

Exercise Medicine for Students

A one-stop resource for the knowledge
and promotion of physical activity



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Contents

Introduction.....	4
Chapter 1 The UK Physical Activity Guidelines.....	5
The Evidence of the Health Benefits of Physical Activity	6
Chapter 2 Cancer	7
Chapter 3 Cardiovascular Health	10
..... <i>Ischaemic Heart Disease</i>	10
..... <i>Heart failure</i>	11
..... <i>Hypertension</i>	11
..... <i>Lipids</i>	12
..... <i>Peripheral Arterial Disease</i>	13
..... <i>Stroke</i>	13
Chapter 4 Type 2 Diabetes	15
Chapter 5 Mental Health.....	17
..... <i>Depression</i>	17
..... <i>Anxiety</i>	17
..... <i>Schizophrenia</i>	17
..... <i>Sleep and psychological well-being</i>	18
..... <i>Dementia</i>	18
Chapter 6 Musculoskeletal Health.....	20
..... <i>Fibromyalgia</i>	20
..... <i>Osteoarthritis</i>	20
..... <i>Osteoporosis</i>	21
..... <i>Rheumatoid Arthritis</i>	22
..... <i>Prevention of falls and fracture</i>	23
Chapter 7 Obesity.....	24
Chapter 8 Chronic Obstructive Pulmonary Disease (COPD).....	28
Chapter 9 Exercise during Pregnancy.....	30
Chapter 10 Surgery and Exercise.....	33
Chapter 11 Sedentary Behaviour	35
Chapter 12 Motivation to Change Health Behaviour	37
Motivational Interviewing (MI) by Prof S Rollnick.....	37
Example MI Dialogue. By Prof S Rollnick	38
Chapter 13 Starting to Exercise	42

Getting Started.....	45
The Referral Pathway	46
Absolute Contraindications of Exercise	47
Case histories.....	48
Case 1 Hypertension or Not?	48
Case 2 Depression.....	49
Case 3 Obesity.....	49
References.....	50
Introduction	50
Chapter 1 The UK Physical Activity Guidelines	50
Chapter 2 Cancer	50
Chapter 3 Cardio Respiratory Health	52
Chapter 4 Type 2 Diabetes	53
Chapter 5 Mental Health	54
Chapter 6 Musculoskeletal Health.....	56
Chapter 7 Obesity.....	58
Chapter 8 Respiratory disease.....	59
Chapter 9 Pregnancy	60
Chapter 10 Surgery.....	60
Chapter 11 Sedentary Behaviour.....	61
Chapter 12 Motivation	61
Chapter 13 Starting to exercise	62

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“If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health”

Hippocrates 460-377 BC

Introduction

Primarily designed for General Practitioners and their teams and based on a comprehensive research approach, the purpose of this document is to give all health professionals the tools and information to enable them to educate, motivate and encourage patients about the benefits of physical activity.

Why encourage physical activity?

- The World Health Organisation ranks physical **inactivity** as the **fourth largest cause of global mortality**.¹
- In the UK 60-70% of our population take insufficient exercise.²
- Physical inactivity is linked with many chronic health problems including cardiovascular diseases, type 2 diabetes, obesity, cancer, dementia, depression and osteoporosis.²
- The present cost of physical inactivity in the UK and the NHS, when indirect costs to the economy are added to health costs, has been estimated to be £8.2 billion.³
- Physical activity is known to be essential for improved health, preservation of function and there is evidence of prolonged life resulting from as little as 15 minutes of regular and moderate daily exercise.⁴
- Long term studies of men and women in the USA have shown a positive linear relationship between physical activity and health and conversely, a low cardio respiratory fitness level as the largest attributable factor for all causes of death.⁵
- **Physical inactivity kills more than smoking, diabetes and obesity combined.**⁵
- Exercise as prevention or as a treatment now features in 39 UK national guidelines.⁶

Chapter 1 The UK Physical Activity Guidelines

This summary of the guidelines is drawn from the 2011 updated UK Physical Activity Guidelines supporting documents,^{1,2} and the British Association of Sport and Exercise Scientists consensus report.³

The **UK Physical Activity Guidelines advice for adults (19-65)** recommend:

- Aim to be active daily. Activity should add up to over 150 minutes per week by participating in at least 30 minutes of **moderate** intensity physical activity on 5 or more days a week, or in multiple bouts of 10 minutes or more.
- Comparable benefits can be achieved through **vigorous** activity of 75 minutes a week, or in a combination of moderate and vigorous activity.
- Adults should also undertake physical activity to improve **muscle strength** on at least two days a week.
- All adults should **minimize** extended **sedentary** (sitting) periods.

-**Moderate intensity** physical activity causes adults to feel warmer, breathe harder and the heart beats faster, with the example of brisk walking being the easiest to recognize.

-**Vigorous intensity** physical activity causes adults to get warm quickly, breathe much harder, perspire and find it difficult to maintain a conversation.

Depending on body weight, 150 minutes of moderate aerobic activity or 75 minutes of vigorous activity will expend about 800-1200 kcal.³

The dose-response relationship between physical activity and health is clear across all ages and there are therefore guidelines for all ages of life. The main differences are summarized below.

- **UK Guidelines for Under-fives not yet walking**
Physical activity should be encouraged from birth, particularly through floor based play and water based activities in safe environments. All under 5s should minimize the time spent being sedentary (restrained or sitting) for extended periods (except sleeping).
- **UK Guidelines for Under-fives capable of walking**
180 minutes (three hours) – each day, once a child is able to walk.
For non-walkers, physical activity should be encouraged from birth, particularly through floor-based play and water-based activities in safe environments.
- **UK Guidelines for Children and young people (5-18 year olds)**
There is a greater emphasis on encouraging 60 minutes a day and up to several hours every day of moderate to vigorous intensity physical activity. Three days a week should include vigorous intensity activities that strengthen muscle and bone. This age group should also minimize the amount of time spent being sedentary (sitting) for extended periods.

- **UK Guidelines for Older people (65+)**

150 minutes (two and half hours) – each week of moderate to vigorous intensity physical activity (and adults should aim to do some physical activity every day). Muscle strengthening activity should also be included twice a week. Any individual at risk of falling should incorporate activity to improve balance and coordination on at least two days a week. All adults should also minimize the amount of time spent being sedentary (sitting) for extended periods.

For most health outcomes, additional benefits occur as the amount of physical activity increases via increased intensity, frequency and or duration.

The Evidence of the Health Benefits of Physical Activity

The UK guidelines were drawn up to promote physical activity because of the overwhelming evidence of the health benefits. The following chapters present the evidence of the main health benefits in brief key messages for undergraduate health professionals. This evidence summary was initially drawn from the 2011 updated UK Physical Activity Guidelines supporting documents,^{1,2} the British Association of Sport and Exercise Scientists consensus report³ and large scale reviews from USA,⁴ Canada,⁵ Sweden,⁶ and Denmark,⁷ which have used major systemic reviews, meta-analysis and consensus statements to reach their conclusions. Major reviews up to July 2015 have now been included.



Chapter 2 Cancer

Cancer develops at a cellular level influenced by genetic, environmental and lifestyle factors via a number of interacting biological mechanisms.

A sedentary lifestyle is now widely recognised as a key component in the risk factors of several cancers.

There is clear data for the positive effects of physical activity both on the prevention of some cancers and on clinical outcomes after diagnosis.

1. **Colon cancer.** There is strong evidence that physically active men and women have a 30-40% lower risk of colon cancer compared to inactive individuals. ¹⁻⁵
 - Studies indicate a positive dose-response relationship so that the longer the duration and the higher the intensity of physical activity, the better the protective effect found for colon cancer. ⁴
 - Likely biological mechanisms of physical activity reducing the risk of colon cancer include a reduced intestinal transit time, increased insulin sensitivity and cell proliferation of the intestinal epithelium. ^{6,7}

2. **Breast cancer.** Physically active women have a 20-30% lower risk of breast cancer, with the evidence strongest in post menopausal women. ¹⁻⁵
 - Likely mechanisms include the impact of physical activity on the metabolism of sex hormones. High oestrogen levels are associated with breast cancer and physical activity reduces the cumulative oestrogen dose that women experience via a number of pathways. ⁴

3. **Endometrial cancer.** There is moderate evidence of a 30% lower risk of endometrial cancer. ^{2-4,8}
 - High levels of oestrogen are also associated with uterine cancers. A potential mechanism for the lower risk with increased physical activity is the lower lifetime accumulation of oestrogen. Increased insulin sensitivity is also thought to contribute. ⁴

4. **Prostate cancer.** There is moderate evidence of a lower risk of high grade prostate cancer, but with higher doses of activity required. ^{4,5}
 - 30 minutes or more of walking or cycling per day during adult life is associated with a reduced incidence of prostatic cancer. Compared to those who did 30 minutes of walking or cycling per day, *every additional 30 minutes reduces the risk of prostate cancer by 7%*. ⁹
 - Plausible mechanisms include the effect of physical activity on testosterone and insulin sensitivity. ⁴

5. **Lung cancer.** There is some evidence of a lower risk of lung cancer, but the problems of adjusting for the risk factor of smoking makes it difficult to draw firm conclusions. ^{2,4}
 - Potential mechanisms relate to how physical activity affects the time that potential carcinogens are in contact with lung cells through improved blood capacity and blood flow.

6. **Oesophageal cancer.** There is emerging evidence based on meta-analysis of observational studies that the risk of oesophageal adenocarcinoma may be 21-32% lower in the most physically active people compared to the least.^{10, 11} It remains unclear which type, intensity, frequency and time period of physical activity is required to achieve a risk reduction.
7. **Gastric cancer.** Meta-analysis of observed studies has also suggested that gastric cancer risk may be 13-28% lower in the most physically active people compared to the least.^{10,12,13,14} As with oesophageal cancer, the evidence of required doses of physical activity are needed to prove the observed associations.

Physical activity pre treatment: Pre surgical exercise, through aerobic, resistance or pelvic floor training, may benefit cancer patients through effects on function and cardiovascular and pulmonary fitness with significant improvements shown in:¹⁵

- Rates of incontinence in prostate cancer
- Functional walking capacity
- Cardiorespiratory fitness

Physical activity during treatment: Although patients often feel unwell before or during treatment for cancer, we know that physical activity during treatment:^{16 - 19}

- Significantly improves fitness and muscle strength
- Shows small improvements in anxiety levels and self esteem
- Shows no worsening of fatigue levels and some small evidence of an improvement
- Increases lean muscle mass
- Improves arm function with no worsening of lymph oedema in breast cancer patients

Physical activity after treatment: Patients often experience loss of physical function as a result of their cancer treatments, but evidence shows that physical activity after treatment can improve several aspects:^{16, 17, 20}

- Increase in fitness and muscular strength
- Reduced fatigue
- Improvements in quality of life, anxiety and depression
- Some reductions in body fat and increase in muscle mass

Physical activity has been shown to improve cancer patients' quality of life during both the treatment and rehabilitation phase and should therefore be encouraged.^{7, 9, 21 - 24}

Physical activity and survival rates: A number of recent studies have looked at whether physical activity benefits actual cancer survival, something that had previously been uncertain. There are three meta-analyses available on either breast,²⁵ colon²⁶ or both types of cancer.²⁷ Each has shown an inverse relationship between physical activity and mortality in patients going on to develop breast or colon cancer. With survivors of breast and colon who increased their physical activity from any level from pre to post diagnosis, a decreased mortality risk of 39% was shown.²⁷

NICE guidelines CG80 (2009)²⁸ and CG81 (2014)²⁹ back up the advice to patients with early and advanced breast cancer, that we should provide the information and access to an exercise programme to help with cancer related fatigue, lymph oedema and quality of life.

Safety considerations during and after treatment³⁰

To avoid symptom exacerbation

- Modify exercise
- Start moderately and progress slowly

During immunosuppression

- Avoid high load/intensity
- Monitor bloods

To prevent falls

- Practice balance exercises
- Practice strength exercises

For patients with lymph oedema

- Progress slowly
- Wear compression garments

Contraindications

Disease or treatment causing Hb < 80 g/L, wbc < 0.5x10⁹/L , or platelets < 60 x 10⁹ (4)

Chapter 3 Cardiovascular Health

- *Ischaemic heart disease*

Primary prevention: There is a clear inverse relationship between physical activity and cardiovascular disease which is dose responsive. The reduction in cardiovascular mortality is of the order of 20-35%, depending on the level of physical fitness. ¹

Mechanisms which contribute to this effect are multiple: ^{2,3}

- Direct actions on the heart (increasing myocardial oxygen supply, myocardial contraction and electrical stability)
- Increased high density lipids
- Decreasing harmful low density cholesterol
- Lower blood pressure
- Decreased blood coagulability
- Improved insulin sensitivity

Secondary prevention: in established heart disease, regular adapted exercise is required to reduce mortality, and habitual physical activity has been shown to reduce all-cause mortality by 25-30%. ⁴ The evidence of cardiac rehabilitation if it is used, is associated with a reduction in morbidity, cardiac mortality (26-36%), total mortality (13-26%) and reduces hospital readmissions (28-56%).⁵ Despite this, 55% of adults in the UK having had a cardiac event do not attend cardiac rehabilitation exercise programmes. ⁶

NICE guideline CG172 on secondary prevention for patients following a myocardial infarct ⁷ recommend:

- Offer cardiac rehabilitation programmes designed to motivate people to attend and complete the programme. Explain the benefits of attending
- Patients should be advised to undertake regular physical activity sufficient to increase exercise capacity
- They should be advised to be physically active for 20-30 min a day to the point of breathlessness
- Patients not achieving this should be advised to increase their activity in a gradual step-by-step way, aiming to increase their exercise capacity
- They should start at a level that is comfortable, and increase the duration and intensity as they gain fitness
- The benefit of exercise may be enhanced by tailored advice from a suitable qualified professional

Contraindications

Heart disease: Acute myocardial infarction or unstable angina until stable for at least 5 days, dyspnoea at rest, pericarditis, myocarditis, endocarditis, symptomatic aortic stenosis. ^{8,9}

- **Heart failure**

Trials support the evidence of the beneficial effect of physical activity training in patients with stable heart failure in NYHA class I, II and III. ^{8, 10, 11}

Although there is no evidence of increased or decreased all cause mortality in the short term (up to 12 months), the benefits of exercise have been shown by meta-analysis to;^{11, 12, 13}

- Physiologically increase VO2 max
- Functionally increase walking speed and tolerance
- Significantly reduce hospital admissions
- Improve quality of life.
- And have an emerging trend towards reducing mortality in trials longer than 1 year.¹¹

NICE guideline CG 10 ¹⁴ on chronic heart failure recommend:

- Offer a supervised group exercise-based rehabilitation programme designed for patients with heart failure
- Patients should be stable
- This can be incorporated within an existing cardiac rehabilitation programme

Contraindications

Heart failure which is uncontrolled or NHHA class 1V ¹⁰

- **Hypertension**

The evidence supports an inverse relationship between physical activity and the incidence of hypertension. Apart from prevention, it is also effective in treatment with clinically relevant reductions in blood pressure.

- The acute effect of physical activity causes a decrease in blood pressure lasting 4-10 hours, but may last up to 22 hours; thus daily activity may achieve clinically significant improvement ^{1, 15}
- For a long term effect, regular exercise is required
- The effect seems to be greatest in those with established hypertension
- Inactive individuals have a 30-50% increased risk of hypertension ¹⁶
- Review data support the observation that physical activity training in hypertensive patients can show a reduction of 7 / 5 mmHg in systolic and diastolic blood pressure respectively ¹⁷
- The main recommendation is for aerobic fitness training but dynamic resistance and isometric resistance at moderate intensity training is also beneficial ^{18, 19, 20}
- Reductions of this magnitude have important clinical implications
 1. They are of a similar magnitude to conventional medication
 2. *A 2mmHg reduction in systolic blood pressure is associated with reductions of 10% and 7% in the risks of stroke and coronary heart disease respectively* ²¹

Pharmacology v physical activity

There is plenty of strong randomized controlled trial data showing reductions in stroke risk in those taking antihypertensive medication.²² There is less evidence that they significantly reduce the risk of all-cause mortality and myocardial infarction, with the exception of thiazide diuretics and angiotensin-converting enzyme inhibitors.²³ However, there is strong prospective cohort evidence that regular physical activity can reduce the risks of all-cause mortality and cardiovascular mortality.²⁴

The comparison of the mortality and morbidity risk reduction between long-term antihypertensive medication and physical activity is made below and reinforces of the need for physical activity as a treatment in hypertensive patients.²³

Table 1: Mortality and morbidity risk reductions with long-term anti-hypertensive medication and physical activity²³

Intervention	All-cause mortality	Cardio-vascular mortality	Myocardial infarction
ACE-I *	10%	19%	NR
Thiazide *	9%	NR	22%
β-blocker *	6% (NS)	NR	8% (NS)
Ca²⁺ channel blockers *	-6% (NS)	NR	29% (NS)
Regular physical activity (self-reported) #	29%	30%	NR
Regular physical activity (fitness tests) #	41%	57%	NR

NS: Not significant; NR: Not reported. *: Randomised control trials. #: Prospective cohort studies

NICE guideline CG127²⁵ on the clinical management of primary hypertension in adults recommends that appropriate guidance and written or audiovisual materials to promote lifestyle changes are offered.

Contraindications

Blood pressures of a systolic >180 or diastolic >100 or higher should receive medication before regular physical activity⁹, with particular restrictions on heavy weights strength conditioning which can create particularly high pressures.¹⁹

- **Lipids**

Isolated hypercholesterolaemia and mixed dyslipidaemia with high LDL cholesterol, high triglycerides and low HDL cholesterol are associated with an elevated risk of atherosclerosis.

Aerobic fitness training has been shown to be beneficial in reducing triglycerides^{26, 27} and elevating the protective HDL cholesterol,²⁸ with some effect in also lowering LDL cholesterol.²⁶

Best results are achieved with regular daily moderate intensity aerobic exercise or vigorous exercise at slightly higher volumes of the present UK guidelines, expending 1200-2000 kcal per week which equates to 360 minutes moderate activity per week. This workload is associated with a 5-8% increase in HDL cholesterol and a decrease in triglycerides of approximately 10%.²⁹ It should still supplement other interventions.

- **Peripheral Arterial Disease**

Risk factors for peripheral arterial disease (PAD) are similar to cardiovascular disease and are an important marker of overall cardiovascular disease, with about 65% of patients with PAD also having clinically relevant cerebral or coronary artery disease.³⁰

There is a strong consensus view that physical training in the form of walking is important in the management of peripheral arterial disease.^{30,31} This is important as the disease responds poorly to pharmacotherapy.³⁰ Three large reviews concluded that physical exercise increased the walking distance to the onset of pain by 179% or 225m and the maximum walking distance by 122% or 398m.^{32,33,34}

NICE guideline CG 147 on lower limb peripheral artery disease recommend:³⁵

- Offering a supervised exercise programme to all patients with intermittent claudication.
- Consider providing a supervised exercise programme which involves:
 1. 2 hours of supervised exercise a week for a three month period
 2. **Encouraging people to exercise to the point of maximal pain**

Exercise should continue lifelong, with expected improvement in walking distance with higher quality of life and reduced pain. It may also slow the progression of further atherosclerotic disease.

- **Stroke**

Primary prevention: the benefits of physical activity on the prevention of stroke are well documented.^{1, 8, 36, 37, 38} Risk factors for stroke include hypertension, type 2 diabetes and hyperlipidaemia all of which are beneficially affected by physical activity. It is not surprising then that there is a clear inverse relationship between activity and risk of stroke. It is also clearly dose dependent and depending on the amount of activity, the effect is a 20 - 35% lowering of risk.³⁹

Secondary prevention: the adverse vascular disease profile of many stroke patients remains after a first stroke and, physical activity should continue to be encouraged.

Treatment: there is a huge variation in the degree of disability after a stroke. Once stabilized, an individualised aerobic fitness training programme can increase the endurance for day to day activities. This can improve self confidence of patients to take part in physical activity themselves.⁴⁰ Similarly, muscle strengthening of the lower limbs has been shown to increase function thereby improving quality of life.³⁸

NICE guideline CG 162 on stroke rehabilitation recommend: ⁴¹

Strength training:

- Consider strength training for people with muscle weakness after stroke
- Include progressive strength building through increasing repetitions of body weight activities (for example, sit-to-stand repetitions), weights (for example, progressive resistance exercise), or resistance exercise on machines such as stationary cycles

Fitness training:

- Encourage people to participate in physical activity after stroke
- Cardiorespiratory and resistance training for people with stroke should be started by a physiotherapist
- Aim that the person continues the programme independently based on the physiotherapist's instructions
- Physiotherapists should supply any necessary information about interventions and adaptations so that where the person is using an exercise provider, the provider can ensure their programme is safe and tailored to their needs and goals

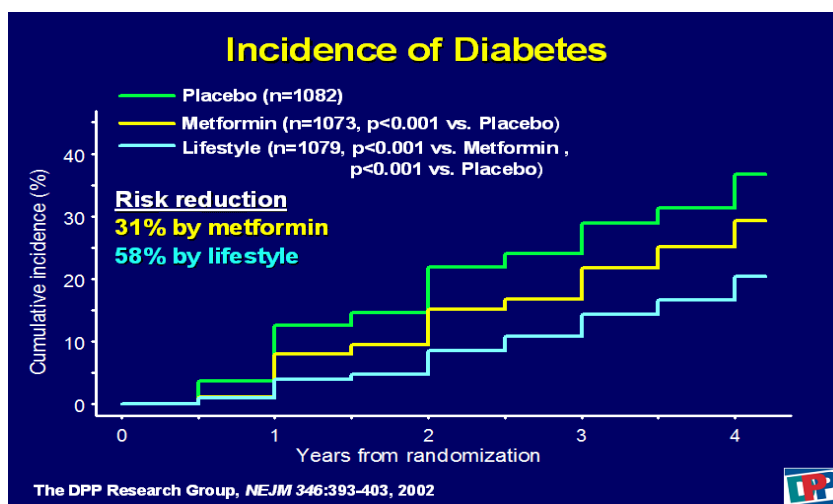
Walking therapies:

- Offer walking training to people after stroke who are able to walk, with or without assistance, to help them build endurance and move more quickly
- Consider treadmill training as one option of walking training for people after stroke including those who require body support

Chapter 4 Type 2 Diabetes

It is well known that physical inactivity is a major risk factor for developing type 2 diabetes. ¹

Primary prevention: many studies have shown that type 2 diabetes can be prevented in high risk (obese) patients by taking regular exercise and following dietary guidelines. ^{2,3} In all, there have been four major trials of diabetes prevention with intensive lifestyle counselling in China, ⁴ Finland, ² India ⁵ and the US. ⁶ In the largest trial, ⁶ the US Diabetes Prevention Program, high risk individuals were assigned to a placebo control, a lifestyle intervention (which included aerobic activity of at least 150min/week) or a third group who were given metformin 850mg twice daily. **Lifestyle advice was nearly twice as effective in preventing diabetes compared to metformin drug therapy in high risk individuals (58% v 31% reductions in incidence) over 3 years of study.** ⁶



In three of these trials there was a 40-60% relative risk reduction in the incidence of diabetes in the lifestyles intervention group. This translates into one case of diabetes being averted by treating around seven people with glucose impairment for three years. ^{7,8,9} In the Indian study the relative risk reduction of diabetes was a little lower at 28.5% but the Indian population was generally younger, with a relatively lower BMI and higher insulin resistance. ⁵ The long term follow up studies show that lifestyle interventions delayed on average the onset of diabetes by two to four years rather than preventing it totally. ^{8,9,10}

In the **treatment** of type 2 diabetes, regular physical activity remains a major part of treatment, alongside dietary and pharmacological interventions. Aerobic training remains the mainstay of treatment, but benefits also occur with strength training and are greatest when combined. ¹¹ A meta-analysis comparing physical activity advice against structured exercise training consisting of aerobic exercise, resistance exercising or a combination, showed all were associated with a reduction of HbA_{1c}. ¹² Longer programs than the recommended 150 minutes per week were associated with a greater reduction of HbA_{1c}. ¹² This study also confirmed physical activity is associated with lower HbA_{1c} but only when combined with dietary advice. ¹²

Physical activity improves insulin sensitivity. It is increased sensitivity to insulin, once achieved, that is important in obtaining good metabolic control, but physical activity also impacts on lowering the risk of cardiovascular complications by improving the blood lipid profile, HbA1c, body weight and lowering blood pressure. ¹³

Precautions: Hypoglycaemia rarely occurs in diet controlled, metformin or gliptin-treated diabetes unless any exercise is prolonged or strenuous, such as in marathon running. ¹⁴ In patients on sulphonylureas, glinides or insulin, moderate to vigorous exercise may cause a drop in blood glucose (sugar) with the effect lasting up to 12 hours post exercise. ¹⁵ Those wanting to take prolonged exercise may need to halve or further reduce oral medication, depending on their blood glucose levels and will need to monitor themselves more frequently. They should also be able to recognize the symptoms of hypoglycaemia. Suitable alteration of carbohydrate intake before, during and after exercise may then be required.

Foot care and exercise: peripheral neuropathy is a common complication of type2 diabetes and patients with this may have a decreased ability to exercise but a greater need for exercise instruction and monitoring. Care should be taken to promote safe good foot care by encouraging patients to check their feet before and after exercise. ¹⁶

NICE guideline PH38 on Preventing type2 diabetes: risk interventions for individuals at high risk recommend: ¹⁷

- Give information about increasing physical activity and reducing the amount of time spent being sedentary
- Consider referring those who want structured or supervised exercise to an exercise referral scheme or supervised exercise sessions, as part of an intensive lifestyle-change programme
- At least once a year, review the lifestyle changes people at high risk have made
- Raise awareness of importance of physical activity
- Help individuals to find other ways to identify and overcome any barriers to physical activity

Contraindications

Uncontrolled blood glucose of >13 mmol or <5.5 mmol/l, which should be corrected first. ¹⁸

Patients with diabetic peripheral or autonomic neuropathy or foot ulcers should avoid weight bearing exercise.

Any acute illness or infection in a diabetic. ¹³

Chapter 5 Mental Health

- **Depression**

There is good supporting evidence for the use of regular moderate intensity physical activity in the acute treatment of mild to moderate depression^{1,2} and in helping reduce the risk of relapse.² However, there has been little evidence on the most effective form of exercise with low intensity exercise appearing to have no effect³ and in children and young adults different exercise intensities failing to show any significant effect.⁴ Physical activity matched to an individual's preferred intensity has been shown to improve mental health outcomes and exercise adherence rates.⁵ When preferred intensity exercise was combined with motivational support it improved depression symptoms severity, quality of life and exercise adherence rates.⁶ Advice on exercise should be given in parallel to antidepressant medication and or psychotherapy treatments.⁷

Studies examining whether physical activity might be protective against the risk of depression later in life have shown a promising positive effect⁸. Evidence appears effective from childhood (9-15yrs) up to twenty years later⁹.

NICE guideline CG90 on Depression in adults: The treatment and management of depression in adults recommend:⁷

For people with persistent sub threshold depressive symptoms or mild to moderate depression, one choice is to offer referral for a structured group physical activity programme which should:

- Be delivered in group with support from a competent practitioner
- Consist typically of three sessions per week of moderate duration (45 minutes to 1 hour) over 10 to 14 weeks (average 12 weeks)

- **Anxiety**

A lot of studies have evaluated the effect of physical activity on anxiety and many link physical activity to a consistent reduction of anxiety symptoms^{10,11}. This is best seen in state anxiety with less evidence in trait states^{10,11}. But the research remains certainly limited for children and young adults⁴ so physical activities may be more effective as an adjunctive treatment for anxiety disorders and appears less effective when directly compared with antidepressant treatment¹².

- **Schizophrenia**

Physical activity can play an important role in the treatment of schizophrenia. Physical activity has been shown to significantly reduce negative symptoms of mental state and improve the control of positive symptoms^{13,14}.

The physical health of people with severe mental illness such as schizophrenia, depression and bipolar disorder is often poor with a high risk of premature death and a shorter life expectancy of at least 10 years^{15,16}. This excess cardiovascular mortality in schizophrenia and bipolar disorder is attributed in part to the increased modifiable coronary risk factors of: unhealthy diets, obesity,

smoking, diabetes, hypertension and hyperlipidaemia^{16, 17}. In most of these conditions lifestyle factors of physical activity plays an important role.

A small number of studies on people with schizophrenia taking part in exercise programs have so far shown a positive effect on both physical health, quality of life and positive and negative symptoms^{14, 15} and therefore increasing physical activity should be advocated¹⁸.

NICE guideline CG 178 on Psychosis and Schizophrenia in adults: treatment and management recommend:¹⁹

- Before starting antipsychotic medication: an assessment of nutritional status, diet and level of physical activity
- People with psychosis or schizophrenia, especially those taking antipsychotics, should be offered a combined healthy eating and physical activity programme by their mental healthcare provider

- ***Sleep and psychological well-being***

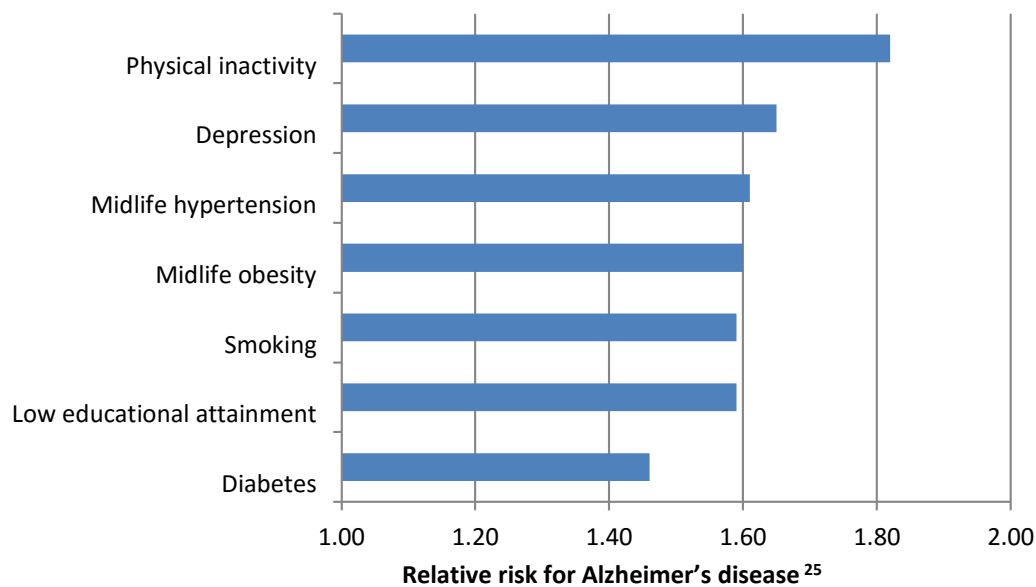
Physical activity has been shown to improve the quality of sleep,^{20, 21} whilst many studies have shown improved well being with physical activity training²². Improved psychological well being is also the most common comment made on self reported feedback questionnaires¹⁰.



- ***Dementia***

Dementia is a word used to describe a group of symptoms including memory loss, confusion, mood changes and difficulty with day to day tasks. It encompasses several forms with Alzheimer's disease being the commonest and vascular dementia the second. The risk of dementia rises with age, with 1 in 3 people over 65 affected²³.

There is a higher risk of vascular dementia for those with a family history, hypertension, high cholesterol, smoking and diabetes, with vascular factors being potentially modifiable by physical activity²⁴. Up to a third of patients with Alzheimer's, the disease may also be attributable by modifiable risk factors, the highest factor being physical inactivity (see diagram)²⁵.



There is clear strong evidence that people who follow recommended levels of physical activity have a reduction in risk of cognitive decline in the order of 18-30%^{26, 27, 28}. Higher levels of physical activity are associated with better cognitive function and a 20% lower risk of cognitive impairment in the highest quartile of activity^{29, 30, 31}.

A review of exercise programs for this population has demonstrated that exercise can lead to:³²

- A significant improvement in cognitive functioning
- Enhanced mobility
- An improved ability to perform activities of daily function
- A likelihood of reducing the burden on family members
- No adverse effects

The prevention of falls with exercise for the healthy elderly is well established but a recent meta-analysis suggests that physical activity may also have a positive effect on the prevention of falls in the older adult with cognitive impairment.³³

NICE guideline CG42 on Dementia recommend:³⁴

Promoting and maintaining independence of people with dementia. Care plans should always include: Physical exercise, with assessment and advice from a physiotherapist when needed

Chapter 6 Musculoskeletal Health

- **Fibromyalgia**

Fibromyalgia consists of a multi symptom syndrome characterized by widespread diffuse treatment-resistant, non-inflammatory joint and muscle pains of at least 3 months duration.¹ Two common symptoms are: reduced muscle strength and rapid fatigue with patients typically being unfit.^{2, 3, 4}

Fibromyalgia is difficult to manage, but physical training combined with cognitive behavioural therapy has been recognized as being the most promising treatment.⁵ Evidence from a meta-analysis of random controlled trials concluded that aerobic training had a beneficial effect on fibromyalgia. The highest quality trials show significantly better improvements in the exercise groups for fitness and tender point pain thresholds.⁶

- **Osteoarthritis**

Contrary to common belief, there is no evidence that regular physical activity promotes the development of osteoarthritis (OA), provided there is no associated major joint injury.⁷

Major joint osteoarthritis is the commonest chronic disease in older people.⁸ The evidence is best for OA of the knee, but studies on hip and hand point to the same conclusions.^{8,9} Once present, both fitness training and dynamic strength training have been shown to:¹⁰

- Reduce pain
- Improve function
- Improve overall well-being.

Aerobic activity is thought to increase endorphin levels which reduce the sensation of pain, whilst increased muscle strength and improved neuromuscular function improve the stability around a joint. These factors, coupled with any associated weight control, will help reduce the load through the joint and hence reduce pain, improve function and improve well-being.¹¹

Exercise training also reduces pain and improves function (strength, gait, balance) in the absence of weight loss. **A key message about exercise and weight loss** is that it is better to talk about fat loss, as weight loss is often compromised by an increase in lean mass (i.e. muscle mass). For example, exercise might produce very impressive improvements in body composition, e.g. a 2kg increase in lean mass and a 2.5kg decrease in fat mass, but an unimpressive overall change in body weight, tending to discourage patients who are primarily motivated by weight loss and not an improvement in health.

There appears to be a dose-response relationship where strength and fitness improvements, lead to better gains.^{12, 13} Training is best planned with small but steady increases in load on the joint and with exercise; there is a greater reduction in pain compared to NSAID treatment occurring after 6-8 weeks of activity.^{12, 14} This gives a clear choice of activity over NSAID medication for many patients and a choice with relatively few side effects.¹⁴

Perhaps the greatest incentive for exercise in osteoarthritic patients from 35 upwards with co-morbidities of cardiovascular disease, diabetes, cancer and walking disability is that they are at

significantly enhanced risk of dying prematurely.¹⁵ It has been suggested even light exercise eg: moving around the house during commercial breaks for those patients with OA who watch many hours of TV, might mitigate the risk.¹⁶ Practical recommendations have been made regarding specific exercise prescription in terms of type, duration and delivery and can be discussed by the clinician or refer to a physiotherapist.⁹

NICE guideline CG 137 on Osteoarthritis and management in adults recommend:¹⁷

Advise people with osteoarthritis to exercise as a core treatment irrespective of age, co morbidity, pain, severity or disability. Exercise should include:

- Local muscle strengthening and general aerobic fitness

- **Osteoporosis**

Prevention: The peak bone mass is achieved by 20 – 30 years of age, so to achieve maximum bone mass during adolescence, a balanced diet and multi-activity physical education in schools with weight bearing exercise needs to be encouraged from early years and even from first walking.⁷ Once our peak bone mass is achieved, a gradual bone loss commences and there is now increasing evidence that physical activity can help prevent the bone loss associated with ageing across the lifespan of individuals.^{18, 19, 20, 21, 22, 23, 24, 25}

Weight bearing exercise, especially resistance exercise, appears to have the greatest effect on bone mineral density.²⁶ There is an inverse relationship of physical activity with the relative risk of hip and vertebral fracture with risk reduction for hip fracture of 36 - 68% at the highest level of activity.⁷

Warning: excessive physical activity can have an unintentional negative effect on bones in girls, who may develop exercise dependent secondary amenorrhoea and then lose bone most commonly around a weight of 45kg.¹

Established disease: weight bearing exercise is still encouraged to minimize further bone loss, but also to help prevent falls²⁷ and subsequent fractures.^{25, 28} Balance, strength and coordination exercise combined with walking is complementary.¹

NICE clinical knowledge summary on Osteoporosis – prevention of fragility fractures²⁸ recommend:

Advise the person to: Take regular exercise (tailored to the individual) to improve muscle strength and reduce pain and stiffness:

- Encourage walking, especially outdoors, as this will increase exposure to sunlight, increasing vitamin D production.
- Encourage strength training of different muscle groups (for example hip, wrist, and spine).

Contraindications

Avoid high impact activities or those with a high risk of falling

- *Rheumatoid Arthritis*

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disease characterised by reduced joint flexibility, muscle function and aerobic fitness. There **is also an increased risk of cardiovascular disease**,²⁹ which combined with an **increased risk of type 2 diabetes, metabolic syndrome and osteoporosis and its related fractures**, provides a very strong indication for promoting physical activity in patients with this common condition. In addition, exercise can counter the important effect of **rheumatoid cachexia**, whereby 2/3 of patients with controlled RA have significant muscle wasting and increased obesity.³⁰ This low muscle mass and adiposity are strong independent predictors of disability in RA patients^{31, 32} and controlling disease activity by standard drug therapy including ant-TNF therapy fails to restore either muscle mass or reduce fat mass. Consequently there is a strong case for progressive resistance training in patients with RA.^{33, 34, 35}

Historically, it has been widely held by many that increasing the level of stress on the joints would increase pain, disease activity and joint damage³⁶. However, major reviews on dynamic exercise therapy, have found a positive effect on aerobic capacity, muscle strength and functional ability.^{36, 37, 38, 39} Exercise training has been shown to redress the adverse effects of rheumatoid cachexia on body composition and also to restore normal levels of physical function in established RA patients.⁴⁰ Importantly there has been no increase in pain or disease activity and with long term exercise programs **no** significant differences in radiological progression were observed.³⁶

Despite being aware of the importance of exercise, many RA patients are less active than the general population.⁴¹ Patients' perceptions of the effects of exercise are a fear of exacerbation of pain, fatigue and joint damage.⁴² They also perceive that health professionals lack exercise knowledge regarding specific exercise recommendations and the occurrence of joint damage.⁴²

All patients with RA should be encouraged to be physically active. Low intensity exercise can be recommended for all patients with RA regardless of their disease state. However, to increase aerobic function and muscle function the patient needs to be encouraged to progress into moderate to high intensity exercises, **with the knowledge and evidence of improved muscle function and quality of life**^{36, 37, 38, 39, 43} **without evidence of progression of joint destruction.**^{39, 44}

Precautions and considerations:

- Increased physical activity should be introduced slowly to minimize the risk of aggravating symptoms and in smaller increments than normally recommended.
- Caution also needs to be taken after any cortisone injections and joint replacement surgery that may not stand up to intense exercise initially.⁴⁵
- Physical activity programmes should include a range of activity including stretching, resistance exercises and aerobic conditioning
- High impact activities or contact sports are not recommended

NICE guideline CG79 on Rheumatoid arthritis – The management of rheumatoid arthritis in adults.⁴⁶

People with RA should have access to specialist physiotherapy, with periodic review to:

- Improve general fitness and encourage regular exercise
- Lean exercises for enhancing joint flexibility, muscle strength and managing other functional impairments

- **Prevention of falls and fracture**

In the elderly, with or without other health conditions, diminishing muscle function with or without coexisting pain can limit daily activity and increase the risk of a fall and fracture. General physical activity such as walking and cycling is not thought to have any effect of falls prevention.⁴⁷ However, the available evidence for this age is that group and home based programmes with muscle strengthening and balance reduces the rate of falls and risk of falling.⁴⁸ Tai Chi has been also shown to reduce the risk of falling and overall exercise interventions significantly reduced the risk of a falls related fracture.⁴⁸

Although most evidence on fall prevention has been with cognitive healthy elderly people, recent evidence supports the evidence that physical activity also has a positive effect in the prevention of falls in the elderly with cognitive impairment.⁴⁹

Strength training may need to precede walking exercise to make the physical activity possible. In the elderly two decades of loss of strength and muscle mass can be regained by two months of strength training.⁵⁰

Identifying the optimum characteristics of an exercise intervention for falls prevention has been assessed on present research and it is thought that:⁵¹

- Exercising for a minimum of 1 hour/week for at least 40 hours of an intervention programme is required to reduce the risk of falling
- The optimum frequency of exercise is three times a week, but duration time of a session remains unclear
- Balance training should be of moderate to high challenge⁵²
- Strength training is most effective when combined with balance training

NICE guidance CG161 on Falls: assessment and prevention of falls in older people recommend:⁵³

- Multifactorial interventions with an exercise component are recommended for older people in extended care settings who are at risk of falling.
- A muscle-strengthening and balance programme should be offered
- This should be individually prescribed and monitored by an appropriately trained professional
- There is no evidence that brisk walking reduces the risk of falling; however, there may be other health benefits of brisk walking by older people

Chapter 7 Obesity

Overweight and obesity are defined as 'abnormal or excessive fat accumulation that may impair health'.¹ Using Body Mass Index (weight (kg) / height² (m))(BMI) overweight is classified as a BMI of 25-30 and obesity as >30.

Obesity is a major risk factor for many non communicable diseases (NCD) such as:¹

- Cardiovascular disease (mainly heart disease and stroke)
- Diabetes
- Musculoskeletal disease (mainly osteoarthritis)
- Some cancers (mainly colon and breast)²

Childhood obesity is associated with a higher chance of obesity, premature death² and disability in adulthood.^{1,2} However, in addition to future risks,³ childhood obesity is associated with considerable emotional and behavioural problems including in boys, conduct problems, hyperactivity and inattention problems, peer relationship problems, prosocial behaviours and total social difficulties.⁴

Weight loss in obesity has been associated with improvements in most cardiometabolic factors,⁵ whilst significant weight loss (>5% of baseline weight) has been shown to be more effective in reducing cardiac and diabetic risk factors, and even death rates.^{6,7}

Weight gain: An increase in weight is affected by the amount of energy expended versus the amount of calories consumed.⁸ If energy expended is low and diet consumption excessive then weight gain will occur.

Physical activity alone or with diet: There is no strong evidence that physical activity of 150 minutes or less a week, on its own achieves any significant weight loss.^{9,10} Without a dietary plan involving calorific restriction individuals will experience weight loss in a range of nil to no more than 2kg.^{10,11} Exercise when combined with diet plans may result in a slight greater weight loss than diet alone¹⁰ but the amounts are small and confirm that the majority of weight loss is to be gained from the calorific restriction.¹¹

Physical activity and increased intensity: Significant weight loss can occur with aerobic exercise without calorific restriction, but it requires a high exercise volume of the order of >225 minutes a week. For the majority, these levels may not be practical or achievable.¹²

Physical activity and prevention of weight gain: To prevent the shift from normal weight to overweight and obesity, it is recommended that levels of 150-250 min/week of moderate to vigorous physical activity are required.¹²

Physical activity and weight maintenance: After successful weight loss physical activity levels of 200-300 min/week should be maintained to avoid regaining weight.¹² NICE guidelines suggest even higher levels of 300-450 min/week.¹³

Aerobic exercise or resistance training and weight loss: Aerobic exercise is most beneficial by virtue of energy expenditure and health benefits of important risk factors.¹¹ There is little evidence that resistance training alone produces any significant weight loss.¹¹ However, resistance strength

training has also been shown to maintain overall health, muscle strength (preventing sarcopenia), preserve bone strength¹⁴ and reduce mortality in men.^{9, 15}

THE REAL HEALTH MESSAGE OF PHYSICAL ACTIVITY IN OBESITY: It is very important to ***stress that aerobic physical activity offers substantial health benefits even if weight loss is not achieved,***¹⁰ as patients often have unrealistic weight loss expectations.¹⁶ However, weight loss is still recommended in obese patients to reduce the risk of NCD's and premature death.^{5, 6}

Many trials of exercise therapy have reported little or no weight loss (<5kgs) but still have reported many health benefits including:¹⁰

- Endothelial function¹⁷
- Lipoprotein particle size¹⁸
- High density lipoprotein¹⁹
- Triglycerides
- Improved cardiovascular fitness²⁰
- Lower blood pressure
- Glucose control
- Quality of life^{21, 22}

Exercise may produce impressive improvements in body composition, e.g. a 2kg increase in lean mass and 2.5kg decrease in fat mass but with an unimpressive change in total body weight which might discourage patients who are often primarily motivated by weight loss. This is the **key concept** to get across to overweight patients, that they can reduce their disease potential if they are active, compared to an inactive individual of similar weight.

An example of this is a study of 58 sedentary and overweight men who undertook a supervised aerobic exercise programme for 12 weeks.²³ The mean reduction in weight was 3.63kg. However, 26 of the 58 failed to achieve predicted weight loss and only had a mean weight loss of 0.9kg. However other health parameters showed the following significant findings:

- Increased aerobic capacity (6-3 ml/kg/min, p<0.01)
- Decreased systolic blood pressure (-6 mm Hg, p<0.05)
- Decreased diastolic blood pressure (-3.9 mm Hg, p<0.01)
- Decreased waist circumference (-3.7 cm, p<0.01)
- Decreased resting pulse (-4.8 bpm, p<0.001)

In addition, these individuals experienced an acute exercise induced increase in positive mood. An example case study is shown in [Case histories 3 in Resources](#).

Advice to obese individuals must be realistic as they are often unfit and have coexisting co-morbidities present. Be aware of the effort required to lose weight, what is a reasonable expectation of weight loss and of the stigma patients that may be felt by overweight or obese.²⁴

Small steps in gained activity through everyday changes should be encouraged and maintained even if more formal physical activity remains difficult. See [The Paradigm of Sitting](#). Guidance on managing the overweight and obese has been summarized in NICE guidelines and the areas relative to physical activity are summarized below.

NICE clinical guidance CH 189 on managing overweight and obesity in **adult's** recommend: ¹³

Encourage adults to increase their level of physical activity even if they do not lose weight as a result, because of the other health benefits it can bring (for example, reduced type 2 diabetes and cardiovascular disease).

Encourage adults to do at least 30 minutes of moderate or greater intensity physical activity on 5 or more days a week. The activity can be in 1 session or several lasting 10 minutes or more.

Advise that to prevent obesity most people have to do 45-60 minutes/day of moderate-intensity particularly if they do not reduce their energy intake. Advise people who have been obese and lost weight that they may need to do 60-90 minutes/day of moderate-intensity physical activity to **avoid regaining weight** once lost.

Encourage adults to **build up** to the recommended activity levels for weight maintenance, using a managed approach with agreed goals. Recommend types of physical activity, including:

- Activities that can be incorporated into everyday life, such as brisk walking, gardening or cycling
- Supervised exercise programmes
- Other activities, such as swimming, aiming to walk a certain number of steps each day, or stair climbing

Take into account the person's current physical fitness and ability for all activities. Encourage people to also reduce the amount of time they spend inactive, such as watching television, using a computer or playing video games.

NICE clinical guidance CH 189 on managing overweight and obesity in **children** recommend: ¹³

Encourage children and young people to increase their level of physical activity, **even if they do not lose weight** because of reduced risk of type 2 diabetes and cardiovascular disease.

Encourage children to do at least 60 minutes of moderate or greater intensity physical activity each day.

- Can be split into several sessions
- Be aware children already obese may need to do more than 60 min/day
- The activity can be in 1 session or several sessions lasting 10 minutes or more
- Encourage children to reduce inactive behaviours, such as sitting and watching television or playing video games
- Give children the opportunity and support to do more exercise in their daily lives
- Give children the opportunity and support to do more regular, structured physical activity
- Make the choice of activity with the child, and ensure it is appropriate to the child's ability and confidence

Summary

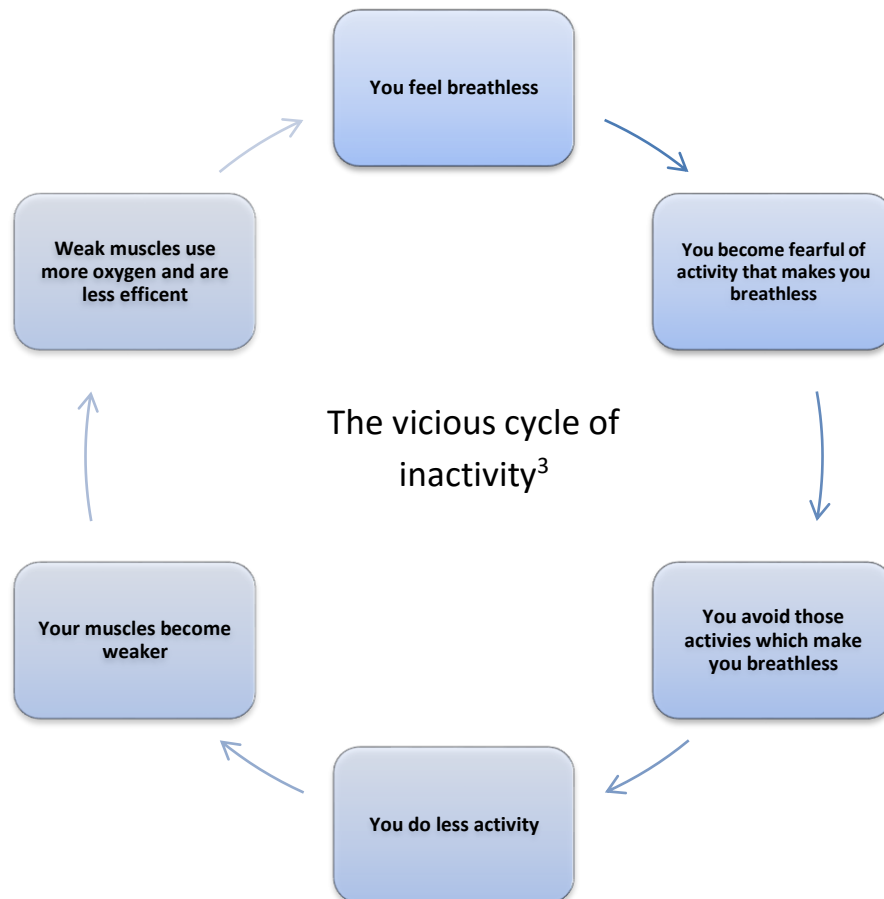
- No strong evidence that physical activity of 150 minutes a week, on its own achieves any significant weight loss
- High levels of physical activity are required to lose weight alone
- 45-60 minutes/day of moderate-intensity physical activity required to prevent weight gain
- 60-90 minutes/day of moderate-intensity physical activity to avoid regaining weight once lost
- Weight loss with physical activity is best when combined with dietary & behavioral interventions

Adults, who find it difficult to maintain their weight, should be encouraged to:

- Reduce energy intake
- Minimise sedentary behavior
- Work on progressively increasing their physical activity, initially up to and then past 30 minutes up to 60 minutes a day or more.
- ***Aerobic physical activity offers substantial health benefits even if weight loss is not achieved***

Chapter 8 Chronic Obstructive Pulmonary Disease (COPD)

COPD leads to damaged airways and lung tissue resulting in obstruction to airflow and consequently dyspnoea. As COPD progresses, patients have increasing dyspnoea which often makes them anxious about moving and becoming more sedentary.¹ This in turn causes a decreasing cardiovascular capacity and reduced peripheral skeletal muscle strength, contributing to a worsening functional level, which in turn exacerbates their dyspnoea.² From a patients perspective this creates a vicious cycle of inactivity.³



Conversely, physical exercise training programmes have clearly shown patients can become less afraid of exerting themselves and more physically active.^{4, 5, 6, 7} The effect is largely on muscle and mental well being. By improving their cardio respiratory muscles and peripheral skeletal muscle, exercise programmes have shown patients can have:^{5,6,7,8,9,10,11,12,13}

- a better quality of life
- increased well-being
- fewer symptoms of fatigue and dyspnoea
- an increase in exercise tolerance
- an increase in physical activity levels
- a reversal of COPD associated wasted muscles or sarcopenia in select patients
- lower morbidity with fewer hospital admissions

Physical activity programmes however, have not been shown to affect a change in lung function.⁵

Physical activity is important for all patients with COPD as their physical activity level has been shown to be the strongest predictor of all-cause mortality¹⁴ Thus, NICE recommendations¹⁵ are for all patients with a Medical Research Council (MRC) dyspnoea grading 3-5 who are functionally breathless, should be offered outpatient pulmonary rehabilitation. Whilst the British Thoracic Society guidelines¹⁶ also includes patients with a MRC grading of 2 who are functionally breathless. However, all patients with level 1-2 should also be encouraged to increase their activity to slow their decline in pulmonary function and progression of COPD¹⁷ with evidence that community based programmes can also help.¹⁸

Grade	Degree of breathlessness related to activities
1	Not troubled by breathlessness except on strenuous exercise
2	Short of breath when hurrying on the level or walking up a slight hill
3	Walks slower than most people on the level, stops after a mile or so, or stops after 15 minutes walking at own pace
4	Stops for breath after walking about 100 yards or after a few minutes on level ground
5	Too breathless to leave the house, or breathless when undressing

NICE guidelines CG101 on Chronic obstructive pulmonary disease recommend:¹⁵

- Pulmonary rehabilitation should be available to all appropriate people with COPD, including those with recent hospitalization for an acute exacerbation
- Pulmonary rehabilitation should be offered to all patients who consider themselves functionally disabled by COPD (MRC grade 3 and above)
- The rehabilitation process should incorporate a programme of *physical training*, disease education, nutritional, psychological and behavioral intervention

Contraindications

Exercise should be stopped or modified with O₂ saturation of 88% or less²

Chapter 9 Exercise during Pregnancy

Many pregnant women are concerned about the effects of exercising during pregnancy, but there is clear evidence that moderate physical activity is not only safe, but also beneficial for both mother and baby. ^{1,2} The recommendation from the Royal College of Obstetricians and Gynaecologists ¹ is that pregnant women should do 30 minutes of moderate intensity exercise most days of the week.

Benefits of Exercise during Pregnancy ³

For the woman reduced...

- tiredness, varicose veins, ankle swelling and breathlessness
- risk of developing gestational diabetes⁴
- excessive maternal weight gain
- risk of pre-eclampsia ⁵
- rate of pelvic and low back pain
- reduced labour time
- stress, anxiety and depression

For the baby...

- Potentially reduced chance of foetal distress during delivery
- May help to enhance brain development during infancy

1. Pre Exercise Evaluation

There are very few absolute contraindications to exercise during pregnancy and these are mostly related to the pregnancy itself e.g. risk of premature labour or presence of pre-eclampsia. However there are a number of medical conditions where women need to be cautious and specialist input may be required ¹ (*box 1*). In addition, any woman undertaking exercise for the first time should be screened in the usual way to consider any risk factors from their general health e.g. by using PAR-Q as a starting point.⁶

Box 1: Cautions and Contraindications to exercise

Pregnancy related...

- Incompetent cervix
- Persistent bleeding in the 2nd or 3rd trimester bleeding
- Placenta praevia after 26wks
- Premature labour during current or previous pregnancies
- Ruptured membranes
- Pre-eclampsia/pregnancy induced high blood pressure
- Multiple gestation at risk of premature labour
- Restricted growth of the baby during current pregnancy

Medical...

- Significant heart or lung disease, poorly controlled hypertension
- Haemoglobin <10
- Poorly controlled Type 1 diabetes, epilepsy or hyperthyroidism
- BMI >40 or <12
- Severe back, pelvic or other joint pains

2. Risk Management

Outside the conditions listed, there is no evidence that there is an increased risk of complications for the mother or the baby if the woman exercises during her pregnancy; however, there are a few types of exercise that should be avoided (*box 2*).

The babies of mothers who exercise regularly throughout their pregnancy or have strenuous physical jobs may be born slightly smaller (but still of a healthy weight). However, the evidence is mixed on this point ⁷.

2.1 Hyperthermia (>39.2°C): During the first trimester in particular, hyperthermia can increase the risk of developmental problems (e.g. spina bifida). There is no evidence that becoming slightly warm during exercise can cause this, however, the woman should be advised to not become uncomfortably hot. Keeping hydrated will help.

2.2 Advise to stop exercising if there is:

- Chest pain, palpitations, presyncope or dizziness, excessive breathlessness
- Painful uterine contractions / preterm labour, abdominal pain especially accompanied with back and/or pubic pain
- Amniotic fluid leakage, PV bleeding
- Reduced foetal movement
- Pelvic pain
- Headache
- Calf pain or swelling
- Excessive fatigue
- Muscle weakness

Box 2: Type of Exercise to Avoid

- Scuba diving
- Exercising at high altitude (>6000feet)
- Exercising in hot temperatures (including Bikram yoga)
- Exercises lying on your back after 16 weeks

After first trimester:

- Contact sports e.g. rugby, martial arts (unless practiced alone)
- Sports where there is a risk of falling e.g. riding, skiing
- Sports where there is a risk of being hit in the abdomen by equipment e.g. tennis, squash

3. 'F.I.T.T.' For Pregnancy

As with any exercise advice, consider the woman's exercise history and preferences. If they are used to exercising, then they can probably just adapt what they are already doing. During the first trimester morning sickness and fatigue may limit exercise ability but otherwise women can do most of what they have done previously. In later trimesters they may need more modifications, but most women will naturally reduce the intensity and impact of the exercise as it becomes more challenging.

FREQUENCY – most days of the week

INTENSITY – moderate; an easy way of monitoring the intensity is telling the woman that they should still be able to talk but their sentences will be shorter. Those women who are training more seriously may be used to monitoring their heart rate in which case they should be advised to work at 50% - 70% of their heart rate max. However there is no indication for someone to start monitoring their heart rate just because they are pregnant.

TYPE – mixture of cardio, strength and stability, for example;

- Swimming / aqua aerobics (water temp not >32deg)
- Walking

- Jogging / running
- Yoga / Pilates / pelvic floor exercises
- Gym and gym classes (inform the instructor)
- Dancing *etc*

TIME – 30-60 minutes

3.1 Advice for those not used to exercising regularly prior to becoming pregnant; walking is a good way to start. Begin with 10 minute walks every other day and then build up to 30 minutes on most days at a moderate intensity. Once they are used to doing some walking on a regular basis they can add in other types of exercise.

3.2 Modifications and Considerations:

- Due to the production of relaxin, ligaments around the spine, hips and pelvis will soften in preparation for delivery so reducing their stability and potential increasing the risk of injury. Stability exercises (e.g. Pilates – as long as it is modified for pregnancy by an experienced instructor) will help to counter this. Also, this softening will effectively increase a woman's flexibility so to protect their joints they should not stretch beyond their normal range.
- Avoid exercising lying supine or standing still for long periods after 16/40 weeks due to venous compression and pooling⁷.
- The combination of increasing lumbar lordosis and weight puts more strain on the joints, especially in the back and pelvis. In addition as the pregnancy progresses, stress incontinence will become more likely (prevalence 32-64%⁸). Stability and pelvic floor exercises will help to protect against this; back and pelvic pain is not inevitability during pregnancy (prevalence 45%⁹). As the woman progresses through the second and third trimesters they should reduce the amount of any weights they are lifting.

4. Post Partum Exercise Advice

Hormone levels remain high for at least 4 to 6 weeks after delivery meaning ligaments will still be relatively soft, increasing the risk of injury. These effects will last longer if the woman is breast feeding. Coupled with recovery from the birth and fatigue from caring for a new born, regular training should not be restarted for 6 weeks after delivery (longer if there were complications) (*see box 3*). Pelvic floor exercises should be restarted as soon as possible and when feeling ready the woman can start going for short walks (before 6 weeks if they want to).

Box 3: Restarting Exercise Post Partum

Uncomplicated vaginal delivery (ie no forceps/suction, no tearing)...

- Pelvic floor exercises and walking as soon as feels ready
- Increase walking gradually, e.g. 10 - 30 minutes a day, low to moderate intensity
- Add in other exercise when feels ready and after 6 week check

Complicated vaginal delivery / Caesarean-section...

- Pelvic floor exercises as soon as feels ready
- After 6 week check and when feels ready, gradually build up activity levels, starting with walking

Chapter 10 Surgery and Exercise

The evidence for physical activity and health is well established across many areas which may prevent or affect surgery: ¹

- All cause mortality – 30% risk reduction comparing most active with least active
- Risk reduction of hip fracture is up to 68% at the highest level of activity
- Lower risk of falls and fractures in elderly patients who regularly participate in physical activity
- Colon cancer – 30% lower risk in those who are active
- Breast cancer – 20% lower risk in those who are active
- Cardiovascular disease – 20-35% lower risk of cardiovascular disease, coronary heart disease and stroke

There is emerging evidence that exercise both pre and post surgery improves surgical outcomes and reduces in patient times in hospital. Surgical patients increasingly have complex medical co-morbidities that may predispose them to post operative complications after surgery, delayed discharge and surgical survival rates. ^{2,3}

It has been shown that poor preoperative physical performance increases the risk of complications after major non cardiac surgery ^{4,5} and prolongs recovery after abdominal surgery. ⁶ There is also strong evidence that if cardiorespiratory fitness (CRF) is measured preoperatively, it is predictive of complications in the postoperative period in several settings. ⁷⁻¹³

The assessment of CRF preoperatively has been shown to offer significant advantage when compared to age alone in predicting mortality after major surgery. ¹⁴ This same study also showed; firstly, CRF to be a significant independent predictor of length of stay in hospital with patients older than 75 and secondly a low CRF to be associated with a median of 11 days longer in hospital and 2 days longer in critical care. ¹⁴

Another study of pre-operative fitness and outcomes after major abdominal surgery also showed that physical fitness was an independent predictor of postoperative recovery in addition to conventional predictors of age and co-morbidities. ¹⁵ Prediction models for mortality, discharge destination and length of hospital stay were once again all significantly improved by the physical activity and fitness factors.

With the increasing evidence of benefits of better preoperative CRF, it follows that a reasonable intervention for improving surgical outcomes is to introduce exercise training preoperatively.

However in a major review ¹⁶ of the many studies which have looked at a preoperative training aerobic training intervention, the frequency, duration, intensity of exercise and outcomes have varied considerably. Also the period between a patient being listed and their operation may be very limited, for instance in cancer patients. As a result, evidence for improved postoperative clinical outcomes after preoperative aerobic training interventions is presently limited. ¹⁶ However, several useful points are already apparent:

- The largest random controlled trial found a reduced hospital and intensive care length of stay in the intervention group. ¹⁷
- Preoperative aerobic training improved at least one reported measure of fitness in the majority of studies
- Preoperative aerobic training benefited or maintained health related quality of life
- Preoperative aerobic training appears to be both feasible and safe

In the area of cancer surgery, aerobic exercise programs undertaken prior to surgery have mainly shown improved function and physical capacity. ¹⁸ But patients often now require neo-adjuvant chemo and radiotherapy before major rectal cancer surgery, which can reduce physical fitness, potentially increasing their complications. However, in a recent and important intervention study it has been shown that structured exercise intervention post chemo radiotherapy is both feasible and can restore fitness to baseline levels again. ¹⁹ This work correlates with the evidence found in the [cancer section](#) on this website where physical activity has been shown to improve function before, during and after treatment for cancer. It has also been shown to reduce mortality risk in breast and colon cancer. ²⁰

There are no specific NICE guidelines on surgery itself but for vascular surgeons **NICE guideline CG147** on lower limb peripheral arterial disease recommend: ²¹

- Offering a supervised exercise programme to all patients with intermittent claudication.
- Consider providing a supervised exercise programme which involves:
 3. 2 hours of supervised exercise a week for a three month period
 4. **Encouraging people to exercise to the point of *maximal* pain**

Conclusions

Surgeons and those giving advice in primary care should consider pre surgical exercise interventions as a useful adjunct to therapy.

To help introduce this to your patients the Royal College of Surgeons of Edinburgh have a guide leaflet for patients on exercise and surgery and can be [downloaded here](#).

Key points

- Poor cardiorespiratory fitness (CRF) increases the risk of complications of major surgery
- Conversely improving CRF preoperatively has been associated with reduced complications
- CRF assessment offers a better prognosis than age alone in major surgery
- CRF is an independent predictor of mortality and length of stay in hospital

Chapter 11 Sedentary Behaviour

In the [UK Physical Activity Guidelines of 2011](#),¹ an emphasis is made in every age group to “**minimize the amount of time spent being sedentary (sitting) for extended periods.**”

Why?

Adults and children increasingly spend time in a sitting position: at a desk or laptop, driving, watching TV or DVD's, playing computer games or social networking. Many occupations have changed from being physically based to office working and an ever increasing dependence working at computers.

Evidence has shown that prolonged sitting and a lack of whole-body muscle movements are associated with obesity, metabolic syndrome, type 2 diabetes, cardiovascular disease, cancer and total mortality **which is usually independent of daily moderate to vigorous intensity physical activity (MVPA)**.^{2,3,4,5,6,7} In particular, TV viewing time is implicated in obesity, with the concurrence of the snacking on sweet or fatty foods, low levels of physical activity and inadequate sleep.^{8,9,10}

It has been thought that this sedentary time is likely to be **in addition** to the risks associated with insufficient MVPA. An Australian study estimated the extent to which TV viewing times reduced life expectancy. The research compared people who watched no TV, with those who spend a lifetime average of 6 hrs viewing a day, and found the latter are predicted to live 4.8 years less. The authors concluded that *'TV viewing time may be associated with a loss of life that is comparable to other major risk factors such as physical inactivity and obesity'*¹¹

Research now suggests that with the strong evidence of sedentary time being adversely associated with poor cardiometabolic health, that this may be a more important indicator of poor health than MVPA levels.¹² Thus it may be more effective in the prevention of type 2 diabetes to target both reducing sedentary time rather than solely focusing on promoting MVPA.

What can we do practically in the workplace and at home to change this behaviour?

One simple way is to introduce the concept of **NEAT (Non Exercise Activity Thermogenesis)**, a term that refers to daily physical activities that are not perceived as exercise or training. By promoting more standing, less sitting and more moving we now know that these activities, however small, are better than sitting still and these small activities accumulate and count towards our daily energy expenditure as well as reduce the sedentary risk factors.

Examples:

- Promote and support standing meetings. (Standing burns 15 calories an hour compared to 5 an hour sitting)
- Get up from a desk to walk across the office to speak to a colleague rather than phone or email
- Use a standing desk to work from
- Read your ipad on top of the filing cabinet
- Stand whilst speaking on the phone if on a cord
- Walk and talk if using a cordless phone
- Use manual buttons on televisions rather than a remote
- Get up and move during commercial breaks on the TV
- Park the car on the far side of a car park at eg: a supermarket
- Using the stairs instead of the lift or escalator

Summary

Doctors' may be able to do little to alter the social changes that have occurred over the past few decades. But by understanding the health problems which have developed from this, we can do more by advising and guiding patients to think about their lifestyles and to address their health risks. Changing patterns of behaviour is not easy, but if small changes are made and this is spread over large populations, then the effect will be significant.

Useful resources for students:

The Chartered Society of Physiotherapists has postcards to buy and a free pdf download for desk workers or even use by yourself! <http://www.csp.org.uk/publications/do-you-sit-desk-all-day>

A - fun 4 minute cartoon video about avoiding being sedentary – '[Let's Make our Day Harder](#)' on You Tube, which may be preferred by some patients.

[A sitting poster](#) from the Washington Post, display it in offices!

Chapter 12

Motivation to Change Health Behaviour

Health promotion forms part of many primary care consultations, be it advice about exercise, weight loss, smoking or alcohol. These consultations are often fraught with difficulty, as many patients are resistant to being told what to do or what is good for them. Moving from this direct style of consultation to a more guiding style that encourages patient motivation is thought to increase the success of health promotion.

Motivational interviewing was originally developed in the field of addiction counselling, but has also been used to promote behaviour change in a wide range of healthcare settings, such as smoking cessation, weight loss and promoting increased physical activity.

There is increasing evidence of its effectiveness,^{1,2} with 80% of 72 studies finding that motivational interviewing outperformed traditional advice-giving.³ It is associated with a more respectful and less combative consultation – this feels professionally better and is certainly more enjoyable for both doctors and their patients.

Motivational Interviewing (MI) by Prof S Rollnick

A consultation that leans on MI has one strong characteristic that supercedes all else: instead of adopting an expert position and using a directing style to persuade the patient why or how they might get more exercise, you adopt a guiding style. It is a more collaborative process of helping the patients to say why and how they might get more exercise. You structure the consultation and provide information (with permission) but most of the time you are eliciting their own motivation to change. This is often expressed in the form of *change talk*.⁴ The more change talk you can elicit from the patient, the better the outcome is likely to be. There is emerging evidence to support this focus on the language used by the patient.⁵

One useful aid might be the recently developed framework for MI⁶ that describes four processes in a constructive conversation about behaviour change:

Engaging

Focusing

Evoking

Planning

They do not always emerge in a linear sequence, but the logic is this: step one is to **engage** with the patient and establish an agreed **focus** for the conversation; then the central task is **evoking** the patient's own motivation to change, followed by **planning** if the person is ready for this. These processes are highlighted in the example below, alongside other key skills.

Example MI Dialogue. By Prof S Rollnick

This example is based on a fictitious consultation between a 51 year old male and his doctor. He is overweight, with borderline raised BP, who gets short of breath when walking secondary to his poor cardiovascular fitness and sedentary job. He travels to work on the bus and works on the third floor of an office.

Doctor: OK, so that's your tablets sorted out, and now I wanted to ask you whether it's ok with you to spend just a couple of minutes talking about something completely different..... Would that be OK? (*Asking permission will help a lot*)

Patient: Yeah OK, what's that then?

Dr: It's about exercise. Would you mind if we chatted about that if I promise not to nag at you about it?

Pt: Yeah OK, as long as you keep to that promise (laughs). (*The focus is clear. Engagement is not strong, yet.*)

Dr: So rather than me talk about it, could you? Could you tell me how you feel about getting more exercise?

Pt: Hate the thought to be honest with you.

Dr: You're not persuaded about this one (*That's a reflective listening statement, not a question*)

Pt: Well I do know that it would help my health (*change talk*), but the effort is really too much.

Dr: You get quite a lot done each day, and adding exercise doesn't seem like it could fit (*another reflective listening statement*)

Pt: Yeah you guessed right, I don't just sit around all day and the thought of going to the gym just doesn't fit for me.

Dr: Going to the gym isn't for you, you are busy enough and yet you know it would be good for your health to get more exercise, have I got you? (*A summary that also includes the change talk*)

Pt: Yeah you've got me for sure. (*Engagement is now much better, as a result of listening and then summarising*).

Dr: Can I ask you how do you see the benefits of just a slow and steady increase in exercise? (*A question that allows the Dr to start evoking change talk*)

Pt: Me? Well if it was slow, and I didn't have to go crazy like at a gym, it might help me (*change talk*).

Dr: It would help you to feel healthier (*a listening statement again, to reflect the change talk and it's also a guess about why it might help*)

Pt: Sort of, but at least I could fit it in, and I might succeed, and I could feel good about that. (*More change talk*)

Dr: Because you don't want to take on some big task like the gym. What suits you more is something smaller to start with. (*Reflecting again, trying to understand how he really feels*)

Pt: If I decide to do it and I haven't yet. (*Patient backs off*)

Dr: You don't want to be pushed into this (Dr doesn't try to win the argument or be clever – just uses a listening statement)

Pt: Exactly, but it might be worth thinking about. Thanks for not lecturing me Dr (laughs)

Dr: *Dr summarises how patient feels and keeps the door open for another time.*

Six weeks later the patient returns for another check on his borderline blood pressure.

Dr: Well thanks for coming back again. I saw you six weeks ago, didn't I?

Pt: Yes, you asked me to come back to check the blood pressure.

Dr: (*Doctor checks BP*) Well it's still on the high side, so we could now ask the question what will help you to get it down and avoid this becoming a cause for concern in the future?

Pt: Well I know I don't want any of those tablets for blood pressure if possible Doc.

Dr: Sure, that's fine for now. Can I raise the subject of exercise again, if I promise not to lecture you?

Pt: You told me that last time, but fair game, you didn't lecture me, so yes fine (laughs)

Dr: I promise again!

Pt: I believe you again, but what now?

Dr: My question would be this: are there some simple small steps you can take to introduce a little more exercise into your daily life?

Pt: I'm glad you are not on about the gym.

Dr: Sure, that's too drastic for you (*reflective listening*)

Pt: I don't do drastic, my life's busy enough.

Dr: Small things might be possible (*reflective listening again – a guess about what might work*)

Pt: Yes, maybe but I'm not sure what you mean by small things?

Dr: *Presents a range of options, not a single idea, with the aim of encouraging the patient to select thus: So that's a number of possibilities. You will be the best judge of what might work for you. (Reinforcing autonomy is a critical aspect of skilful consulting about behaviour change).*

Pt: Well of all those things you mention, there's only two that make sense to me: walking up the stairs rather than the lift and getting off the bus 2 stops before work and walking the last part (*patient emits change talk*).

Dr: *You can see a way of doing these simple things (the best response to change talk is a simple reflection).*

Pt: I guess I can, and if it works I might try walking that same distance after work again (*more change talk*).

Dr: *You want to experiment and see what works for you (more reflection).*

Pt: Yeah I am happy to try those two things (*change talk*).

Dr: *Summarises all the change talk that has emerged. So you don't want tablets, and you think you might be able to walk up the stairs at work, and get off the bus two stops early, and walk into work.*

Pt: Knowing me, I'll give it a go. It might help me to feel better about myself (*change talk*).

Dr: And would you mind coming to see me for a brief catch-up in six weeks?

Pt: Sure.....Etc etc

In addition to motivational interviewing, GP's may have their own favourite method of motivation to elicit behaviour change that they wish to use. In promoting exercise, alternative **socio-behavioural** approaches have also been developed to help people change physical activity patterns. The following case study is an example of such a technique:

Edith

In recent years, 50 year old Edith has experienced more and more bouts of prolonged unhappiness. She has not been diagnosed with clinical depression, but her GP has recommended she becomes physically active. She has done little if no purposeful exercise since her teenage years when she used to hate sport and physical education at school, finding it threatening and embarrassing. Edith is on the borderline between overweight and obesity with a BMI of 29 and has been recently been diagnosed with mild hypertension. She has a family history of type 2 diabetes.

The start point for Edith is to construct an activity programme with the help of an exercise professional using a person-centred approach.

The first step is to discuss with Edith her past history in sport and exercise and help her to work out which activities she might be interested in starting. During this discussion, we discover she has not been involved in any sport or exercise since leaving school (her 7-day recall of activity revealed less than 10min of activity- only walking- each day) and that she never enjoyed team games such as hockey at school. She says she might enjoy some group activity, but feels she is not confident to join a group at the moment. She would like to think she could join a group of women with similar kinds of issues at some point.

The second step is to weigh up the pros and cons Edith perceives in becoming more active. Edith agrees that being more active is important for her and might help her feel more positive about herself and life in general, as well as help her lose some weight and get her blood pressure down. However, Edith does not feel very sporty or athletic and finds it difficult to see ways in which she can be more active, so the conversation turns to walking as a starting strategy.

The next important task is short-term goal setting that can provide a sense of steady but safe improvement. Short term goals have to have a flavour of where, when, and what. They need to be specific and agreed (following the SMART principle of being Specific, Measurable, Agreed, Realistic and Time phased).

The discussion moves to time difficulties, as Edith is still holding a demanding full-time job and finding it difficult to cope. The key motivational issue, then, is to ensure small goals for the early weeks that are achievable but that will move her forwards. Goals that are too demanding at this point may undermine confidence and disappoint if they are not reached. It is important to emphasize that mental health or mood benefits may be experienced fairly quickly and there will be changes in exercise capacity in a matter of a few weeks.

Case study reference⁷

Summary

NICE guidelines recommend using techniques that create attitude and behaviour change within health care interventions.⁸ Whilst no single method can be universally applied, a combination of motivational interviewing and written physical activity on prescription has been used effectively in Sweden for the past 10 years. A follow up study there has shown a majority (65%) still adhering to the advice after 6 months, with partial adherence at 19% and non adherence 16%. This, as they point out, *“is as good as adherence to other treatments for chronic diseases. This is significant because even a small increase in physical activity is important both on an individual level and for public health”*.⁹

Chapter 13 Starting to Exercise.

For many patients the thought of starting to exercise can be overwhelming. It is perceived as being difficult, painful, largely gym-based, with only demanding regimes producing real benefits.

These are false beliefs and much of the advice about exercise should be about incorporating more physical activity into everyday life, with alternative choices if required, to gym-based exercise. This section will aim to give brief guidance on the main principles of exercise, how to start exercise and how to dispel these beliefs.

Assessment of present levels of activity;

- *The UK General Practice Physical Activity Questionnaire (GPPAQ)* ¹ can be used to categorise patients into levels of activity.
- *'The Exercise Vital Sign'*. ² A brief assessment using 2 questions:
 - 1 "On average how many days/ week do you engage in moderate or greater physical activity (like a brisk walk)?"
 - 2 "On those days, how many minutes do you engage in activity at this level?"

Then multiply the two measures to arrive at an average minutes per week of moderate exercise that you can compare with the recommended guidelines on physical activity or use to monitor progress.

Four important aspects of exercise;

- *Cardiovascular fitness*
- *Muscular strength*
- *Endurance*
- *Flexibility*

Many of the health benefits of exercise come from improved **cardiovascular fitness** using aerobic exercise (see [Health Benefits](#)). However **muscle strength** and resistance exercises also benefit bone formation, glucose metabolism, hypertension and maintenance of weight.

Muscle strength and **endurance** are also essential to maintain mobility and prevention of falls, which increases in importance as we grow older. **Flexibility** is often overlooked, but is also important as it reduces the possibility of injury, stiffness and an inability to perform simple tasks like turning around to enable you to park your car.

There are some simple basic principles that can be used in 'prescribing exercise', which if patients can grasp, will promote more enjoyment and increase motivation, cutting through some of their beliefs/fears of pain or difficulty.

Warm up and Cool down

It is desirable that individuals include a warm up and cool down as part of their activity. This may be the same activity performed at a lower intensity. For example, walking at a slow pace for your warm up and cool down, with a moderate intensity walk for 30 minutes as the main activity.

Apply the **FITT principle**.

Frequency – How many times a week for an activity?

Intensity ---- How hard to exert?

Type ----- Which type of activity agreed with the patient?

Time ----- How long in minutes?

The current UK physical activity guidelines are for moderate intensity activity on 5 or more days a week. For individuals who have led a sedentary lifestyle this may be difficult to establish initially. Here, the advice may be to exercise aerobically three times a week, allowing a day or two in between exercise days. However, once this is established individuals should be encouraged to increase the frequency to 5 or more days.

Frequency is the most important aspect to establish as without a routine pattern it will not become a lifestyle change. Motivation is what gets you started but habit is what keeps you going.

Time or how long to exercise, should be established but should not include any warm up or cool down. Present guidelines have recently changed and people can be advised that bouts of physical activity of 10 min or more accumulated throughout the day are as effective as longer sessions.

Newcomers to exercise may need to start at low *intensity* but need to be aware that the evidence for health change is mostly from moderate exercise, so if walking they won't improve their cardiovascular fitness with a gentle stroll for 30 minutes. If walking, aim to increase the number of minutes of walk before increasing the intensity (by walking faster or uphill).

There are many activities that can be started and it is most important to find a *type* of exercise that the individual finds enjoyable convenient, affordable and achievable. Walking, cycling and swimming are three of the commonest and known to virtually everyone, but dancing, yoga, Pilates and Tai Chi are also very popular and help prevent falls and encourage core strength.

Definitions of moderate and vigorous intensity:

- *Moderate intensity* physical activity causes adults to feel warmer, breathe harder and the heart beats faster with the example of brisk walking being the easiest to recognize.
- *Vigorous intensity* physical activity causes adults to get warm quickly, breathe much harder, perspire and find it difficult to maintain a conversation

Monitoring

Some people find it helpful to monitor their progress and use it to motivate themselves.

Ways of monitoring progress:

- Keep an exercise diary – cheap and easy to record your progress, success, feelings and identify barriers to exercise.
- Pedometers – cheap easy to use, but not always reliable.
- Accelerometers – more reliable and can be linked to a computer program for monitoring.
- Walk4life – the walking web based site which is free to join in and uses ordinance survey maps and routes and has a ‘track your progress’ page to monitor your own fitness.

The above advice is partly taken from Bandolier.³ Further advice on Starting to exercise available from their fuller version at: www.medicine.ox.ac.uk/bandolier/booth/hliving/startoex.html and the Swedish guidance at:

<http://fyss.se/wp-content/uploads/2011/06/2.-General-recommendations-regarding-physical-activity.pdf>

Disclaimer

Health professionals are not trained in giving exercise programmes to individuals and this resource is not intended to encourage anyone to go beyond their own experience. However, guiding someone to walk, swim, cycle or dance is within everyone’s understanding.

Getting Started

Increasing physical activity for many is difficult and we need encouragement and ideas that can be integrated into daily life.

There are many ways of increasing activity and walking is one of the easiest ways. If 30 minutes all at once seems too much, then try short bouts in the day. For example:

- Leave the car at home for short trips to shops or friends
- Walk to school with the children when you can
- Park the car when used, at the far side of a car park
- If commuting, get off the train or bus one or two stops early to fit in a walk to work
- If you work in a large office, walk to talk to colleagues rather than use the phone
- Promote and support standing meetings. (Standing burns 15 calories an hour compared to 5 an hour sitting)
- Get up from a desk to walk across the office to speak to a colleague rather than phone or email
- Use a standing desk to work from
- Read your Ipad on top of the filing cabinet
- At home or work if you have a cordless phone, walk and talk
- Avoid lifts and escalators –use the stairs
- Meet friends for a walk
- Use an exercise bike whilst watching TV; don't store it in the spare room!

Around the house many jobs involve activity and can help get you going.

- Cleaning and polishing furniture, floors and windows.
- Cutting the grass or the hedge.
- Brushing the yard or raking up leaves.
- Washing and polishing the car by hand.
- DIY – carpentry, sanding, painting, building etc.

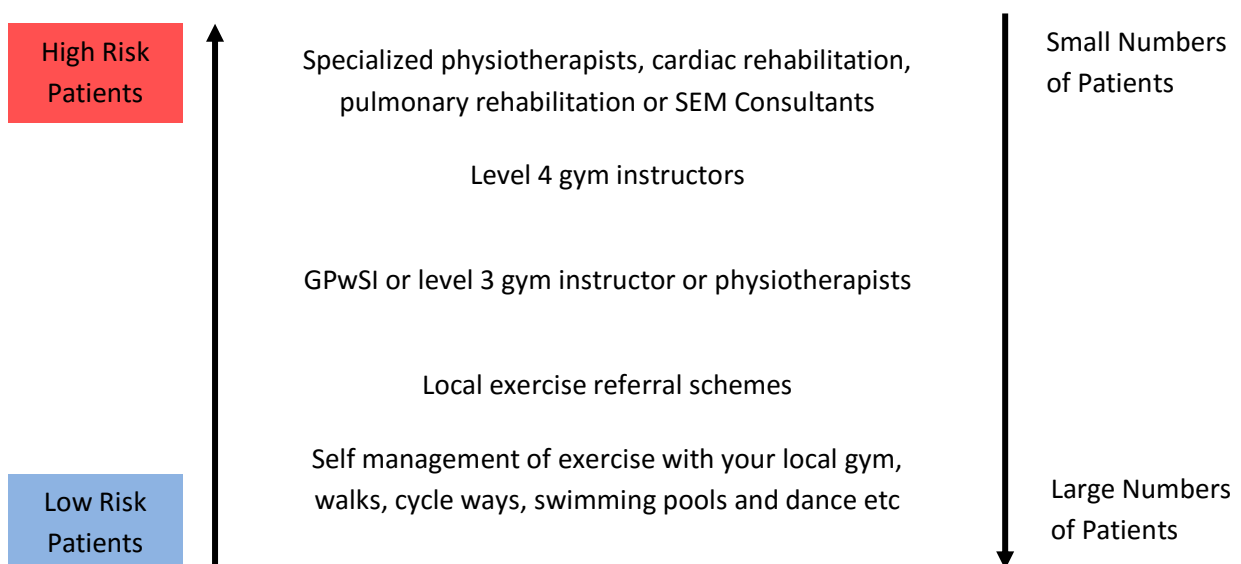
There are many other activities but most important is finding a form of exercise that the individual finds enjoyable, social and achievable.

- Walking – walk with a friend or join a walking group. <http://www.walk4life.info> has information on local walks and walking groups for many areas.
- Cycling – many cycle paths have or are being developed across the UK and it is a fun activity for all the family. <http://www.sustrans.org.uk/ncn/map/national-cycle-network>
- Dance – increasingly popular, enjoyable and social with many alternative types such as salsa, zumba, line dancing and ballroom.
- Swimming – traditional fun for the family and water aerobics for some.
- Golf – 18 holes is five miles on most courses
- Tennis, squash, badminton – many clubs and courts all around the country for fun and competition.

- Football – the nation’s most popular sport, so get out with your children and kick a ball again!
- Yoga and Pilates – excellent activities for flexibility, core strength and posture to relieve and prevent many back problems.

Remember every activity counts.

The Referral Pathway



In Primary Care across the UK, there are almost 900,000 GP consultations daily. ⁴ The average patient visits their GP about 4 times per year. ⁵ During these visits there is ample opportunity for the GP, practice nurse and health care assistant to promote exercise as a beneficial lifestyle and as a form of treatment in many diseases. In Secondary Care there are many thousands of outpatients and inpatient consultations where exercise advice should be incorporated into the treatment plan.

The majority of patients need encouragement towards being more active through simple guiding techniques of Motivational Interviewing and straight forward advice on promoting activity or taking up exercise. Many patients do not want to go to a gym, but prefer to participate in walking, cycling, swimming and dancing, the advice for which falls comfortably within the role of any health professional.

As patients present with more complex problems, with one or more co-morbidities, doctors or nurses may prefer to refer to Local Exercise Schemes or physiotherapists depending on the conditions and level of risk for more detailed advice on specific exercise plans. However, there is still plenty of simple encouragement regarding walking, gardening and housework, which can be done in parallel, as any activity provides a valid health benefit.

For a small number of patients their activity needs require rehabilitation through specialised physiotherapists or high level 4 gym instructors, or through pulmonary or cardiac rehabilitation units. Assessments of these patients may need to be made by Cardiac, Respiratory or, if available, Sport and Exercise Medicine (SEM) consultants.

Absolute Contraindications of Exercise

- Uncontrolled or poorly controlled asthma. ⁶
- Cancer or blood disorders: when treatment or disease cause leucocytes below $0.5 \times 10^9/L$, haemoglobin below 60g/L or platelets below $20 \times 10^9 /L$. ⁶
- COPD: patients are required to be stable before training and oxygen saturation levels should be above 88-90%. ⁷
- Diabetes: if blood glucose is >13 mmol or <5.5 mmol/l then it should be corrected first. ⁸ Patients with diabetic peripheral or autonomic neuropathy or foot ulcers should avoid weight bearing exercise. Any diabetic with acute illness or infection. ⁶
- Heart disease: acute myocardial infarction or unstable angina until stable for at least 5 days, dyspnoea at rest, pericarditis, myocarditis, endocarditis, symptomatic aortic stenosis, cardiomyopathy, unstable or acute heart failure, uncontrolled tachycardia. ⁶
- Hypertension: resting blood pressures of a systolic >180 or diastolic >100 or higher should receive medication before regular physical activity, ⁸ with particular restrictions on heavy weights strength conditioning, which can create particularly high pressures. ⁹
- Osteoporosis: avoid activities with a high risk of falling. ⁶
- Fever: should be settled to avoid a risk of developing myocarditis. ⁸
- Unexplained dizzy spells. ⁸
- Acute pulmonary embolus or pulmonary infarction. Excessive or unexplained breathlessness on exertion. ⁸
- Any acute severe illness.

(Absolute contraindications taken from BACR (2006) Phase IV Exercise Instructor Training Manual and ACSM (2009) Guidelines for Exercise Testing and Prescription) Courtesy of Wales NERS guidelines.⁸

Case histories. Examples can motivate some patients and are useful for nurses to quote.

Case 1 Hypertension or Not?

A 52 old man was referred by the practice nurse for initiation of blood pressure medication after having had 3 raised blood pressures recorded, 170/96, 176/100, 178/98.

This gave a conventional diagnosis of mild hypertension. He had a busy job but denied being stressed. Ambulatory blood pressure monitoring was not available in this case. His initial treatment plan:

- ✓ Lifestyle advice of low salt, losing weight and regular exercise was advised. The patient was keen to avoid medication if possible.
- ✓ Motivation for the patient came from a desire to avoid medication.
- ✓ Specific advice on exercise was given for 30 minutes of moderate exercise on 6-7 days a week. He presently did no regular exercise. Different forms of exercise were explored and walking chosen as being the most practical.
- ✓ A follow up appointment was made for 4/52.

Repeat BP and weight recordings were made at monthly follow up appointments.

- ✓ The following recordings were made. 164/92, 162/90, 156/86, 154/86, 146/ 82, 144/ 82.
- ✓ He noted he was sleeping better, felt much better and hadn't realised he had been stressed with his job. He lost 2kg.
- ✓ NICE recommends ambulatory 24hr monitoring before a diagnosis of hypertension. This may have picked up a white coat hypertension diagnosis. Lifestyle intervention would still be indicated.

“Discharged” with a normal BP profile but follow up check at 6/12.

Potential cost savings:

- ☺ Cost of drug prescription for hypertension treatment for 12/12 each year until maybe he becomes hypertensive in the future.
- ☺ Blood test monitoring of electrolytes if he had ACE or diuretics per year.
- ☺ Clinical time for future monitoring 2 x BP checks and problems or side effects.

Costs incurred:

Appointments x 6 to initially monitor, but if initially he was treated, then follow up and stabilisation after initiating anti-hypertensive's may have cancelled these out.

Case 2 Depression.

A 46 year old man presented with mild depression. His PHQ9 score for depression was 9/30. One normal mode of practice would have been to start an antidepressant and follow up monthly.

Instead, an alternative behaviour lifestyle approach was chosen with an emphasis on exercise which the patient previously enjoyed but had allowed to relapse. His initial treatment plan:

- ✓ Exercise discussed with motivational interviewing and 7/7 of 30 minutes moderate exercise was 'prescribed' with cycling being the chosen exercise in the form of commuting to and from work.
- ✓ Follow up monthly was undertaken with the addition of the Welsh bibliography prescribing scheme (self help books from the local library).
- ✓ Slow resolution of depression occurred and the patient episode resolved after 12/12.

Cost savings:

- ☺ Antidepressant medication for 12 months or more.
- ☺ *Appointments cost neutral*, same number of patient follow up appointments used as this doctor's normal practice.

Case 3 Obesity.

A - 38 old female type 2 new diabetic presented following a diagnosis of diabetes and being overweight. Wt 154kg, BMI= 51.6

For the first 2 years despite advice on diet and exercise, her weight fluctuated with crash diets and intermittent exercise between 154kg and 137kg, but after 2 years it was back to 151kg and with ever rising Hba1c she had progressed onto metformin with increasing doses. One year ago with metformin at 1gm bd and an abnormal hba1c yet again she was given motivational interviewing guidance on activity.

Prior to this she;

"Used to dread getting out of bed in the morning. I wish I wouldn't wake up."

Now for the first time she has exercised regularly and consistently.

"I look forward to the day. I have lost inches from my waist and my back pain has gone."

Her Hba1c has dropped for the first time and is now normal on metformin 1gm bd. Her weight is 141 kg. She has decided to increase her activity time with a target of 300 minutes a week.

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Further resources:

These chapters are extracts from the Welsh Deanery CPD module Motivate2Move information found at: <http://gpcpd.walesdeanery.org/index.php/welcome-to-motivate-2-move> where more bite size sections on the other benefits of exercise can be found. There are also patient resources and links into more detailed information and other relevant organizations.