

Prehabilitation at University Hospital Southampton (UHS)



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Overview

- ▶ What is prehabilitation?
- ▶ Prehabilitation service at UHS
- ▶ Insight and patient experience
- ▶ Case study
- ▶ Summary

What is prehabilitation?

*Prehabilitation is **needs-based** multi-modal intervention, before and during cancer treatment. Its aim is to **optimise** physical, nutritional and psychological status, enhance readiness for and tolerance of treatments, and improve recovery and/or quality of life. Prehabilitation involves **screening** AND needs-based **assessment**, enabling **individualised prescription** of exercise, nutrition and psychological interventions supported by behaviour change techniques.*



Principles and guidance for prehabilitation within the management and support of people with cancer

In partnership with

NIHR | Cancer and Nutrition
Collaboration

RCOA
Royal College of Anaesthetists

MACMILLAN
CANCER SUPPORT

<https://www.macmillan.org.uk/healthcare-professionals/news-and-resources/guides/principles-and-guidance-for-prehabilitation>

Update coming later this year

Cancer information and support

[Home](#)[Cancer A to Z](#)[Diagnosis](#)[Treatment](#)[Worried about cancer](#)[Supporting someone](#)[Get help](#)[After treatment](#)[Booklets and resources](#)[Home](#) > [Treatment](#) > [Getting ready for treatment](#) > [Cancer prehabilitation](#)

Prehabilitation and cancer treatment

Prehabilitation aims to get you as fit and healthy as possible before, during and after cancer treatment.

On this page

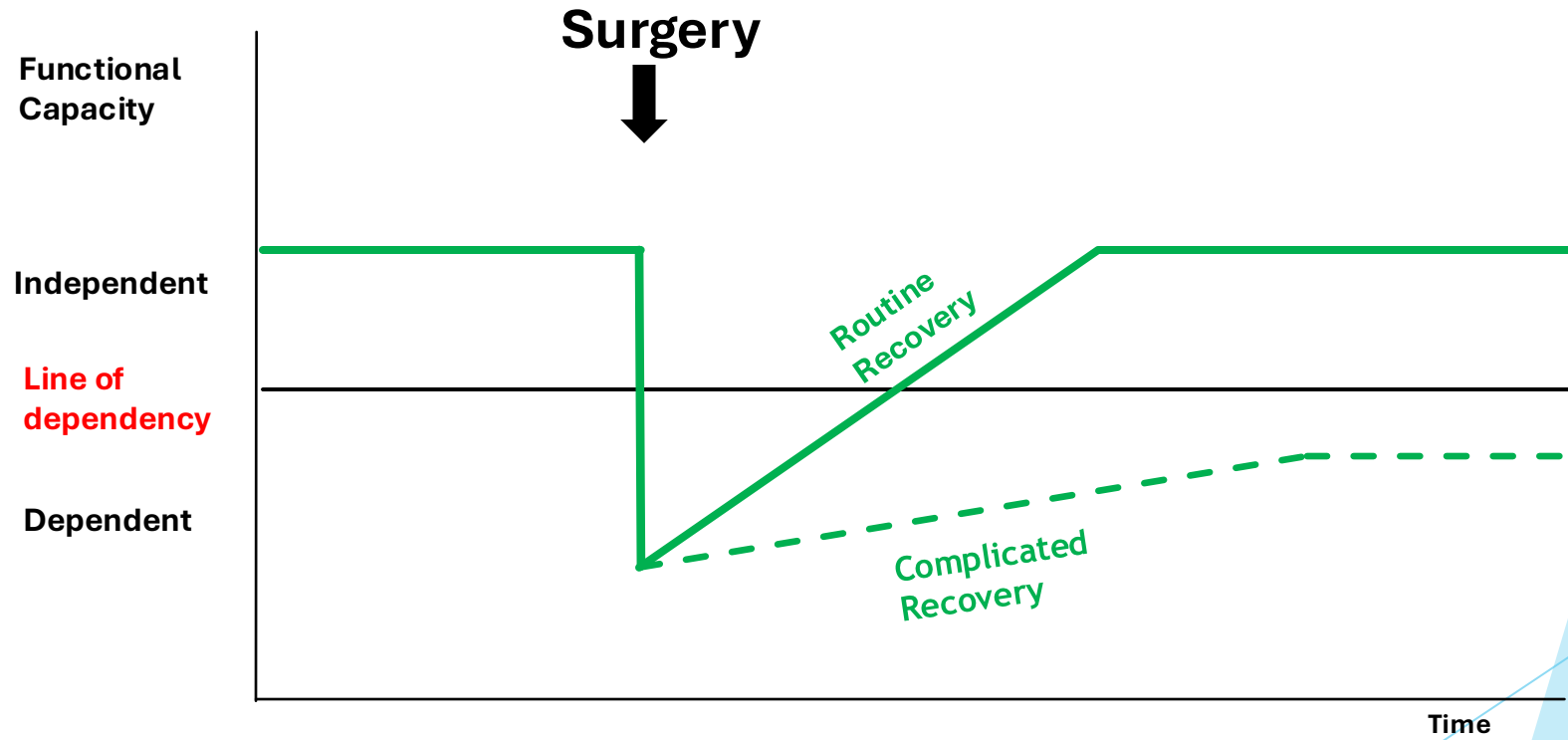
- [What is prehabilitation?](#)
- [When is cancer prehabilitation used?](#)
- [Does prehabilitation work](#)
- [What prehabilitation involves](#)
- [Changes you can make before cancer treatment](#)
- [Learn more about prehabilitation](#)
- [Ongoing support](#)
- [For healthcare professionals](#)
- [How we can help](#)

<https://www.macmillan.org.uk/cancer-information-and-support/treatment/preparing-for-treatment/cancer-prehabilitation>

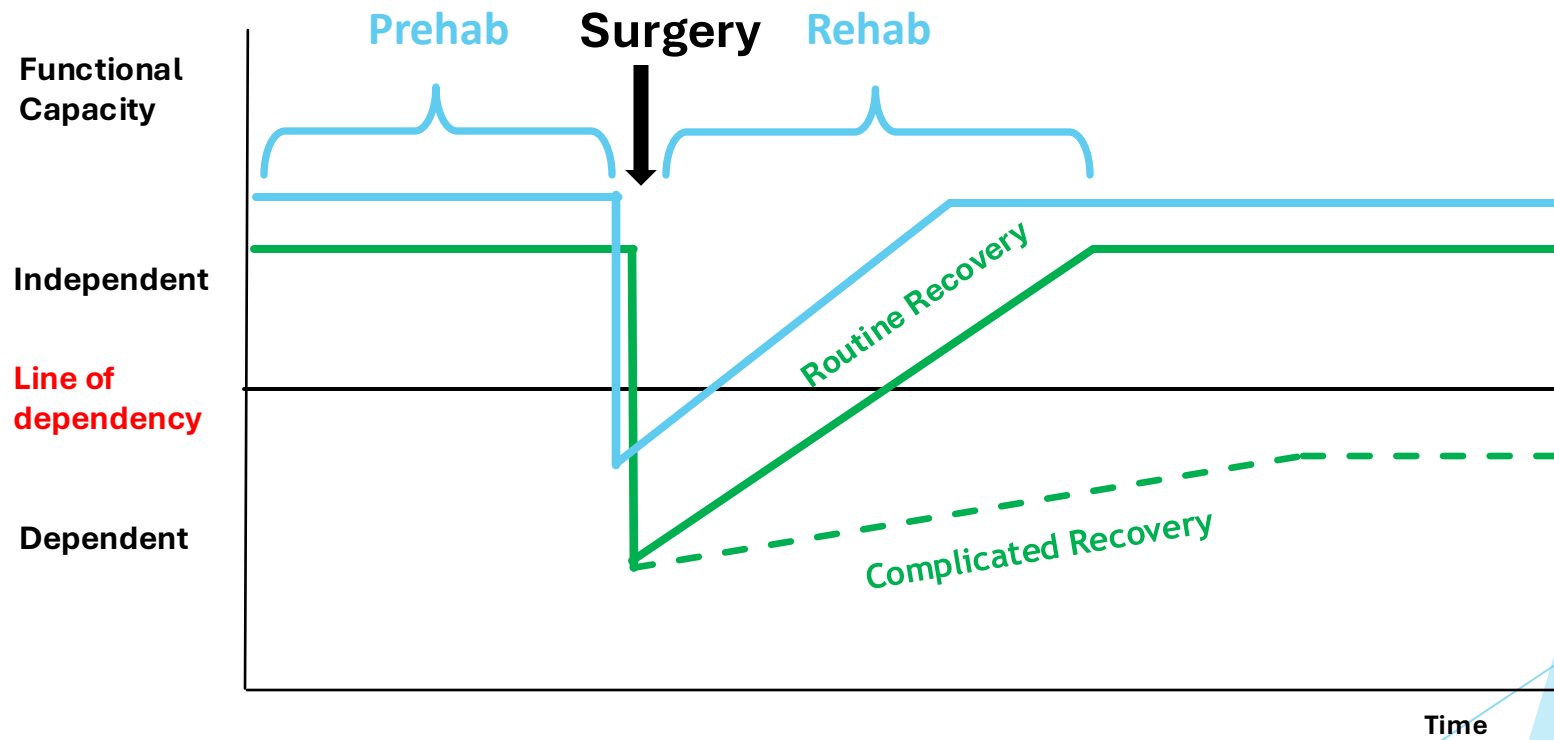
'Good' Prehabilitation has the potential to:

- Reduce length of stay
- Improve cardiorespiratory fitness
- Enhance recovery following treatment
- Reduce post treatment complication
- Improve nutritional status
- Improve aspects of neuro-cognitive function
- Enhance quality of life
- Provide a teachable moment for behaviour change (i.e. lifestyle modification)

Prehabilitation, Surgery and Recovery



Prehabilitation, Surgery and Recovery



Mechanism(s) of harm: Why multimodal approach?

Poor physical fitness:

Predicts adverse postoperative outcome.

- Surgical stress response elevates tissue and organ demand for oxygen.
- Reduced lean muscle mass (sarcopenia), an independent risk factor for adverse outcome.

Malnutrition:

A key perioperative risk factor severely undermining recovery.

- Major surgery induces a profound catabolic state.
- Malnutrition may involve macronutrient (carbohydrate, protein and fat) deficiency (malnourished malnutrition) or excess (obesity).

Psychological traits:

Linked to postoperative outcomes.

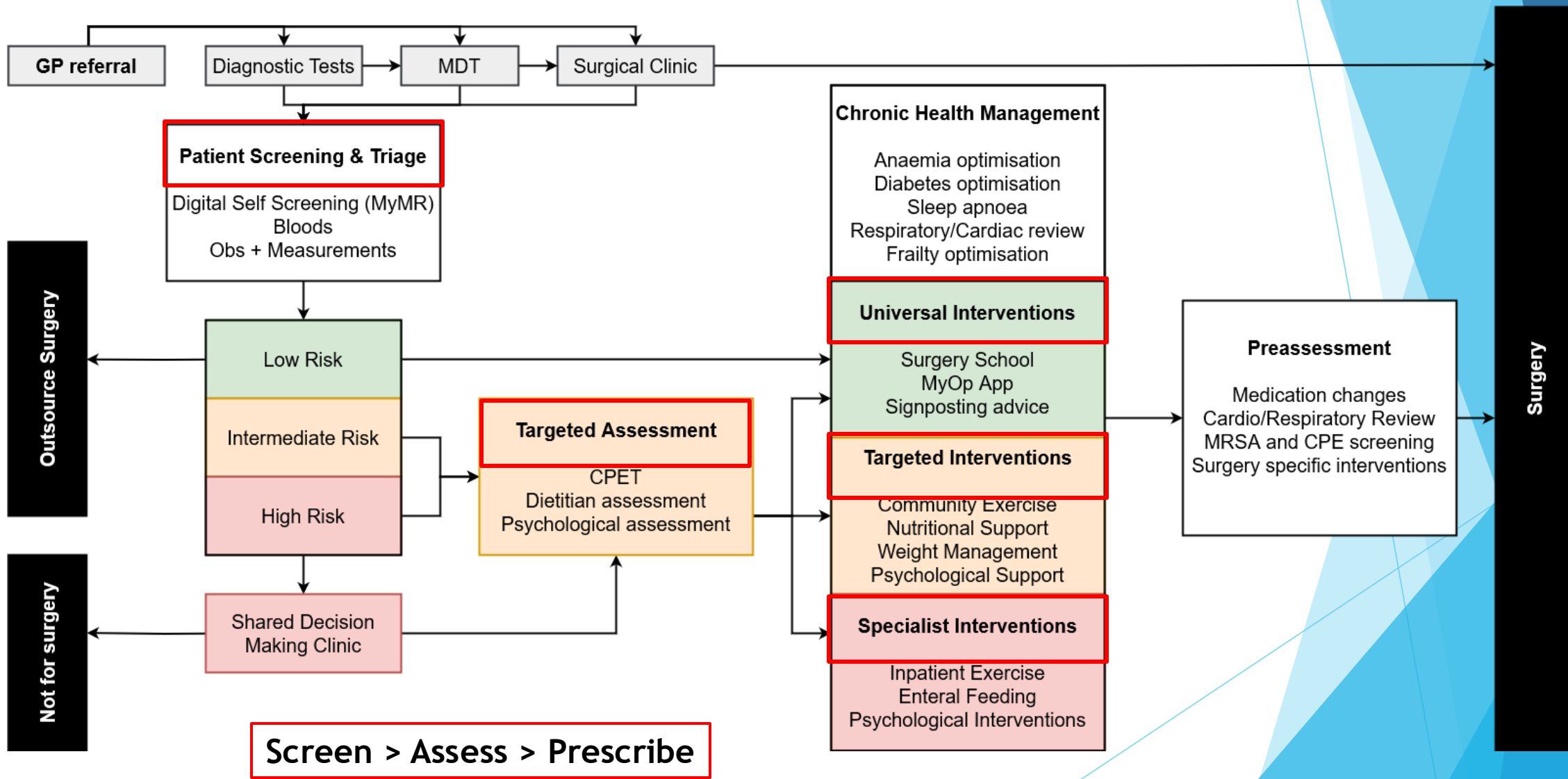
- Adverse mood states, such as depression, anxiety and distress.
- Attitudinal factors may present targets for preoperative psychological support.

Prehabilitation service at UHS

- ▶ Multi-professional lead
- ▶ Currently funded for 500 patients per year
- ▶ Colorectal, UGI and Urological cancer
- ▶ Staffing includes:
 - ▶ Prehab Clinical Practitioner (B7)
 - ▶ CPET & Exercise Prehab Lead (B7)
 - ▶ Clinical Exercise Physiology team (1x B6, 2x B5, 1x B4 Trainee)
 - ▶ Dietitian (B7)
 - ▶ Clinical Psychologist (B8a)
 - ▶ Digital Support Assistant/Health advisor (B3)



The Prehabilitation Patient Pathway



SCREENING



My medical record

Screening Questions

- DASI – Functional capacity
- Nutrition Risk Score – Malnutrition
- HADS – Psych well being
- Frailty – modified Edmonton
- Audit C – Alcohol
- Chronic Pain – Opiate use
- Smoking
- Stop Bang – Sleep Apnoea
- Targeted co-morbidities

Triage

Risk - RAG

PREHAB

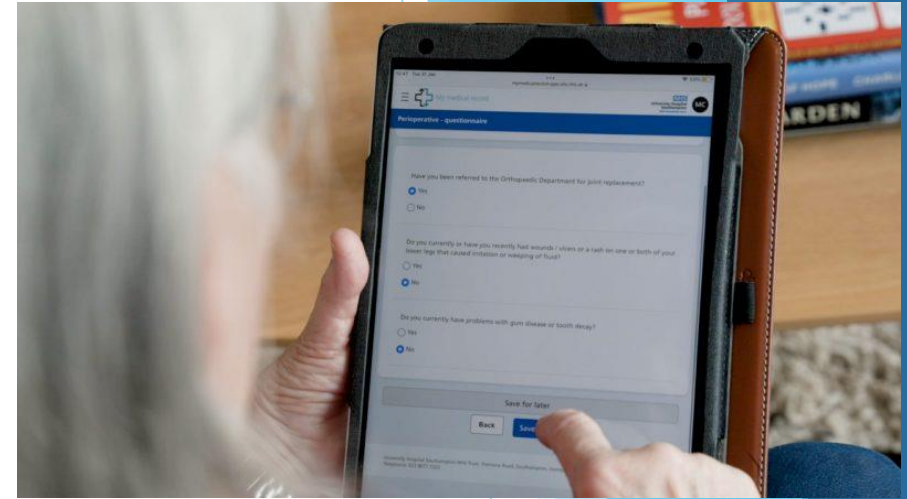
Outsourcing

Telephone

preassessment

List management.

Crit care



Perioperative - questionnaire



Perioperative Questionnaire

Your assessment was submitted on Tuesday 23 November 2021

Based on the answers you provided, the following recommendations are applicable to you.

Review our *Getting Fit for Surgery* guide

This guide provides useful information to help you prepare for surgery and to reduce your risk of problems after surgery. To view the guide, click here.

Reduce your alcohol consumption

Alcohol use, especially the amount of alcohol you drink daily, can affect your surgery and recovery. Decreasing your use of alcohol or stopping altogether before surgery will help speed up your recovery and reduce your risk of developing complications post-operatively. For further information, click here.

Stop Smoking

Smoking increases your risk of developing complications. We recommend that you stop smoking as soon as you can before surgery, nicotine replacement therapy can help you do this. For further information, click here.

Get advice about your existing wounds

Please see your doctor or District Nurse to ensure any wounds are well healed before your surgery. Open or weeping wounds or sores can increase your risk of infection after your surgery so your surgery may be cancelled on the day.

Get advice from your dentist

Please see your dentist to ensure you have good gum and dental health before your surgery. Gum disease and tooth decay can result in harmful bacteria entering the blood stream, which under normal circumstances may not cause symptoms or health problems. However, when you have joint replacement surgery, these bacteria can cause infection of the newly implanted joint with potentially severe health problems and ultimately the failure of the surgery.

Screening and Assessment:

Implementing Digital screening

- ▶ Digital Health Assistants
- ▶ 20 minutes per patient
- ▶ 80% of patients completed on their own
- ▶ Healthy conversations



Screening output

- Prehabilitation practitioner role
- Preassessment Band 6 nurse

evaluating their health status at any point in the future.

| | | | | | | | |
|----------------------|--------------------------------|--------------------------------------|------------------------------|-----------------------------|---|-------------------|-------------------|
| Anaesthetic concerns | Surgical concerns | Fitness (DASI) | Frailty (REFS) | Emotional wellbeing (HADS) | Alcohol (AUDIT-C) | Smoking | Nutrition concern |
| Yes | Yes | 11.52 (derived VO2peak in ml/kg/min) | 6.00 (Apparently vulnerable) | Yes (Borderline abnormal) | 21 (Extended advice, 20+ indicates possible dependence) | Yes | Yes |
| BMI | Sleep Apnoea (STOP-BANG Score) | Cardiac concerns | Neuro/Cognitive problem | Bleeding / clotting problem | Diabetes | Impaired Immunity | Chronic Pain |
| 25.7 | 4 (OSA unlikely/ low risk) | No | Yes | Yes | Yes | Yes | Yes |

Prehabilitation at UHS: Outcomes 2022-2025

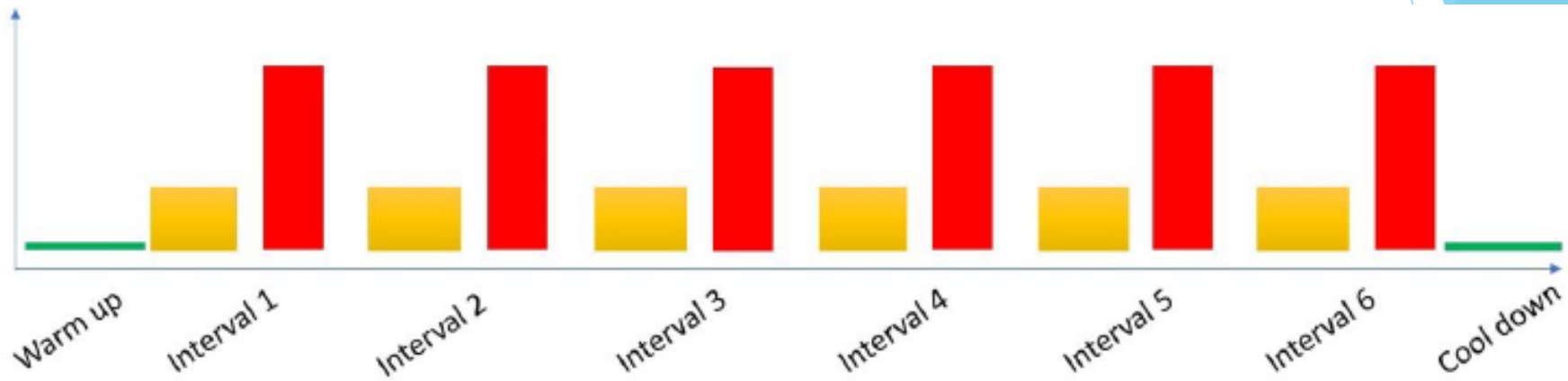
- *839 patients have been referred* since inception.
- *No clinical on the day cancellations* in this cohort.
- Those who received exercise as part of their prehabilitation programme were found to have a *1-day median length of stay reduction*.

Universal Prehabilitation Interventions

- ▶ MyOp digital application
- ▶ Virtual surgery school seminar OR physical booklet
- ▶ Specific healthy living advice
- ▶ Local gym membership



Targeted exercise interventions



| Phase | Duration | Work rate | Heart rate | RPE ^a | |
|-----------------------|---------------|-----------|------------|---------------------------|-----|
| Warm up | 5 minutes | X Watts | | | |
| Main Set [#] | Low Interval | 3 minutes | X Watts | 50-65% HRmax ^b | 3-4 |
| | High Interval | 2 minutes | X Watts | 75-85% HRmax | 7-9 |
| Recovery | 5 minutes | X Watts | | | |

[#]Main set: 4-6 x 5-minute intervals [Interval= 3 minutes Low Interval & 2-minutes High Interval]

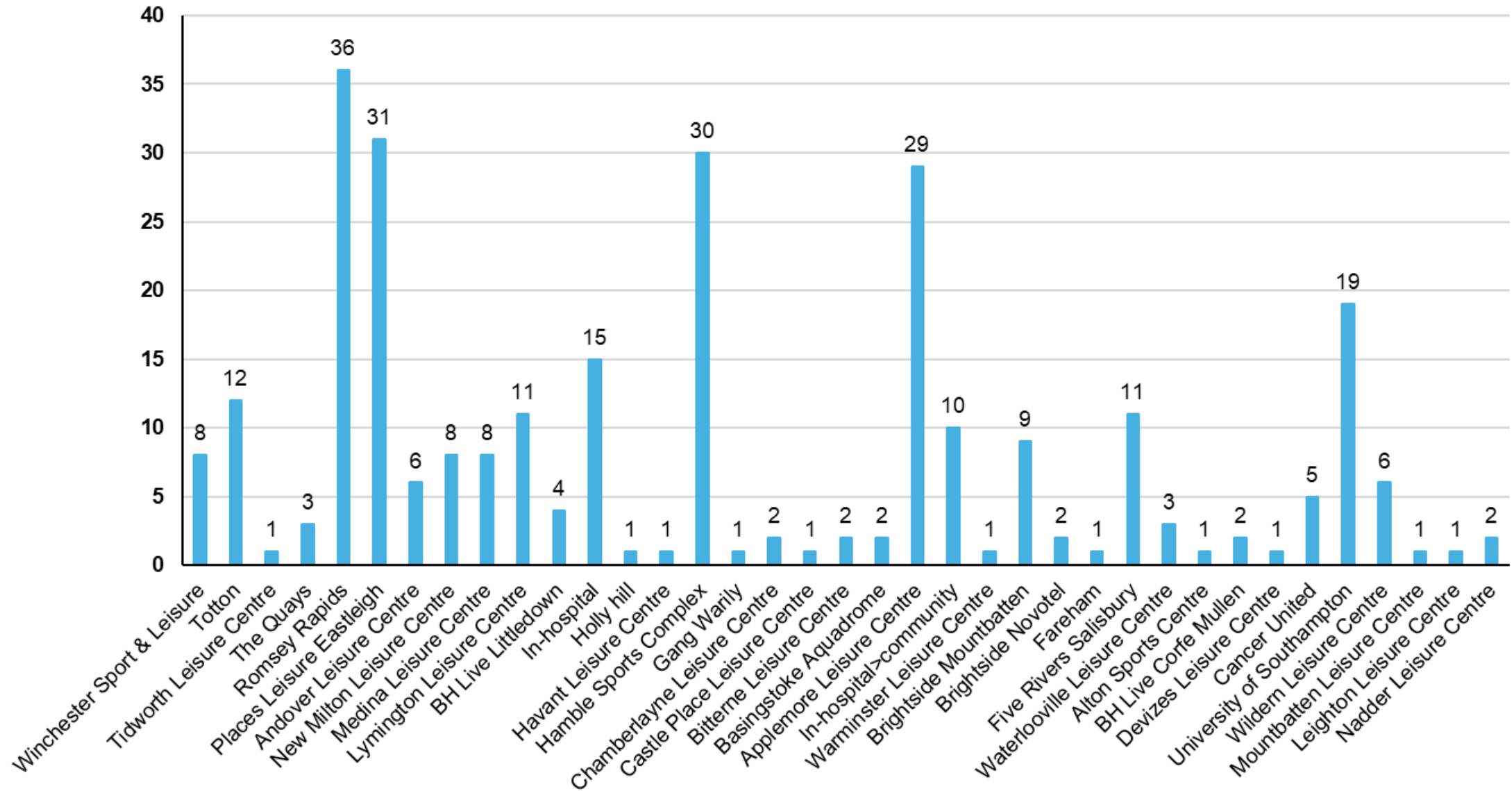
^aRating of Perceived Exertion (RPE) using 0-10 Scale

^bHRmax measured during CPET or can be calculated (HRmax= 220 – Age). The later should be avoided in patients on medications that modify HR, such as betablockers.

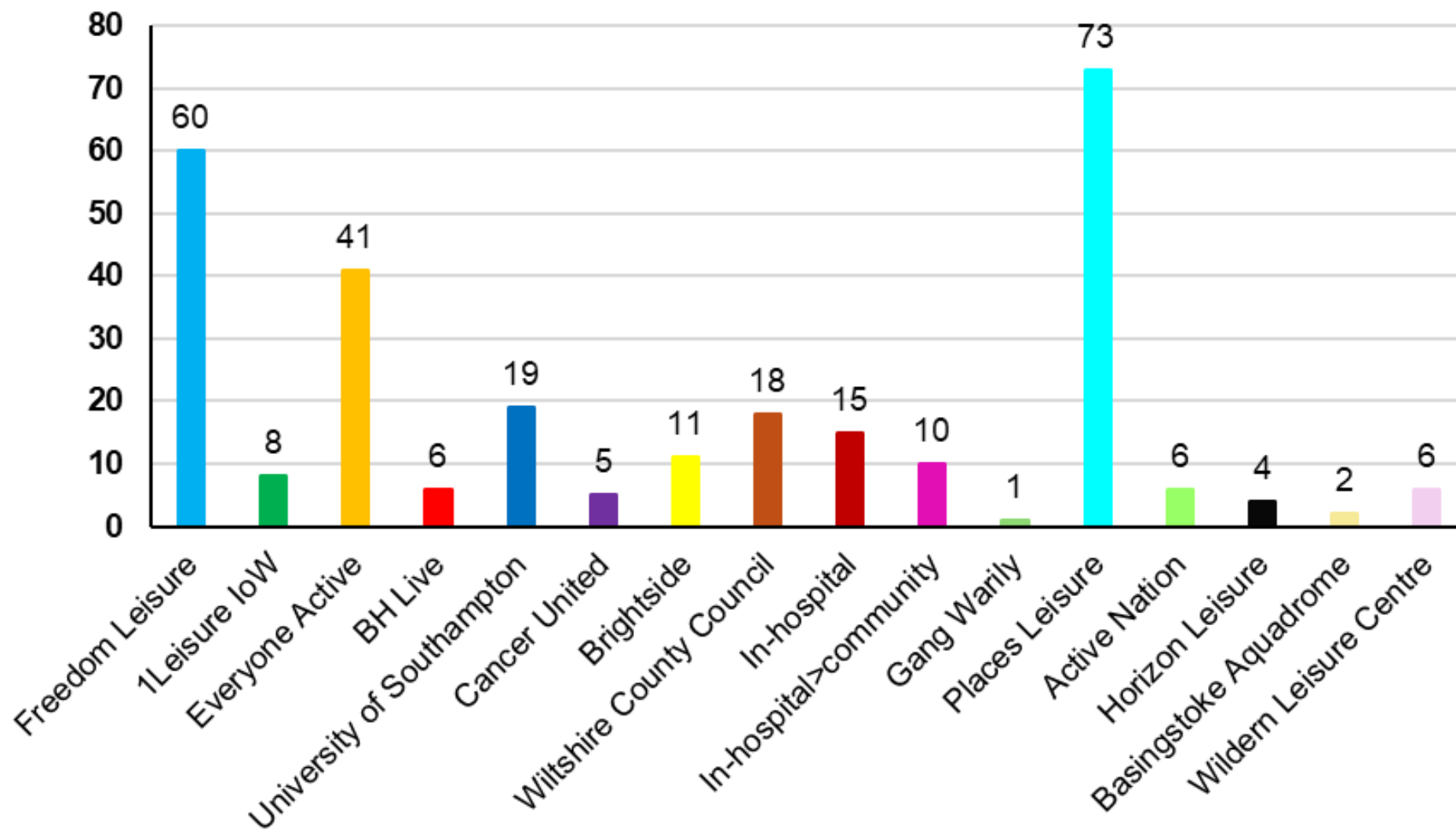
Current Geographical Reach: Wessex and Beyond



Exercise referral location



Community gym provider



Patient feedback

Service should be offered to more people and without the help from the prehab team it would have been very difficult to get through the operation.

Extremely impressed with prehab - particularly useful having supervised so didn't 'over do it' - breathing exercises at surgery school helped lots.

Excellent service - really good gym, had 3 session pre op and 3 session post op - really glad to have it in the recovery period. felt much stronger going into surgery. Would 100% recommend.

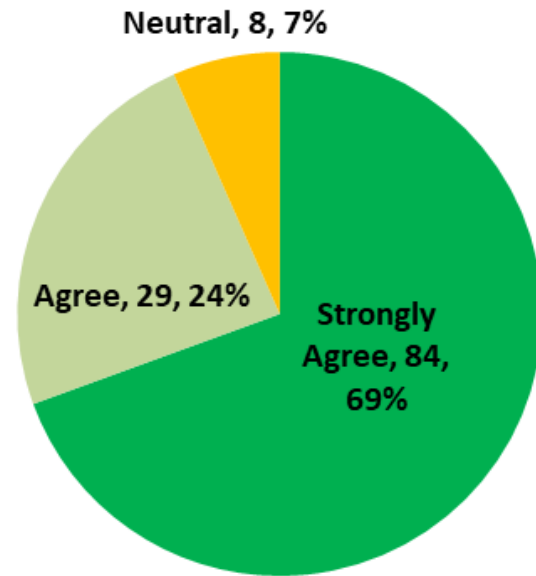
Prehabilitation at X gym was brilliant. My personal trainer was brilliant, and I felt much fitter and more prepared for my surgery. I would suggest everyone attends who's having an operation. I can't wait to start my rehabilitation with the team.

Prehab was really really useful - felt much more prepared and back to normal quicker than anticipated. Following surgery I have returned to the gym 2-3 times a week.

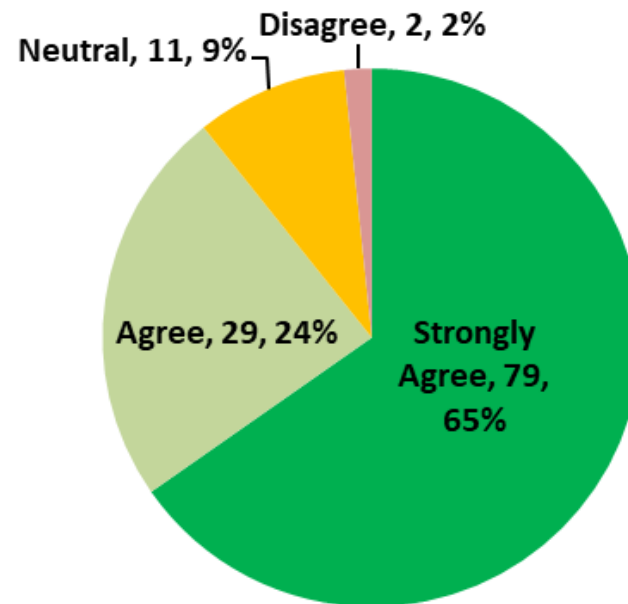
The prehab was excellent. Felt a real improvement in my fitness with the 1:2:1 sessions, and the team at X were excellent.



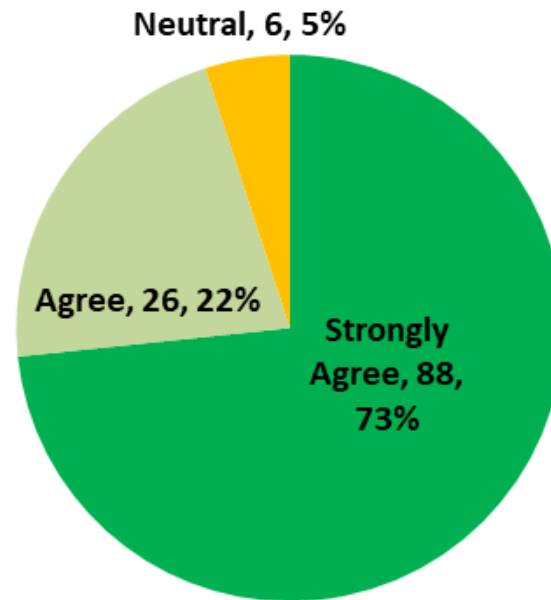
I would recommend the exercise prehab service to others preparing for surgery



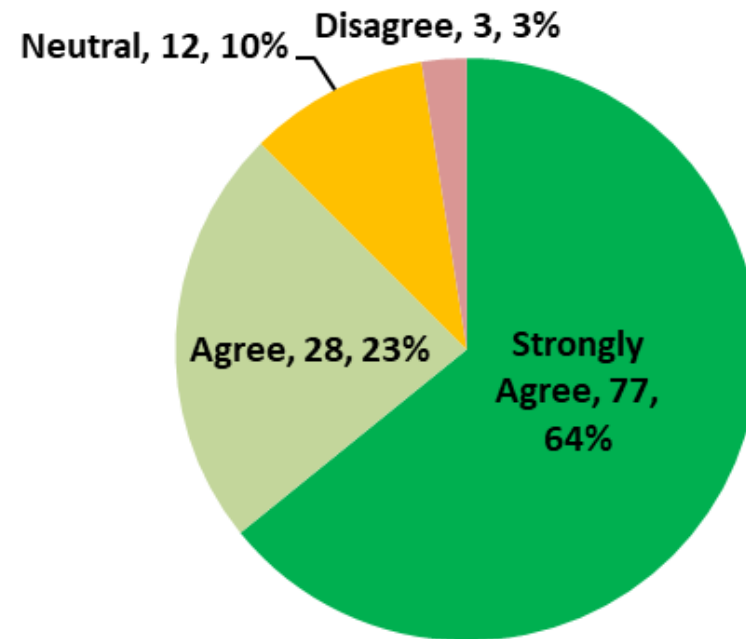
Undergoing exercise prehab was beneficial as part of my preparation for surgery



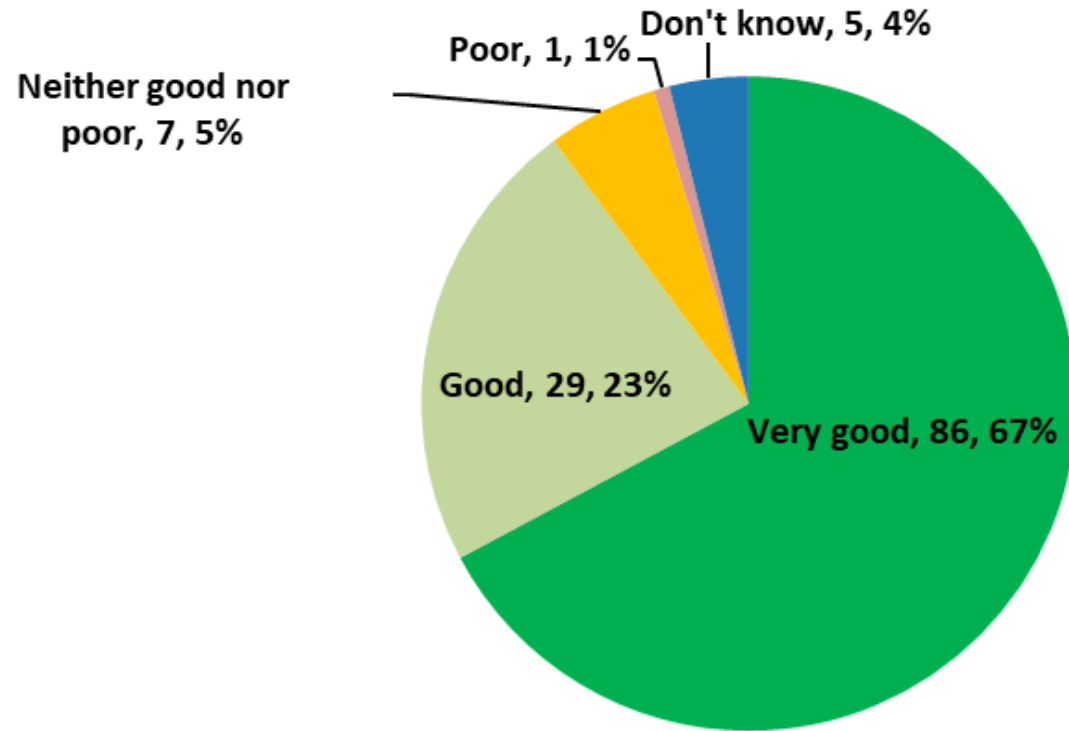
I would recommend this program to others preparing for surgery.



After the program I felt fitter and more prepared for my operation



Overall, how was your experience of our service?



Case study

Patient details

80-year-old male (59.8 kg; BMI: 19.5 kg/m²)

Rectal Cancer – consideration of surgery

PMH: CHF (LVEF 25%), ICD, HTN, ex-smoker, bilateral THR, Bell's palsy, dilated cardiomyopathy, anaemia

Meds: Aspirin, Atorvastatin, Bisoprolol, Dapagliflozin, Valsartan, Eplerenone, Metformin, Bumetanide, Tamsulosin

MyMR Digital health screen flagged cardiac history, diabetes, and a nutritional concern (weight loss)

| Function ▼ | Wellbeing ▼ | Nutrition ▼ | Chronic health ▼ |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Green No outstanding task | Green No outstanding task | Amber No outstanding task | Amber No outstanding task |

Initial CPET

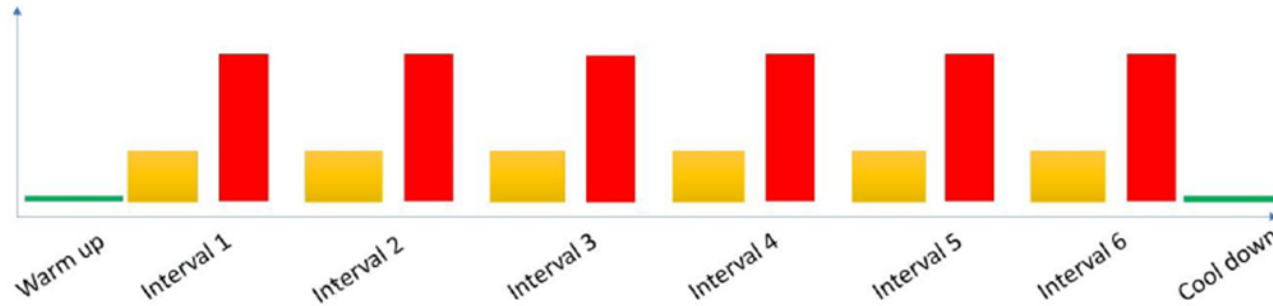
| Date | VO ₂ peak ml/kg/min l/min | AT ml/kg/min l/min | V _E /VCO ₂ | Peak WR (Watts) | Risk Profile |
|------------|--|--------------------------|----------------------------------|--------------------|--------------|
| 15/07/2024 | 14.0 0.84 | 8.0 0.48 | 47.7 | 49 | High Risk |

Exercise intervention

Exercise Prehabilitation Prescription

Evidence shows performing high intensity interval training (HIIT) prior to surgery improves aerobic fitness and surgical recovery.

Your exercise training sessions should prioritise increasing cardiorespiratory fitness. Below is a CPET guided interval HIIT session based on power output (Watts)*. We advise this forms most of your exercise training programme.



| Phase | Duration | Work rate | Heart rate | RPE ^a | |
|-----------------------|---------------|-----------|------------|---------------------------|-----|
| Warm up | 5 minutes | X Watts | | | |
| Main Set [#] | Low Interval | 3 minutes | X Watts | 50-65% HRmax ^b | 4-5 |
| | High Interval | 2 minutes | X Watts | 75-85% HRmax | 7-9 |
| Recovery | 5 minutes | X Watts | | | |

[#]Main set: 4-6 x5-minute intervals [Interval= 3 minutes Low Interval & 2-minutes High Interval]

^aRating of Perceived Exertion (RPE) using 0-10 Scale

^bHRmax measured during CPET or can be calculated ($HR_{max} = 220 - \text{Age}$). The later should be avoided in patients on medications that modify HR, such as betablockers.

*Session can be adapted to different exercise modalities if required with exercise intensity prescribed using Rating of Perceived Exertion (RPE) and/or heart rate ranges.



Repeat CPET

| CPET Date | VO ₂ peak ml/kg/min l/min | AT ml/kg/min l/min | V _E /VCO ₂ | Peak WR (Watts) | Risk Profile |
|------------|--|--------------------------|----------------------------------|--------------------|--------------|
| 15/07/2024 | 14.0 0.84 | 8.0 0.48 | 47.7 | 49 | High Risk |
| 31/10/2024 | 15.9 0.97 | 9.7 0.59 | 43.3 | 64 | High Risk |

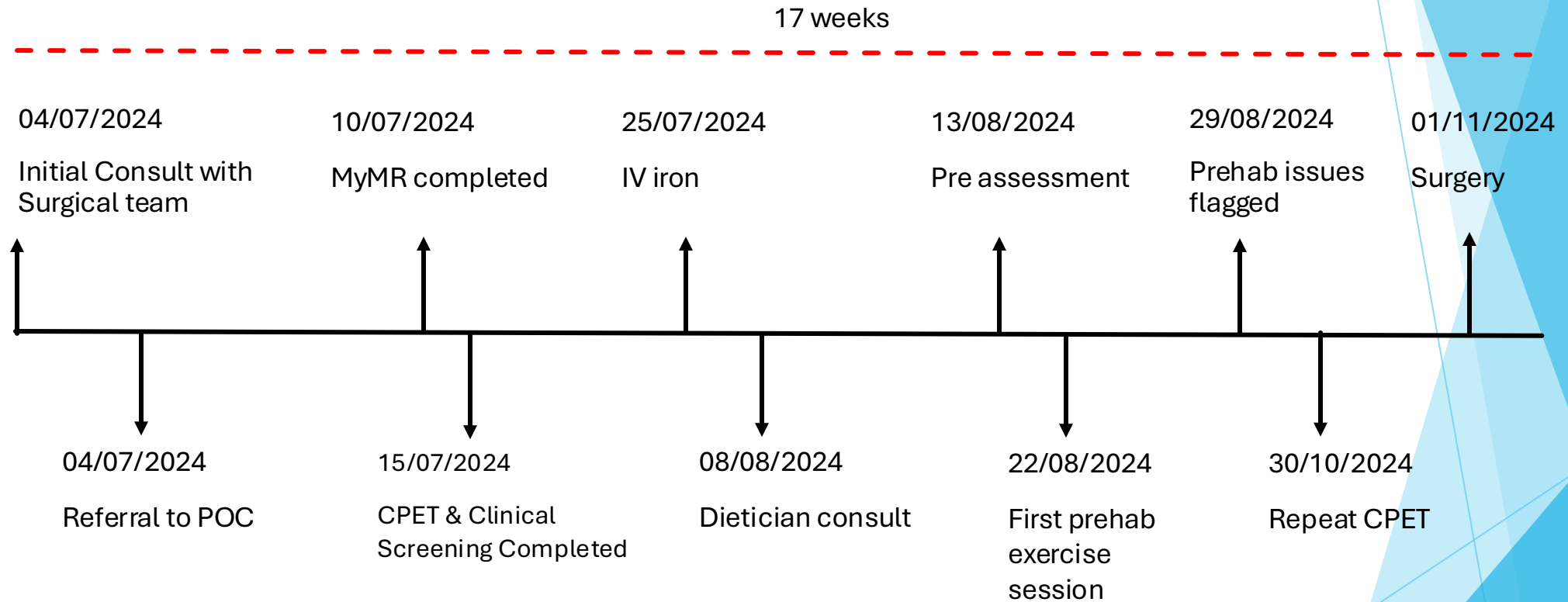
- ▶ VO₂ peak ↑ 13%
 - ▶ 21% ↑ AT
 - ▶ 9% ↓ Ve/VCO₂ (more efficient)
 - ▶ 30% ↑ Peak WR
 - ▶ Weight ↑ 59 to 61 kg
- After Prehab

MDT working

▶ Referred to:

- Dietician for review
 - ONS prescribed
 - Continued diabetes management
- POAS for IDA post CPET
 - i.v. iron administered
- Co-morbidity optimisation
 - Hypotension in context of heart failure
 - Referred to HF assessment unit for BP and medication review

Timeline



Outcome and summary

- ▶ Surgery- 01/11/2024 having previously been deemed too high risk.
- ▶ Uneventful recovery and discharged within 48 hours.
- ▶ Great example of multidisciplinary team working.
- ▶ Multi-modal, needs-based prehab works!

Exercise- Key message

Even for people with symptoms of multiple long term health conditions, the benefits of physical activity and exercise far outweigh the risks!

Reid H, Ridout AJ, Tomaz SA on behalf of the Physical Activity Risk Consensus group, *et al* Benefits outweigh the risks: a consensus statement on the risks of physical activity for people living with long-term conditions *British Journal of Sports Medicine* 2022;**56**:427-438.

Effects of Exercise on Health-Related Outcomes in Those with Cancer

What can exercise do?

- **Prevention of 7 common cancers***

Dose: 2018 Physical Activity Guidelines for Americans: 150-300 min/week moderate or 75-150 min/week vigorous aerobic exercise









- **Survival of 3 common cancers****

Dose: Exact dose of physical activity needed to reduce cancer-specific or all-cause mortality is not yet known; Overall more activity appears to lead to better risk reduction

*bladder, breast, colon, endometrial, esophageal, kidney and stomach cancers

**breast, colon and prostate cancers

Overall, avoid inactivity, and to improve general health, aim to achieve the current physical activity guidelines for health (150 min/week aerobic exercise and 2x/week strength training).

| Outcome | Aerobic Only | Resistance Only | Combination (Aerobic + Resistance) |
|---|--|--|---|
| Strong Evidence | Dose | Dose | Dose |
|  Cancer-related fatigue | 3x/week for 30 min per session of moderate intensity | 2x/week of 2 sets of 12-15 reps for major muscle groups at moderate intensity | 3x/week for 30 min per session of moderate aerobic exercise, plus 2x/week of resistance training 2 sets of 12-15 reps for major muscle groups at moderate intensity |
|  Health-related quality of life | 2-3x/week for 30-60 min per session of moderate to vigorous | 2x/week of 2 sets of 8-15 reps for major muscle groups at a moderate to vigorous intensity | 2-3x/week for 20-30 min per session of moderate aerobic exercise plus 2x/week of resistance training 2 sets of 8-15 reps for major muscle groups at moderate to vigorous intensity |
|  Physical Function | 3x/week for 30-60 min per session of moderate to vigorous | 2-3x/week of 2 sets of 8-12 reps for major muscle groups at moderate to vigorous intensity | 3x/week for 20-40 min per session of moderate to vigorous aerobic exercise, plus 2-3x/week of resistance training 2 sets of 8-12 reps for major muscle group at moderate to vigorous intensity |
|  Anxiety | 3x/week for 30-60 min per session of moderate to vigorous | Insufficient evidence | 2-3x/week for 20-40 min of moderate to vigorous aerobic exercise plus 2x/week of resistance training of 2 sets, 8-12 reps for major muscle groups at moderate to vigorous intensity |
|  Depression | 3x/week for 30-60 min per session of moderate to vigorous | Insufficient evidence | 2-3x/week for 20-40 min of moderate to vigorous aerobic exercise plus 2x/week of resistance training of 2 sets, 8-12 reps for major muscle groups at moderate to vigorous intensity |
|  Lymphedema | Insufficient evidence | 2-3x/week of progressive, supervised program for major muscle groups does not exacerbate lymphedema | Insufficient evidence |
| Moderate Evidence | | | |
|  Bone health | Insufficient evidence | 2-3x/week of moderate to vigorous resistance training plus high impact training (sufficient to generate ground reaction force of 3-4 time body weight) for at least 12 months | Insufficient evidence |
|  Sleep | 3-4x/week for 30-40 min per session of moderate intensity | Insufficient evidence | Insufficient evidence |

Citation: bit.ly/cancer_exercise_guidelines

Moderate intensity (40%-59% heart rate reserve or VO_{2R}) to vigorous intensity (60%-89% heart rate reserve or VO_{2R}) is recommended.

Hot off the Press!

The CHALLENGE Trial

EXERCISE SAVES LIVES

Findings from a 15-Year
Colon Cancer Study

Exercise as a Cancer Therapy

- Colorectal ca is the 3rd most common ca worldwide
- High recurrence rates despite surgery and chemo
- New recurrence-prevention strategies are needed

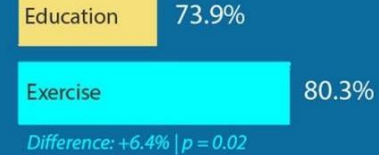
ASCO 2025 Spotlight

- Abstract ID: LBA4319
- Presented #ASCO25
- Simultaneous in NEJM

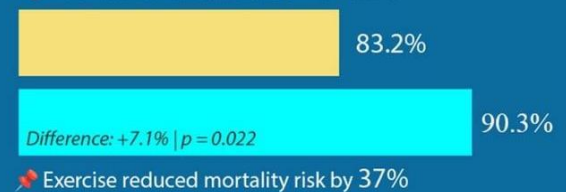
CHALLENGE Trial Design

- 889 total patients
- Stage III or high-risk stage II colon cancer
- Median age: 61
- Women: 51%
- Exercise group (N=445)
Structured exercise for 3 years
- Education group (N=444)
Received only educational brochures
- Moderate-intensity aerobic exercise equivalent to 150-180 minutes walking/week

Disease-Free Survival (DFS) – 5 Years



Overall Survival (OS) – 8 Years



Improvement in Functionality

SF-36 Physical Function Score

| Time Point | Exercise | Control | Difference |
|------------|----------|----------|------------|
| 6th month | +7.1 pts | +1.3 pts | +5.8 pts |
| 3rd year | +6.1 pts | +3.0 pts | +3.1 pts |

6-minute walk distance: +30 meters

Biological Effects of Exercise

- Lowers insulin and IGF levels
- Suppresses systemic inflammation
- Boosts immune system activity
- Inhibits micrometastases
- Reduces tumor angiogenesis

drozdogan.com 2025

Conclusion

Exercise should be **part of the standard care** in colon cancer treatment.

2025 ASCO ANNUAL MEETING

First Author:
Christopher Booth



Service summary

- Early health screening is important to flag areas of optimisation in a timely manner.
- Patients do not want to travel far for exercise prehabilitation.
- They like and benefit from supervised exercise sessions in the community.
- They would like earlier referrals and greater duration of exercise prehab.
- As a service we want to be able to offer these services to more cancer patients and ultimately 'Prehab for all'.
- Exercise interventions should be standard care.
- Multidisciplinary team approach is vital to be able to implement multi-modal Prehabilitation interventions.

Questions?