

PREPARING FOR SURGERY

THE PREP-WELL PROJECT REPORT





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PREPARING FOR SURGERY: THE PREP-WELL PROJECT



South Tees Hospitals
NHS Foundation Trust



South Tees
Clinical Commissioning Group



Northumbria
University
NEWCASTLE



UNIVERSITY
of York

Collaborating Partners

- South Tees Hospitals NHS Foundation Trust (lead organisation)
- Public Health South Tees
- South Tees Clinical Commissioning Group
- Northumbria University
- University of York

Project Funding

Funding was secured through a Health Foundation Innovation Round 6 award. The first 3 collaborating partners listed above provided additional funding. We would like to thank all partners and funders for supporting PREP-WELL and enabling the project to become a reality.

Report Contributors

- Prof Gerard Danjoux
- Mrs Esther Carr
- Dr James Durrand
- Dr Garry Tew
- Dr Joanne Gray
- Dr Sarah Taylor
- Dr Sarah Peacock
- Mr Mal Fitzgerald

Affiliations and professional positions of contributors are outlined in 'Meet The Team' section of the report.



MEET THE TEAM

Professor Gerard Danjoux is a Consultant in Anaesthesia and Sleep Medicine at South Tees Hospitals NHS Foundation Trust. He has a clinical and research interest in improving patient health and wellbeing before surgery to facilitate improved outcomes for patients. Gerard was overall project lead for PREP-WELL.



Dr Rhiannon Hackett is a Consultant Anaesthetist at South Tees Hospitals NHS Foundation Trust, with an interest in perioperative medicine and prehabilitation for major surgery. She has been a key part of the PREP-WELL team from the development stage and has delivered clinical elements, including patient recruitment and medical support. Rhiannon will be clinical lead for the new Orthopaedic pathway.



Dr James Durrand is a specialty trainee in anaesthesia and intensive care medicine and PhD student at Northumbria University department of Sport, Exercise and Rehabilitation. His area of interest is in optimising patients' health prior to major surgery. He has been a key part of the PREP-WELL team from the development stage and has delivered clinical elements, including patient education throughout the pilot phase of the project.



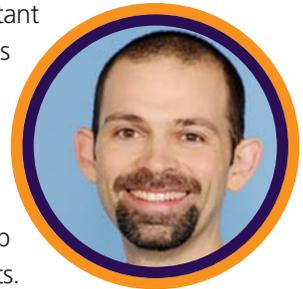
Esther Carr is a Senior Physiotherapist at South Tees Hospitals NHS Foundation Trust. She is the Project Manager for the PREP-WELL Project. Prior to this she has worked for a number of years within the Cardiac rehabilitation setting.



Dr Sarah Taylor is a Northern Deanery Academic Foundation Doctor. She has completed an academic placement at South Tees NHS Foundation Trust, where she was heavily involved in the PREP-WELL project.



Mr Barnabas Green is a Consultant Vascular Surgeon at South Tees Hospital Foundation Trust. He has been the Vascular 'surgical champion' for the pilot phase and will be continuing to work with the team to further develop the pathway for high-risk patients.



Mr Paul Baker is a Consultant Orthopaedic Surgeon and Director of Research and Innovation at South Tees Hospital Foundation Trust. He has been the Orthopaedic 'surgical champion' for the pilot phase of PREP-WELL and will be continuing to work with the team to further develop the pathway for orthopaedic patients.



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MEET THE TEAM

Dr Garry Tew is the Director of Enterprise and Engagement for the Department of Sport, Exercise and Rehabilitation and one of the leading members of the Department's "Promoting and Preserving Health and Wellbeing" research theme. Garry has played a key role in developing the exercise training elements of the PREP-WELL programme, and also in the analysis and reporting of the findings from the pilot project and will continue to be involved in the future development work.



Dr Joanne Gray is an experienced health economist with special interests in economic evaluation of health and social care interventions and priority setting methods to help underpin commissioning processes. She has led on the health economic evaluation of the pilot and will continue to work in this role as the project develops.



Dr Sarah Peacock is a Perioperative Medicine Research Fellow at the South Tees Hospitals NHS Foundation Trust. Her role will include developing the high-risk PREP-WELL pathway to further target patients undergoing surgery for cancer. Sarah is also interested in researching the impact of health inequalities on the provision of perioperative care.



Mal Fitzgerald is the Programme Director for 'You've Got This'. He has over 25 years' experience in public and voluntary sector; specifically in training and development and supporting and building the capacity of people and organisations in communities. Mal has contributed to a number of local, regional and national strategic partnership boards. His specific interests are behaviour change, complex systems and health inequality.



Val Jones is a Senior Health Development Officer with Public Health South Tees. She is experienced in Exercise Referral, working with people with a range of medical conditions. Alongside prehabilitation, Val is interested in working with clients with cardiac and neurological conditions to improve their health, fitness and quality of life.



Craig Postgate is a Senior Health Development Officer with Public Health South Tees. He is experienced in Exercise Referral, working with people with a range of medical conditions.



Imran Naeem is a Senior Health Development Officer with Public Health South Tees. He is experienced in Exercise Referral, working with people with a range of medical conditions. His main interests lie in the management of patients with diabetes and in stroke rehabilitation.



Val, Craig and Imran have taken the lead with exercise delivery for the PREP-WELL programme, but have been supported by all members of the Health Development Team.



EXECUTIVE SUMMARY

Background

Unhealthy lifestyle factors (e.g. smoking and low levels of fitness) commonly lead to adverse outcomes following surgery, and affect 10 – 50% of patients. Optimising health and wellbeing in advance of surgery is crucial in improving patient and clinical outcomes. Evidence suggests that this can be achieved by utilising a unique 'teachable moment' to support patients to make positive lifestyle changes in the time available before surgery, thereby improving chances of a smoother and successful recovery.

Our Innovation

We designed and piloted the UK's first comprehensive, supervised, community-based programme, specifically designed to improve the health and wellbeing of patients before surgery: PREP-WELL. Our service was modelled on the success of the national Cardiac Rehabilitation platform, whilst aligning with NHS priorities of promoting healthier lifestyles through supported self-management closer to home. The project was unique in being supported and delivered by a regional health sector partnership across Secondary Care, Primary Care and Public Health.

Successes, Challenges and Enablers

Our overarching achievement was to embed the service into routine clinical care across a range of surgical specialties. The vast majority of patients (>70%) gained clinically meaningful improvements in their health status and quality of life (before surgery) following participation. Several patients initially deemed too 'high-risk', were able to have surgery by improving their fitness and wellbeing following participation. Patient feedback about the programme, and our team, was excellent.

Our key enablers were: stakeholder support and investment (with matched project funding); patient engagement and peer-support for one another through our group setting; effective team working; a central easily accessible one-stop location for patients; and our clinical champion strategy.

Health Economics

When compared to baseline (before participation), patients reported an average relative improvement in their health-related quality of life of 20% on programme completion (before surgery), and 45% at 12-weeks after surgery. The average weekly cost of providing the service was £52.35 per patient, with programme duration being the main determinant of cost.

Future Plans

Our learning from the pilot will enable us to develop our service model to benefit a wider spectrum of patients. Over the next four years our team will work together to develop greater capacity and flexibility to engage and support local people to improve their health and wellbeing before surgery. Our 3 future planned work streams are: a high-risk pathway focusing on people undergoing surgery with vascular disease and treatment for cancer; a pathway for people undergoing surgery for hip and knee replacements; and a remotely-supervised digital pathway. This will be supported by Sport England (through the South Tees Local Delivery Pilot: You've Got This) and Macmillan Cancer Support, with huge potential to improve health outcomes and value-added care for a greater number of people. We plan on using the increasing number of programme participants to undertake a robust evaluation of surgical outcomes and associated health economic outcomes to aid in the strategic roll-out of PREP-WELL region-wide.

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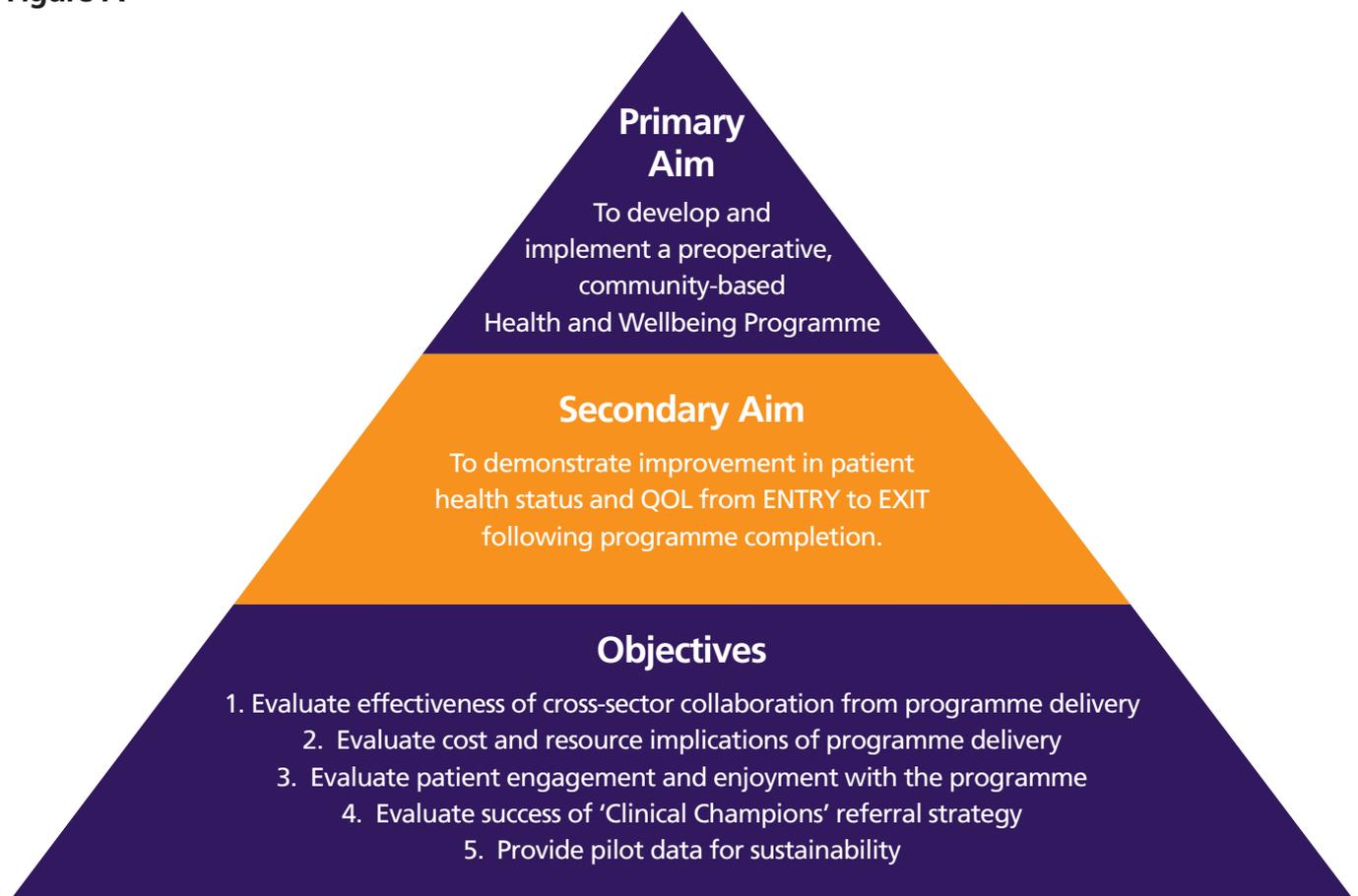
AN OVERVIEW

PREP-WELL is a pilot clinical service introduced by South Tees NHS Foundation Trust to improve the fitness, health and wellbeing of patients prior to major surgery. The pilot was run for 12 months, from January 2018 to January 2019.

Patients were able to access progressive, supervised support for several preoperative risk factors, in a 1-STOP setting, in the weeks prior to surgery.

AIMS AND OBJECTIVES

Figure A



QOL = Quality of Life

ENTRY = patient assessment prior to starting programme

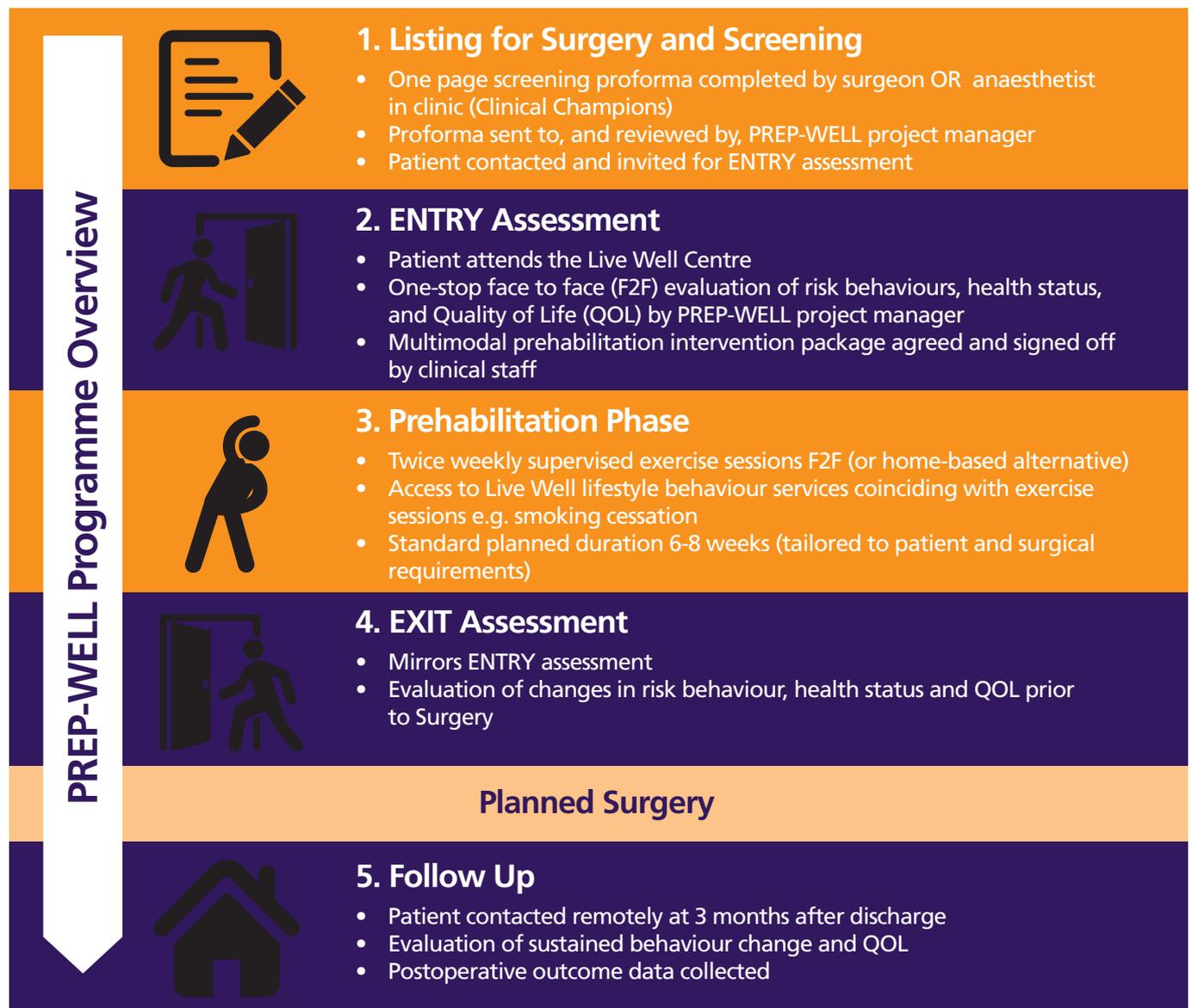
EXIT = patient assessment on completion of programme (but before surgery)



PREP-WELL PATIENT PATHWAY

The service was based on the national Cardiac Rehabilitation template and was designed with the following key features:

Figure B



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KEY PROGRAMME FEATURES

1. Screening by 'clinical champions' from 5 specialties with quick referral once a decision to proceed with surgery has been made



2. ENTRY assessment by the Project Manager, which involved:
 - a. Comprehensive screening for modifiable lifestyle risk factors (Figure C)
 - b. Expedited evaluation and optimisation of non-lifestyle risk factors, e.g. anaemia



3. Individualised multimodal programme co-developed with the patient based on their risk factor profile



4. Key intervention was a 6-8 week supervised wellbeing programme, provided free-of-charge, in a community wellbeing hub in Middlesbrough (The Live Well Centre) supported by Health Trainers and the Project Manager





TARGET RISK FACTORS

Figure C



Smoking:

Poor wound healing and increased risk of complications



Physical inactivity:

Low fitness leads to slow recovery and increased risk of complications



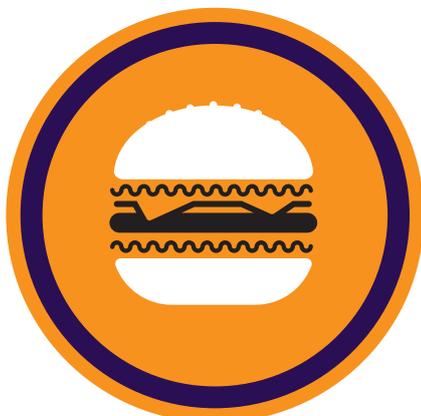
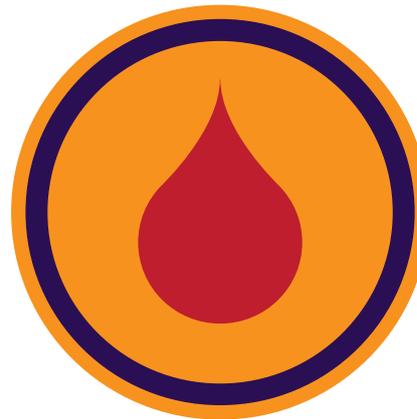
Alcohol consumption:

> 14 units/week
Increased risk of complications and longer hospital stay

Cognitive impairment:
Strongest predictor of post-operative delirium



Anaemia:
Haemoglobin < 130g/L
Increased risk of complications and longer hospital stay



Malnutrition:

Both 'over' and 'undernutrition'
Undernutrition increases risk of complications 3 - 4 times



Obstructive sleep apnoea:

Abnormal breathing at night
Increased risk of postoperative cardiovascular complications



Anxiety and Depression:

Increased risk of postoperative pain and delayed recovery

RESULTS

1. Evaluation strategy

Our approach was to use an observational pre-post design involving a mixture of quantitative and qualitative data (i.e. we did not conduct a randomised controlled trial). Our measurement plan sought to collect data on the following:

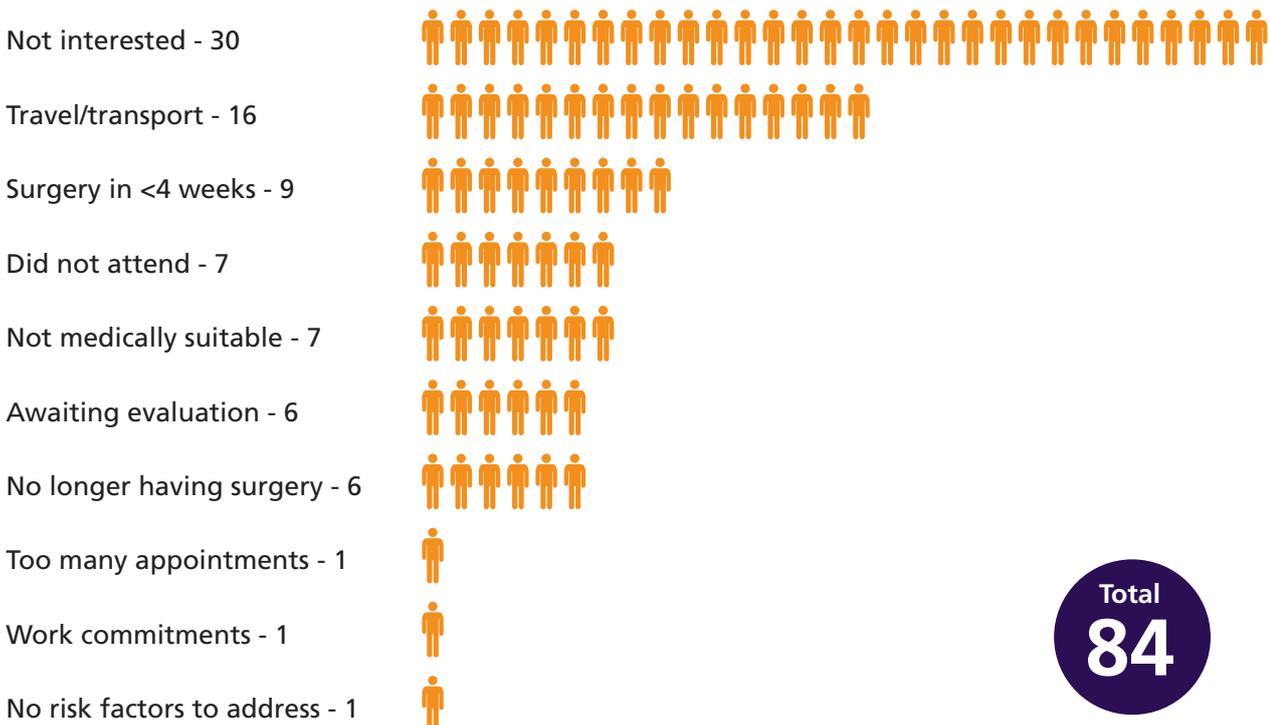
- Numbers and characteristics of patients participating in PREP-WELL
- Changes in patients' lifestyle behaviours, fitness and health indicators, quality of life and mental wellbeing between programme ENTRY, EXIT and 3 MONTHS POST-SURGERY
- Costs of setting up and maintaining the programme
- Resource use implications for primary and secondary care after surgery
- Process issues, including acceptability of the intervention to patients and providers

We successfully collected data on all of the above points.

2. Patient referrals and recruitment

- 159 referrals were made with 75 patients (47%) agreeing to participate
- Surgeons and anaesthetists made the majority of the referrals: 59% and 32% respectively
- The mean time from referral to ENTRY assessment was 12 days (range = 0 to 62). Prolonged time periods were usually in orthopaedic patients where no formal date for surgery had been set at the time of referral
- A map of geographic area of residence for patients referred is shown in Appendix 1

3. Reasons for non-participation

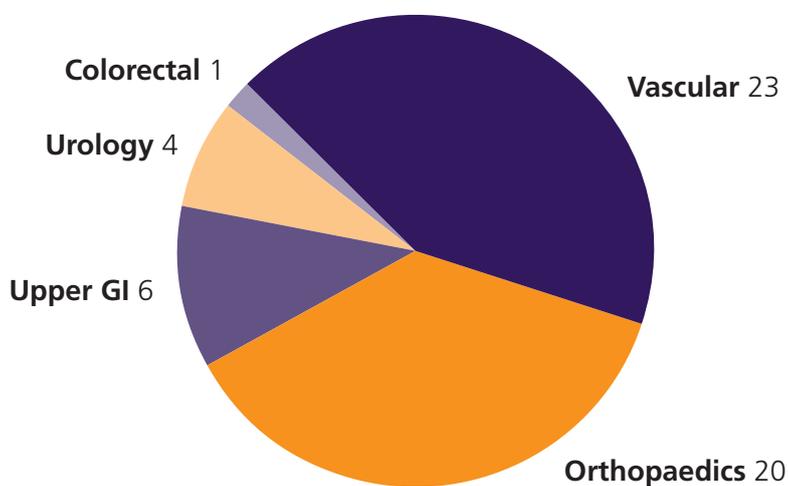




4. Patient assessments and programme preferences

- All 75 participating patients underwent ENTRY assessments with 54 (72%) opting for supervised classes (F2F) at The Live Well Centre. The remaining 21 patients (28%) opted for a home-based programme
- Twenty-seven patients (50%) who opted for the F2F programme completed both ENTRY and EXIT assessments
- Twenty-seven patients from the F2F programme (50%) did not undergo EXIT assessment, with the majority either failing to attend pre-booked appointments (30%) or reason unknown (44%)
- Thirty-three patients (61%) completed both ENTRY and THREE MONTH POST-SURGERY assessments

5. Surgical specialties and characteristics of people opting for supervised sessions



Average Age

69
YEARS

Age Range

42 — **87**
YEARS

Sex

38 **16**
MALE FEMALE

Ethnicity

53 **1**
WHITE ASIAN

Marital Status

33 **21**
MARRIED OTHER

Average Body Mass Index

29.4
kg/m²

High/Low BMI

4 **2**
>35 <20

6. Duration of programme

For patients attending F2F sessions, and who completed both ENTRY and EXIT assessments (n=27):

- Mean duration in the programme was 9.3 weeks (range 2 to 24)
- Mean number of centre-based sessions attended was 11 (range 1 to 34)

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7. Prevalence of risk factors and interventions offered to the 54 patients undertaking a F2F programme

Interventions were offered to participants based on individual need. The following graphics provide a summary of what was offered.



Smoking Cessation

Out of 7 patients who smoked:

- 2 were referred to smoking cessation services
- 2 wanted to self-refer
- 3 declined referral



Alcohol Reduction

Out of 11 patients who drank >14 units/week

- 11 accepted verbal advice
- 1 was also referred to alcohol liaison services
- 1 declined this referral



Physical Activity

No patients reported achieving WHO recommended levels of physical activity

- 54 had exercise as an agreed intervention
- 17 also received inspiratory muscle training



Weight Management

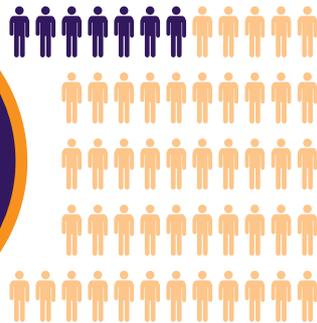
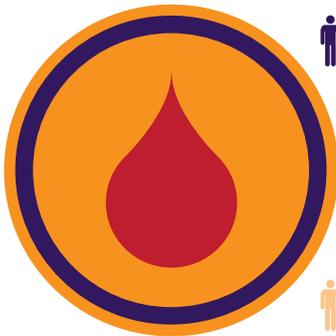
6 patients were malnourished at ENTRY:

- 4 were given weight reduction strategies
- 2 were given nutritional supplementation



Obstructive Sleep Apnoea (OSA)

- 3 patients were screened as being high-risk for OSA
- 1 patient required treatment with CPAP therapy



Anaemia

Of the 7 patients who were anaemic at ENTRY assessment:

- 5 received intravenous iron via the transfusion pathway
- 2 were referred to their GP for management



Anxiety/Depression

Of the 7 patients with elevated scores at ENTRY:

- 5 received mindfulness training
- 1 was referred to counselling
- 1 declined all interventions



Cognitive Impairment

20 patients screened positive for possible cognitive impairment:

- All of these patients were referred to their GP or secondary care team for further investigation

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8. Changes in lifestyle behaviours and health indicators

Analyses are based on data from participants who completed all assessments at ENTRY, EXIT and 3 MONTHS POST-SURGERY (3MPS).

	ENTRY	EXIT	3MPS	
Patients complying with WHO aerobic exercise guidance (%)	17	75	63	▲▲▲
Patients complying with WHO aerobic + strength training guidance (%)	0	73	29	▲
Mean 6MWD (m)	444	479	N/A	▲
Alcohol >14 u/week (%)	17	13	4	▼▼
Smoking (%)	17	13	17	▶
Anxiety Score (mean) *	5.5	5.4	4.4	▼
Depression Score (mean) **	4.6	3.8	2.5	▼▼
HRQOL (mean) ***	0.54	0.64	0.78	▲▲

* Taken from Hospital Anxiety and Depression Scale (HADS). A higher score equates to greater levels of anxiety (range 0-21).

** Taken from HADS. A higher score equates to greater levels of depression (range 0-21).

*** Taken from EQ5D-3L tool. Score of 1.0 = full health, 0 = a state equivalent to being dead (see Section 10)

WHO = World Health Organisation. WHO guidance = 150 min of moderate exercise and x2 sessions of strength training per week

6MWD = distance walked in 6 minutes, objective measure of aerobic fitness

- The number of patients achieving WHO targets for physical activity and strength training INCREASED significantly. This increase was maintained after surgery
- The mean 6-minute walk distance INCREASED by 35m. 56% of patients achieved a clinically significant improvement of >25 m
- The number of smokers remained constant between ENTRY and 3MPS
- The number of patients drinking >14 units per week of alcohol reduced significantly between ENTRY and 3MPS
- Anxiety and depression scores reduced following participation with further drops following surgery

9. Patient reported outcomes

- The 5 patients undergoing 1:1 interviews at the beginning of the programme provided universally positive feedback
- 7 participants returned programme EXIT questionnaires:
 - 6 rated the programme as 'excellent'
 - 1 rated the programme as 'good'
 - All 7 participants would recommend the programme to others

10. Health Related Quality of Life (HRQOL) (Appendix 3)

- 4 out of 5 patients maintained or improved their HRQOL on programme completion (pre-surgery), with an average relative improvement of 20%
- HRQOL continued to improve after surgery. The overall average relative improvement from starting the programme to 3MPS was 45%
- Overall this demonstrates highly encouraging patient-reported benefits from PREP-WELL participation



11. Patient stories

Patient stories from the project can be found through the following links:

(a) Why did you come to PREP-WELL?



<https://vimeo.com/323701838/6caf7c53d4>

(b) What did you do in the project?



<https://vimeo.com/323709390/f84d8fb9c7>

(c) Would you recommend PREP-WELL to others?



<https://vimeo.com/323713515/e15ad54740>

(d) Billy's story



<https://vimeo.com/323740295/6409889c63>

N.B. Formal consent was obtained for all patient stories presented.

12. Cost analysis summary

The total cost of the PREP-WELL pilot project was £101,000, with £75,000 secured from a Health Foundation Innovation award and £26,000 from stakeholder matched funding.

- The average total cost of the intervention per patient was £404.86
- The average weekly cost per patient (for all specialties) was £52.35
- The main factor determining cost was programme duration, with Orthopaedic surgery having the highest average cost per participant at £475.92. This is likely to reflect longer waiting times for surgery in this population, and highlights the need for prehabilitation to be part of whole-system integration in the surgical pathway
- The majority of cost associated with the programme was staff-related

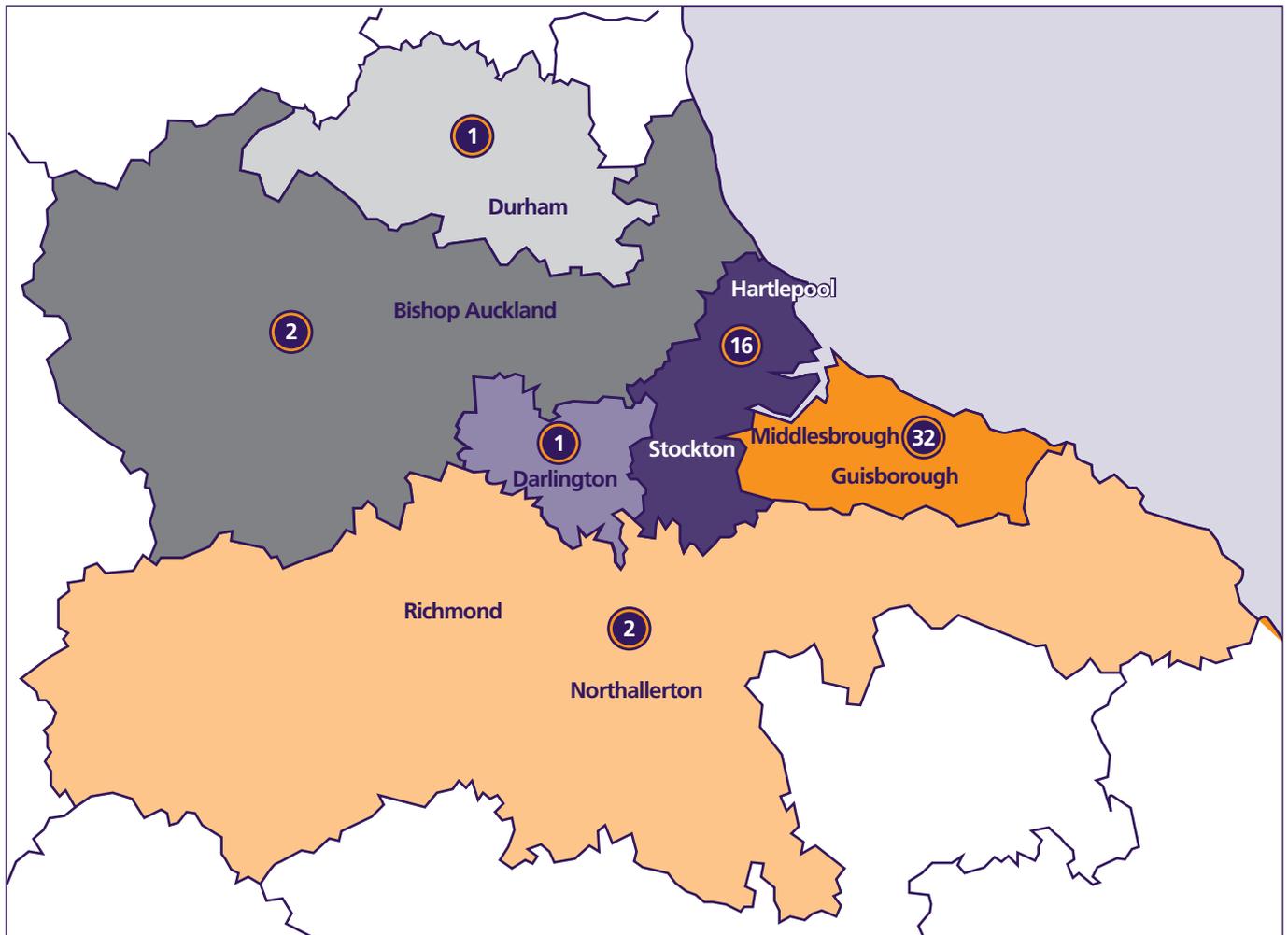
A more detailed breakdown of the analysis strategy and costs is provided in Appendix 3.

13. The Unexpected

- Three vascular surgical patients with Abdominal Aortic Aneurysm (AAA) disease were initially deemed too 'high risk' to undergo surgery. Following PREP-WELL programme participation all 3 patients objectively improved their fitness by 20-30%, enabling them to undergo planned surgery without complications
- News of the success of the programme resulted in requests to refer patients from previously unanticipated sources. These included the regional AAA screening programme and from Primary Care
- We were delighted to receive visits from healthcare professionals from a worldwide audience, including; Australia, New Zealand, Canada and across the UK



Number of patients attending from each CCG area



CCG area

Data from 54 patients opting for the supervised programme

 South Tees CCG	32 (59)
 Hambleton and Richmondshire and Whitby CCG	2 (4)
 Hartlepool and Stockton CCG	16 (29)
 Darlington CCG	1 (2)
 Durham Dales Easington and Sedgefield CCG	2 (4)
 North Durham CCG	1 (2)

More about Patient Experience

The project was designed to create a very different experience for patients; tackling personal, social and structural barriers to engagement and behaviour change.

The programme benefitted from being run in a community health facility, The Live Well centre. This is a “one-stop” centre containing a range of public health and lifestyle interventions, including smoking cessation, specialist alcohol services and a gym, meaning patients can access all support services in one setting. The centre affords easy access due to its location in central Middlesbrough, good parking facilities and excellent public transport links.

The exercise training sessions and introductory seminar (information session for patients and their relatives) were

delivered in group sessions. The peer support networks developed during the group exercise sessions bolstered patient ‘buy in’. These sessions also provided opportunities to discuss any concerns or questions with health professionals. Patients were able to understand that they were not alone in their journey through surgery, with many developing new friendships within the groups.

A few consistent themes emerged from the patient stories from participation. Patients often commented on the peer support provided for one another through the group/class environment. Patients also mentioned that participation provided them with incentive or motivation to keep going when they might otherwise be having a ‘bad day’ and have lost interest. Another key theme was the positive impact that participation had on self-reported mental and physical health.

Patient telephone interviews

5 patients underwent 1:1 telephone interviews at the beginning of the programme and provided universally positive feedback. During the interviews patients were asked questions in relation to themed areas. Sample patient quotations are provided below in relation to some of the themes:

(a) Why did you choose to take part in the programme?

“It got me out of the house”

“To be fit to cope with the stress when you are having an operation”

“I was a bit down in myself and needed to get out”

“To help with the recovery”

These replies demonstrate that there were numerous reasons for programme participation extending beyond simply improving fitness for surgery.

(b) What changes have you noticed as a result of the programme?

“I’m 100% better.... I’ve got my confidence to go out....it’s got me going again...I’m more calm about going in to hospital tomorrow”

“It changed my attitude”

“My limbs are coming on a treat”

“My fitness has improved a bit....my breathing has improved...I feel happier”

“I’ve lost 4 pounds....I seem to be walking the dog a lot further than I used to...my breathing seems a lot better”

Perceived benefits from programme participation appear to have positive benefits across a number of important domains including fitness and wellbeing, confidence and activities of daily living.

(c) Has it affected how you will approach life going forwards?

“I would consider going to a gym that was structured in the way PREP-WELL was”

“I might see about joining a gym”

“If someone rang me up and said would you like to join this fitness thing... I would (but wouldn’t join a gym off my own back)”

“Hopefully I will get back into golf again”

“I’ll get back into it again (after the operation)”



Health Economics

A cost outcome study was conducted to evaluate the costs of delivering the intervention and the impact on health related quality of life of participants.

Identification and measurement of resource use

The main focus of the study was to identify and quantify the additional costs of delivering the intervention and the potential resource implications post-operatively in terms of length of stay. The costs associated with the exercise intervention were estimated on a per patient basis using NHS price year 2018. The intervention costs comprised three components: the capital costs of the intervention materials; staff time associated with the delivery of the interventions and evaluations and overhead costs in terms of room rental. Capital costs included the purchase of pedometers, therabands and Powerbreathe devices with filters and packs of nutritional supplements. Staff time was broken down into entry and exit evaluations and supervised exercise sessions.

The sessions were initially planned to be undertaken twice weekly and to last for 6 weeks, but in fact lasted until surgery. There were 95 supervised exercise sessions which each lasted for 90 minutes with an expected attendance of 9.14 persons. However, the average attendance over the course of the intervention was 5.34 persons. In terms of staff time, each session was supervised by the Project Manager and two Health Trainers.

Calculation of health utilities

Health related quality of life was measured, in line with NICE recommendations (National Institute for Health and Care Excellence, 2013), using the EQ-5D-3L tool. Applicable to a wide range of health conditions and treatments, it provides a simple descriptive profile and a single index value for health status that can be used in the clinical and economic evaluation of health care as well as in population health surveys. EQ-5D is designed for self-completion by respondents and is ideally suited for use in postal surveys, in clinics, and in face-to-face interviews. It is cognitively undemanding, taking only a few minutes to complete. Instructions to respondents are included in the questionnaire. The EQ-5D-3L is based on a descriptive system and comprises the following 5 dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension has 3 levels: no problems, some problems, extreme problems. The respondent is asked to indicate his/her health state by ticking (or placing a cross in) the box against the most appropriate statement in each of the 5 dimensions.

Future Plans

PREP-WELL pilot

Development Aims

- Integrate learning from pilot phase
- Meet differing patient risk and prehabilitation requirements
- Widen access targeting 'prehabilitation for all'
- Make optimal use of regional facilities, staff and resources to deliver prehabilitation
- Facilitate rapid service monitoring, audit and research integrating a digital patient database and live 'dashboard'
- Develop a competency framework for staff delivering prehabilitation

PREP-WELL High-risk pathway

- Evolution of pilot model
- Higher-risk patients requiring more intensive and closely monitored intervention
- Two-year focus on developing pathways for patients undergoing surgery with vascular disease (e.g. AAA) and people requiring intervention for cancer
- Development of supervised lifestyle offer across several community locations in South Tees
- Implementation of a skills and competencies framework for health trainers and staff to deliver face to face prehabilitation

PREP-WELL Low-risk pathway

- Development of new 'high-volume' pathway
- Lower-risk patients typically undergoing major orthopaedic surgery requiring less intensive and less 'medicalised' preoperative support
- Dedicated project manager newly appointed
- Planned to embed in multiple existing regional public health exercise facilities
- Implementation of a skills and competencies framework for health trainers and staff to deliver face to face prehabilitation

Digital PREP-WELL Home-based pathway

- Development of digital platform for patients unable to engage with face-to-face options
- Facilitated self-managed option
- Potentially more cost-effective
- Aligns with NHS priorities to deliver digital healthcare and telemedicine
- Can supplement low and high-risk pathways

In development in collaboration with:

**MACMILLAN
CANCER SUPPORT**