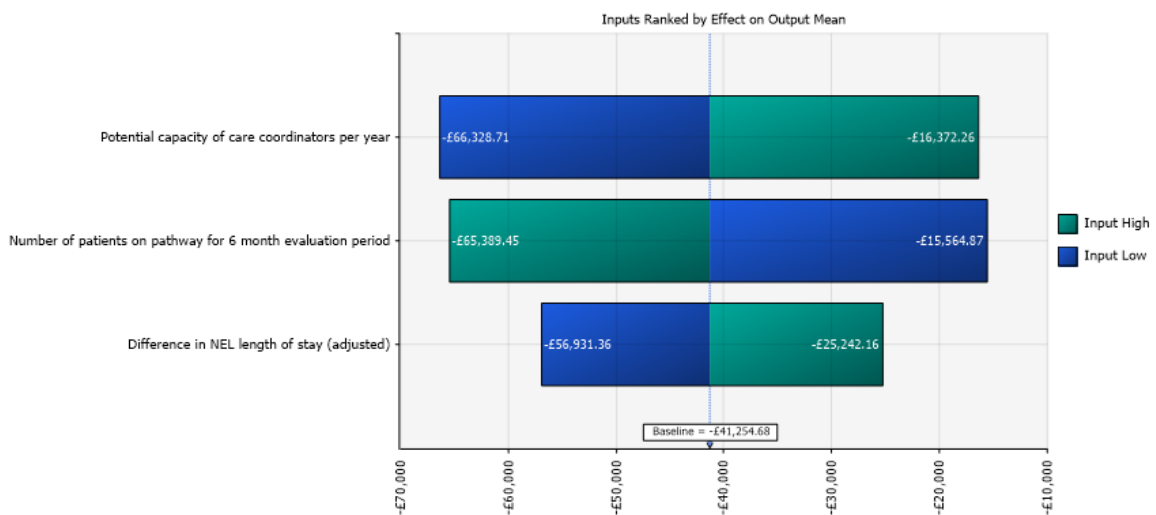


Figure 23: Scenario 4 - Tornado chart showing elements of greatest variability.

Break-even

Table 11 illustrates the potential impacts relating to the current care coordinators being able to see a total of 492 new patients per year.

Table 11: Break-even analysis for care coordinator capacity. Impacts have been expressed as a mean impact with respective ranges indicated for the total net impact (NI) value. Figures in brackets represent the potential sensitivity ranges at the 90% CI.

Scenario 4: Estimated Model Impact from Jun 22 - May 23 for 100% of care coordinator capacity (£ represented as net present value in 2022 figures)	2022/23	2023/24	2024/25	3-year (2022/23 - 2024/25)
Benefits				
4.1 Increasing capacity for GPs (urgent + non-urgent gp contacts)	-£33k	-£32k	-£31k	-£97k
4.2 Reduction in GP home visits	£8k	£8k	£8k	£24k
4.3 Reduction in nurse appointments	£4k	£4k	£3k	£11k
4.4 Reduction in A&E attendances	£6k	£5k	£5k	£16k
4.5 Reduction in non-elective (NEL) admissions	£63k	£60k	£58k	£181k
4.6 Reduction in non-elective length of stay	£90k	£87k	£83k	£260k
Total Benefits	£137k	£132k	£127k	£395k
Costs				
Total Costs	£136k	£132k	£127k	£395k
NPV				
Total NPV	£1k	£0k	-£1k	£0k
Total BCR	1.0	1.0	1.0	1.0
*The figures above have been rounded to the nearest whole pound for presentation and as such totals may not sum				

Figure 24 shows the sensitivity distribution when the variable for the total care coordinator capacity is set to 492 new patients per year.

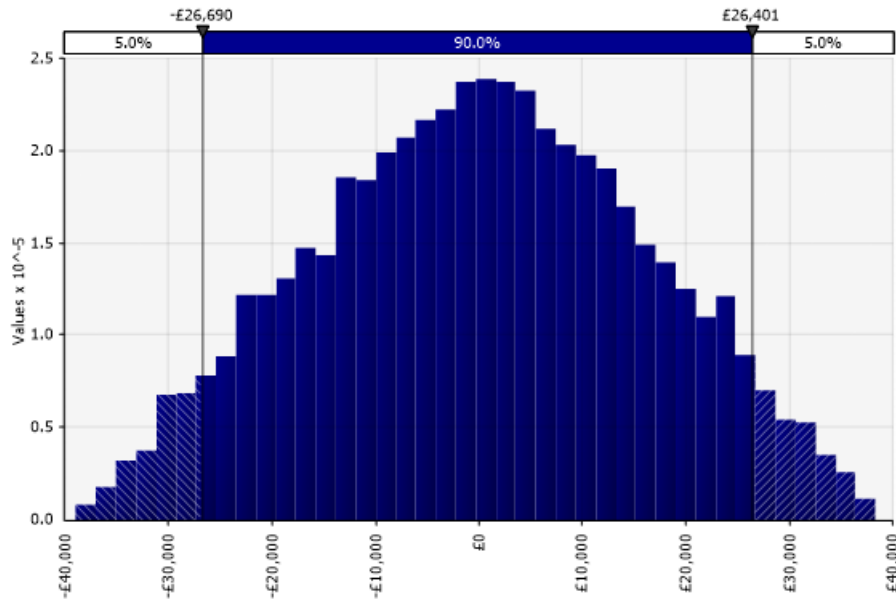


Figure 24: Scenario 4 – Break-even - Bell curve of 3-year value estimate.

4. Discussion

In this section, key findings will be discussed in the context of the evaluation questions defined for the project. Ultimately, the extent to which the frailty service has achieved its goals during the pilot period will inform the assessment its performance. The discussion is broken down by qualitative analysis, quantitative analysis, and health economics, to provide a clear and robust insight into the effectiveness of the pathway based on the evidence provided.

4.1. Qualitative analysis

Access to care and services

As shown in Figure 4, patients were asked to indicate the extent to which they agreed that they have been able to access the support they need to manage their health, to which 12 out of 17 respondents indicated that they agree or strongly agree, with the remaining five indicating they neither agree nor disagree. Additionally, patients were asked to indicate to what extent they agree that they understand what support is available to help them manage their health, resulting in all 16 respondents indicating the agree or strongly agree. The latter question only received 16 rather than 17 responses since it was missed by one of the paper responses.

For the free text responses, when asked what patients think is positive about the pathway, three out of 14 recorded responses highlighted improved access, with one patient providing the following response:

“They care! Which is more than most others! They take time to listen and more than that they do their (well, she does) utmost to get things moving for you (if needed), keep you up to date and follows through!”

Free text responses from the staff survey also indicated that the pathway helps patients access more support, with one response from a care coordinator stating that it *“Gives the elderly and frail an opportunity to have more support and access services they need to carry on being independent and reduce any further hospital admissions.”*

Overall, responses to the multiple-choice question indicates that the patients on the pathway are generally happy with their ability to access care and services. This is further supported by positive comments from patients regarding how the new service has helped them access services.

Although despite an overall positive response, the question around being able to access the support they need had the joint highest number of patients who neither agree nor disagree, totalling five responses, and the joint second lowest number of those who strongly agree, totalling four responses. Hence, while performing well in this area overall, it still appears to be one of the issues impacting patients the most.

Personalised care

One of the key objectives of the pathway was to ensure the care provided followed a personalised approach, by addressing the individual needs of patients. According to the Dahlgren and Whitehead model for the wider determinants of health, a person’s ability to manage their own health is affected by a range of environmental, cultural, and social factors, in addition to ‘constitutional’ factors such as age or genetics (G. Dahlgren, M. Whitehead, 1993). These wider issues can be addressed though developing an understanding of a patient’s individual needs to ultimately help them manage their own health better.

To understand whether the pathway has achieved this, the respondents to the patient survey were asked whether they felt listened to by care coordinators, to which all 17 respondents indicated they agree or strongly agree, with 7 out of 17 selecting strongly agree as a response, as shown in Figure 4. When asked the extent that they agree with a statement relating to whether their care on the frailty pathway feels personalised to them, 14 out of 17 respondents selected agree or strongly agree, with the remaining three respondents neither agreeing nor disagreeing. A similar response was received when asked if the service helps them meet their health needs at the current time, with 14 out of 17 respondents selecting agree or strongly agree. Additionally, all 17 respondents agreed that they felt involved in decisions about how they are cared for on the new pathway.

The personalisation of care delivered was also assessed from the perspective of staff at the PCN through the staff survey, where staff were asked how satisfied they were with the time available to spend with patients, to which six out of eight responses said they were very satisfied. The staff were also asked what extent they agreed with a statement that the frailty pathway enables shared decision making with the patient, to which eight out of nine respondents agreed or strongly agreed.

Free text responses from the staff survey provided further insight into how care was personalised, with the following quote extracted from the free text responses to a question asking what respondents think is positive about the pathway.

“It identifies patients who have high health needs but often do not engage well with primary care services and provides both medical and social support to help improve their health and wellbeing, focusing on what is important to them”

Evidence gathered from the patient and staff surveys suggest that the pathway has been successful in achieving their goal of implementing an approach to care which offers more personalisation and more consideration to the patients' individual needs. This likely stems from the way the pathway is structured around the Measure Yourself Concerns and Wellbeing (MyCaw®) questionnaire, where patients are asked what matters to them, with a longer time being spent with the patient on visits from the care coordinators than it would for traditional care methods.

Isolation

The results from the patient survey presented in Figure 5 and Figure 6 indicate that the majority of patients on the frailty pathway regularly feel isolated, and out of the nine respondents that experienced a feeling of isolation, six of them said that the frailty pathway made them feel less isolated, with the other three said they felt the same as before. Additionally, when asked to give a free text response on what was good about the new frailty pathway, patients commented on how it was *“nice to have someone to come and visit them,”* and that they *“appreciate having someone to talk to”*. This indicates that patients benefit from the social interaction and human side of the pathway and appreciate being listened to.

Results overall indicate that there are many people in the target cohort who do regularly feel isolated, and that results from the patient survey demonstrate that the new frailty pathway is helping people by reducing their feeling of isolation. This impact is likely observed as a result of the new care model enabling care workers to spend more time with patients, getting to know them on a personal level to help support them with their individual needs.

Impact for patients

Given that the primary focus of the care pathway is to provide additional support to vulnerable patients, the impact to patients is ultimately key to demonstrating the effectiveness of the pathway. This was measured across a range of different impacts and benefits as set out in the patient survey, in addition to the perceived impact on patients from the perspective of staff.

The majority of questions asked in the patient survey, including both multiple choice 'agree with' statements and questions on isolation, were designed to demonstrate impact on patients. The 'agree with' questions overall provided a positive response, with variation between how much respondents agreed with different statements. When ordering them in terms of number of 'strongly agree' responses as shown in Figure 4, it appears that the biggest impacts felt by the patients include feeling listened to, the personalisation of their care, and helping them meet their health needs. Comparatively, less impact appears to be experienced for patients understanding what support is available, accessing further support, and helping patients better manage their own health, however, responses for these questions are still mostly positive, meaning the impact is likely still benefitting the patients. Results from the isolation question, as discussed in the Isolation section, also demonstrate a positive impact on the majority of patients who experience a feeling of isolation.

Free text survey responses also provide further evidence that the pathway is having a positive impact on patients, when looking at the disparity between the volume and detail of positive feedback and praise from service users, compared with the lack of negative responses or feedback on how the service could be improved. This shows that the additional care provided to the patients has been well received, suggesting the pathway has been helpful and had a positive impact on the patients in numerous different ways.

Feedback obtained from the staff survey also gives further evidence that the pathway is achieving its goal of having a positive impact on patients. 9 out of 10 responding staff agreed that the frailty pathway helps improve the patients' quality of life, with four strongly agreeing, making it the highest scoring question out of those presented in Figure 9. Additionally, when respondents were asked if they agree that they are making a positive difference to patients on the frailty care pathway, all eight staff members who responded agreed, with two strongly agreeing. The survey also asked if the staff think that the pathway helps reduce the number of falls leading to hospitalisations, and whether the pathway improves continuity of care, to which both questions had 9 out of 10 respondents agree.

“I believe patient's benefit greatly from this holistic approach to patient care”

Results from both the patient and staff surveys demonstrate that the new frailty pathway, overall, impacts patients positively in many different ways. To some extent this can be expected, given that

this level of personalised care did not exist for these patients before. Although qualitative results confirm that the cohort group do need the additional support offered to them, suggesting that the pathway is achieving its goal of addressing a significant unmet need amongst a vulnerable population.

Integrated care

One of the key objectives of the Ageing Well Programme is to improve how services are integrated to reduce barriers and improve access to care, making it one of the key targets of the new frailty pathway.

Patients were asked if they agreed that they understand what support is available to help them manage their health, and whether they have been able to access the support they need. Responses to both questions were overall positive, however, these areas performed less well than others when ranked in order of 'strongly agree' responses.

While not performing as strongly as some of the other elements, claims that the pathway provides an integrated approach to care were reinforced by some of the free text responses, with one patient noting that the staff are *"providing phone numbers for available services"* and another describing the staff as *"Fantastic coordinated professionals"* who come together to *"render the appropriate services to vulnerable patients."* Another respondent also noted that *"This has been very helpful to me, leading me in the right directions."*

Insights from the staff survey also demonstrates how the pathway integrates care to improve access to a wider range of services, with the following quote extracted from the free text responses:

"It identifies patients who have high health needs but often do not engage well with primary care services and provides both medical and social support to help improve their health and wellbeing, focusing on what is important to them"

Meanwhile, when asked about what could be improved, some staff added comment relating to service integration, notably around how local services interact with each other. One respondent commented saying that there should be *"more interaction with local services"* and another noting that they need to *"link in more strongly with community services."* Four out of nine responses also noted that communication needed to improve between services, and that local knowledge of what is available to people needed to be improved. Furthermore, responses to the multiple choice 'agree with' gave the lowest score to a statement relating to how easy it is to build strong relationships across organisations when working on the frailty pathway. For this question, four out of eight respondents agreed, with one disagreeing.

These comments demonstrate that some patients do feel that the pathway is helping to integrate care, but compared to other elements of the pathway, the results suggest there could be some room for improvement. Analysis of the free text responses indicates that improving communication between services is a key driver for this improvement.

Spread

One of the objectives of the evaluation was to understand whether the system in which the pathway operates has the right mechanisms in place to enable wider adoption and spread across other PCNs. To answer this question, insights regarding acceptability from the system's perspective have been drawn from the qualitative elements of the evaluation.

From the staff survey, there were some positive free text responses which provided detail on how the impact on patients supports the case of the wider adoption of the intervention, including one comment noting that "*[they] think this should be implemented in all surgeries as [they] feel it's really effective and empowers the elderly and housebound*". The impact on patients is also demonstrated in other areas of the qualitative study, such as the patient survey, providing a strong argument for the wider spread of the intervention.

On the other hand, some of the comments from the staff survey highlight potential concerns, notably around how the services communicate with each other, presenting barriers which may impact acceptability amongst the wider system. For example, when asked what could be improved about the service, one respondent referenced "*Communication and working together with community teams*" as an area for improvement, adding that there were "*Different levels of input and buy-in from the GP surgeries involved in the project*". Another respondent added that "*some practices are reluctant to work with the frailty team*", highlighting potential issues around how the service is received across the wider system. Another respondent commented that it is "*Questionable whether it is cost effective*", demonstrating another barrier which the pathway may need to overcome to promote further spread.

"I think over all the pathway and service will been seen in time to have had and continue to have a positive outcome for patients its might need tweaking as we move forward as its very new currently"

While the new pathways positive impact on patients provides a strong argument for adoption, insights from the staff survey highlight numerous barriers which the pathway may need to overcome for the system to accept the pathway at scale. Recommendations from the evaluation may help support the improvement of certain aspects of the pathway which could enable the adoption and spread of the service. This may to help provide care for a larger population of vulnerable patients across a wider geographical area.

Patient satisfaction

While most of the multiple-choice questions presented in Figure 4 from the patient survey don't explicitly ask about satisfaction, they do provide an indication of how happy patients are in general with different aspects of the care they receive on the pathway. The results from this group of survey questions indicate broadly a positive response across all aspects of their care, with not a single respondent disagreeing with any of the given statements. Furthermore, when ranked in order of number of 'very satisfied' responses, the joint-highest scoring question is a statement on whether the respondent is satisfied overall with the care they received on the frailty service. Out of 17 respondents, all 17 agreed with the statement, with 7 out of 17 strongly agreeing.

For the free text responses to the patient survey, respondents were asked to comment on what they thought was good about the service, to which 14 patients provided comments, with no patients noting any feedback regarding how the service could be improved. There were a few responses, however, with patients adding comments such as "no feedback for how it can be improved" and "no, I have all the details I asked for", however one respondent did note that it was "too soon to say at this time".

Considering the results from the patient survey, the response is clearly positive with no suggestion that any of the patients are dissatisfied. This is likely because the service is providing additional support for a vulnerable group of patients for whom no similar service was provided before. The new frailty pathway is not replacing an existing care service, so the personalised care patients are provided with appears to be well received and appreciated, as demonstrated by the survey responses. Especially, since the service is not mandatory, so anyone who has enrolled on the pathway feels like they want or need the support offered to them, demonstrating how the service meets unmet need across frail or housebound patients identified by PHM.

Staff satisfaction

As shown in Figure 8, the staff survey included a group of questions specifically asking how satisfied respondents were with different aspects of their role. Results were mostly positive, with responses varying across the different questions. The elements which respondents suggested they were the most satisfied with include the time they have available with patients, for which six out of eight respondents said they were very satisfied, and the standard of care the staff are able to provide, resulting in five out of eight respondents selecting very satisfied.

There were, however, elements where staff satisfaction performed less well, with the amount of training support and guidance available being highlighted as a key area which has some room for improvement. For this question, 5 out of 10 respondents were satisfied, one of which was very satisfied, and three respondents noted they were dissatisfied with this element of their role. The number of dissatisfied respondents is a key figure, given that this was the only of the satisfaction questions which resulted in a dissatisfied response. Additionally, for the 'agree with' questions, the statement whether the staff had been provided with sufficient training ranked second lowest, receiving one disagree response and two which neither agree nor disagree.

Generally, the responses are still very positive across the board, with eight out of nine respondents selecting they are satisfied with their job on the new pathway overall. When comparing performance across all areas, however, the amount of training, support, and guidance is highlighted as a key element which has room for improvement. A variety of training resources have been made available to staff who have been encouraged to utilise these. Therefore as various training has been provided, the respondents to this question may have viewed it from the support and guidance lens. This is a new pathway that has been designed to give the care coordinators the freedom to support the patients as they see fit so this may also be a reason while some may feel there was not enough support and guidance.

4.2. Quantitative analysis

Pathway, GP, and hospital data obtained as part of the evaluation of the new frailty pathway is discussed here and contextualised in terms of the impact that it demonstrates. Data discussed in this section is presented in Quantitative findings.

Access to care and services

The pathway data obtained directly from the frailty team shows the number of contacts made by the service, demonstrating that there are 149 patients who have had visits completed after 208 patients were contacted, with 14 patients (6.7%) refusing the service offered to them. Of the 149 patients, there have been 35 internal referrals, and 39 external referrals to services outside of the PCN such as specialist or secondary care services. Information regarding the type of referrals was not provided.

With the frailty pathway providing a new service to patients who otherwise would not have the same level of care, it is likely that the pathway is improving patients' access to services by addressing a significant unmet need amongst this population of vulnerable patients. These actions, taken by care coordinators on the new pathway, are potentially helping the patients access care at an earlier stage than they might have before the new pathway was implemented. It is reasonable to suggest that without this new pathway, these patients may not have accessed these services and therefore had a lower quality of life.

Impact for patients

Impact on patients is demonstrated from the hospital data by a reduction of 51 non-elective bed days for the cohort group when comparing the same group before and after the new pathway was implemented. Reducing the burden on secondary care services was one of the key objectives of the pathway, which hypothesised that early intervention and promotion of self-management from the additional support provided by care coordinator appointments would reduce demand for hospitals.

While the number of non-elective bed days reduced for the cohort group, the number of A&E attendances and number of falls increased slightly. When looking at the impact on a per patient basis, there were fewer admissions and A&E attendances as displayed in Figure 15.

Impact on capacity

The impact that the new frailty pathway has on the capacity of the system is indicated by the GP and hospital data provided, split across efficiency, effectiveness, and healthcare resource utilisation.

Efficiency

The hypothesis based on the care coordinator model was that the additional support provided would save time for clinical staff and non-clinical staff in primary and secondary care. Results from the GP data show that there is a reduction in GP home visits and nurse appointments, compared with an increase in both urgent and non-urgent GP visits. Given that home visits use significantly more of the GPs time, it is likely this would improve efficiency for primary care clinicians, however, this benefit is offset by an increase in contacts in other areas, making it difficult to conclude the impact on efficiency based on the data available.

Effectiveness

The effectiveness of the pathway in terms of improving capacity is demonstrated by a change in contacts overall across primary and secondary care. Overall, quantitative results indicate that the pathway has been successful in freeing capacity for secondary care services, however, the change in number of primary care contacts varies by contact type, making it difficult to draw a reliable conclusion on the impact on primary care capacity without further modelling.

Healthcare resource utilisation

One focus of the pilot was to understand the resource utilisation of the cohort group on the new frailty pathway compared to people who are not enrolled on the pathway. The comparison presented in this evaluation demonstrates that the overall use of secondary care appears to be lower following the introduction of the pathway, however, it is difficult to determine the impact on primary care given the data provided.

Furthermore, any positive impact on primary and secondary care services in terms of resource utilisation will be offset by the additional cost of the dedicated staff hired to deliver the care provided by the new frailty service. The CBA relating to resource utilisation from the system perspective is incorporated into the health economic modelling activities conducted as part of the evaluation. These results are discussed in the Health economics section.

4.3. Health economics

A key evaluation question to explore is what the economic impact of the new frailty pathway is. Part of this is understanding and determining whether it provides value for money. This supports

decision makers to understand whether there is a valid economic case to roll this pathway out across other PCNs across the whole BNSSG footprint. It is worth noting however that these outputs should be considered along with other aspects such as any assumptions, limitations, and the qualitative findings.

Please note that the benefit and cost streams included in the model were included as data were able to be collected. Data that was not able to be collected or potential benefits that were not included can be found within the limitations section in 5.3 Health economics.

As seen in the results section, all four scenarios that were modelled produced a negative impact on the healthcare system (-£40k, -£234k, -£177k, and -£42k respectively). The benefits with the largest cost savings were from secondary care and were NEL admissions and bed days which is to be expected as they are high value units. Primary care is prevention focussed so it can be expected that secondary and tertiary care will achieve the greatest cost savings as their services are more expensive. Roughly 72% of the NHS commissioning budget is spent on secondary care (Gainsbury, 2016). Primary care prevention initiatives such as observing deterioration sooner and slowing illness progression can reduce the knock-on effect of healthcare utilisation in the entire system.

The staff costs when looking at the full year scenarios (2 – 4) over the 3-year period amounted to £395k per scenario and are based on 2.0 FTE care coordinators and 1.1 FTE physician associates. These are classed as sunk costs, meaning that they are not recoverable. It is important to distinguish that these FTE costs would be the same whether 100 or 500 new are enrolled onto the pathway, meaning the greater number of new patients seen, the more cost effective the pathway would be.

Scenario 4 was the most cost effective over the 3-year period and was based on the perceived maximum care coordinator capacity once relevant reductions had been made (see Model assumptions). This amounted to seeing 440 new patients per year (220 per FTE care coordinator). As this was the most cost-effective scenario, a break-even analysis was conducted (see Break-even analysis). A total NI of £0 and a BCR of 1.0 was derived through setting the capacity of the care coordinators accordingly to break-even. A goal seek (Microsoft, 2023) was conducted to identify the number of new patients that would need to be seen to maintain a cost neutral solution. The break-even analysis suggests that the new frailty pathway can remain cost neutral if 492 new patients were seen per year. Data from the evaluation period showed the care coordinators between them saw on average 1.4 new patients per day when in order to become cost-effective, this must increase to 2.2 Whether this number can be achieved based on the current capacity remains unknown.

The model only looked at the patients that accepted being enrolled on the new pathway and not those that declined or did not respond to efforts to contact them. The declined population could have been used as the comparator or 'counterfactual.' Data were not available for these patients, therefore only those patients who had a frailty pathway flag on their electronic record were included.

Removing physician associate cost

During discussions with the project team it was noted that the role of the physician associate had changed during the evaluation period and involved more day to day GP work. Therefore, the evaluators were requested to re-run scenario 1 excluding the cost of the physician associate. Table 12 shows the results for this amended scenario.

Table 12: Scenario 1 not including the cost of the physician associate

Scenario 1: Actual Impact During Evaluation Period Jun 22 - Nov 22 (£ represented as net present value in 2022 figures)		in-year (2022/23)
Benefits		
1.1 Increasing capacity for GPs (urgent + non-urgent gp contacts)		-£7k
1.2 Reduction in GP home visits		£2k
1.3 Reduction in nurse appointments		£1k
1.4 Reduction in A&E attendances		£1k
1.5 Reduction in non-elective (NEL) admissions		£13k
1.6 Reduction in non-elective length of stay		£18k
Total Benefits		£28k
Costs		
Total Costs		£34k
NPV		
Total NPV		-£6k
Total BCR		0.8
*The figures above have been rounded to the nearest whole pound for presentation and as such totals may not sum		

The results show that the removal of £34k in physician associate salary costs improve the NPV to -£6k and a BCR to 0.8 (from 0.4). If replicated across scenarios 3 and 4 the savings would be an NPV of £22k and £157k respectively with a BCR of 1.1 and 1.8 respectively. This suggests that for every £1 invested in the new pathway, these two scenarios would return a greater saving across the healthcare system.

While this presents a hypothetical scenario, the updated NPV reflects the pathway had it been redesigned so the physician associate costs are not absorbed by the pathway specifically as a lot of the work a physician associate performs is work a GP or senior nurse would do. This provides a



useful estimate of NPV given that the impact of the physician associates is unclear, and not directly tracked against patient contacts.



5. Limitations

5.1. Qualitative analysis

Limitations of the patient survey

Sample size

The patient survey received 17 responses out of 149 patients enrolled on the pathway at the time of evaluation, which meant themes which emerged in the analysis of results may not accurately represent the themes which may have emerged if all patients enrolled on the pathway completed the survey (Andrade, 2020). Potentially due to the small sample size, results did not provide any negative feedback, meaning there was a lack of improvement feedback from the patients to inform the recommendations to the pathway.

Lack of comparator

The absence of a comparator meant it was difficult to identify whether the impacts experienced by the patients were specifically due to changes to their care as a result of the new pathway. It was communicated in the blurb of the survey and in the wording of the questions that responses must only relate to care they received on the pathway; however, this has the potential to be overlooked or misunderstood by patients.

Limitations of the staff survey

Cohort size

Since the dedicated staff on the new pathway included just three care coordinators and one physician associate, the survey was designed to enable responses from a wider cohort of staff by introducing an 'N/A' option allowing staff members to skip questions which were not relevant to them. While this approach yielded more responses and hence, more insights into the pathway, it meant that some responses had more relevance to the evaluation than others, with all responses impacting the overall trends. This was mitigated by adding a description to the survey stating that only staff whose work is significantly focused on the new frailty pathway should respond, however, this may be interpreted differently or potentially overlooked in some cases.

Respondent bias

There may have been some positive bias from the responses given that the staff completing the survey are the ones who are delivering the service and may want the results to reflect positively on the care they provide. The trends from the results, however, followed a similar trend to those of the patient survey and were in fact less positive overall, and almost all staff members provided feedback for how the service could be improved.

Different go-live dates

All of the practices in the Y&F PCN which participated in the new frailty pathway pilot launched the service at different times, as shown in Table 3. Therefore, staff at some practices may have had more knowledge and experience of the pathway than others.

5.2. Quantitative analysis

Patient historical activity

The population of patients on the new pathway had been defined within the data in November 2022, so only those present in the pilot population as of November 2022 are considered. Any individuals no longer registered within Y&F PCN who fit the criteria, or those who are now deceased and may have historically fit the criteria, are not included in the data. Rather, the historical activity of patients in the pilot population as of November 2022 is included, with the possibility that individuals were not considered in the pilot cohort during some of the historical activity.

To add perspective, of the 149 patients that were visited during the evaluation period, just 100 (67%) of these fit the above criteria and were included in the quantitative data shown in the Quantitative findings section, which was used for the health economic modelling. This means that the impact of the pathway for approximately a third of the cohort group is not reflected in the analysis but could be inferred.

Physician associate data

There was no specific data collected for the physician associate activity. Costs were included but not clear from data that were received if they do home visits and if they do, how many. The number of GP appointments doubled when comparing the baseline to the evaluation period which was unexpected. It is possible that physician associate appointments were included in these numbers but not recorded as such but without evidence it is just a theory.

Counterfactual group

Data for the counterfactual group, as defined in the Pathway data section in Quantitative findings, was not available for this evaluation. Even though this is a small sample size and results may or may not be replicated over a larger sample size, ideally these patients would have been flagged in the clinical system and this data made available by One Care and the ICB.

5.3. Health economics

Common limitations of health economic modelling

Identifying and quantifying costs and benefits

CBA requires the identification and subsequent appropriate quantification of all costs and benefits in a scenario. Despite this, a number of benefits were not modelled that may have had an economic impact if they were able to be measured and monetised, and the inability to account for all possible variables. This may have led to inaccurate analysis and could potentially create inaccurate conclusions surrounding the potential impact of the new frailty pathway. The main benefit and cost variables, obtained from literature review and discussions with the Frailty pathway project team are accounted for within the model.

The most prominent examples of these unmodelled benefits included, but were not restricted to:

- Improved quality of life and health status of the frail cohort
- Medicines adherence (including wastage)
- Increased staff effectiveness

Source data

When collating figures, some sources were not as recent as desired. Some figures were also derived from lower quality sources, such as figures based on generic national analysis or from uncorroborated expert judgement as opposed to those from randomised controlled trials. Optimism biases were applied in an attempt to mitigate for this. As stated in the Optimism bias section, the lower the age and quality of the source, the higher the optimism bias. Therefore, benefit streams including low quality or dated sources were accounted for by applying a greater optimism bias to refrain from underestimating costs or overestimating benefits.

Limitations relating specifically to the frailty model

Data assumptions

A number of the model assumptions were provided by Y&F PCN and therefore could not be corroborated by Unity Insights. These attracted large optimism biases that reduced the benefits accordingly.

As mentioned in the Cost streams section, training costs are not included as they were provided free of charge and any ongoing training costs would be on an ad hoc basis and were not agreed at the time of this evaluation.

6. Recommendations

The following recommendations are based on the outputs from the analytical components of the evaluation, including both the staff and patient survey results and the health economic modelling. Additionally, recommendations are informed by learnings, knowledge and understanding of the service in a real-world setting gathered through the evaluation.

Metrics and data collection

Firstly, it is important that a suite of metrics is agreed prior to further implementation so data can be collected that can help quantify and understand the impact of the programme. It is recommended that as additional practices that are onboarded, staff are made aware of what metrics need to be collected during the project.

Furthermore, it is crucial to have mechanisms in place for collecting the data and understand what agreements need to be in place when requesting data from the relevant parties. Involving these colleagues as early as possible in the process, ideally pre-intervention would reduce the risk of delays in accessing data. Without these connections, it would not be possible to show the impact of the pathway across the system.

As mentioned under the Physician associate data heading in the limitation section, as the project data was collected, it was not split out into care coordinator and physician associate visits therefore it was not possible to determine the potential capacity of the physician associates. It is recommended that in future, this data be collected separately so that their involvement and impact on the pathway can be better understood.

Analysis on the type of non-elective admissions that these frail patients had would provide more accurate information on for the cost saving as an average non-elective cost was used in the model. The average cost was £2,507 whereas for example the average non-elective cost nationally for a hip fracture is £4,149 or knee fracture is £3,757 (NHS England, 2021).

Counterfactual group comparison

As discussed in the limitations section under Counterfactual group, an analysis comparing the intervention and counterfactual groups was not possible. In order to compare the patients enrolled on the new pathway against those that declined the service the groups must be identified and flagged on the GP clinical record system. Currently, those patients that accept the new service are assigned a code to their clinical record of 'under care of care programme approach worker' (concept ID – 204311000000104). This code is used in EMIS and may vary for other suppliers such as SystemOne (TPP, 2023) or Vision 3 (Cegedim Healthcare Solutions, 2023). It is recommended that for those patients who decline, a similar code be added to identify them in order for their outcomes to also be extracted and compared with the intervention group.

Care coordinator role

A theme that can be associated with new pathways or interventions is that uptake can be slow at first as staff get used to new ways of working. It is expected that over time patient enrolment and therefore the number of visits the care coordinators are able to make will increase. This has not necessarily been the case and new ways of working may need to be embraced. A barrier anecdotally mentioned was that some patients have a carer to help them get ready in the morning meaning visits may only be able to occur after 10 AM. This could have a significant impact on the ability of the care coordinators to visit three or four patients per day as is envisaged. A discussion with the team regarding what would need to be in place for them to achieve those goals is required and would likely uncover reasons behind the low number of visits per day. It may be that the visit length is reduced from the current 1.5 to 1 hour in order to increase the number of potential visits per day, per care coordinator.

Communication

As noted in the results, this was an area that was highlighted as could be improved. The feedback that was collected could be implemented by setting up meetings or other regular interactions with local services and community teams, ensuring some additional time is dedicated towards improving communication. Additionally, the pathway leads could follow up with staff members to gather further feedback on how communication could be improved. The service may also need to consider how it shares information about the frailty pathway across other services, to build awareness of the pathway and demonstrate its value. Awareness of the pathway and its aims is key to drive buy-in from both internal and external services. As a result of the new pathway, these services have seen an increase in demand that will continue and therefore engaging to understand capacity will be key in spreading the new pathway further.

Surveys and interviews

Although a small sample size, the patient survey showed very encouraging results. It is recommended that this survey be used going forward to capture more patient views over a longer period of time. It is expected that through a larger volume of completed surveys, further insights will be gained especially in relation to how the service could be improved. Regarding staff surveys, these could be re-issued to staff after a certain period of time so a picture can be built up to help drive service improvement and highlight areas that require attention. A separate survey could be created to capture views before and after training to determine the impact and usefulness of the training. Going forward this information could be used to refine the training schedule for new member of the service.

To support the staff survey, semi-structured interviews could be held with the care coordinators and physician associates to further understand the role in practice and unpick the themes that were discovered in the survey analysis.

Additional benefits

Further potential benefits that could be looked at in the future may consist of carbon savings of fewer A&E and hospital attendances, however this would need to be offset with the increased number of home visits performed.

Another benefit could be to look at a potential reduction in medicines wastage due to more compliant patients. (Bezreh, Barton Laws, Taubin, Rifkin, & Wilson, 2012) suggest that 30% to 60% of patients with chronic illnesses do not take their medication as instructed which can lead to adverse effects and may lead to hospitalisation, which for patients that are frail, could have severe consequences. In order to collect this information, a bespoke data collection would be required and would rely on the openness and honesty of patients.

7. Concluding remarks

Overall, the feedback received from staff was positive, however three staff members reported they were dissatisfied with the training, support, and guidance on offer. This result highlights a potential area for improvement, with further exploration required as to whether more frequent and structured training is needed.

Patient feedback was extremely positive, demonstrating the value that the frailty service provides to patients from a personalised care perspective, helping address the service users' individual needs. Additionally, the pathway has shown to be effective in helping to reduce isolation amongst a vulnerable cohort group, amongst other social benefits to the patients.

From the data collection for the evaluation, it is not possible to infer what the impact has been from referring patients to other services. It is clear that communication regarding the purpose of the new pathway needs to be improved which may aid in the buy-in locally.

The pathway is not currently cost-effective based on the data available and assumptions made in the model. If the physician associate cost is removed from the pathway design as shown in Removing physician associate cost section then scenarios 3 and 4 are both cost effective. The role of the physician associate should be explored further to determine the impact on service and the pathway in general.

Considering there are limitations with the health economic analysis, improved information and data surrounding the patients on the new pathway, may increase/ decrease demonstrable benefits through additional costs or benefits becoming monetisable.

The report and the methodology used provides a prudent method of estimating healthcare outcomes and as such, the results of the methodology used to evaluate the new frailty pathway has demonstrated a negative return on investment based on the visit data recorded at the time of the evaluation.



The way this new pathway is designed means that as more new patients are enrolled onto the pathway, more home visits are performed, making the service increasingly cost effective. As mentioned in the break-even results in the Health economics discussion, 492 new patients per year are currently required for the service to break even across the system. In order for this pathway to be spread successfully, it is key to understand the capacity issues that have limited the number of home visits the care coordinators have been able to make.

8. References

- Age UK. (2020). *Understanding frailty*. Retrieved from <https://www.ageuk.org.uk/our-impact/policy-research/frailty-in-older-people/understanding-frailty/>
- Andrade, C. (2020). Sample Size and its Importance in Research. *Indian Journal of Psychological Medicine*, 42(1), 102–103. doi:https://doi.org/10.4103/IJPSYM.IJPSYM_504_19
- Bexley JSNA. (2023). *Frailty and Falls*. Retrieved from <https://bexleyjsna.co.uk/groups-communities/frailty-falls/>
- Bezreh, T., Barton Laws, M., Taubin, T., Rifkin, D. E., & Wilson, I. B. (2012). Challenges to physician-patient communication about medication use: a window into the skeptical patient's world. *National Library of Medicine*, 6:11-8.
- Bhandari, P. (2023, February 10). *Normal Distribution | Examples, Formulas, & Uses*. Retrieved from Scribbr: <https://www.scribbr.co.uk/stats/the-normal-distribution/>
- Cegedim Healthcare Solutions. (2023). *Vision 3*. Retrieved from Cegedim Healthcare: <https://info.cegedim-healthcare.co.uk/vision-clinical-system>
- G. Dahlgren, M. Whitehead. (1993). Tackling inequalities in health: what can we learn from what has been tried? Working paper prepared for the King's Fund International Seminar on Tackling Inequalities in Health, September 1993.
- Gainsbury, S. (2016). *Feeling the crunch: NHS finances to 2020*. Nuffield Trust.
- Greater Manchester Combined Authority [GMCA]. (2022). *Unit cost database v23*.
- HM Treasury. (2022). The green book. Central government guidance on appraisal and evaluation.
- Jones, K., & Burns, A. (2015). *Personal Social Services Research Unit*. Retrieved from Unit Costs of Health and Social Care 2015: <https://www.pssru.ac.uk/pub/uc/uc2015/community-based-health-care-staff.pdf>
- Jones, K., & Burns, A. (2021). *Personal Social Services Research Unit*. Retrieved from Unit Costs of Health and Social Care 2021: <https://www.pssru.ac.uk/project-pages/unit-costs/unit-costs-of-health-and-social-care-2021/>
- Microsoft. (2023). *Use Goal Seek to find the result you want by adjusting an input value*. Retrieved from Microsoft 365 support: <https://support.microsoft.com/en-us/office/use-goal-seek-to-find-the-result-you-want-by-adjusting-an-input-value-320cb99e-f4a4-417f-b1c3-4f369d6e66c7>
- Mott MacDonald. (2002). *Review of Large Public Procurement in the UK*. London: HM Treasury.
- NHS England. (2013). *Frailty – what it means and how to keep well over the winter months*.
- NHS England. (2021). *National Cost Collection for the NHS*. Retrieved from www.england.nhs.uk: <https://www.england.nhs.uk/costing-in-the-nhs/national-cost-collection/>

- NHS England. (2022). *Ageing well and supporting people living with frailty*.
- NHS England. (2022). *Electronic Frailty Index*. Retrieved from <https://www.england.nhs.uk/ourwork/clinical-policy/older-people/frailty/efi/#what-does-the-new-frailty-identification-requirement-in-the-gp-contract-mean-for-general-practice>
- NHS England. (2022). *Identifying frailty*. Retrieved from <https://www.england.nhs.uk/ourwork/clinical-policy/older-people/frailty/frailty-risk-identification/>
- NHS England. (2023). *Frailty resources*. Retrieved from <https://www.england.nhs.uk/ourwork/clinical-policy/older-people/frailty/frailty-resources/#:~:text=Every%20year%20more%20than%20one,%C2%A32.3%20billion%20per%20year>
- NHS England and NHS Improvement. (2021). *Ageing Well Programme*. Retrieved from West Cheshire CCG: https://staff.westcheshireccg.nhs.uk/document_uploads/MISC/4_3%20Ageing%20Well%20prog%20APP%20LINKED%20DOC.pdf
- NHS England. (2019). *NHS Long Term Plan*.
- One Care. (2023). *Enabling general practice to survive and thrive*. Retrieved from Onecare: <https://onecare.org.uk/>
- Public Health England. (2018). *Research and Analysis Chapter 6: wider determinants of health*. Retrieved from <https://www.gov.uk/government/publications/health-profile-for-england-2018/chapter-6-wider-determinants-of-health>
- Rockwood & Theou. (2020). Using the Clinical Frailty Scale in Allocating Scarce Health Care Resources. Retrieved from <https://cgjonline.ca/index.php/cgj/article/view/463/577>
- The economy forecast; Inflation Q1. (2022). *Office for Budget Responsibility*. Retrieved from <https://obr.uk/forecasts-in-depth/the-economy-forecast/inflation/>
- TPP. (2023). *Systemone*. Retrieved from tpp-uk.com: <https://tpp-uk.com/products/>
- Turney, S. (2023, January 18). *Poisson Distributions | Definition, Formula & Examples*. Retrieved from Scribbr: <https://www.scribbr.co.uk/stats/poisson-distribution-meaning/#:~:text=A%20Poisson%20distribution%20is%20a,the%20mean%20number%20of%20events.>

Appendices

Appendix A: Frailty medical deficits

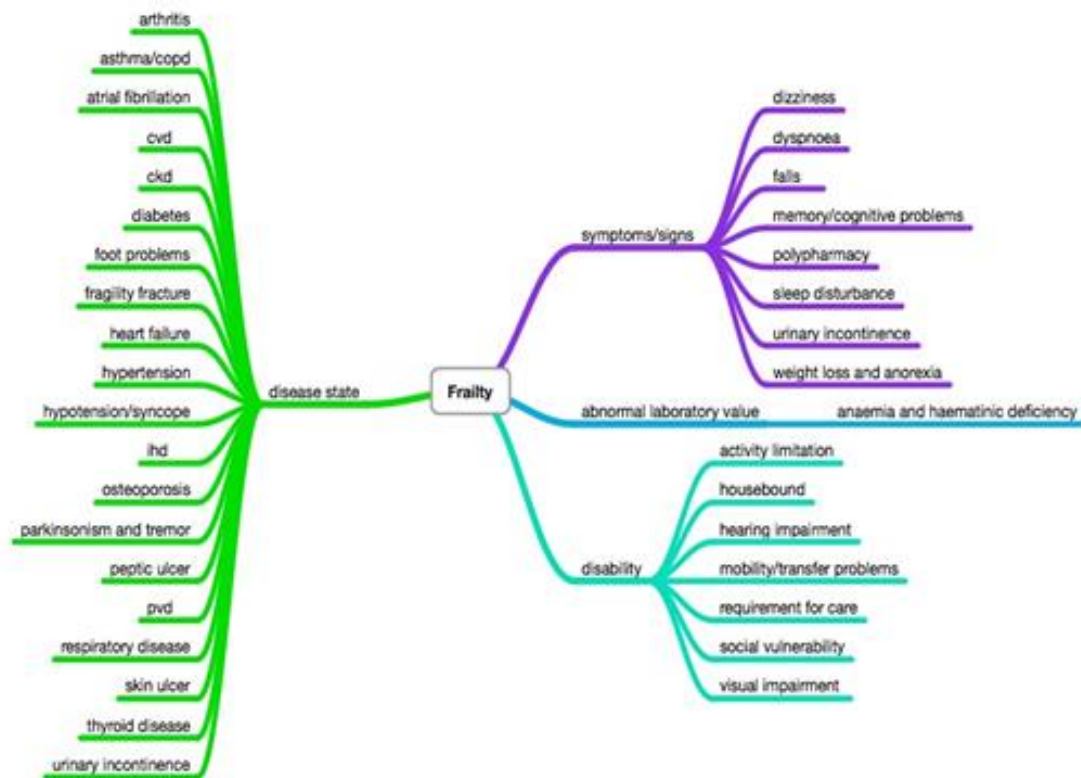


Figure 25: Graphic showing the different medical deficits contributing towards an individual's eFI scoring (Bexley JSNA, 2023).



Appendix B: Patient identification and prioritisation

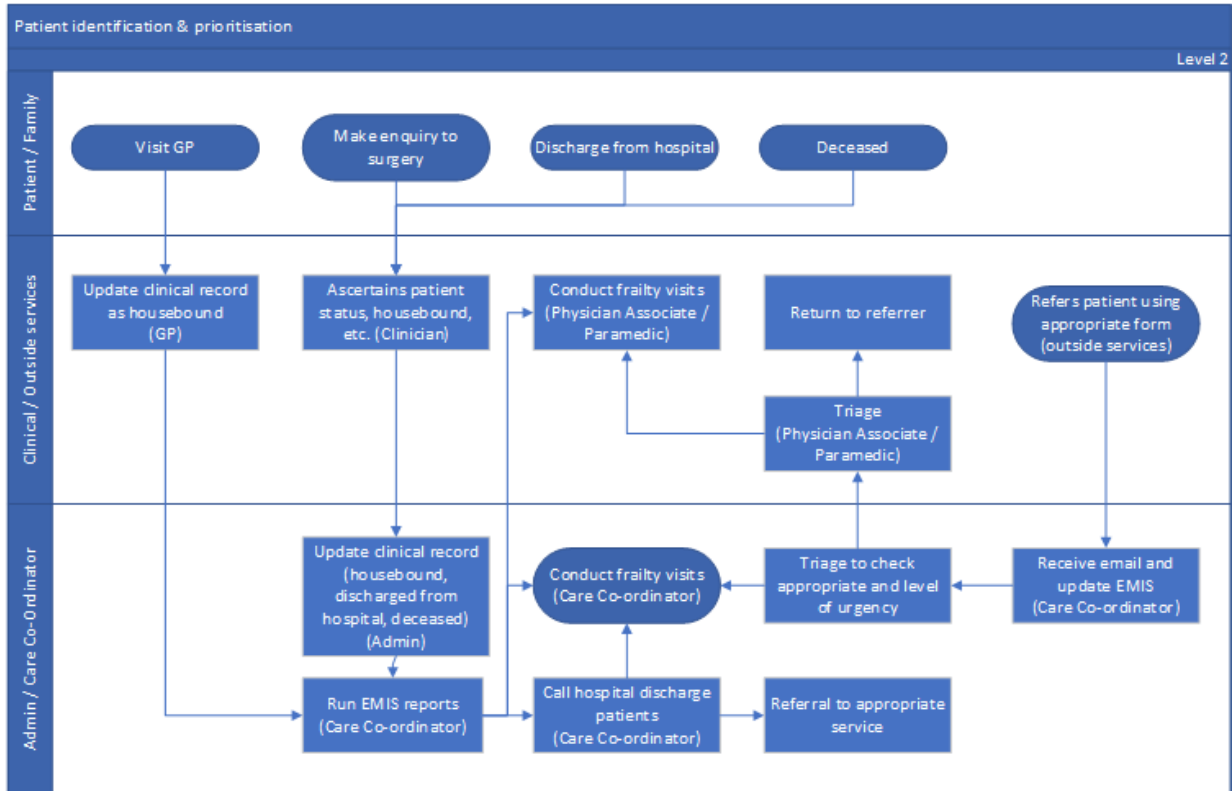


Figure 26: Patient identification and prioritisation flow chart diagram provided by Y&F PCN.



Appendix C: Frailty visit

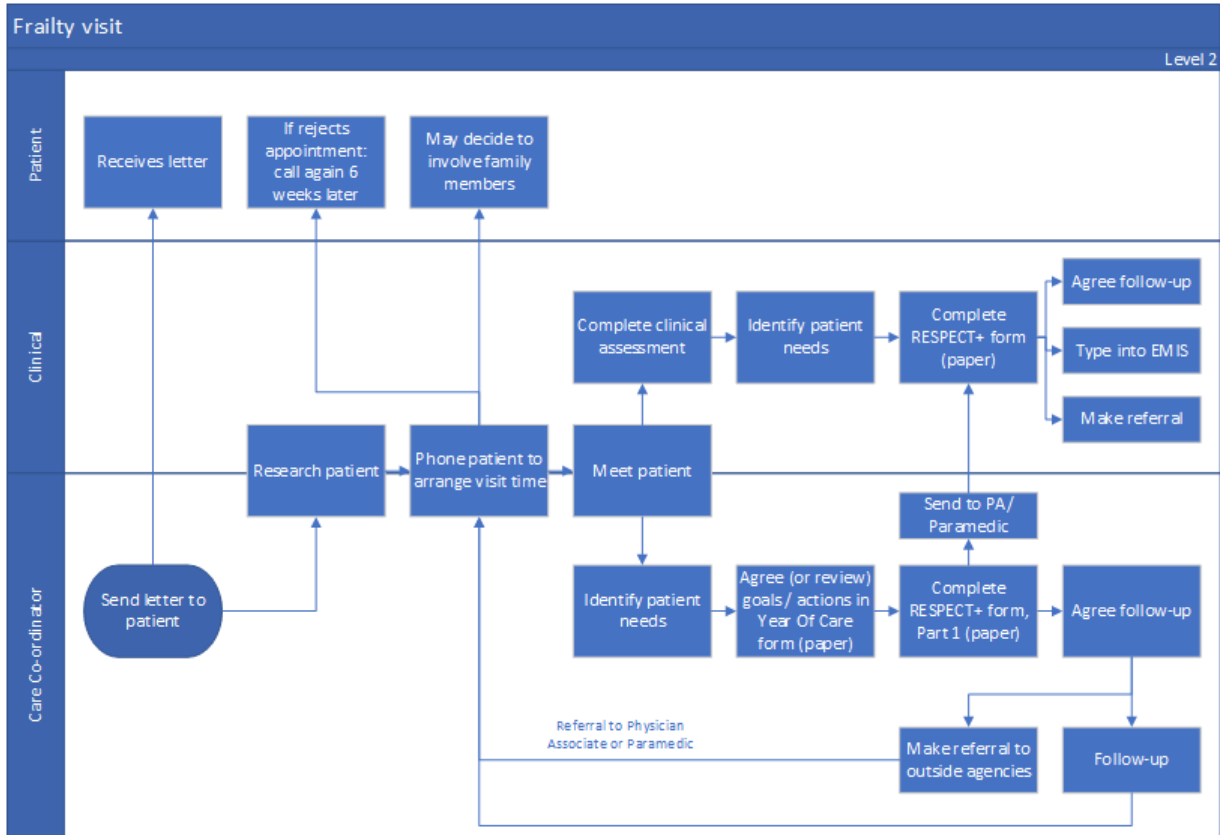


Figure 27: Frailty visit flow chart diagram provided by Y&F PCN.



Appendix D: Logic model

Problem/Opportunity: Historically there are 3 triggers for contacting housebound patients, 1 - if there is something wrong/ they are unwell, 2 - to meet QoF targets/ annual health checks, 3 - if a patient has been in hospital and the GP receives the discharge letter. This reactive care means it is harder to prevent deterioration or for them to access different services available to them to maintain their health and manage their conditions. There is an opportunity to implement a proactive model of care focusing on early intervention and empowering patients.

Goals: To design and successfully pilot a new shared care plan, focusing a holistic approach, anticipatory care and shared decision-making (SDM) in the Yate & Frampton PCN. To prepare for the rollout of the shared care plan across the Bristol, North Somerset, and South Gloucestershire (BNSSG) area. To change the conversation from "what is wrong with you?" to "what matters to you?"

Assumptions

- Less patient deterioration fewer hospital admissions
- By patients receiving more appropriate support there is more effective and efficient use of resources
- Patient experience improves with increased motivation
- Patients having choice improves their satisfaction

Resources

- Ageing well funding
- Care coordinator roles
- EMIS template for patient questionnaire
- Staff trained in personalised care
- Training needs analysis
- Engagement with key services (primary, community, social service)
- Time from the PCN staff: PCN admins, nurses, GPs involved in learning sessions etc, MDTs/ outside services
- Transport costs and additional resources provided to care coordinators for home visits

	Activities	Outcomes	Impact / benefits
Short-term	<ul style="list-style-type: none"> • Engagement with hard to reach cohort: housebound patients (to be extended to a further cohort of frail patients who are at risk of becoming housebound) • Creation of the job description for the care coordinators • Engagement with GP practices • Patient identification • Facilitating shared decision making with patients • Liaising with family members and including them in the shared decision making process (where appropriate) • Making patients aware of and initial discussion about the ReSPECT form or yearly renewal • Documenting patient needs • Presenting to patients the services available 	<ul style="list-style-type: none"> • Care coordinators able to raise concerns earlier to the MDT/ outside services • Improved patient activation (knowledge, confidence and skills) • Improved patients' awareness of the services available to them (through guidance and signposting to community services, social services, tertiary sector initiatives) • Improved process to identify patients requiring support • Freedom to act for care coordinators, able to dedicate time to patients' visits and support 	<ul style="list-style-type: none"> • Improved patient quality of care • Patients better referred to the appropriate service in a timely matter
Medium term	<ul style="list-style-type: none"> • Standardising processes • Reduced patient GP contact due to care coordinators identifying possible issues earlier • Onward referrals to other services • Liaising with MDTs/ outside services to facilitate discussions to ensure the patients needs are being met • Engage with the nCHIP project to help develop the new care pathways 	<ul style="list-style-type: none"> • Reduction in patients isolation • Increased percentage of patients reporting that they feel listened to, that their voice is heard • Reduction in A&E attendances and admissions • Reduction in falls • Reduction in requests for urgent GP visits and out of hours GP care • Improve patient's self-management of their health • Releasing time/capacity for GP practices staff (GP, admin staff) • Enhanced knowledge, skills and job satisfaction across PCN team 	<ul style="list-style-type: none"> • Reduction in the patients' risk of deterioration • Improved care plan for the patients (anticipatory and following patients' wishes) • Improvement in the workforce satisfaction • Reducing inequality
Long-term	<ul style="list-style-type: none"> • Delivery of the pilot and across the Bristol, North Somerset, and South Gloucestershire (BNSSG) area • Working with voluntary sector 	<ul style="list-style-type: none"> • Increase in the provision of personalised care • Build stronger clinical relationships across organisations • Building a personal relationship with patients via regular interactions and continuity of contact • Staff and patients satisfaction about the pilot • Make recommendations to the PCN on the provision of the social prescribing services 	<ul style="list-style-type: none"> • Enabling the delivery of integrated care and cross organisational work by linking services • Effectively managed clinical network • Demonstrating that the ReSPECT and care coordinator care plans are successful and sustainable • Delivery of anticipatory care rather than reactive care

Figure 28: Logic model as initially defined during the session in April 2022.

Appendix E: Order of prioritisation

Table 13: Table describing the 10 categories of frail patients considered relevant to the new pathway, in order of priority.

Priority number	Category description
1	Housebound AND "living alone" (Housebound is the only report used in Phase 1 of the Frailty Project)
2	Housebound but "not living alone"
3	Severely frail and 5 or more A&E attendances within the last 12 months
4	Severely frail and 2 or more emergency admissions within the last 12 months
5	Severely frail and 3 or more home visits from GP in the last 6 months
6	Severely frail and living alone
7	Moderately frail and 5 or more A&E attendances within the last 12 months
8	Moderately frail and 2 or more emergency admissions within the last 12 months
9	Moderately frail and 3 or more home visits from GP in the last 6 months
10	Moderately frail and living alone

Appendix F: Health Economic benefit stream calculations

Benefit stream 1: Increasing capacity for GPs (urgent + non-urgent GP contacts)

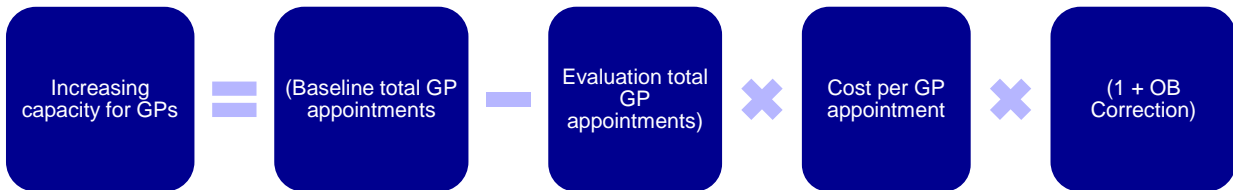


Figure 29: Increasing capacity for GPs.

Benefit stream 2: Reduction in GP home visits

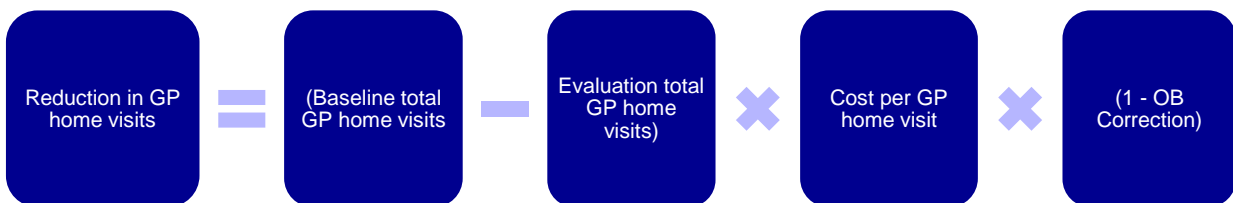


Figure 30: Reduction in GP home visits.

Benefit stream 3: Reduction in practice nurse appointments



Figure 31: Reduction in practice nurse appointments.

Benefit stream 4: Reduction in A&E attendances



Figure 32: Reduction in A&E attendances.

Benefit stream 5: Reduction in non-elective (NEL) admissions

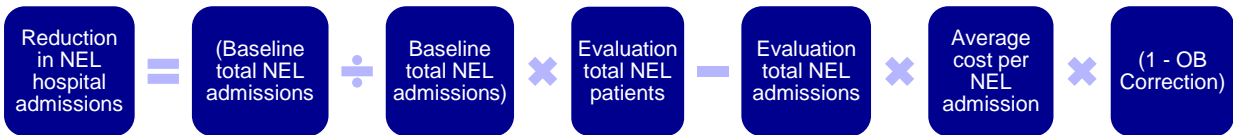


Figure 33: Reduction in non-elective (NEL) admissions.

Benefit stream 6: Reduction in non-elective (NEL) length of stay

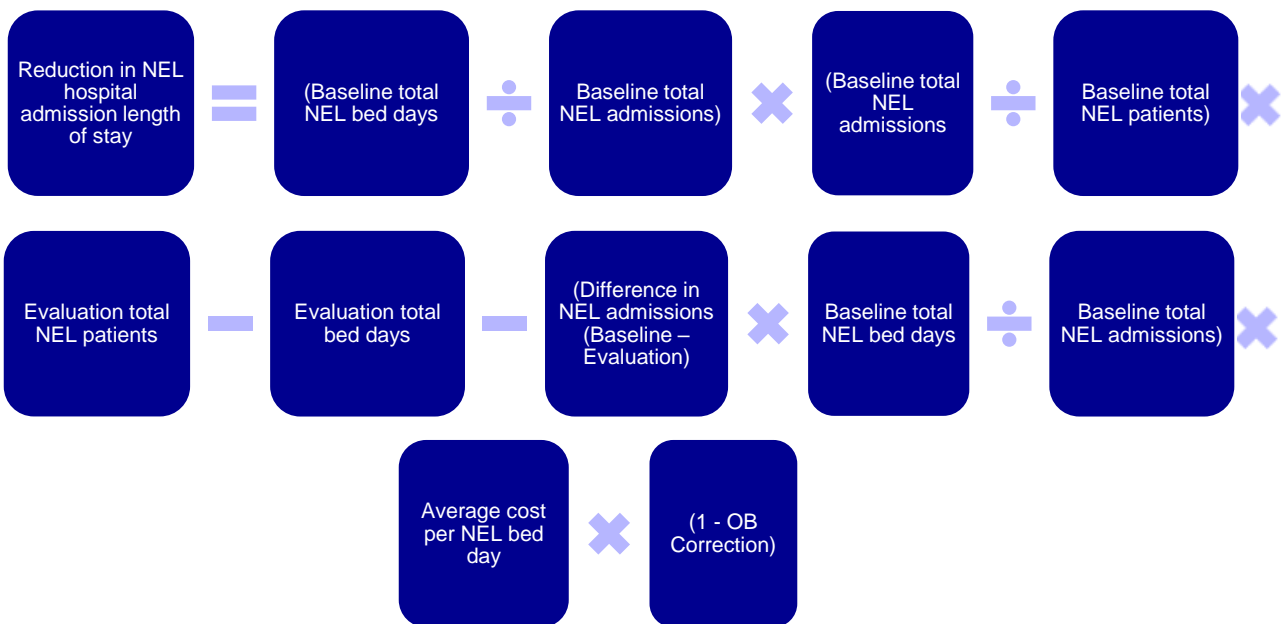


Figure 34: Reduction in non-elective (NEL) length of stay.

Appendix G: Health Economic cost stream calculations

Cost stream 1: Cost of care coordinators

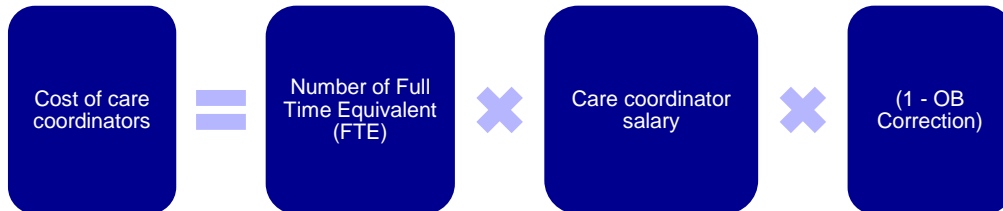


Figure 35: Cost of care coordinators.

Cost stream 2: Cost of physician associates

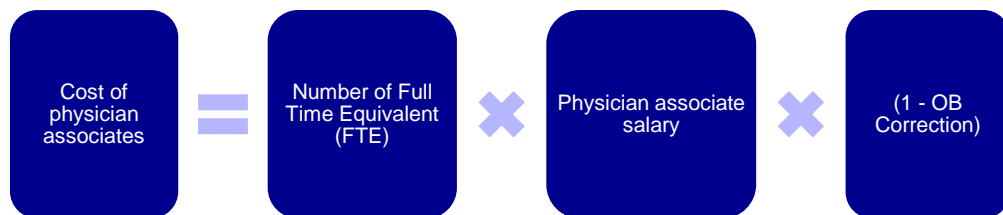


Figure 36: Cost of physician associates.

Appendix H: Health Economic optimism bias application

Table 14: Unity Insights' optimism bias confidence grades.

Confidence grade		Data Source											
		Formal service delivery contract costs		Practitioner monitored costs		Costs developed from ready reckoners		Costs from similar interventions elsewhere		Cost from uncorroborated expert judgement			
		Figures derived from local stats / RCT trials		Figures based on national analysis in similar areas		Figures based on generic national analysis		Figures based on international analysis					
		1		2		3		4		5			
Age of Data	< 2 Years	1	1.1	0%	2.1	10%	3.1	15%	4.1	25%	5.1	40%	
	2 - 3 Years	2	1.2	5%	2.2	10%	3.2	15%	4.2	25%	5.2	45%	
	3 - 5 Years	3	1.3	10%	2.3	15%	3.3	20%	4.3	30%	5.3	50%	
	5 - 10 Years	4	1.4	15%	2.4	25%	3.4	30%	4.4	40%	5.4	55%	
	> 10 Years	5	1.5	25%	2.5	30%	3.5	40%	4.5	50%	5.5	60%	

Appendix I: Health Economic sensitivity analysis methodology

Step one: allocation of ranges

Variables of interest are given base-case values (or mean estimates), and an expected range. The range given to each assumption is dependent on the confidence grading applied seen in Table 15.

Table 15: Unity Insights' sensitivity confidence grades.

		Data Source											
		Confidence grade		Formal service delivery contract costs		Practitioner monitored costs		Costs developed from ready reckoners		Costs from similar interventions elsewhere		Cost from uncorroborated expert judgement	
				Figures derived from local stats / RCT trials		Figures based on national analysis in similar areas		Figures based on generic national analysis		Figures based on international analysis			
		1		2		3		4		5			
Age of Data	< 2 Years	1	1.1	10%	2.1	10%	3.1	15%	4.1	20%	5.1	25%	
	2 - 3 Years	2	1.2	10%	2.2	15%	3.2	20%	4.2	25%	5.2	25%	
	3 - 5 Years	3	1.3	15%	2.3	20%	3.3	25%	4.3	25%	5.3	30%	
	5 - 10 Years	4	1.4	20%	2.4	25%	3.4	25%	4.4	30%	5.4	35%	
	> 10 Years	5	1.5	25%	2.5	25%	3.5	30%	4.5	35%	5.5	40%	

The example in Table 16 demonstrates the quality-of-life adjustment factor and life expectancy.

Table 16: Example of sensitivity range allocation

Variable	Sensitivity grading	Range applied	Lower range estimate	Base-case / mean estimate	Upper range estimate
Difference in GP home visits	1.1	+/- 25%	40	44	48
GP home visit cost	5.1	+/- 10%	£56.25	£75.00	£93.75

Step two: allocation of ranges

All data has a shape to its distribution. If there is equal likelihood of any value within a range being drawn, then a rectangular distribution can be used (so called because a graph of the probability of any specific value being drawn would appear to be a rectangle). If there is a lower likelihood of a value at the extreme ends of the range being drawn, then a triangular distribution could be used.

If there is reason to believe the distribution meets the statistical qualities required to be defined as normal (Bhandari, 2023), Poisson (Turney, 2023), etc, then these can be applied. In this study, we have generally applied triangular distributions as this best reflects the ranges used and diminishing probabilities of more extreme ends.

Step three: allocation of ranges

The model selects at random a value for each variable from within the range between the upper and lower estimate and calculates the outcome from each draw, considering the distribution shape selected and therefore the probability of any value being drawn.

Step four: allocation of ranges

Five draws are given in Table 17, using a rectangular distribution. These deliver estimates lying between £2,511.25 and £3,702.80. The draw is repeated thousands of times. In this evaluation we use 10,000 runs as standard.

Table 17: Example of random variation within Monte Carlo simulation.

Variable	Draw 1	Draw 2	Draw 3	Draw 4	Draw 5
Difference in GP home visits	40	42	48	41	42
GP home visit cost	£92.57	£83.99	£57.59	£61.25	£78.89
Benefit (Difference in GP home visits x cost of GP home visits)	£3,702.80	£3,527.58	£2,764.32	£2,511.25	£3,313.38

Creating 10,000 estimates allows the creation of a distribution of possible outcomes from the draws made. From this distribution we can then compute the range within which we expect 90% of the observations from the draws to fall. This is called the 90% confidence interval, illustrated in Figure 37.

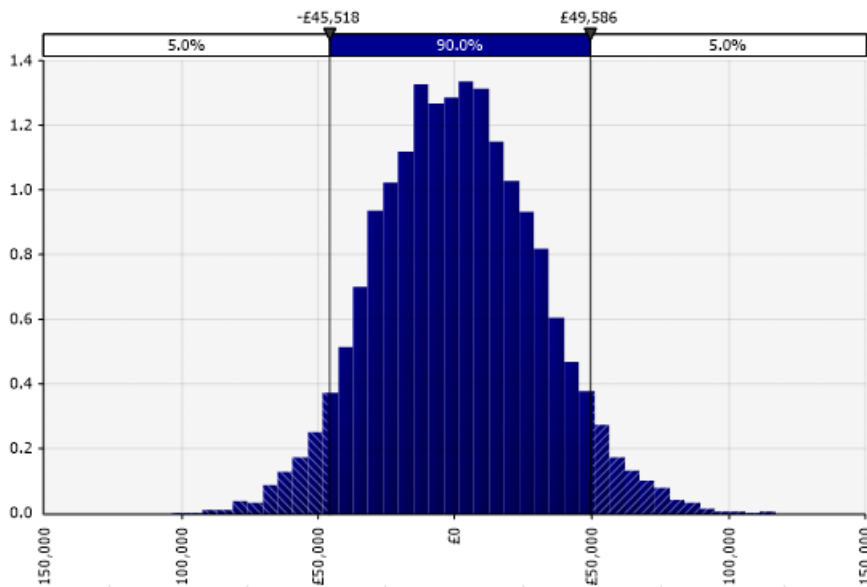


Figure 37: Illustration of a sensitivity analysis.

The source for many of the data inputs in the model may also include a confidence interval, such as if the source is an academic study. In these cases, the confidence interval from the data source is used to provide the maximum and minimum ranges for the data input in the sensitivity analysis. Where no confidence interval is provided, the quality of the data is graded in a similar way to optimism bias to express the degree of certainty that Unity Insights has in the estimates.



Unity Insights
Analytics and evaluation for positive change

unityinsights.co.uk