

# Prehabilitation

for health professionals



**PLANT-BASED**  
Health Professionals UK

Promoting Sustainable Health and Nutrition

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**Prehabilitation** is the process of getting people as healthy as possible before surgery.

The emerging evidence for prehabilitation is promising, showing *shorter hospital stays, reduced readmission rates, reduced dependence on social care, and faster functional recovery.*

## The need for prehabilitation

**As more people are living longer, the need for surgery is increasing and will continue to rise.**

People are also becoming more 'high risk' - elderly, frail, or with chronic conditions like diabetes, lung or heart disease - making complications from surgery more likely.

Lifestyle factors, such as poor fitness levels, smoking, excessive alcohol consumption and malnutrition, can also make people 'high risk.'

Complications affect **15-40%** of people having surgery, and lead to them staying **2 to 4** times longer in hospital.

Prehabilitation may benefit all patients, but the impact is greatest on those deemed 'high risk.'

## Physiology of surgery

### Inflammation

Major surgery causes a widespread stress response in the body. This results in inflammation and an increased need for oxygen.

### Increased oxygen requirements

The heart and lungs must work harder to meet the extra oxygen demand. This increased oxygen requirement also continues into the recovery period following surgery.

General anaesthesia and therapies like intravenous fluids and oxygen also place further pressure on the heart and lungs.

### Increased energy requirements

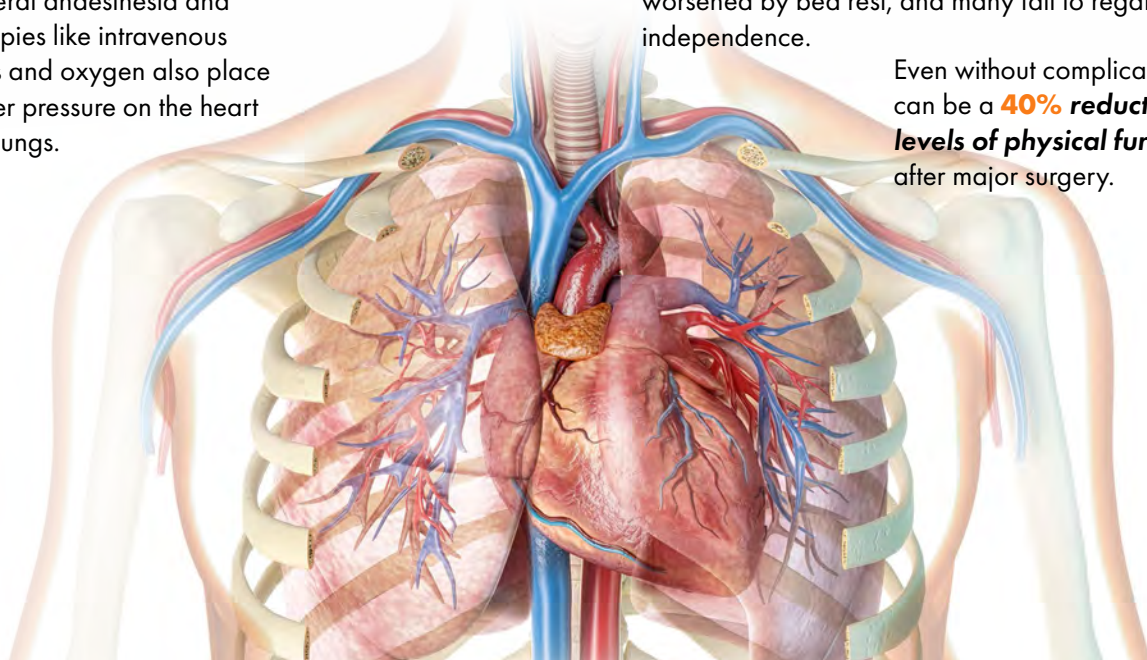
To overcome these stresses, the body needs more energy. Energy is also needed to fight infections and repair tissues.

The body starts to break down muscle and use the protein as extra fuel.

### Reduced levels of functioning

Muscle loss reduces levels of physical functioning. It's worsened by bed rest, and many fail to regain their independence.

Even without complications, there can be a **40% reduction in levels of physical functioning** after major surgery.



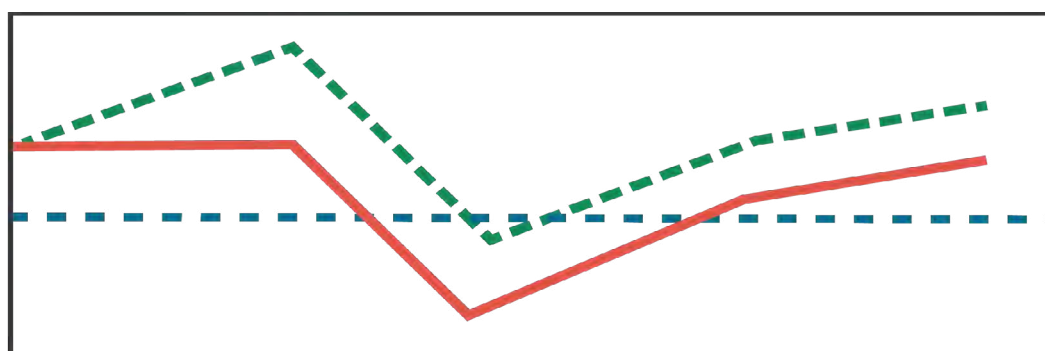
## Benefits of prehabilitation

In prehabilitation, you *train yourself for surgery in the same way you would train for a marathon.*

Prehabilitated patients *cope better* with the strain of surgery, recover more rapidly and *retain* more of their functional ability after their operation.

It also *reduces* the number of complications after surgery and shortens hospital stays.

Minimal level of functional ability



Prehabilitation is a *proactive approach* which enables people to participate in their own care.

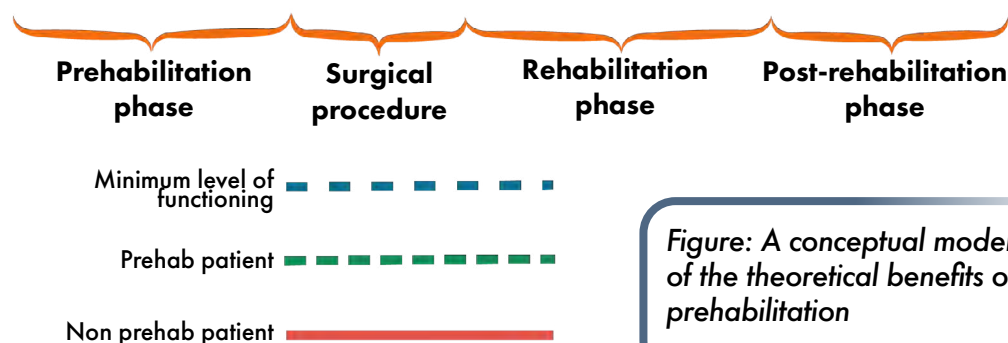


Figure: A conceptual model of the theoretical benefits of prehabilitation

## Other benefits of prehabilitation:

**Empowers people** by helping them regain some control over their own outcomes

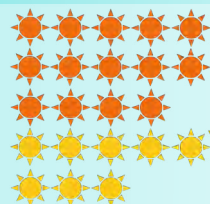
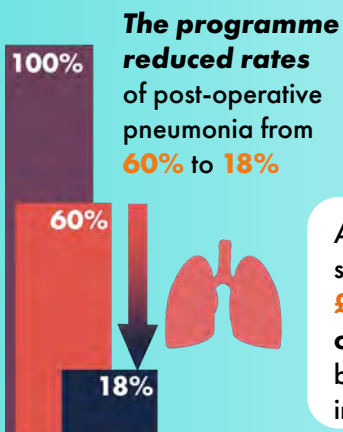
**Makes use of** waiting times as an opportunity to implement healthy behaviour changes

**Gives tools to develop** healthy habits, which are often continued and lead to lasting lifestyle changes

**Brings about** improvements in as little as 2 weeks, allowing it to be used in people who need surgery as soon as possible

## Case study: PREPARE

The four-week long **PREPARE programme** at Imperial College optimised physical activity, diet, psychosocial wellbeing and medications of people undergoing surgery for cancers of the oesophagus.



Median length of stay dropping from **14 days** to **8 days**.

Analysis of this programme showed that for a **cost of £20,900** per year, **savings of £265,000** per year could be obtained as a result of the improved outcomes.



It has now expanded to work with urological and lung cancer patients and is being adapted from a 4-week to a 2-week timeline.



## What's involved

**Prehabilitation programmes mostly focus on the 3 domains of exercise, nutrition and psychological wellbeing.**

Programmes can vary greatly, depending on the type of surgery and resources available.

Some programmes may only involve 1 or 2 domains, but multimodal programmes that incorporate all 3 domains are more effective.

They may also include respiratory exercises, smoking cessation, alcohol reduction, and optimisation of any concurrent diseases.

## Physical activity

**Exercise improves endurance, dampens the stress response in the body, and shortens recovery times.**

**Two types of exercise should be performed. They can be performed for around 150 minutes per week.**

- 1 **Aerobic exercise** improves the ability of the heart and lungs to deliver oxygen during surgery.

*Examples: walking, cycling*

- 2 **Strength training** builds muscle mass and helps offset the muscle protein lost. It also allows a faster return to carrying out daily activities.

*Examples: weight training, use of resistance bands*

Recently, carefully designed and supervised **high intensity interval training (HIIT)** regimes have generated much interest as a time-efficient way for effective exercise training before surgery.

## Respiratory exercises

**Lung complications, such as collapsed small airways and pneumonias, are common after major operations.**

**Respiratory exercises improve lung function and can help open up the airways and move phlegm after an operation.**

**They can be performed for 5-10 minutes, as often as every 2 hours, or less frequently such as once or twice a day.**

**Examples:**

- deep breathing
- breath holding
- cough training
- using equipment like a spirometer or blowing up a balloon



## Nutrition

**The goal of nutritional prehabilitation is to optimise nutrient stores so that the body can meet the increased requirements of surgery.**

**Good nutrition** ensures muscle mass and immune function are **preserved** during the recovery period.

**Poor nutrition** is associated with **worse** outcomes, such as longer hospital stays and more complications like wound infections.

### Examples:

- *Dietary changes decreasing high calorie and fatty foods, and increasing fruit and vegetables*
- *Using nutritional supplements as recommended by your healthcare professional*
- *Aiming for double the normal protein requirement, i.e. 1.5 g per kg of ideal body weight*
- *Blood tests looking for vitamin and mineral deficiencies*
- *Eating more immune strengthening foods that contain omega 3 fatty acids*

### A note on weight

**The biggest risk from surgical complications comes from being underweight.**

Interestingly, obese people have better survival after operations than normal weight people, as long as their BMI is not above 40. This is known as the **obesity paradox**.

However, obesity **causes more** wound infections, longer operations and more blood loss when compared to people with a normal BMI of 18.5 - 24.9.

## Smoking cessation

**The effects of cigarette compounds like carbon monoxide and nicotine disappear from the body in as little as 24 to 48 hours.**

The longer you stop smoking, the better. People who stop smoking at least **1 month** before surgery **have better outcomes**.

## Psychological wellbeing

**Psychological support aims to reduce anxiety, as well as increase self-confidence, motivation and adherence to programme content.**

**Reducing psychological stress** is beneficial for immunity and wound healing. It can also improve fatigue and mood as well as performance in rehabilitation after surgery.

**Stress management** can include relaxation training, guided imagery, problem solving and coping strategies, and music therapy.

## Alcohol

**Alcohol impairs the heart and increases the risk of bleeding, post-operative infections and heart and lung complications.**

Alcohol also interferes with certain blood thinning medications (anti-coagulants) that may be used after surgery.

**The rate of complications goes up the more alcohol you drink.**

Eliminating alcohol for as little as **4 weeks** has been shown to have a **beneficial effect** on complication rates.

## Optimisation of chronic conditions

**Chronic conditions, like heart and lung disease, diabetes and high blood pressure, increase the risk of heart attacks, strokes and pneumonia after an operation.**

Anaemia is also common in patients undergoing major surgery.

For these reasons, **optimising** chronic conditions with medications is included in many prehabilitation programmes.





## Building better health with a whole food plant-based diet

### Plant foods can add several benefits.

#### Plant foods reduce inflammation in the body

Animal derived foods cause inflammation in the body, whereas **plant foods reduce it**. It is best to have as little inflammation as possible at the time of surgery.

#### Plant foods are nutrient dense

They are **low in calories**, and full of **antioxidants**, **vitamins** and **minerals** that your body needs to **repair** and **recover**.

#### Plant foods contain all essential amino acids

By eating a combination of fruits, vegetables, legumes and whole grains, you can easily **meet** your **protein** targets.

#### Plant foods improve chronic conditions

Heart disease, diabetes, high blood pressure, and high cholesterol are all improved on a plant-based diet, **reducing the risk of complications**.

#### Plant foods strengthen your immunity

Fruits and vegetables consumption have been linked to **fewer infections** with cold viruses and influenza. Foods like flax seeds, chia seeds and walnuts have high amounts of omega 3 fatty acids which **support** the **immune system**.

#### Plant foods reduce cancer risk

Animal foods raise levels of IGF-1, a hormone that **fuels** all types of cancer. IGF-1 levels are **reduced** on a plant-based diet.

#### Plant foods promote a healthy gut biome

Healthy gut bacteria produce short-chain fatty acids which **strengthen** immunity, **fight** inflammation and cancer.



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