The Faculty of Sport and Exercise Medicine (UK)

EXERCISE PRESCRIPTION IN HEALTH AND DISEASE:

A SERIES OF CASES FOR MEDICAL STUDENTS.

EDITED BY DR PATRICK O'HALLORAN
AND DR GURJIT BHOGAL

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FOREWORD BY THE EDITORS - DR PATRICK O'HALLORAN AND DR GURJIT BHOGAL

Dr Patrick O'Halloran is an ST2 GP Trainee in the Severn Deanery.
Dr Gurjit Bhogal is an ST6 Registrar in Sport and Exercise Medicine in the East Midlands Deanery and Member of the Faculty of Sport and Exercise Medicine UK.

The Chief Medical Officer UK guidelines on physical activity suggest that adults should be active to a moderate intensity for at least 150 minutes per week. In addition, the weight of evidence which suggests that physical inactivity is harmful to health or that physical activity is beneficial to the treatment of a range of medical conditions is rapidly expanding.

However, it is rare to find a patient who is swayed by guidelines or evidence alone. In a similar fashion to smoking, alcohol and substance abuse issues, it can be difficult to encourage patients to change their behaviour to take positive steps for their health. Enabling patients to see physical activity as an adjunct to their treatment, removing the perception that physical activity is harmful and fitting physical activity into a patient's busy lifestyle can all present a great challenge to healthcare professionals.

Yet the promotion of physical activity for health to patients of all ages is something to which everyone involved in healthcare can contribute, including medical students who are often in the fortunate position of having more time to talk to and understand patients concerns and beliefs.

We hope that this series of cases will serve to be a useful learning tool to demonstrate that there are actually relatively few patients who would not benefit from increasing their physical activity levels and that there are many creative methods by which this behaviour change can be encouraged.

We would suggest reading cases relevant to the patients you are seeing and then taking the time to discuss physical activity with patients and your tutors in order to understand how it can be used as part of a wider treatment strategy.

This series of cases is intended to be a starting point to encourage discussion and foster further learning about the promotion of physical activity to patients and we would recommend looking at the resources laid out in the "Further Reading" sections at the end of each chapter, to learn more about specific topics.

We would like to take this opportunity to thank Professor Mark Batt, Dr Roderick Jaques and Professor Stewart Hillis for their encouragement and support and the Faculty of Sport and Exercise Medicine UK which helped make this project possible.

Finally, and most importantly, we would like to thank all of the authors who generously donated their time and effort to complete the chapters laid out here. Without them, this resource would never have been completed and we are very grateful for all of their help.

FOREWORD - DR RODERICK JAQUES

Dr Roderick Jaques is the President of the Faculty of Sport and Exercise Medicine

The role of physical activity in the medical management of patients with co-morbidities needs greater public and professional awareness. This medical student exercise prescription booklet elegantly gives the reader tools to address the patients' exercise health in a number of different conditions. The chapters give a great introduction to the medical student and future physician, with references and further reading options allowing for in depth access to further knowledge.

Many patients do want to learn empowering ways of managing their medical health and wellness. So often they sense that 'their' doctor doesn't really know how to help. This prescription booklet will change all that.

I congratulate the authors, it's a great step forwards in the right direction to improve patient and public healthcare.

For more information about the Faculty of Sport and Exercise Medicine UK and to learn more about the specialty of Sport and Exercise Medicine, please visit the Faculty webpage:

www.fsem.ac.uk

DEDICATION

PROFESSOR WILLIAM STEWART HILLIS OBE

This booklet is dedicated to the life and work of the late Professor Stewart Hillis, without his professional guidance it would not have been published. The editors and authors would like to thank Professor Hillis for dedicating his personal time to this project, providing support in his capacity as Chair of the Education Committee at the FSEM. Professor Hillis was also an examiner for the Faculty, Chair of the CPD Committee and was integral in the development of the Diploma in Sport and Exercise Medicine Exam. He was a man of superb professional and personal qualities who was always willing to give up his free time to further the medical careers of others.

HOW TO TAKE AN EXERCISE HISTORY - DR JAMES THING

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"WALKING IS A MAN'S BEST MEDICINE"
HIPPOCRATES 460 - 377BC

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HOW TO TAKE AN EXERCISE HISTORY

As with all fields of medicine the history forms the backbone of any successful consultation and subsequent management plan. It enables the clinician to establish exactly what the individual's current activity level is and, if considered inadequate, allows them to offer bespoke advice to optimise their lifestyle.

The link between physical activity and good health has long been established, as hinted at by Hippocrates more than 2000 years ago and supported by reams of more recent research.

Exercise can however seem difficult to quantify, unlike an individual's blood pressure or pulse rate, which can be represented in simple terms. It may be for this reason that doctors and healthcare workers are notoriously poor at recording an individual's physical activity (PA) load, or it may simply be that they consider it less "vital".

Research clearly demonstrates that physical inactivity, as a risk factor for chronic disease, is as important as blood pressure, cholesterol level, blood sugar and smoking status, all of which are routinely measured in medical consultations on a daily basis. But more often than not clinicians fail to measure a patient's weekly exertion levels.

The concept of exercise as the "5th vital sign" (along with pulse, blood pressure, respiratory rate and temperature) has been pioneered in America in an attempt to quantify an individual's PA volume to decide whether intervention is required. This involves the clinician asking two simple questions:

1) "On average, how many days per week do you engage in moderate (able to talk but not sing) or greater intensity physical activity (like a brisk walk)?"

2) "On those days, for how many minutes do you engage in activity at this level?"

HOW TO TAKE AN EXERCISE HISTORY

The product of these two answers will enable the clinician to roughly quantify the volume of physical activity performed per week and determine whether it meets current recommendations, i.e. 150 minutes of moderate intensity physical activity per week. In a time restricted setting it can be difficult to ask about physical activity, however it is often possible to relate the benefits of exercise to any consultation. For example:

- A patient with low mood may benefit from the suggestion of increasing their PA levels when discussing management options.
- A patient attending for their annual cholesterol check would benefit from a brief PA assessment in order to stratify their risk and offer practical advice as required.

It may however be necessary to ask the patient to return to ensure that there is enough time to deal with the subject completely. In the UK, healthcare workers often use the GP Physical Activity Questionnaire (GPPAQ) to quantify levels of PA. This enables individuals to be classified into one of four categories: Inactive, Moderately Inactive, Moderately Active or Active. The clinician can then use this information to decide whether further action is required to ensure that the patient reaches their PA goals. Taking an exercise history can start as simply as this, but in order to fully understand what our patients are undertaking there are several other aspects of their physical activity that are important to ascertain.

The FITT (Frequency, Intensity, Time, Type) principle offers the clinician a useful tool for establishing a detailed account of an individual's "exertional load" and often forms the basis for an "exercise prescription".

Case 1: 25 year old, unemployed man, Bmi:34.
Claim: "walks a lot"
Reality: Strolls 200 yards to the corner shop to collect his cigarettes on a twice weekly basis.

Case 2: 88 year old, charity shop worker, Bmi:23.
Claim: "walks a bit"
Reality: Briskly walks the 3 miles to and from her place of work, 5 times per week.

HOW TO TAKE AN EXERCISE HISTORY

The use of the FITT principles help us to differentiate the 25 year old couch potato who "walks a lot" from the active octogenarian who "walks a bit".

It is important to consider all exercise elements, including both recreational and occupational physical activity levels. Asking about employment often gives the clinician further insight into the patient's overall activity levels. For example exercise at work may comprise the majority of the overall energy expenditure for a postman or builder. In addition it is important to determine whether the patient is undertaking any resistance exercise, e.g. heavy lifting, in addition to aerobic activity, which involves activities such as walking, cycling and swimming.

Having established exactly what the patient is undertaking the clinician can then focus on the remainder of the history on establishing any contraindications to exercise and any necessary precautions required prior to exercise. It is essential to consider previous medical problems when taking an exercise history. These problems may be related to exercise or may preclude certain aspects of physical activity (see Box 1).

Exercise related symptoms such as breathlessness, chest pain and dizziness must be excluded in order to enable tailoring of safe exercise advice for the individual. The Physical Activity Readiness Questionnaire (PARQ) is a tool designed for use by lay people, such as fitness instructors, to determine whether further assessment by a doctor is required prior to initiating organised physical activity. The American College of Sports Medicine (ACSM) have also produced a Pre-participation Screening Questionnaire that is designed to ensure that individuals, who are at higher risk of exercise related medical issues, are identified and stratified accordingly.

Box 1: Important medical issues to consider in an exercise history –

Cardiovascular disease	Anaemia
Coronary procedures	Cancer
Pacemaker in-situ	Pregnancy
Diabetes	Osteoporosis
Pulmonary disease	Musculoskeletal disorders i.e. arthritis
CerebrovascularAccident CVA	Eating disorders

(Adapted from ACSM guidelines for exercise testing and prescription)

HOW TO TAKE AN EXERCISE HISTORY

It is important to establish whether there is a family history of sudden death, especially if related to exertion. Many of the conditions that predispose to exercise related sudden death are heritable e.g. Hypertrophic Obstructive Cardiomyopathy (HOCM) in younger patients, and Coronary Artery Disease (CAD) in older patients. A positive family history would require further testing prior to the safe recommendation of physical activity.

Risk stratification of patients, i.e. which patients require further testing prior to initiating exercise, will be covered in a later chapter (Chapter 3-Who can and cannot safely start exercising).

The drug history forms another vital part of the exercise history taking process. Many patients seeking exercise advice will be taking prescribed medication that may preclude physical exertion or limit their ability to reach expected peak levels. The prescription of drugs such as warfarin or aspirin may have profound implications on a young athlete who is keen to compete in contact sport or an elderly person who is unsteady on their feet and prone to falls but keen to continue exercising.

Beta-blockers or digoxin, prescribed for Atrial Fibrilation (AF) or angina, will limit the ability of the heart to reach previously achieved cardiac output levels and as such may reduce the capacity of the individual to undertake vigorous exertion.

Most prescribed medications will have some impact upon the individual's physical activity potential. A person who has previously enjoyed long walks may be crippled by the introduction of a diuretic that results in them needing to access toilet facilities with an increased frequency.

In this respect it is important to note exactly what the patient is taking (prescribed and non-prescribed medication) and to consider the impact of introducing new medications on that person's lifestyle before starting them.

By taking an exercise history we hope to optimise an individual's physical activity levels in order to address a known risk factor.

HOW TO TAKE AN EXERCISE HISTORY

At this stage it is also useful to consider addressing their other risk factors such as smoking, drug and alcohol intake. Abuse of any of these substances may also have profound effects on an individual's ability to perform physical activity in a safe and productive manner.

Having established a comprehensive exercise history the clinician must then go on to determine whether the patient is in fact keen to improve their physical activity levels. Often patients are fully aware that their smoking habit, poor diet or insufficient activity level puts them at risk of developing medical problems, but they do little to change these behaviors. The clinician plays an essential role in ensuring that this health information is made available to the patient. They must also determine the patient's readiness to change, and where possible facilitate the transformation to a more active lifestyle.

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SOLUTION FOCUSED MOTIVATIONAL STRATEGIES - GARRATH FORD

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SOLUTION FOCUSED MOTIVATIONAL STRATEGIES

It is now recognised that every appointment should include health promotion. This requires all practitioners to have the skills and confidence to take the initiative and actively facilitate health-related behaviour change. This chapter aims to highlight patient-centred ways to promote physical activity in the full context of a person's wider determinants of health and wellbeing.

Focus on Solutions

Simply giving advice is not sufficient. Learning to lead Solution Focused conversations enables patients to create their own personalised solutions.

Figure 1: Example of a Solution Focused Motivational Strategy

Highlight progress →	Discover what is working →	Explore preffered futures →	Agree best hopes

Agree Best Hopes

Asking about 'best hopes' allows patients to show professionals that they are well intentioned and desiring to create a healthier future. Benefits include maximising patients' cooperation and satisfaction. Solution Focused questions require professionals to trust patients as experts in their own lives.

Practice example – Part 1

· What are your best hopes from coming to see me?

- I just can't continue with how things are going, my weight is really starting to bother me.... I just don't know what to do.

· And what are you hoping for from deciding to come and talk to me?

- I thought maybe you could give me some ideas for losing weight... but I've tried everything.

SOLUTION FOCUSED MOTIVATIONAL STRATEGIES

· And what are you hoping these ideas will lead to?

- Well I want to get back on-track; I want to get back to being myself.

· Okay, let me check...from our talking today your best hopes are to get back on-track and back to being yourself, is that right?

- Yes.

Taking a moment in every consultation to enquire about patients' 'best hopes', turns passive recipients into active participants in "self care".

- Practice tip
  Asking this question as soon as possible, allows each consultation to serve their aims. Do not worry if the patient is not yet talking about 'taking more physical activity or exercise' or about any of the other agendas we as professionals have (e.g. smoking, medication-adherence etc).

Explore Preferred Futures

Once a patients' best hopes have been set, practitioners gain as detailed a description of what these best hopes will look like when they are realised as possible. Investigating preferred futures enables patients to determine their own realistic and unique preferences for achieving them.

- Practice tip
  Key to increasing physical activity is eliciting patients' local knowledge for ideas and solutions that fit their lives.

Stay with the positive

The process of being asked about the preferred future in a gentle step-by-step way, invites the patient to think in new ways. A rich, empowering and hopeful vision of what life could be like is created.

- Practice tip
  Ask patients how they will 'notice' when they are achieving their best hopes in the future.

SOLUTION FOCUSED MOTIVATIONAL STRATEGIES

Focus on signs

Guiding the patient to imagine and describe the very first signs of progress makes it easier for patients to understand what they need to do and experience early improvement. For example, 'being healthy' may be a far away goal, but choosing to 'take the stairs' is possible in the very near future.

Practice example – Part 2

· Let's imagine that you wake up tomorrow morning and you are back to being yourself and on-track...what is the very first thing that you will notice?

- I'd walk the kids to school, rather than taking them in the car.

· And how will walking the kids to school be good for you?

- It would put me in a better mood and set me up for the day.

· Great. What would this better mood lead to?

- I'd probably be bothered to look for work. I was made redundant last year.

· And what else would tell you that you are being yourself and on track?

- I'd want to do more with my family...for example, I'd suggest we started back at swimming. I'd also like to get back in touch with friends.

· Where do you swim?

- At the local school.

· When would be a good time to go?

- Practice tip
  Patients want the same positive outcomes as professionals. They simply have their own unique ways of expressing their best hopes and preferred ways and order of achieving them.

SOLUTION FOCUSED MOTIVATIONAL STRATEGIES

Discover what is working
Solution Focused questions can be used to illuminate what patients are already doing well (aspects of the preferred future already being achieved). This moves professionals away from thinking they have to initiate change, rather the task is to find positive health-related behaviour and encourage the patient to do more of it.

Ask scaling questions
0 to 10 scales help to make best hopes and preferred futures more concrete and give momentum to patients' efforts. Scales demonstrate that patients are (even before their first appointment) already on their way to achieving their desired healthier lifestyle.

Practice example – Part 3

· On a scale of 0 to 10, with 0 representing the worst things could ever be and 10 representing you being fully yourself and on-track; where would you say you were at the moment?

- I'd say a 2 because I really have been struggling.

· Why 2 and not lower....what are you doing....even a little, that you are pleased with?

- I have been forcing myself to take the kids to the park... but it doesn't happen very often.

· And what's better when you force yourself?

- It gets me out of the house and it means I have to be active! The kids like me to get involved. It also shows me that I can still do things.

· What else do you know is good to force yourself to do?

- The exercises my physio gave me for my back! It's so easy to skip them but for the last few weeks I've been doing them everyday. I've even made myself a chart.

SOLUTION FOCUSED MOTIVATIONAL STRATEGIES

· What is better when you do your exercises?

Past and recent successes

Uncovering times of competence, recent improvements and coping helps patients to utilise and adapt their strengths to current priorities.

As well as capturing what patients are already doing well, scales can be utilised for eliciting further signs of the preferred future beginning to happen.

Practice example – Part 4

· How will you know when you have moved up to 3?

- I will have asked Dave at work if he wants to start-up our bike rides again.

· What else?

- I would be walking the kids to school at least twice a week.

· What else?

- I would be looking for work on the internet and maybe phoning a few old work colleagues for advice.

If a patient does not naturally talk about becoming more physically active (or other health behaviour you deem important), it may be appropriate to introduce this into the conversation, whilst still maintaining a Solution Focused approach. For example:

- As you probably know, it is now part of my job to encourage all my patients to lead a healthier lifestyle....can you tell me 5 things you have been doing recently to look after your health?
- Being physically active is important for all of us...how are you taking care to be physically active?
- When have you been physically active in the past?

SOLUTION FOCUSED MOTIVATIONAL STRATEGIES

· How is being physically active good for you?

- Practice tip
  When learning this approach, many practitioners are surprised that patients are not given an 'action plan'. Rather, this way of working simply leaves the patient knowing a range of achievable options for improving their health. The professional is required to have confidence that the patient will choose to make improvements to their lifestyle, in a way and at a time that is right for them.

Highlight progress

Purposefully utilise future appointments to ask about progress. Asking 'What is better?' invites patients to review what improvements they have made and communicates practitioners' high expectations. The benefit of not setting a formal goal(s) in the previous appointment is that the patient can now take all the credit for their success.

- Practice tip
  Fully explore what is better, allowing the patient to enjoy and reflect on their improvements and knock-on benefits. Ask about the good intentions behind patients' efforts to improve their lifestyles.

Even if patients initially report that nothing is better, the professional is gently persistent in looking for small signs of progress.

Practice example – Part 5Follow-up appointment:

· What has got better since last time we met?

- Err...I'm not sure if anything has... a lot has been going on.

· I know it's difficult to think back... I'm interested in what you have been pleased to notice?

- Well my mood is better and I've definitely got more energy these days.

SOLUTION FOCUSED MOTIVATIONAL STRATEGIES

· How have you noticed?

- I'm wanting to do more things, for example, yesterday we all went swimming.

· What made you think of doing that?

- Well you know I want to get back on-track.... I'm trying to do more.

· What difference is swimming making?

- We have something to look forward to now as a family... we go on a Wednesday.

· Great....how else are you noticing you are being more yourself and on-track?

- Now you ask.... I've been sleeping better and I've even got an interview scheduled for next week.

· That's great. I'm also pleased to tell you that your blood pressure has improved. What do you think most explains this; your increased exercise, your better mood or sleeping better?

SOLUTION FOCUSED MOTIVATIONAL STRATEGIES

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Training course dates and information,
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WHO CAN AND CANNOT SAFELY START EXERCISING? - DR KIM GREGORY

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WHO CAN AND CANNOT SAFELY START EXERCISING

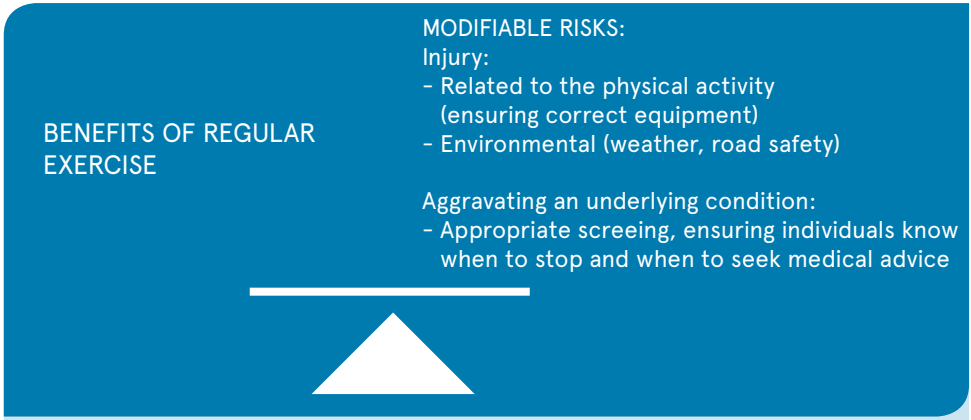

Figure 1 BALANCE = the right physical activity at the right frequency and intensity for the individual taking in to consideration their work and family commitments.

As with almost any intervention in medicine there are risks associated with regular physical activity, the most obvious being injury. However, the majority of the risks can be considered modifiable by taking simple safety precautions (e.g. high-visibility outerwear if going out in the dark) and ensuring appropriate equipment is used for the particular activity (e.g. wearing appropriate footwear). Aggravating pre-existing medical conditions is a commonly identified concern by both individuals and by clinicians who are not that confident in discussing physical activity. The aim of this chapter is to provide a simple framework to try and reduce this anxiety and help you to identify:

- Those individuals who can safely start gradually increasing their physical activity
- Those who have risk factors and need further investigation or who should initially participate in appropriately supervised physical activity

The other important message is to ensure individuals you advise understand:
- When to stop physical activity
- When they should seek medical review before continuing to participate in their chosen activity

WHO CAN AND CANNOT SAFELY START EXERCISING

You are already developing the tools required to obtain information from patients needed to safely advise them on starting to gradually increase, or continue their current physical activity from your history taking and physical examination skills. You need to be able to confidently elicit the major risk factors associated with cardiovascular, respiratory and metabolic disease processes, in particular those which may require modifications to an individual's participation in physical activity, and be aware of other special circumstances such as pregnancy which may influence your advice. Ultimately most individuals will benefit from physical activity, but few will benefit from inactivity.

Assessing Risk

There are several established self-assessment questionnaires, which can assist you in identifying patients with risk factors or conditions that require further assessment before commencing a physical activity programme. One example of this is the Physical Activity Readiness Questionnaire (PAR-Q) that can be filled in by individuals in the waiting room.

If an individual answers NO to all these questions they can generally be considered LOW RISK for health complications should they choose to start participating in physical activity at any intensity. However, your own clinical judgment should be applied and, if you have any concerns, you should seek advice from a more experienced clinician.

If an individual answers YES to any of the questions then further clinical assessment is required. The PARMed-X form provides one example of a structured approach to assist you in risk stratifying individuals further and also gives some initial targeted general exercise advice to discuss. A specific version is also available focusing on those individuals who are pregnant but wish to increase their physical activity. Both are available to download online (www.csep.ca). The flow diagram in Figure 2 summarises another practical approach you could use to structure your clinical encounters when considering physical activity interventions in clinical practice.

WHO CAN AND CANNOT SAFELY START EXERCISING

Asking explicitly about the following symptoms at rest and on exertion may help you to decide about risk stratification:

- Chest discomfort
- Shortness of breath
- Dizziness, presyncope or syncope
- Palpitations, arrhythmias
- Neck, jaw, arm or leg pain which may be ischaemic

- Review current medication doses, the time of day taken and any noticed side effects individuals may have noticed

- Ask about previous physical activity participation and any reasons for stopping it

Contraindications to Physical Activity

The recognised benefits of regular physical activity across many conditions are difficult to argue against and there are relatively few complete contraindications to participating in some form of physical activity; some of which will be addressed later in this booklet. The major contraindications are any uncontrolled symptoms or clinical signs. Commonly discussed examples include unstable angina, severe aortic stenosis, uncontrolled arrhythmias and acute infections. If you are unsure seek advice and always err on the side of caution.

Having started to increase their physical activity, if individuals develop new symptoms (e.g, chest pain, palpitations, dizziness, significant shortness of breath) particularly if directly related to their activity, they should be encouraged to seek medical review before further participation. Explaining as they start new activities that it is common to experience mild muscular discomfort (ache), which typically settles within 24-48 hours and reduces as they become more accustomed to the activity is worthwhile to reduce anxiety.

WHO CAN AND CANNOT SAFELY START EXERCISING

Key Points

- Advice must be tailored to the individual
- Modifications must be made to adjust for specific conditions as clinically indicated
- Increases in physical activity participation should always be gradual
- If individuals develop new symptoms and/or clinical signs they should seek medical review before continuing their chosen physical activity
- And don't forget that it is good medical practice to document the content of any such discussions with individuals within your clinical notes.

History Taking and Examination

PAR -Q questionnaire +/- PARMed -X
or
Medical History Taking and Clinical Examination within clinical consultation

Risk Stratification

HIGH RISK	MODERATE RISK	LOW RISK
· Known Cardiovascular Disease, Respiratory Disease, Metabolic Disease · Major Signs or Symptoms suggestive of Cardiovascular, Respiratory, Metabolic Disease	· More than 2 recognised Cardiovascular, Respiratory or Metabolic Risk factors · Age · Family History · Smoking History · BMI · Hypertension · Hypercholesterolemia · Confirmed impaired glucose tolerance	· Answered NO to all PAR-Q questions · Less than 2 recognised Cardiovascular, Respiratory or Metabolic risk factors

WHO CAN AND CANNOT SAFELY START EXERCISING

Dont forget: to consider special circumstances which may require other modifications e,g, pregnancy, musculoskeletal conditions limiting physical activity, the impact of medication side effects, individual's concerns over exercising

Remember: patients can move between risk levels if their symptoms respond to interventions so advice needs to be reviewed regularly ('The fifth vital sign') You should always use your clinical judgement and work within your level of competence

Management

HIGH RISK	· Requires approprate focused investigations prior to increasing physical activity participation · Specialist opinion/advice required and initial supervised exercise may then be appropriate
MODERATE RISK	· Able to commence light to moderate intensity physical activity but may need further investigation before vigorous activity · Consider local area supervised physical activity interventions
LOW RISK	· Patient is safe to start gradually increasing their physical activity without further assessment ·Advise on safety precautions and importance of correct equipment etc

- Figure 2 Risk stratification approach to increasing physical activity

WHO CAN AND CANNOT SAFELY START EXERCISING

Potential Sources of Further Information and Advice

PRIMARY CARE	· GP clinical supervisors · Local physical activity intervention programmes (e.g. to identify inclusion/exclusion criteria for individual programmes)
SECONDARY CARE	· Specialist Consultants E.g. Sport & Exercise Medicine Physicians, Cardiologists, Respiratory Physicians, Diabetologists · Specialist Nurses and Multidisciplinary Teams E.g. Cardiac or Pulmonary rehabilitation teams, Pain clinics, Clinical Exercise Scientists

- Figure 3 Considering physical activity and its potential risks during a clinical encounter

Specialist Sport and Exercise Medicine services vary across the United Kingdom, as with other specialist services. As you progress through your clinical training you will gradually become more familiar with the local services in the region you are based. Some areas have specific Sport and Exercise medicine clinics, others may have musculoskeletal clinics run by a combination of specialist Sport and Exercise Medicine physicians, Rheumatologists, Orthopaedic surgeons and GPs, all with an interest in Sport and Exercise Medicine and many work closely with extended scope physiotherapists. Consultant physicians in other medical specialties, with a particular interest in exercise for different patient groups are valuable sources of expertise e.g. bone metabolism and health, cardiac arrhythmias, asthma, falls prevention. As in many aspects of medicine, maintaining an ability to think 'outside of the box' will ensure you don't overlook potential sources of support when you are promoting safe exercise to your patients.

WHO CAN AND CANNOT SAFELY START EXERCISING

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HOW CAN I PRESCRIBE EXERCISE - DR KIM GREGORY

4

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HOW CAN I PRESCRIBE EXERCISE?

Having recognised the benefit of including exercise as 'the fifth vital sign' within your clinical practice it is also important, as in other areas of medicine, to remember that 'one size does NOT fit all' when it comes to engaging and supporting individuals to increase their physical activity. You as the clinician and the patient also need to recognise and acknowledge that the hard part of regular physical activity is the regular, not just the physical activity. For physical activity prescription to work it has to be designed by the individual, as they are the ones who ultimately manage their own time.

Much of the information presented below, you will already have access to through medical notes, have established with prior clinical encounters with the individual or knowledge of the local practice area. As with other medical prescriptions, physical activity needs to be reviewed and any prescription altered to respond to changes in individual's circumstances (medical, social or goals). Encouraging individuals to gain support of family and friends is really important to achieve the regular element of regular physical activity.

Establishing the Individual's Goals

Why do they want to increase their physical activity?

- Disease prevention
- Slowing progression of a condition
- Improve their overall quality of life (e.g. meet people, be able to do more with friends/family)
- Lose weight

What is their preferred method to increase their physical activity participation?

- Lifestyle changes
- Individual activities
- Team or group activities
- Using the commute to work e.g. cycling
- Indoor activities e.g. gym, exercise classes

HOW CAN I PRESCRIBE EXERCISE?

- Outdoor activities e.g. gardening. walking/jogging/running in a park, specific sports
- Home activities e.g. home gym, exercise videos, housework

Are there any practical obstacles that need to be considered to maximise success?

- Child care
- Lack of time
- Financial e.g. equipment costs, childcare costs,
- Locality e.g. accessible facilities, transport, personal safety

During discussions about physical activity goals remembering the Specific, Measurable, Attainable, Realistic Time-bound (SMART) approach is more likely to result in long-term behavioral changes in relation to physical activity. If an individual had previously undertaken no physical activity, then expecting that the government's physical activity recommendations can be achieved immediately is unrealistic in the short term. However, with continued change in behavior over a sustained time frame and gradual increases in frequency of physical activity, this goal becomes achievable in the longer term. Managing the expectations of the patient is an important skill for clinicians to acquire and this is no different when supporting people to increase their physical activity.

The Physical Activity Prescription

MEDICATION PRESCRIPTION

Example

Drug	Paracetamol
Dose	1 gram
Route	Oral
Frequency	4 Times a Day
Quantity	100 Tablets

PHYSICAL ACTIVITY PRESCRIPTION

Example

Frequency	5 Days a Week
Intensity	Moderate
Time	30 Minutes
Type	Walking

HOW CAN I PRESCRIBE EXERCISE?

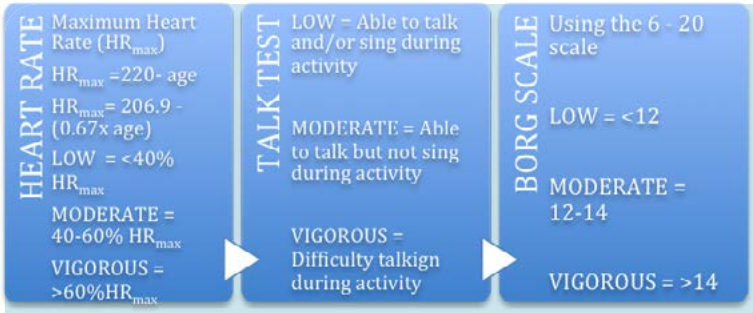
Prescribing physical activity using the 'FITT' principle, described by the American College of Sports Medicine, 'Exercise is Medicine' initiative, structures physical activity prescription into a format that is familiar to doctors. At the same time it introduces you to the concept of thinking of exercise as a medication. Examples for specific medical conditions are given throughout this booklet and the same format can be used for prescribing physical activity with a focus on lifestyle changes, aerobic or resistance activities.

The FITT Principle

F = Frequency	· The number of times a week the activity is performed.
I = Intensity	· The level of 'vigor' the activity requires · Choose a method of describing intensity that the individual an work easily with and understand
T = Time	· The duration in minutes the activity is performed for · Breaking the recommended 150 minutes a week into manageable 10 minutes periods is a recognised strategy or 30 minutes on at least 5 days a aweek
T = Type	· The type of physical activit performed · Aerobic, Resistance, Flexibility, Balance Training · Walking / jogging, running or lifestyle activity changes OR leisure / sports activities

When discussing intensity of physical activity with individuals, some will expect to relate this to a physiological measure such as heart rate (% of their maximum heart rate), but others may find it easier to use a subjective perceived exertion scale (the Borg Rating of Perceived Exertion, RPE) or the "Talk Test". These methods are relative rather than absolute measures of intensity, but importantly are readily accessible and easy to explain within an average clinical consultation time once you become familiar with them.

HOW CAN I PRESCRIBE EXERCISE?



6	
7	Very, very light
8	
9	Very light
10	
11	Fairly light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very Hard
18	
19	Very, very, hard
20	

Lifestyle changes are the simplest way of increasing physical activity into an individual's day without having to find 'additional' specific time. Practical points to suggest could include:

- Walking up the stairs rather than using escalators or lifts
- Parking the car further away from the shops and walking
- Getting off the bus a stop early and walking to your destination
- Meeting friends for a walk (and then a coffee) rather than just a coffee
- If working from home, walk around the block at the start and end of your working day
- Going for a walk at lunchtime
- Holding walking meetings at work rather than just sitting at a desk
- Consider doing static exercises when on the phone or watching TV
- Go for a walk rather than watch TV after work to unwind

If individuals express a preference for group activities or a more structured activity programme signposting them to local community programs is another way to facilitate physical activity prescription.

HOW CAN I PRESCRIBE EXERCISE?

Examples include:

- Formal exercise on prescription schemes
- Community walking or cycle events
- Tai Chi, Pilates, Aqua-aerobic classes structured for specific population groups
- Park runs (for those who are already more active)

Progressing the Physical Activity Prescription

The initial frequency will be determined through negotiation with an individual to set a practical, achievable starting level of activity and maximise compliance. You may wish to try suggesting three times a week, which places emphasis on the regular element of the overall benefit of physical activity and requires commitment on alternate days of the week. Subsequent increases can then be considered dependent on progress and focus on gradually (every 1-2 weeks) increasing the frequency, intensity or time of the activity or a combination of these factors.

Considering several activities or lifestyle changes may maintain motivation and enthusiasm by providing variation. Positive reinforcement for sustained changes is vital, which strengthens the argument for considering physical activity as the fifth vital sign within a clinical consultation.

The important points to remember yourself, as the prescriber, and emphasise to individuals and your colleagues are:

- Regular is the key word in 'regular physical activity'
- The physical activity needs to be something enjoyable (or non-intrusive to a busy lifestyle)
- Gradually increase the frequency towards achieving the national physical activity recommendations of at least 150mins of moderate intensity activity a week – "some activity is better than none"

HOW CAN I PRESCRIBE EXERCISE?

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EXERCISE PRESCRIPTION FOR THE AVERAGE MAN - DR STAN BALTSEZAK

5

''IN ORDER FOR MAN TO SUCCEED IN LIFE, GOD PROVIDED HIM WITH TWO MEANS, EDUCATION AND PHYSICAL ACTIVITY. NOT SEPARATELY, ONE FOR THE SOUL AND THE OTHER FOR THE BODY BUT FOR THE TWO TOGETHER. WITH THESE TWO MEANS, MEN CAN ATTAIN PERFECTION.''
PLATO, 4TH CENTURY BC

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EXERCISE PRESCRIPTION FOR THE AVERAGE MAN

5 Facts about regular moderate physical activity

1. It reduces risk of range of diseases, including coronary heart disease, stroke, diabetes mellitus type 2
2. It helps to maintain a healthy weight
3. It helps to maintain the ability to perform e everyday tasks with ease
4. It reduces symptoms of anxiety and depression
5. It improves self-esteem

Introduction

During your attachment in General Practice, you and your trainer see Mr J. He is a 40 year old man who works as a manager for a medium size company. He tells you that he has been experiencing a lot of stress at work. He says that he is sometimes having difficulty sleeping because of concerns about project deadlines. He has no other significant past medical history. He is married and has one child.

While the GP decides to check for symptoms of depression using the Patient Health Questionnaire (PHQ-9), you have an opportunity to ask about his physical activity level. Mr J. admits that he was not a 'sporty' type during his university years but has always been interested in what could be done to lose a bit of weight, 'get into shape', and improve his physical fitness. Some of his work colleagues play regular golf at weekends and he'd be interested in joining them as long as it does not interfere with work and family commitments.

After a quick look at the General Practice Physical Activity Questionnaire (GPPAQ) you conclude that his current physical activity index (PAI) is 'Inactive'.

Your GP trainer agrees with you that Mr J's health will benefit from an increase in physical activity. She advises another appointment where you will have time to discuss benefits of physical activity and talk about appropriate exercise.

EXERCISE PRESCRIPTION FOR THE AVERAGE MAN

Considerations for this patient

This patient will benefit from an increase in physical activity. An exercise programme should be designed to meet individual health and physical fitness goals. Physical fitness can be divided into three main components: aerobic fitness, muscular strength, and flexibility.

The prescription of exercise can be simplified by using **FIT** approach: **F**-frequency, **I**- Intensity **T**-time. (See Table 1)

	Frequency (per week)	Intensity	Time (Duration of activity)
Aerobic fitness	5 days/week 3 days/week	Moderate Vigorous	30 min 25 min
Muscular Strength: each major muscle group(chest, shoulders, abdomen, back, hips, legs, arms)	2-3 days/week	8-12 repetitions (resistance that is 60-80% of the individual's one repetition maximum (1-RM) - greatest amount of weight lifted during single repetition.	2-4 sets (per muscle group), 2-3 min interval between sets.
Muscular endurance	2-3 days/week	15-25 repetitions (with no more than 50% 1-RM resistance	1-2 sets
Flexibility (major muscle tendon groups: neck, shoulders, back, hips, legs)		2-3 days/week	4 or more repetitions per muscle group Static stretch should be held for 30-60 sec.

Table 1. General exercise recommendations based on the American College of Sports Medicine (ACSM) guidelines

EXERCISE PRESCRIPTION FOR THE AVERAGE MAN

For practical purposes, the intensity of aerobic exercise can be defined by many methods including Borg's Rate of Perceived Exertion (RPE) scale, 'sing-talk' test, metabolic equivalents (MET) and percentage of maximum heart rate (%max HR) (See Table 2). Maximum HR (HR max) can be calculated by the '220-age' formula. However it may underestimate HR max for people who are younger than 40 years old and overestimate it for those older than 40 years old.

	Light physical activity	Moderate physical activity	Vigorous physical activity
MET	<3 MET	3-6 MET	>6 MET
% max HR	50-63	64-76	77-93
RPE (6-20 scale)	6-11	12-14	15-20
'Sing-talk' test	Can sing during activity	Can only talk during activity	Cannot maintain conversation

Table 2. Defining the intensity of physical activity.

A more precise way of finding the desired intensity of exercise would be to first assess the patient's maximal aerobic capacity (VO2 max) and training status, since the same physical activity can be perceived as light for a well- trained individual and as vigorous for a sedentary person, though this may not always be practical. Benefits of aerobic exercise can be achieved at 55-65% of VO2max for sedentary, 65-75% of VO2max for moderately active, and at 75-90% of VO2max for highly active individuals. There are number of tests, tables and charts to estimate VO2 max and work out the pace of aerobic exercise. They can be found in the references listed at the end of this chapter.

Current Department of Health 2011 UK guidelines recommend 150 minutes of moderate intensity physical activity per week. The evidence shows that benefits of physical activity can be achieved through sessions of 10 minutes or more of moderate intensity physical activity. Comparable health benefits can be achieved through 75 minutes of vigorous activity spread across the week or combinations of moderate and vigorous activity.

EXERCISE PRESCRIPTION FOR THE AVERAGE MAN

Guidelines also recommend physical activity to improve muscle strength on at least 2 days a week. 2012 European guidelines on cardiovascular disease prevention state that healthy adults should spend 2.5-5 hours a week on activity of moderate intensity or 1-2.5 hours a week on vigorous physical activity, suggesting that vigorous intensity activity is about twice as potent as moderate intensity activity.

Taking into account that Mr J. has no medical problems, he can start an unsupervised exercise programme. The main concern with Mr J. will be exercise adoption and maintenance. An individualised lifestyle physical activity programme may help with his exercise adherence.
Pinto et al (1998) suggested a "Five A's" model of physical activity counselling:

1. Address the patient's agenda and express desire to talk about health behaviour
2. Assess readiness for change, knowledge of risks of exercise, concerns about increasing physical activity, past history of exercise, reasons for wanting to change behaviour and start exercising, reasons for maintaining low physical activity levels
3. Advise behavioural change. Personalise risk and immediate and long term benefits of exercise
4. Assist with correct understanding of exercise benefits. Correct unrealistic expectations. Provide support and address barriers to change. Identify potential resources and support. Encourage coping strategies
5. Arrange follow up appointment to confirm whether exercise plan is being followed

Patient Progression

During your next meeting with Mr J. you highlight the fact that work-related anxiety can be helped by increased physical activity levels. You explain that it is important to start with short regular sessions of physical activity to allow body the time to adapt. You encourage a variety of moderate physical activity that can be done throughout the day (See Table 3).

EXERCISE PRESCRIPTION FOR THE AVERAGE MAN

	Light physical activity	Moderate Physical activity	Vigorous physical activity
Walking pace	Approx. 40 min/ mile	Approx. 31 – 15 min/mile	Approx. 13 min/ mile
Household And occupation	Washing up, ironing, walking shopping, playing musical instruments	Washing car, windows, decorating, plumbing, food shopping using trolley, mowing lawn, hoovering.	Shovelling, digging ditches, heavy farming
Sports	Billiards, Darts, Croquet	Recreational Volleyball and Badminton, Recreational Cycling on flat (10-12mph), leisurely swimming, Golf.	Basketball, football, swimming fast, tennis, Cycling (12-14mph).

Table 3. Examples of approximate intensity of common physical activities. (Adapted from ACSM's guidelines for exercise testing and prescription, 2010).

A number of tips can be given to increase amount of physical activity taken throughout the day (e.g. parking at the far end of the car park and walk to office/supermarket; taking the stairs rather than using escalator/lift; going for a 10 minutes' walk during lunch/coffee break, scheduling time before/after work for some physical activity; walking the children to school rather than driving). Cycling to work is an excellent way of exercising while reducing your carbon footprint at the same time. Using stationary exercise bike is an ideal form of exercise for beginners and a way of incorporating activity into the current lifestyle.

EXERCISE PRESCRIPTION FOR THE AVERAGE MAN

In order to improve compliance with new exercise regime you may want to consider involving patient's spouse. They both can join the gym. Using an accelerometer and exercise diary will help to self-monitor exercise progress and achievements.

During consultation you ought to explore possible barriers to exercise: Mr J. had expressed an interest in playing golf – what has stopped him so far from taking up this activity?

As an exercise prescriber you have to bear in mind behavioural stages of change model. You can plan and discuss a relapse to a non-active state. The majority of people will relapse at some point. Planning for return to activity following a relapse because of change in circumstances (e.g. illness, holiday, moving house, change of job etc.) will reduce perception of failure for the patient and its impact on future exercise participation.

Mr J. has agreed to start a moderate intensity physical activity programme. He is planning to go to the gym twice a week and use stationary bike (15 min) and treadmill (15min), achieving a heart rate of 115-136 beats per minute (64-76% of HR max). He may also us pocket-size RPE scale to measure intensity of exercise (RPE 12-14). The second half of his training session will be aimed at improving muscular strength. Mr J. will finish each training session with stretching of major muscle groups. He will use an exercise diary to record the amount of lifestyle activity done during the week, building it up to 150 minutes per week. You agree on a follow up appointment in 4 weeks' time to check on his progress.

- **Practice Points**

Lifelong activity is the key in prevention of a number of chronic non-communicable diseases.

Finding an activity/exercise/sport your patient likes doing might help with exercise adherence long term.

EXERCISE PRESCRIPTION FOR THE AVERAGE MAN

Type, frequency, and duration of exercise needs to be personalised for the individual.

The key element in prescribing exercise is establishing the correct intensity of activity.

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THE OVERWEIGHT PATIENT WHO WANTS TO EXERCISE MORE - DR JAMES THING

6

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THE OVERWEIGHT PATIENT WHO WANTS TO EXERCISE MORE

1) There is clear evidence for a dose-response relationship between physical activity and weight loss. The more you put in the more you will "get out".

2) Obesity is one of only a few medical conditions that can be completely reversed by undertaking physical activity.

3) Without significant wholesale changes 50% of UK women and 60% of UK men will be obese by 2050.

The rapidly increasing number of overweight or obese individuals is perhaps one of the most worrying features of modern day human society. We have evolved from "hunter-gatherers" who relied upon an ability to undertake endurance exercise in order to catch food and evade predators. Over the last hundred years, man has turned to industrial means to provide food and transport. Fast food, motorised transport and deskwork have replaced pedestrianism and work requiring high-energy expenditure. As a result we are starting to see an unparalleled "obesity epidemic" in the developed world (See Figure 1).

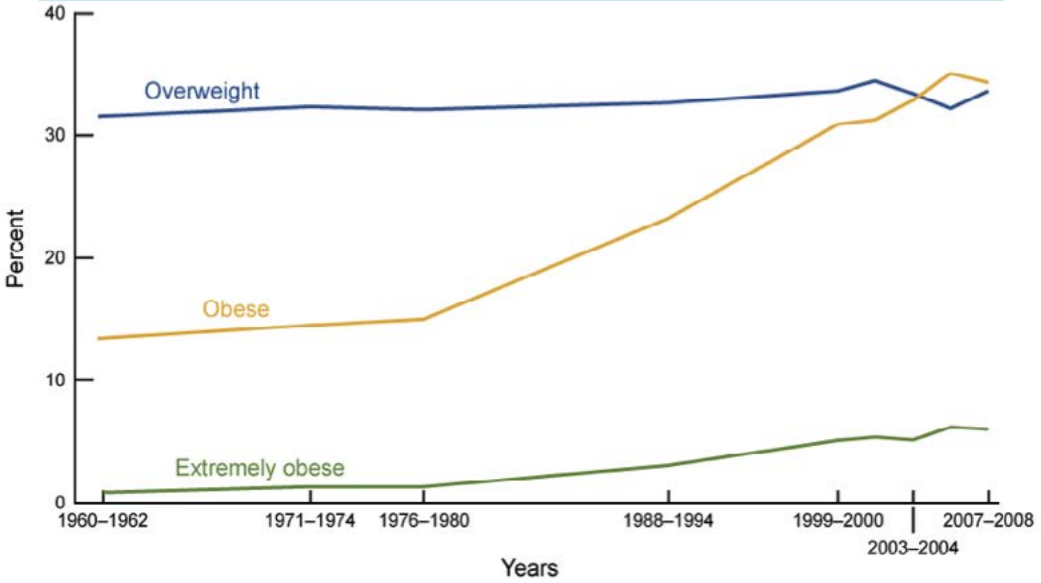


Figure 1: Trends in overweight, obesity, and extreme obesity among adults aged 20-74 years: United States, 1960 – 2008

THE OVERWEIGHT PATIENT WHO WANTS TO EXERCISE MORE

Mrs E is a 37-year-old woman who attends her GP surgery complaining of general tiredness that has been present since the birth of her youngest child, eighteen months ago. Having received reassurance from her GP regarding the common finding of tiredness in a busy mother, she turns to leave the consultation room and bursts into tears. On further questioning she admits that tiredness is only a "minor problem" and that the real reason behind her attendance is her concern about her weight.

Prior to conceiving her first child, at the age of 30, computer records show that Mrs E had a healthy BMI of 24.9 (weight 60kg, height 1.55m). She now weighs 75kg and her BMI is 31.2.

Background

It is essential to establish current and previous levels of physical activity, obstacles to exercise and potential motivating factors for each individual. This enables the clinician to prescribe suitable, bespoke exercise advice.

Mrs E is the mother of three young children. Her husband works long hours and is not at home during the day. She used to regularly attend the gym but now struggles to find the time to get there. At present Mrs E is walking the two-mile round trip to the shops, three times a week, and takes the children to the park across the road on a daily basis. She is otherwise not currently taking part in any organised physical activity.

She now feels ready to change and is currently motivated by a recent invitation to attend the wedding of a close friend in 9 months time, for which she would like to be "back to her old weight".

Medical History

Prior to offering exercise prescription advice the clinician must establish whether there are any contraindications to Physical Activity (PA). These may include previous medical problems, exercise related symptoms and consideration of potential side effects of medication.

THE OVERWEIGHT PATIENT WHO WANTS TO EXERCISE MORE

Mrs E has no medical problems and is not currently on any medication. She does not smoke and drinks 5 units of alcohol per week. Her parents are alive and well. In the past Mrs E has had no difficulty in undertaking exercise and has never suffered from any exercise related symptoms. Aged 28, she completed a marathon and until the age of 30 she regularly competed in local club netball matches.

She is unaware of how to restart exercising after a long break and realises that time availability may prove the biggest hurdle to success. Mrs E falls into a "low risk" category according to the ACSM guidelines (See Figure 2). As a result of this she does not require any screening or investigation prior to initiating exercise.

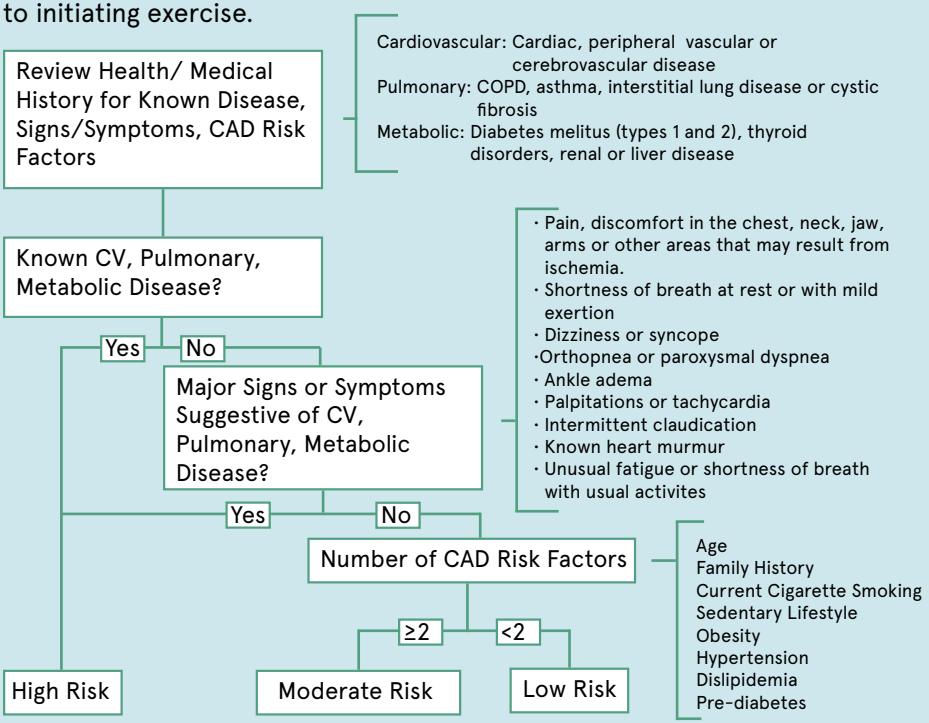


Figure 2: Risk stratification for patients prior to exercise prescription (Adapted from ACSM Guidelines for Exercise Testing and Prescription)

THE OVERWEIGHT PATIENT WHO WANTS TO EXERCISE MORE

Prior to commencing exercise however it is advisable for the clinician to perform a brief examination that will help to establish whether the patient is physically fit and exclude medical conditions that could potentially preclude exercise i.e. previously undiagnosed heart murmur. The physical examination also provides baseline data that helps the clinician and the patient to monitor progress and act as a source of ongoing motivation.

Pulse: 85 bpm
BP: 135/87
Heart sounds: I + II + 0 (Normal)
BMI: 31.2
Weight: 75kg
Height: 1.55m
Waist circumference: 36 inches

Goal Setting

In such a clinical scenario it is vital to establish a series of goals with the patient, as well as identifying the potential barriers to exercise so that these can be discussed and techniques to avoid these barriers can be developed.

Mrs E has the long-term goal of being able to fit into a dress that she last wore seven years ago, aged 30. In order for her to do this she is aiming to lose 10-15kg in 9 months. She also aims to become fitter and healthier so that her children can learn the importance of leading such a lifestyle. She hopes that by incorporating exercise into her routine she will feel less tired and have more energy to play with the children.

Her short-term goals include trying to eat more healthily and incorporating exercise into her daily schedule. She plans to lose weight in a progressive manner and with the help of her GP has calculated that she must lose 1.5kg per month.

Goals are often successfully achieved when noted down and displayed in a clearly visible place at home i.e. the fridge. This provides motivation to avoid "binge eating" as well as reminding the patient of their primary target.

THE OVERWEIGHT PATIENT WHO WANTS TO EXERCISE MORE

Exercise Prescription

The exercise programme should be commenced at a level which Mrs E can realistically achieve. Although she may be tempted to immediately return to previous levels of physical activity, she may find this difficult and should begin in a slow and steady manner.

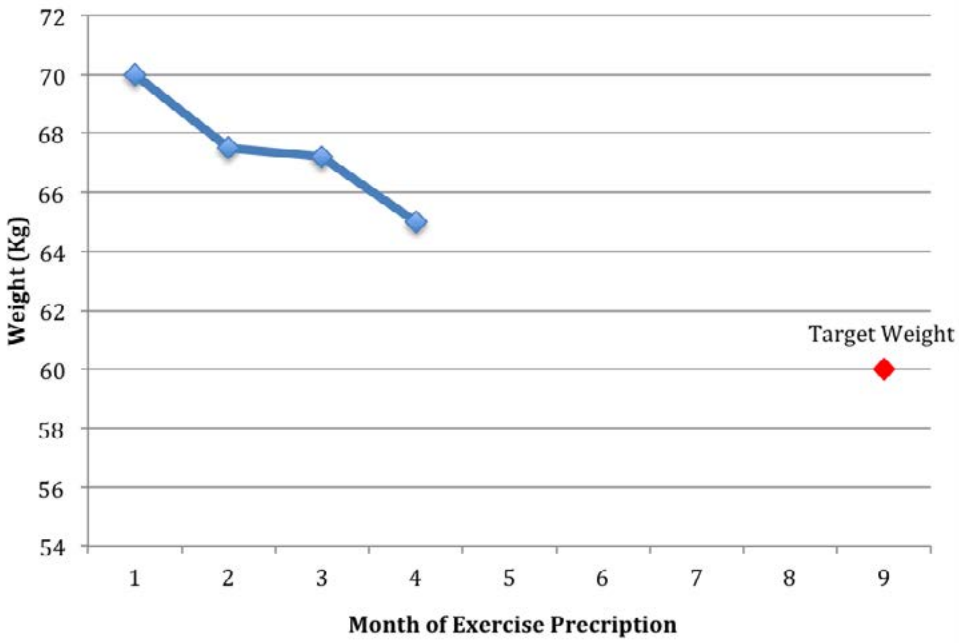
Aerobic Exercise

Walking or cycling on a stationary bike will provide an ideal starting point. She should initially attempt to exercise for 30 minutes, on at least three occasions per week. This can be broken down into 10-minute bursts of activity separated by periods of rest, making it easier to fit into a daily routine. The walking pace should be of a "moderate" (able to talk but not sing) to "vigorous" (able to talk in broken sentences) intensity, such that she notices an increase in her heart rate and frequency of breathing. Pedometers can provide the individual with an objective measure of PA load and can be used to maintain motivation with the achievement of daily targets.

This load can gradually be increased over a period of weeks and months. The duration of exercise can be increased by 10 minutes every 1-2 weeks so that by the end of the first month Mrs E could be undertaking 60 minutes of moderate to vigorous intensity aerobic exercise on at least three occasions per week. Once the duration and frequency have been optimised, the prescription can then be adjusted by altering the intensity of exertion or the type of activity. Cross-training machines and rowing may provide Mrs E with more variability and interest. Swimming or water aerobics may offer another exercise option, as there are reduced impact forces on weight bearing joints.

It is important to arrange regular follow up to ensure that the progression of exercise is appropriate and well tolerated. If any aspect of the exercise prescription becomes unachievable then the programme must be tailored to ensure adherence and minimise the risk of injury. Progression towards long-term goals can be regularly assessed at follow up to ensure that the patient is making suitable progress. Weight, BMI, Blood pressure, pulse

and waste circumference should be measured and can be plotted using a graphical format to best represent progression towards a target (See Figure 3)



- Figure 3: Graphical representation of progression towards a target weight.

Resistance Exercise

Resistance training is essential as it helps to delay some of the changes associated with aging, such as muscle and bone mass loss. Resistance training contributes towards overall strength gains and is associated with a reduction in the incidence of glucose tolerance and low back pain, both of which are commonly associated with obesity.

THE OVERWEIGHT PATIENT WHO WANTS TO EXERCISE MORE

Mrs E can be advised to start training on three occasions per week. It should be stressed to her that these exercises should be performed in addition to the aerobic activity and not as a replacement. A circuit of 8 – 10 gym exercises is selected with the initial weights chosen based on her ability to complete 10 – 15 repetitions without feeling excessive strain upon completion. After a one-minute break she is advised to rotate on to the next exercise and complete two to three circuits overall. Ideally the consecutive stations should work different aspects of the musculoskeletal system i.e. bicep curls followed by calf raises.

She is advised to start with low weights and a relatively high number of repetitions and to seek advice from a fitness instructor regarding optimising her technique in order to minimise the injury risk. As improvements are made the weight and repetition number can be increased and rest time reduced to enable further adaptation to occur.

Mrs E initially felt overwhelmed by the prospect of taking on such a large volume of exercise, having lead a relatively sedentary existence over the previous seven years. As such it was necessary to make compromises in order to facilitate long-term compliance with the fitness programme. It was agreed that three aerobic sessions and one resistance session per week would provide a reasonable starting point, with the aim of progressing towards five aerobic sessions and two resistance sessions per week within three months.

The most difficult part of adhering to the fitness programme lay in her inability to set aside time for the specific purpose of exercising. This was finally addressed by organising a regular time slot on specific days of the week whereby a family member could look after the children for 2-3 hours. For the remaining sessions, Mrs E decided to undertake exercise with her children in order to reduce the need for childcare. The arrival of a family dog ensured that long walks were now mandatory, helping to contribute towards overall aerobic fitness targets. On other occasions Mrs E found it helpful to plan exercise with friends and went on to set up a local walking group for young mums. This enabled her to engage in exercise while maintaining social contact and improving her self esteem.

THE OVERWEIGHT PATIENT WHO WANTS TO EXERCISE MORE

At 9 months Mrs E revisited her GP who documented the following:

	Pre-exercise prescription	9 months post-exercise prescription
Pulse	85	74
BP	135/87	126/82
BMI	31.2	25.8
Weight	75kg	62kg
Waist circumference	36″	30″

In addition to the advice that she received from her GP, Mrs E highlighted the importance of recording her daily progress, using a commercial phone application (myfitness pal). This required her to input daily calorie intake as well as energy expenditure and reinforced compliance with prescribed diet and exercise advice. Regular follow up with her GP ensured that progress was monitored and motivation optimised. Follow-up provided her with a sounding board to discuss any frustrations or difficulties that were limiting her ability to progress.

Helpful Tips

1) Record demographic data prior to initiating exercise. This offers the patient a baseline with which to measure progress and provide motivation.
2) Plan regular follow up in order to provide an opportunity to combat any negativity or barriers to exercise.
3) Have detailed goals and monitor progress using a visual aid to provide further inspiration.

By incorporating regular, planned physical activity sessions into her busy routine, Mrs E now enjoys a healthier lifestyle as well as benefiting from significant improvements in weight, blood pressure and self-esteem.

THE OVERWEIGHT PATIENT WHO WANTS TO EXERCISE MORE

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EXERCISE PRESCRIPTION IN THE PATIENT WITH HYPERTENSION

- DR RHODRI MARTIN AND DR THOM PHILLIPS

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EXERCISE PRESCRIPTION IN THE PATIENT WITH HYPERTENSION

Introduction

Hypertension affects approximately 1 billion people worldwide. In the UK as many as one in three of the general population aged over 35 (32% men and 27% women) are classified as hypertensive. The National Institute for Health and Clinical Excellence (NICE) classifies hypertension as:

- **Stage 1 hypertension** - BP in surgery is ≥140/90 mm Hg and ABPM* or HBPM† is ≥135/85 mm Hg.
- **Stage 2 hypertension** - BP in surgery is ≥160/100 mm Hg and ABPM or HBPM is ≥150/95 mm Hg.
- **Severe hypertension** - ≥180/110 mm Hg

*ABPM – Automated Blood Pressure Measurement
†HBPM – Home Blood Pressure Measurement

Hypertension has many associated health risks including being a major risk factor for cardiovascular disease (CVD), congestive heart failure, peripheral vascular disease and renal failure. The risk of death from CVD doubles with each 20mmHg increase in systolic blood pressure, and population studies show that only a small reduction in systolic BP (2mmHg) can reduce the risk of coronary heart disease by 7%.

Two major modifiable lifestyle factors, obesity and physical inactivity, are closely implicated in the aetiology of hypertension. Furthermore, undergoing regular physical activity has been shown to prevent the development of hypertension, with a risk reduction of up to a half in those that exercise regularly. It is no surprise then, that lifestyle interventions (including increasing physical activity) are recommended by NICE either in isolation or as an adjunct to pharmacological therapy in the management of hypertension.

Blood Pressure Response to Exercise

Blood pressure varies depending on the type, duration and intensity of the exercise. The typical response during aerobic exercise is an initial drop in systolic BP associated with peripheral pooling, and then a steady rise in line

with increased cardiac output. The magnitude of the increase depends on the intensity and duration of the exercise.

The change in diastolic blood pressure is less predictable and can drop, rise or remain stable. Isometric exercises are not recommended in hypertensive patients due to the resultant increase in both diastolic and systolic blood pressure.

Post exercise there is a transient drop in BP. The duration of this drop varies depending on the frequency, duration, intensity and type of exercise. Moderate intensity resistance training has also been shown to have similar blood pressure lowering properties as aerobic exercise.

The precise mechanisms responsible for the reduction in blood pressure post exercise remains unclear. However, a number of contributory factors have been identified:

- Reduction in sympathetic nervous system activity resulting in both vasodilation and reduced cardiac output
- Norepinephrine secretion is reduced following exercise. This results in less vasoconstriction, and a reduction in total peripheral resistance (TPR). Lower levels of plasma norepinephrine will also lower heart rate, reducing the cardiac output
- Normalisation of arteriole morphology, which reduces total peripheral resistance
- Increased blood flow during aerobic exercise alters renal function. Increased renal excretion of sodium, plus sweating reduces intravascular fluid volume thus reducing TPR
- Increased endothelial responsiveness to vasodilators

Long term mechanisms include:

- Reduced resting heart rate
- Increased capillarisation of muscle fibres, which reduces TPR
- Blunted blood pressure responses to non-exercise induced environmental stressors

EXERCISE PRESCRIPTION IN THE PATIENT WITH HYPERTENSION

Physical Activity in the Management of Hypertension

Physical activity has the greatest impact on high blood pressure of all the lifestyle modifications. As previously mentioned, NICE recommends that lifestyle intervention is included in the management of hypertensive patients either as an isolated treatment or as an adjunct to pharmacological treatment, depending on the severity. The management targets for hypertension have been set out by NICE:

- People aged <80 years: clinic <140/90 mm Hg, ABPM/HBPM <135/85 mm Hg.
- People aged ≥80 years: clinic <150/90 mm Hg, ABPM/HBPM <145/85 mm Hg.

As little as 30 minutes of moderate intensity activity can reduce systolic blood pressure by up to 20mmHg, and longer bouts of up to 60minutes have even greater effects. The effect persists for up to 24hours after completing the activity. Despite most guidelines recommending a frequency of between 3 and 7 days per week, the acute affect of exercise on blood pressure would suggest that shorter bouts of exercise daily is the optimal strategy for controlling hypertension. Furthermore it's important to note that the blood pressure lowering effect of exercise is lost within 10 weeks of detraining.

The primary mode of activity in hypertensive subjects should aim to engage large muscle groups or whole body movements in aerobic activities. Resistance training should also be incorporated into an exercise programme up to 3 times weekly, however in the hypertensive patient there should be a focus on using lower resistance and higher repetitions. Isometric exercises (e.g. the plank) and any other exercise that results in the 'Valsalva manoeuvre' should be avoided due to their affect in raising Systolic and Diastolic BP during the exercise.

Lower intensity exercise has been shown to be equally effective in reducing blood pressure as higher intensity exercise. This is especially important when you are prescribing for patients with co-morbidities that limit their exercise capacity e.g. age, respiratory disease, and physical disabilities.

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The American College of Sports Medicine recommends including a flexibility and balance training component into all exercise prescription programmes. They recommend that all major muscle groups should be stretched a minimum of 2-3 times per week. This is in order to maintain range of motion and strength around major joint complexes while completing a progressive exercise programme.

Special Considerations

- Patients with BP ≥200/115 mm Hg should not exercise without a full exercise testing screen and medical supervision
- β-blockers decrease exercise capacity and inhibit normal heart rate responses during maximal and sub-maximal exercise
- Ca2+ channel blockers, Nitrates, and α-blockers can cause post exercise hypotension, a graduated cool down component should be emphasised for patients at risk
- Avoid exercises that result in the 'Valsalva manoeuvre' such as isometric exercises
- Patients who participate in exercise programmes should be monitored at regular intervals to ensure the appropriateness of ongoing anti-hypertensive medication

Component	Frequency	Intensity	Duration	Activity	Example
Cardiorespiratory	5-7 d/wk	RPE 12-16 40-70% VO2R 65-90% HRMAX	30-60 minutes	Large muscle groups. Dynamic activity.	Cycling Zumba Walking
Resistance	2-3 d/wk	Volitional fatigue: RPE 16	1 set of 12-20 repetitions	8-10 exercises. Include all major muscle groups	Circuit class Gym routine
Flexibility	Min:2-3d/wk	Ideal: 7d/wk	15-30seconds, 2-4 per stretch	All major muscle groups	Pilates Yoga Home routine

Table 1. Exercise recommendations for hypertensive patients.

EXERCISE PRESCRIPTION IN THE PATIENT WITH HYPERTENSION

Prescribing Physical Activity in the management of Hypertension

There are three considerations to make when assessing patient suitability for a physical activity programme for the management of hypertension:

1. Determine the patients current level of physical activity (freely available self reported physical activity questionnaires are the General Practice Physical Activity Questionnaire and Scottish Physical Activity Questionnaire)
2. Determine the patient's motivation to increase their physical activity level. At this stage you must gage whether the patient is ready to change their lifestyle
3. Determine if it's safe for the patient to increase their physical activity level with pre-participation screening

1) John is a 57 year old white man who has just registered as a new patient with the practice. He does not feel he is suffering any health problems and takes no medication. He is booked in to see the practice nurse for an initial examination. She finds that John is a life-long non-smoker who drinks 10-15 units of alcohol per week. His BMI is 32kg/m2. He has no family history of heart disease. A random plasma glucose was 6.8mmol/L. His U & E and LFT results were all within the normal reference range. His lipid profile showed a TC of 6.2mmol/L and an HDL of 1.7mmol/L. His blood pressure was 144/92mmHg.

John falls into the moderate risk category for exercise. Being over 55 years old should make sure you consider his other risk factors. In John's case, he has a dyslipidaemic profile (TC> 5.2 mmol/L) however, his high levels of HDL would suggest some cardio protection. John is very mildly hypertensive and there is no evidence of impaired glucose tolerance. John's drinking habits fall well within the RCP recommended limits for alcohol consumption.

All of this would suggest that John's obesity is the result of poor diet and lack of physical activity. He may benefit from seeing a dietician for healthy eating advice and should be encouraged to try to increase his levels of physical activity.

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John should be encouraged to get active independently and you should reassure him that if he follows a graded, progressive exercise programme he is unlikely to suffer any ill effects. There are a number of activities that John could participate in, encourage him to check resources like national sports council websites for ideas and clubs in the area.

2) Ellis is a fit 61-year-old, semi-retired gardener. He is a moderate (10/day) smoker with minimal alcohol intake and there are no other cardiovascular risk factors. His average blood pressure from several readings over the last 4 months is 190/102. Physical examination is unremarkable. Electrolytes, FBC, lipids, glucose and uric acid tests are normal. There is no history of asthma. At this stage you decide to treat Ellis' hypertension.

Ellis' needs to stop smoking. If he has tried will-power alone in the past then he should be offered both pharmacological support, as well as a session with a smoking cessation nurse and directed to any group therapies available.

In this case, Ellis' hypertension is severe, and you would consider physical activity as well as a pharmacological intervention to get it under control. One of the downsides of exercise is that the dose response takes time to achieve. If he enjoys his work, perhaps encourage Ellis to join a local gardening group. Activity doesn't always have to be "sport", there are several ways to raise your heart rate – be creative.

EXERCISE PRESCRIPTION IN THE PATIENT WITH HYPERTENSION

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EXERCISE PRESCRIPTION IN HEART FAILURE - DR BRINDA CHRISTOPHER

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EXERCISE PRESCRIPTION IN HEART FAILURE

As recently as twenty years ago it was common practice to recommend that heart failure patients avoid exercise at all stages of the disease. It was thought exercise was deleterious to the failing heart for fear that it could aggravate disease progression. However, there is now scientific evidence that opposes patients' and physicians' intuitive prejudice; it has been proven that exercise training not only improves exercise capacity and quality of life, but reduces hospitalisations and may also lower mortality rates. Despite several bodies of evidence, unfortunately exercise training recommendations are poorly implemented: it has been suggested that less than 20% of European chronic heart failure (CHF) patients participate in a cardiac rehabilitation programme.

Introduction

CHF is increasingly common: around 900,000 people in the UK have heart failure. The prevalence is expected to increase due to an ageing population and higher survival rates of ischaemic heart disease. The condition carries a poor prognosis, often worse than most cancers, with a 5 year survival rate of 25%. In 2000 the NHS spent £905 million on the management of heart failure, with the majority of these funds spent on acute hospital admissions. However, management for chronic heart failure is changing to favour a proactive model rather than crisis intervention. It is within this proactive model that exercise intervention has a role as a preventative tool to decrease hospital admissions, and improve morbidity and mortality.

Heart failure (HF) is an abnormality of the cardiac system resulting in a failure of the heart's ability to deliver oxygen at a rate to meet the requirements of metabolising tissues. Heart failure is mainly a clinical diagnosis where patients exhibit typical symptoms and signs due to a defect of function or structure of the cardiac system. Historically, a reduced ejection fraction has been the most common abnormality noted. However, any abnormalities of ventricular diastolic function, valves, pericardium, endocardium, heart rhythm, and/or conduction can be a cause of HF. The severity of HF is classified by symptoms and functional exercise capacity according to the widely used NYHA classification system shown below: it is useful to note that symptom severity correlates poorly with ventricular function.

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Class I No limitation of physical activity.
Class II Slight limitation of physical activity. Comfortable at rest, but ordinary PA results in undue breathlessness, fatigue, or palpitations.
Class III Marked limitation of PA. Comfortable at rest, but less than ordinary PA results in undue breathlessness, fatigue or palpitations.
Class IV Unable to carry on any PA without discomfort. Symptoms at rest can be present. If any PA is undertaken, discomfort is increased.

Table 1. New York Heart Association functional classification

Effects of exercise on Chronic Heart Failure

Cardiovascular effects

It is hypothesised that exercise training improves cardiac function by restoring cardiomyocyte contractility and calcium sensitivity. However, currently researchers concur that exercise-induced improvements in heart failure outcomes are not the consequence of direct effects on the heart

Ventilation and the lung

It is commonly noted that CHF patients demonstrate an exaggerated ventilatory response under exercise by increasing their ratio of ventilation to CO2 produced (VE/VCO2). This indicates ventilatory inefficiency. Exercise training improves ventilatory efficiency by reducing peripheral reflex inputs. Improved lung alveolar diffusing capacity might also contribute to improved ventilatory efficiency.

Endothelial effects

Training has been shown to improve agonist mediated endothelium dependent vasodilation of skeletal muscle vasculature, and basal endothelial NO formation. These effects have been directly measured as an increase in muscle perfusion after training CHF patients. This suggests improved peripheral microcirculatory function as an increase of skeletal muscle capillary density which is indicative of improved angiogenesis.

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Skeletal muscle effects

Patients with CHF have extreme abnormalities of skeletal muscle which result in fatigue, dyspnoea, and exercise limitation. Skeletal myopathy involves the major muscles of locomotion, small accessory muscles and those of respiration. Marked cachexia is associated with poor perfusion and marked metabolic changes due to a conversion of fatigue resistant muscle fibres (Type 1) to fatigue prone fibres (Type IIB). These changes result in ineffective usage of high energy phosphate resulting in early accumulation of lactate during exercise.
Training in CHF patients improves oxygen usage through an increase in mitochondrial content and increased activity of oxidative enzymes. These changes lead to an improvement after training in peak VO2 and delay the onset of lactate accumulation due to anaerobic metabolism.

Anti-inflammatory effects

Regular sustained training results in anti-inflammatory effects in patients with CHF. Intense exercise training can:

- Reduce plasma levels of inflammatory cytokines
- Reduce platelet related inflammatory mediators
- Reduce peripheral markers of endothelial dysfunction
- Reduces skeletal muscle expression of pro inflammatory cytokines
- Enhance Cytochrome C activity - which eventually improves muscular oxidative metabolism

Neurohormornal effects

Exercise training is associated with a reversal of autonomic dysfunction. This shifts activity away from sympathetic towards vagal activity as shown by reduced circulating levels of plasma norepinephrine. Exercise also reduces the levels of circulating neurohormornes namely aldosterone, vasopressin, natriuretic peptides, resulting in improved cardiac function, reduced vasoconstriction, and better peripheral and skeletal blood delivery which further aids exercise capacity.

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Quality of life

Patients receiving exercise training show an improvement in: emotional status, exercise tolerance and CHF-related quality of life measures. Improvements in anxiety and depression are most noticeable in those severely depressed patients who show the biggest improvements of functional capacity.

Patient selection

Exclusion criteria

There is a need to exclude patients with serious arrhythmias, angina precipitated by low work-loads, symptoms of heart failure at rest, severe aortic stenosis, active myocarditis, and hypertrophic cardiomyopathy; as well as those who are systemically unwell with an active febrile illness.

Patient characteristics

Exercise training benefits are similar in male and female populations. With longer exercise programmes, both groups have increasing improvements in oxygen consumption, although the mechanisms of benefit might differ between sexes. Similar benefits of training have been found in those older and younger than 65 years. However, it is widely recognised that those aged over 70 years fail to maintain increased habitual physical activity levels, despite making physiological improvements from training.

It has been suggested that those with heart failure of non-ischemic aetiology have better outcomes than those with ischaemic aetiology: but there is no convincing evidence for the selection of subgroups that should not be offered exercise training for heart failure.

How to implement exercise training

A structured exercise training programme can be implemented alongside the promotion of common daily activities - such as climbing the stairs and undertaking more household work.

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Exercise training is recommended for NYHA I-III HF patients although it is hypothesised that advanced and acute HF patients could also benefit from early mobilisation. Four different training modalities have been proposed for the purposes of CHF rehabilitation:
Gradual mobilisation otherwise known as callisthenic exercises. This is recommended as a preparatory form of exercise in patients with cachexia or physical deconditioning. Straightforward movements with stretches are designed to utilise body weight as resistance. This not only improves movement and coordination but respiratory capacity too.

Aerobic training in conditions of energetic yield is the most efficacious exercise intervention because of its well demonstrated efficacy and safety. The rule of thumb is to start low and go slow and is easily taught usually on a cycle ergometer or a treadmill. Recommended training intensities are initially 40 – 50% increasing to a target of 70 – 80% of VO2 peak (or 40-70% of heart rate reserve).

Resistance or strength training is muscle contraction performed against resistance. It not only strengthens muscle but also increases bone mass. Resistance training has been proposed as an intervention to help prevent the wasting syndrome associated with CHF. Minimum recommendations for a resistance programme include three stages: an instruction phase, a resistance phase where a high number of repetitions are carried out at a low intensity, and a strength phase in order to increase muscle mass. The amount of cardiovascular stress expected during resistance strength training depends on three factors; the amount of resistance, the size of the working muscle, and the relationship between the duration of muscle contractions and rest periods. The magnitude of resistance is measured as a percentage of one repetition maximum (% 1-RM).

Respiratory muscle training can improve exercise capacity and quality of life in those who present with inspiratory muscle weakness and would be most beneficial if used as an adjunct to standard endurance training.

Barriers to exercise training programmes

However effective it may be, an exercise intervention is rendered worthless

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if promotion, education and adherence to an interventional programme is poor. A lack of knowledge amongst clinicians regarding guidelines promoting the positive effects of exercise is a significant barrier. Perhaps this could be remedied by better delivery of information to healthcare workers who in turn could then encourage promotion to patients. Furthermore, more effective political and organisational measures are needed to financially sustain interventional exercise programmes.
To achieve improved patient compliance is a multidimensional task; it is effected by many factors including the condition itself, therapy, mind-set, gender, social support, socioeconomic status and work schedule, to name but a few.

History
A 68 yr old male who lives alone complains of difficulty in sustaining recreational activities and even those of daily living such as supermarket shopping. He has been diagnosed with ischaemic heart failure and is hypertensive. Current medications include Clopidogrel, Lisinopril, Carvedilol, and Atorvastatin.
On Examination
He is an elderly male who is comfortable at rest with a BMI of 30.
HR 55bpm BP 130/70mmHg ECG Sinus bradycardia

Investigations
Echocardiography: 28% ejection fraction with mild ventricular hypertrophy, inferior wall akinesis, mild mitral regurgitation.
Graded exercise test: VO2 peak 15.3ml/kg/min (62% of age predicted). Terminated by patient due to difficulty with breathing. RPE 18/20. ECG occasional PVCs. Peak HR 92bpm. Peak BP 160/70 mmHg

Diagnoses
Cardiac Heart Failure NYHA III
Ischaemic Heart Disease

Plan
Introduce home based exercise
Increase physical activity levels
Review in 6 months

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Mode	Frequency	Duration	Intensity	Progression
Aerobic Daily	Daily	20mins or as session tolerates	HR 40-70% of VO2 peak	Increase to 30min/ session as tolerated
Resistance	2-3 days/ week	1 set of 8-10 rep	50-70% of	Limit to 2 sets of 10-12 reps
Calisthenics	2-3 days/ week	20-60mins stretches	Maintain stretch before discomfort point	
Warm up and cool down	Before and after each session	10-15 min		

Goals

Improve functional capacity
Monitor symptoms of CHF
Modify lifestyle to decrease cardiovascular risk.

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EXERCISE PRESCRIPTION IN PERIPHERAL VASCULAR DISEASE - DR ADRIAN LIM

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EXERCISE PRESCRIPTION IN PERIPHERAL VASCULAR DISEASE

Introduction

In the United Kingdom an estimated 2.7 million people aged over 55 have some degree of peripheral vascular disease (PVD). The incidence increases with advancing age, with an estimated incidence of 15% to 20% in people aged over 70. There are a variety of symptoms in PVD which can affect the amount of physical activity a patient is able to perform. 20% remain asymptomatic while the rest suffer from a range of claudication to superficial skin changes such as ulcers and gangrene.

Benefits of exercise in PVD

- Improves symptoms without the risks of surgery
- Prevents atrophy of surrounding muscles and improves walking ability, hence ensuring increased functionality and independence
- Helps address other risk factors which often accompany PVD such as cardiovascular disease and diabetes.
- Improves overall sense of well-being and reduce symptoms of anxiety and depression

General exercise guidelines in PVD

- Patients with PVD should get a complete medical evaluation
- They should perform daily exercise with frequent rest periods
- Initially, recommend low-impact, non-weight-bearing activities such as swimming, rowing, and cycling. Add weight-bearing activities as exercise tolerance improves
- Avoid exercise in cold air or water to reduce the risk of vasoconstriction
- Interval training, which may involve 5 – 10 minute exercise bouts, one to three times daily, may initially be appropriate for some PVD patients
- They need to take excellent care of their feet to avoid blisters and other injuries that could lead to infection
- Ideally, individuals with PVD should be closely supervised, such as in a cardiac rehabilitation programme

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- Absence or reduction of pain will dictate when to increase the duration and intensity of physical activity
- Encourage PVD patients to work as much and as often as they can tolerate

Case study

SP is a 65-year-old man who suffers from intermittent claudication, with pain usually coming on after 10 minutes of walking. His past medical history include coronary artery disease (CAD), hypertension, and hypercholesterolemia. His father also suffered from PVD. He is independent in all activities of daily living. He retired from his office job 3 years ago, after suffering a mild heart attack. Medications include aspirin, ramipril, atenolol, and atorvastatin.

He stopped drinking alcohol after his heart attack but has smoked a pack of cigarettes per week for the past 10 years (he used to smoke a pack per day x 30 years). On examination, he is overweight (BMI 30) and has a normal pulse and rate. His renal function and liver function are within normal limits. He has an ABPI of 0.7 and his GP has confirmed moderate PVD on a recent Doppler scan. He otherwise has no superficial skin changes or ulcers on his legs.

In his first few consultations, SP had mentioned that he was not keen on any type of surgical intervention due to his father's previous complicated surgeries for PVD. He was therefore desperate for his GP to suggest other conservative measures first. With this in mind, his GP started by addressing his risk factors for PVD. SP was referred to a dietician in order to help him lose weight and to avoid foods rich in LDL cholesterol and triglycerides. He was advised on smoking and referred to the smoking cessation nurse. His statin dose was increased while his hypertension was reasonably controlled with his medication. However, when approached about exercise, Mr. SP was initially not keen on it as he had previously been quite inactive and he felt that this brought on his leg pain, which could potentially make things worse. Despite his GP explaining the benefits of exercise, he was not initially receptive to the idea and hence did not give it any consideration, preferring to try the other conservative methods first.

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Over the next 2 months, SP had managed to cut down his smoking to just one a day, but conversely was unable to lose much weight despite the diet changes. His cholesterol was now within normal range with the increased statin dose. However, he was still experiencing intermittent claudication pain after 10 minutes of walking. Over the next two review consultations, SP realised that he needed to try something else. His GP had continued to encourage him to try some exercise and since it was his last resort before surgery he was more open to the idea and willing to listen and give it a go. He agreed to the start an exercise programme consisting of walking in the gym.

Considerations in this case

The case of SP has highlighted a few typical barriers in PVD patients. SP came to the GP with his own pre-conceptions and ideas which had been formed from his own personal experience. Having had treatment and medication for most of his other co-existing morbidities, he wasn't prepared to 'self-treat' with exercise. When given a choice, he preferred interventions involving physical forms of treatment such as medication or referrals to a dietician or the smoking cessation nurse. Consultations such as these are challenging as they directly address patients' own health beliefs and discuss alternatives to conventional treatment methods, something not every patient is prepared to hear when they attend their GP surgery.

Exercise in symptomatic PVD is generally challenging as these patients usually present with pain in the calf, thigh or buttock that is elicited by exercise and relieved with a few minutes of rest. Because of this most of them tend to avoid prolonged exercise, preferring to remain symptom free. As in SP's case, because it brought on pain, patients tend to have a perception that exercise will make things worse, so it becomes very difficult to convince them otherwise. We know however that this is not the case as according to a 2000 Cochrane review (confirmed again in 2008), intermittent claudication patients who participated in an exercise programme had significantly greater pain-free and maximal walking times and distances compared with individuals who were given a placebo or usual care (variations included placebo tablets, laboratory visits for ankle brachial index measurements, advice to maintain usual activity, no exercise, or

lifestyle advice).
In addition to this, PVD patients also often have co-existing coronary heart disease in addition to other co-morbidities such as diabetes and obesity, as in SP's case. This not only reduces their exercise capacity, but also places them at a greater risk of complications if they go beyond the level they are capable off. It is important for the healthcare professional to perform a functional evaluation including an exercise treadmill test when possible prior to the patient's beginning an exercise programme.

Bearing this in mind and his previous level of activity SP had to be properly evaluated before starting his exercise programme. For a start, he was asked to first fill in a Physical Activity Readiness Questionnaire (PAR-Q). His GP also performed a thorough examination and sent him for some basic investigations like blood tests and an ECG. After a discussion with SP it was decided that SP would be referred for an exercise treadmill test. This would help provide information regarding the claudication threshold, as well as heart rate and blood pressure response. It would also be a useful screening tool for previously unrecognised exercise-induced symptoms and signs such as arrhythmias or ischemic ST-T wave changes. However, it is important to remember that the usefulness of exercise testing may be limited by leg pain before reaching a heart rate or blood pressure at which abnormal cardiac responses may occur. SP therefore had to perform an adapted protocol involving a slower speed and less rapidly changing grade. For more severe cases, arm ergometry can be used instead of the treadmill.

Progression

Exercise should be prescribed using the FITT (frequency, intensity, time, type) principle. Weight bearing exercise is preferred but in severe cases, it may be necessary to start out with non-weight bearing exercise like stationary bicycling or water based activities. It will be necessary to eventually move to weight bearing exercises such as rebounding or treadmill walking. As SP's claudication was moderate, he was able to start off with supervised walking.

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Before starting his walking programme, SP was educated on the different ischaemic pain grades. The following ischemia scale helps to quantify the patient's ischemic discomfort during exercise and will be an important documentation tool which helps monitor progress.

Ischemic Grades	Pain Descriptors
Grade I Pain	Discomfort(minimal) but can continue exercise
Grade II Pain	Moderate Discomfort : Patient's Attention Can Be Diverted W/ Conversation
Grade III Pain	Intense Pain : Patient's Attention Cannot Be Diverted
Grade IV Pain	Excruciating Unbearable Pain : Must Stop Exercise

Table 1-Ischaemia Grading

SP was encouraged to walk at an intensity that elicited symptoms within 3 to 5 minutes, stopping when symptoms became moderate, resting until symptoms had resolved, and then resuming walking. He initially started with 30 minute sessions, stopping once or twice in each session, 3 times per week. Over the next few weeks, he started to notice an improvement in his symptoms and was able to walk further. Encouraged by this, he became more motivated and was soon able to do 60 minute sessions up to 5 times a week. Over the course of the programme, SP also met a few people who were on similar exercise programmes and they helped support and spur each other on. SP also managed to lose some weight, and began to feel much better in himself. With the encouragement of his new friends, he was able to give up smoking completely. After completing the 12 week programme, SP and his friends decided to continue their sessions in the gym as well as progressing to outdoor walking and even other sports such as golf.

EXERCISE PRESCRIPTION IN PERIPHERAL VASCULAR DISEASE

Key points

Whilst this case has highlighted the main challenges with exercise prescription for the PVD patient, it also demonstrates how beneficial it can be once these barriers have been overcome.

- It is important to continuously inform and remind the patient of the benefits of physical activity right from the start so that they can be motivated and convinced that exercise is beneficial
- It is important to challenge preconceived health beliefs and ideas
- To be supportive and allow patient time in between consultations to make informed decisions
- To try and facilitate patient involvement and allow them to choose activities which they like and will adhere to
- PVD is associated with other comorbidities like coronary heart disease and a thorough pre-exercise evaluation including a treadmill test is essential before embarking on an exercise programme
- The exercise programme should be supervised and patients should be aware of the ischaemic pain scales
- Exercise will bring on claudication pain initially, but over time walking distance and symptoms will start to improve
- Regular contact supports the patient and enables monitoring of progress
- Additional benefits can be gained from social interaction with peers
- After completion of a supervised walking program, strategies to enhance long-term participation in other home or community based walking programmes should be incorporated
- An exercise programme should be individualised to the patient and considers the patient's goals, comorbidities, and response to exercise

EXERCISE PRESCRIPTION IN PERIPHERAL VASCULAR DISEASE

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EXERCISE PRESCRIPTION IN TYPE 2 DIABETES - DR STAN BALTSEZAK

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''WALK MORE, SIT LESS, AND EXERCISE''
TUDOR-LOCKE AND SCHUNA, 2012

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EXERCISE PRESCRIPTION IN TYPE 2 DIABETES

1. It prevents the onset of Diabetes Mellitus type 2(DM) in those at risk.
2. It increases insulin sensitivity and decreases insulin requirements.
3. It reduces risk of coronary heart disease in individuals with DM.

Introduction

Mrs S, is a 56 year old female with a 2 years history of T2DM. She is overweight with a BMI of 28. She comes in for her routine diabetes check-up. From previous practice notes you see that she is a non-smoker, normotensive, and has a good lipid profile. Mrs S has been managing her diabetes with diet control only. You notice that her recent HbA1C is 7.5%. She has not developed any micro or macro vascular diabetic complications or symptoms. She says that she is using a pedometer and tries to take at least 6500 steps per day to keep active. Mrs S's husband is going to run a local 5 km charity race in 4 weeks' time. She wants to participate in this event as well and wonders whether it is safe for her to do it.

Considerations in this patient

While considering starting a blood glucose lowering medication (e.g. metformin), you also need to address the safety of exercise participation. A pre-participation health screening should take place. You should establish whether this patient is at higher risk of developing an acute cardiovascular event during physical activity. You should also assess her current physical activity level.

According to the American College of Sports Medicine risk stratification categories for cardiovascular disease, people with known cardiovascular, pulmonary (COPD, asthma, interstitial lung disease, cystic fibrosis), or metabolic diseases such as diabetes mellitus, thyroid disorders, renal or liver disease are considered high risk. The implications are that high risk individuals will need to have a thorough medical examination and graded exercise test before commencing moderate or vigorous physical activity. Tudor-Locke and Basset identified several activity levels based on number of steps done per day (See Table 1).

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<5000 steps/ day	5000-7499 steps/day	7500-9999 Steps/day	≥10000 steps/day	>12500 steps/ day
Inactive	Somewhat active	Low active	Active	Highly active

Table 1. Activity levels based on number of steps a day.

Further research from Tudor-Locke et al showed that as guidance, 7000-8000 steps/day would meet minimum amount of daily moderate to vigorous physical activity. 100 steps per minute would on average represent a speed of moderate intensity walking. They also concluded that some improvements in body composition can be achieved by adding an 2000 extra steps a day.

The UK National Obesity Forum recommends gradually building up the number of steps to 10000 steps a day. It also recommends increasing step count to 15000 steps a day for someone who wants to lose weight. General exercise recommendations for healthy adults apply to people with diabetes mellitus type 2. Ivy also advocates strength training to prevent muscle atrophy and improve glucose tolerance.

Post-exercise hypoglycaemia could be a problem in people taking insulin and/or some oral hypoglycaemic medications (e.g. sulphonamides). A balance between carbohydrates consumption, medications before and after exercises, and intensity of exercise should be found by measuring blood glucose levels before, during and after exercise. Lefebrve et al recommend consuming 1 gram of carbohydrate per minute of vigorous exercise. They advise ingesting it 20-30 minutes before exercise and then repeating it every 30-60 minutes during prolonged exercise. A further 15-30gram should be taken after exercise to prevent hypoglycaemia.

For patients with diabetic complications such as proliferative retinopathy Bird et al advise against isometric weightlifting or exercises involving Valsava manoeuvre, head-down position or head jarring. Patients with peripheral neuropathy should avoid jarring impact to lower extremities (e.g. running).

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Cycling and walking with appropriate footwear would be more suited to this type of patients. Swimming is another activity which may be appropriate to people with peripheral and/or autonomic neuropathy.

You compliment Mrs S. on her regular physical activity and use of pedometer. However you explain that the number of steps has to be gradually increased from 6500 to10000 steps/day. You advise that running and jogging represent vigorous activity. In order to determine whether it is safe for her to engage in this type of exercise you will organise an exercise tolerance test at your local hospital. You warn her about rather short preparation time for charity run especially taking into account current activity levels.

Also, a sudden increase in physical activity may put musculoskeletal system under extra strain and lead to injuries. Provided she tolerates exercise test well i.e. is asymptomatic and has normal haemodynamic response and electrocardiogram - she can plan a training programme for the next run. Preparing for the competition/race is a great motivator to do regular physical activity.

You recommend missing the race this time and consider signing up for next year. It will allow sufficient time to gradually build up her level of physical activity. She may continue using a pedometer to monitor activity levels. In addition, she could encourage her husband to train with her to help maintain her motivation and enjoyment.

Practice Points

1. Identify high risk patients who require exercise testing before commencing physical activity programme
2. Encourage patients to build up physical activity gradually when getting started
3. Beware of post exercise hypoglycaemia in some patients with T2DM

EXERCISE PRESCRIPTION IN TYPE 2 DIABETES

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EXERCISE PRESCRIPTION IN OSTEOARTHRITIS

- DR JILL PATTERSON AND DR AMIR H PAKRAVAN

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EXERCISE PRESCRIPTION IN OSTEOARTHRITIS

Introduction

Osteoarthritis is a common degenerative condition affecting an estimated 8.5 million people in the UK. It can affect any joint but is predominantly known for its effects on the knees, hips, back and hands often leading to significant limitations in activities of daily life.

Sufferers often worry that exercise may aggravate their symptoms and result in further damage, making them reluctant to accept physical activity as a mode of treatment or prevention. However, research shows that regular physical activity and targeted exercises in addition to general health benefits and prevention or control of other risk factors and co-morbidities, are effective in reducing pain and improving function in osteoarthritis.

Mrs DP is a fit and well 51 year old. She took voluntary redundancy from a stressful job as an office manager and over the last 3 years, has set up a small business offering garden maintenance and small landscaping jobs with her husband. Mrs DP works 3 days a week in a physically demanding job.

Mrs DP enjoys keeping fit and last year completed her first half marathon as a 50th Birthday challenge. She continues to enjoy jogging 3-4 times a week and regularly cycles with friends, covering over 70miles most weekends.

Whilst training for a half marathon, Mrs DP experienced knee pain during and after running. On the advice of her GP and fellow runners, she modified her training routes and managed her pain with paracetamol as required.

During a routine medication review, Mrs DP mentions that she is still troubled by left knee pain and stiffness after long working days or hard runs. She has always put the pain down to getting older and "over-doing it" but is reluctant to give up the exercise and job she enjoys.

Having always struggled with her weight, Mrs DP was delighted that her BMI dropped to 26 over the last 2 years and is worried that she will put on weight if she stops jogging. She also hopes to complete a half marathon again this year in aid of the hospice where her mother died.

EXERCISE PRESCRIPTION IN OSTEOARTHRITIS

Mrs DP consults her GP for advice about how to manage her pain and whether or not she should continue the work and exercise she enjoys, including completing another half marathon.

Considerations in this case

By taking a detailed history and musculoskeletal examination, in addition to medial joint line tenderness and crepitations in the left knee, Mrs DP's GP notes swelling in the DIP and PIP joints. To further establish a potential diagnosis of osteoarthritis and exclude other causes of knee pain and joint swelling such as auto-immune, rheumatoid or crystal arthropathies, her GP organises X-rays of Mrs DP's hands and left knee as well as blood tests, including vitamin D, calcium, inflammatory markers, uric acid and rheumatoid factor. X-rays show moderate degenerative changes both in hands and left knee with blood test results all within the normal range.

Having made the diagnosis of osteoarthritis, Mrs DP's GP discusses how this is affecting her life, what her worries, hopes and expectations are and what treatment options are available.

The balance of a physically demanding job and recreational exercise is difficult for Mrs DP and she struggles to determine which activities bring on her symptoms. She is distressed at the prospect of disabling arthritis which she has witnessed in elderly relatives and worries about giving up the work and exercise she enjoys. If she continues them, she fears needing knee replacement surgery at an early age.

Mrs DP's GP provides an information leaflet about OA and suggests that she keep a diary of her activities and pain to identify the triggers and help her prioritise which activities to continue. He prescribes regular paracetamol and an NSAID. Mrs DP is reluctant to take regular medications so they agree to meet again in one month to review her pain diary and re-visit her analgesia.

From her diary, Mrs DP realises that certain gardening jobs cause more pain and stiffness than others and longer days at work are most debilitating. It confirms that running causes significant exacerbation of her symptoms

whereas cycling causes only mild pain in comparison. On reflection and reading the supplied information leaflet, Mrs DP has taken regular paracetamol for the last two weeks and realises this has improved her overall pain level. She has slept better and functioned better at work since her pain is better controlled and is reassured that she has not suffered any side effects.

Mrs DP and her GP discuss the findings and diagnosis of OA. He emphasises the importance of a healthy lifestyle, good sleep and maintaining a good level of pain control to enable continued function, weight control and fitness. Her GP describes the benefits of alternative forms of exercise and Mrs DP is reassured that by following an organised programme of general and targeted exercise she may eventually be able to manage her symptoms without regular painkillers.

The GP goes through some simple home exercises aimed at flexibility and core stability. He explains the importance of strong muscular support around joints and provides targeted exercises for the lower limb including quadriceps strengthening. Mrs DP is advised to complete sets of exercises with gradually increasing numbers of repetitions, resistance and frequency. They discuss non-impact exercise such as cycling, cross training, swimming and aqua jog, and her GP also emphasises to Mrs DP the importance of the three phases of warm-up, training, and cool-down to avoid injury.

Mrs DP is offered a referral to physiotherapy to help her refine her training regime. Heat and cold therapy were discussed as an adjunct to pain killers and exercise.

Together, Mrs DP and her GP make a list of achievable personal goals with a realistic timetable. Mrs DP concludes that, in the short term, she will try to make changes to her working pattern and modify some tasks. She will start the home exercises discussed and also takes up the physiotherapy referral. Mrs DP will explore local swimming and gym facilities and, in the long term, will consider an alternative to running as her recreational sport of choice.

EXERCISE PRESCRIPTION IN OSTEOARTHRITIS

Mrs DP's GP explains that the process will require her determination and patience, and further emphasises the importance of adhering to the varied but organised plan of stretching, strengthening and aerobic exercises. They agree on a review appointment in 6months time but Mrs DP is comforted that she can contact her GP sooner if necessary.

Patient Progression

When Mrs DP returns to her GP 6 months later she reports that her knee pain is much more manageable.

In addition to the simple exercises prescribed by her GP, the physiotherapist helped Mrs DP to build a routine of static stretching followed by at least 15minutes of strengthening programme 2-3 times a week. She also enjoys attending a Pilates class at her local gym and feels she has improved function and flexibility with reduced stiffness in her knees. Mrs DP's balance has improved and she is now more confident in certain gardening tasks which she previously found difficult.

Although she had to give up running due to her symptoms, Mrs DP still enjoys hill walking and has started swimming as a new challenge. She is looking forward to taking part in the Great North Swim, a sponsored 1mile open-water event which will raise money for her mother's hospice. Mrs DP has also been able to continue cycling and manages the exacerbations in her knee pain by a combination of medications, heat and cold therapy, and activity modifications. She is very pleased with her general fitness and weight control, with her BMI stable at 26.

Mrs DP's husband has been very supportive and at work they have re-allocated the tasks allowing her to work shorter days. Mrs DP hopes to continue in the gardening business for another 4-5years before retirement and is now confident that these life style modifications and organised exercise regime will enable her to continue working.

Her GP encourages the positive changes Mrs DP has made and offers his support. He also reassures Mrs DP that he is always available to discuss treatment options including surgical intervention if things change over time.

EXERCISE PRESCRIPTION IN OSTEOARTHRITIS

Learning Points

The physician must consider the individual lifestyle, level of disability and expectations of each patient when discussing physical activity in OA. Some patients with osteoarthritis will be overweight and inactive so physical activity must be started gradually, with realistic goal setting and consideration of community-based exercise classes to improve compliance. Other arthritis sufferers, like Mrs DP, may have previously led very active lives, with high impact activities and previous sporting injuries being significant risk factors for the development of knee osteoarthritis. A targeted and organised exercise programme, individualised towards the patients' agreed goals, is an essential component of OA management.

Patients who are usually physically active, either through occupation or sports, may be reluctant or unable to accept recommendations of activity modification. They will require time to accept and adjust to the diagnosis of osteoarthritis and agreed follow up appointments may be useful to review symptoms and discuss alternative treatments. A pain diary can provide a useful objective tool to demonstrate what exacerbates the patients' symptoms and to assist in discussion about activity modification, analgesia and goal setting. Encouraging low-impact physical activities in place of running, football or racket sports may ease the distress of giving up recreational sports.

Although many recreational sportsmen and women have good aerobic fitness, they may have neglected other types of exercise such as strengthening or flexibility. Explanation of the benefits of different types of exercise may support exercise prescription;

- Aerobic exercise is important in weight reduction to off-load affected joints and to improve cardiovascular and respiratory health;
- Flexibility exercises help maintain range of motion and reduce stiffness;
- Strengthening exercises will provide essential muscular support joints to reduce mal-tracking, absorb impact and maintain function.

EXERCISE PRESCRIPTION IN OSTEOARTHRITIS

An organised exercise programme should incorporate all three components and is proven to improve strength, mobility and function in osteoarthritis of the knee. This can postpone or negate the need for other treatment modalities including strong analgesics and surgery.

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EXERCISE PRESCRIPTION IN OSTEOPOROSIS -DR ALAN RANKIN

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EXERCISE PRESCRIPTION IN OSTEOPOROSIS

1. Physical activity is essential for bone health to enhance peak bone mass and reduce the rate of bone loss associated with ageing
2. Secondary benefits include reduction of falls risk by improving balance (proprioception) and increasing functional muscle strength
3. Impact/weight-bearing and resistance exercises should be utilised for the greatest benefit to bone health

Osteoporosis is a skeletal disease characterised by low bone mass and decreased structural integrity of bone leading to an increase in bone fragility and the risk of fractures. Fractures may occur spontaneously in certain areas but are mostly the result of low energy (fall from standing height or less) trauma. They commonly affect the spine, hip and distal radius and can cause significant pain, reduce the quality of life and even decrease life expectancy in the case of hip and spinal fractures.

Mrs M is a 75-yr-old lady who attended her GP Practice with her daughter who expressed concerns that since a fall 3 years ago, Mrs M had become increasingly socially withdrawn and less independent. This once vibrant lady, who enjoyed shopping and meeting her friends, had become increasingly anxious when away from home, especially in crowded and unfamiliar areas, rarely going into town anymore. Over the last few years her posture had become mildly stooped and she had developed pain around the thoracic spine and occasionally across the shoulders.

Background

She initially had a simple fall 3 years ago resulting in a fracture of her right distal radius (Colle's fracture). This took place while shopping in town and resulted in embarrassment and loss of confidence. Due to the low energy involved in this incident, investigations were performed and osteoporosis was confirmed by her T-Score using dual X-ray absorptiometry (DXA) scan (See Figure 1). A calcium and vitamin D supplement was commenced along with a weekly bisphosphonate preparation.

EXERCISE PRESCRIPTION IN OSTEOPOROSIS

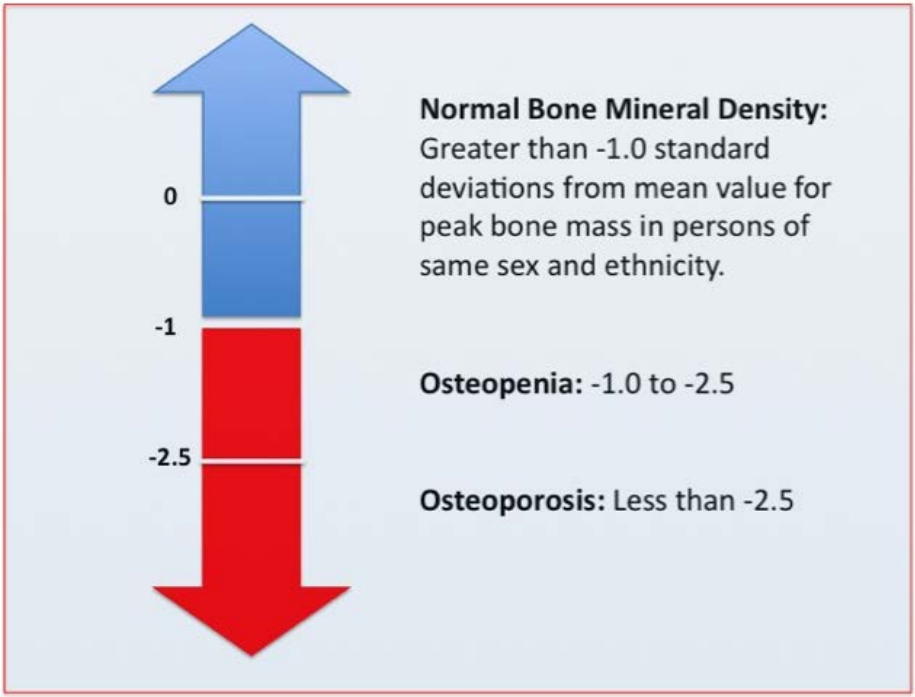

Figure 1 World Health Organisation T-Score Bone Mineral Density (BMD) Definitions:

Mrs M had enjoyed reasonably good health and had been very particular about her weight trying to eat a healthy diet. Her current body mass index (BMI) was at the lower limit of normal at 20kg/m2. She had no major medical issues other than deteriorating eyesight that meant that she had to undergo regular eye examinations. Formerly an excellent club and inter-county tennis player, Mrs M had to give up the sport at the age of 50 owing to her visual problems. Exercise at that stage took the form of long walks with her pet dog who sadly passed away 7 years ago.

At the initial consultation, the issues surrounding Mrs M's lack of confidence and low mood were explored. She had symptoms of mild depression.

EXERCISE PRESCRIPTION IN OSTEOPOROSIS

Clinical examination revealed a mildly increased thoracic kyphosis with a decreased range of thoracic spine mobility. An x-ray of the thoracic spine was requested along with simple blood tests to exclude any other cause of her shoulder girdle pain. Lifestyle measures were discussed to improve mood and decrease social isolation, including increased contact with friends and relatives along with daily walks with her daughter around her local area using a walking stick to improve confidence. Simple regular analgesia was prescribed to address the pain and a review was arranged for 2 weeks.

Patient Progression

On review the x-ray report described minimal anterior wedging of several thoracic vertebral bodies but no acute fracture. Blood tests including ESR were within normal limits. In general, pain and mood had improved and Mrs M was beginning to enjoy regular short walks with her daughter. Her real passion was for walks in the countryside but she still lacked the confidence to attempt this over uneven ground. As the thoracic spine showed some increasing osteoporotic changes, the opportunity was taken to address other lifestyle factors that may contribute to this. This included smoking (she was a non-smoker), decreasing excess alcohol (Mrs M states she is at or below the recommended weekly limit), exploring nutritional factors, as well as discussing increased weight-bearing and resistance (weight training) exercise.

She seemed keen to explore these options. Medical assessment was performed which revealed her health status to be stable with no additional co-morbidities. Assessments of gait, balance and posture were performed. As a result of these it was decided that a supervised programme of physiotherapy should be organised to improve thoracic extension strength, body proprioception and encourage her independence.

Considerations in this case

Most osteoporosis is due to an age-related decline in bone mass that commences in early adult life. It is more common in women than men and should be suspected in all women over 65 and all men over 75 years of

age. Factors that would suggest the possibility of osteoporosis in younger patients include previous low-trauma fracture, current/frequent use of oral or systemic gluco-corticoids, history of falls, family history of hip fracture, body mass index less than 18.5kg/m2, smoking and excess alcohol consumption.

Genetic influences can play an important role in osteoporosis and low-impact fractures. The best protection against osteoporosis is to develop an optimal peak bone mass to slow the inevitable age-related decline that commences in the 30s. An adequate diet with good sources of vitamin D and calcium is important throughout life. Impact exercise such as jogging, jumping or even walking can help develop peak bone mass. Resistance exercise will also provide an important stimulus for bone development through weight training or activities such as manual work or aerobics. There is evidence that continuing these activities throughout life can slow the decline in age-related loss of bone mineral density (BMD) as well as maintaining strength and balance, important in the prevention of falls and therefore fractures.

Mrs M had a Colle's fracture 3 years ago. In the case of an acute fracture, this should be healed completely prior to commencing an exercise programme and specialist advice should be sought from physiotherapy during initial fracture rehabilitation (See Figure 2). Spinal extension exercises have been shown to be of particular benefit in those with thoracic back pain due to a kyphotic posture, as in this case. Improvements in pain, function and posture can be achieved consistently with this approach. In those persons where a kyphotic thoracic spine is evident, referral for physiotherapy advice on this form of strengthening is advised.

EXERCISE PRESCRIPTION IN OSTEOPOROSIS

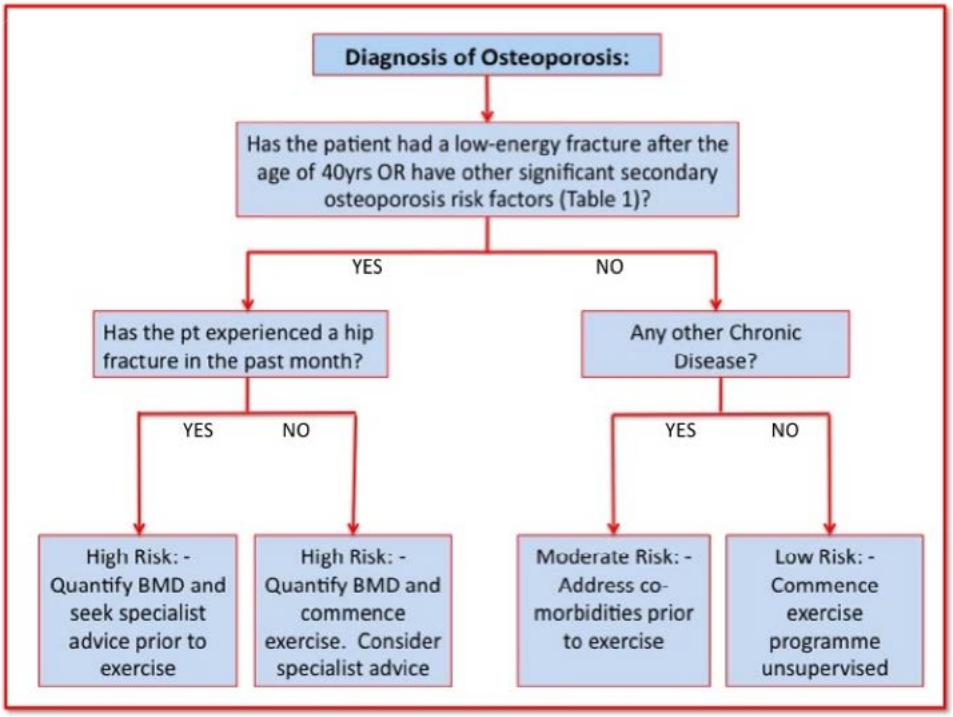

Figure 2 Decision Making Flow Chart for Osteoporosis

Patient Progression

Mrs M returned later in the year to see her GP. She had made excellent progress with her physiotherapist and her posture and confidence had improved. The physiotherapists had re-enforced the need for impact activity and had advised her to make a follow-up visit with her GP to discuss this further.

It was suggested to Mrs M that she should use exercise to help to load and stimulate bone activity. It was agreed that progressing with walking was the safest initial impact activity to pursue. She was encouraged to progress this activity in a gradual fashion. An example exercise prescription for Mrs M is shown in Table 1.

EXERCISE PRESCRIPTION IN OSTEOPOROSIS

Mrs M lived close to the local leisure centre and agreed to attend a Tai Chi class as one of her friends also attended. She was not keen on attending the gym but together with her daughter and grandchildren started to walk regularly in the local park. Over the course of the next 6 months, she gradually increased her distances, venturing into town and even to the countryside occasionally. She found Tai Chi beneficial from her increased physical confidence and also from the social perspective. A follow-up DXA scan early the next year (recommended 3 years after initial diagnosis) showed a marginal improvement in T-score at the femoral neck, with no deterioration at the spine.

Impact or weight bearing activities suitable in osteoporosis include walking, jogging, dancing, stair climbing and fitness classes such as aerobics, pilates and Tai Chi. Swimming and cycling, while of benefit in maintaining strength and musculoskeletal health, do not load bone as effectively. The emphasis should be on incorporating activities that the patient enjoys into their daily routine. Ballistic, plyometric and other explosive types of activity should be avoided in osteoporotic individuals; along with activities involving spinal flexion due to the potential risk of fracture.

Resistance training involving body weight exercises and targeting large muscle groups with 3-4 sets of 10-20 repetitions will help to load bone. This can be very helpful in maintaining bone mass and should be ideally performed at least twice per week.

Exercise targeting co-ordination and balance may be of additional benefit in fall prevention. Proprioceptive benefit will be gained through the various aerobic and resistance activities already mentioned. For those who are particularly unsteady, specialist physiotherapy advice and supervision is recommended. Tai Chi is a form of martial arts performed slowly and with control, which if available, is an excellent low-moderate intensity method of improving proprioceptive awareness and muscle strength.

EXERCISE PRESCRIPTION IN OSTEOPOROSIS

Type of Excercise	Frequency	Intensity	Timing	Type	Comments
Aerobic	Regularly throughout the week – aiming to build up to 150mins/ week	Initially low intensity building to moderate intensity	Ideally 30 mins per day but 10min periods initially in de-conditioned	Impact/ weight bearing activity – walking/ jogging/ dance/ aerobics/ Tai Chi/ racket sports etc.	Avoid plyometric – high impact activity. May be elderly – Start slowly and build gradually. Consider supervision if high risk of fracture or falls risk
Resistance	At least twice per week	Initially low/ body weight	Aim for 2-3 sets with 10-15 repetitions	7-10 exercises involving large muscle groups with emphasis on functional movements	Avoid spinal flexion. Caution with free weights – machine weights/ body weight initially. Thoracic extension in appropriate patients
Proprioception/ Balance Training	Incorporate elements into resistance and aerobic conditioning	Not applicable	Not applicable	Tai-chi, aerobics, walking, physiotherapy	Essential in those at risk of falls
Flexibility	Daily if possible	Gentle stretching of major muscle groups	10 second holds at least	Ideally performed as part of the cool-down phase of exercise	Important to maintain joint function and range of motion

EXERCISE PRESCRIPTION IN OSTEOPOROSIS

Summary Points

1. It is generally safe to exercise with osteoporosis
2. The exercise prescription follows that of exercise for general health
3. Emphasis should be placed on impact activities and resistance training
4. Should a kyphotic thoracic spine develop, consider physiotherapy for a programme of thoracic extensor strengthening
5. Osteoporosis and insufficiency fractures are a significant cause of morbidity and mortality. As this condition is usually present in the elderly controlled and gradual progression of exercise is recommended

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EXERCISE PRESCRIPTION IN PATIENTS WITH MENTAL ILLNESS - DR DINESH SIRISENA

13

"THE DOCTOR HAS BEEN TAUGHT TO BE INTERESTED NOT IN HEALTH BUT IN DISEASE.WHAT THE PUBLIC IS TAUGHT IS THAT HEALTH IS THE CURE FOR DISEASE."
ASHLEY MONTAGU

DR DINESH SIRISENA IS A SPORT AND EXERCISE MEDICINE CONSULTANT, LOCAL MEDICAL DIRECTOR TO BUCKS MUSCULOSKELETAL INTEGRATED CARE SERVICE, TEAM DOCTOR TO AFC WIMBLEDON AND THE FA PARTIALLY SIGHTED TEAM AND FELLOW OF THE FACULTY OF SPORT AND EXERCISE MEDICINE UK

EXERCISE PRESCRIPTION IN PATIENTS WITH MENTAL ILLNESS

Introduction

Throughout our professional careers, we will encounter patients suffering with mental health conditions in varying capacities. In the not too distant past, these patients were collected and housed in institutions, isolated from the outside world. Over recent years, there has been a renaissance in the way we support and treat those with mental health conditions. This has been partly driven by a change in public perception but also a realisation from the medical fraternity that integration in society rather than isolation plays a therapeutic role.

One of the key challenges in clinical practice is engagement with the patient when considering therapeutic options. Difficulties may arise due to a lack of insight or past experiences when dealing with the medical community. Drug therapies followed by psychological support from counsellors or therapists has tended to be the traditional approach when supporting individuals with mental health conditions.

Despite our past methodology, there is an increasing body of evidence that mental health conditions respond positively to structured physical activity and this can be instigated with minimal expense but maximum impact. While it is evident that not all conditions will respond to exercise, for specific conditions with well described presentations or severities the outcome can be favourable.

Much of the work appears to have been done in patients diagnosed with depression. A meta-analysis of the available data suggests that a structured physical activity programme can be successfully employed in patients with mild to moderate depression. Other groups, focusing on the low mood aspects associated with Schizophrenia have found physical activity alleviates these symptoms.

In addition to primary presentation of mental health conditions, we often witness depressive symptoms in patients with chronic medical conditions. This is particularly evident in the elderly; many will experience multiple co-morbidities, require regular medication, become socially isolated and have low self-esteem. Exercise, focusing on cardiovascular fitness together

EXERCISE PRESCRIPTION IN PATIENTS WITH MENTAL ILLNESS

with conditioning activities helps these patients with their medical problems as well as improve their mood and regain confidence.

Nevertheless, in many situations the dilemma is one of engagement; those who take up this option find significant benefit while others, including the treating physician, might not consider physical activity as important.

Mr. AY is a 28-year-old architect who has a mixed Asian/Caucasian background. He has been registered at the practice for the past twenty-two years and considers the senior partner a family friend rather than simply his GP. Other than mild eczema and acne in the past, there are no co-morbidities of concern. He is an infrequent visitor but made an emergency appointment one morning.

During the consultation, his initial complaint was of symptoms pertaining to a viral infection. However, when asked whether there was anything further concerning him, he mentioned feeling low for at least one year and this has progressively worsened over the past three months. Although this was the first time Mr. AY reported this mood change, since his late teens there had been periods when his mood was particularly low. Unable to put a trigger on these past events he had generally disregarded it as teenage anxieties and controlled the symptoms by taking part in regular sport.

On further questioning, it was established that although doing well professionally, there were number of facets to his present state of mind. Firstly there was the pressure of work; having taken on a senior role within the firm, he had found the transition more challenging with the balance between work and leisure time increasingly difficult to achieve.

There are also difficulties at home. The recent arrival of their first child had put immense pressure on the relationship with his partner and while both of them had previously taken part in high level sporting activities, this has significantly lessened, causing conflict at home and might have added to his current state.

EXERCISE PRESCRIPTION IN PATIENTS WITH MENTAL ILLNESS

Case considerations

As with all patients the initial rapport is often the most critical. Being attentive to underlying issues and picking up on important cues will assist in our supporting this patient. With this particular case it is essential to evaluate red flag symptoms such as self-harm, suicidal ideation or illicit substance usage before working towards a treatment plan.

It is possible that pre-existing long-term problems are contributing to his current presentation but more evident are the recent change in personal circumstances that appear to be the trigger factors. Mr. AY's added responsibilities, longer working hours and the changes in his home circumstances have been coupled with a reduction in his level of physical activity, culminating in his depressive symptoms. While there may be other factors, we already have some idea of what is happening from the limited information provided.

Although not always possible, a positive step in this case would be the early discussion of physical activity. While his predicament resonates with many people, it may be especially poignant as exercise appears to have been a key coping strategy in the past and could favorably influence his outcome from this episode.

While physical activity is not often considered a first line therapy in depression, it has been identified as an adjunct to mild and sometimes therapy resistant depression. In this case, it may be worthwhile promoting exercise as the initial treatment and avoid medication altogether; this is on the proviso that his symptoms are not impacting on his life and thus not severe enough to warrant medication.

During the initial consultation the Mr. AY, important red flags relating to depression were excluded but a PHQ-9 questionnaire completed afterwards scored 24/27 indicating that he had quite significant symptoms. Consequently an approach employing medication and counseling was initiated with physical activity being mentioned as a potential tool but this was not taken further on this occasion.

EXERCISE PRESCRIPTION IN PATIENTS WITH MENTAL ILLNESS

A fortnight later as part of a routine follow-up, Mr. AY enquired about other methods to improve his outlook and help with symptoms, in particular exercise as this had been mentioned earlier. He was particularly keen to limit his medication use and perhaps even wean off it earlier than planned. Reflecting on past episodes of low mood, exercise had always been a successful therapy for Mr AY, alleviating his symptoms and having played regularly for a racquet sport team, he had achieved a national standard after taking part in high-level competitions. Due to the changes in his circumstances, this level of physical activity was no longer easily achievable and had served to exacerbate recent stresses.

As a pragmatist, Mr AY sought a method by which he could incorporate physical activity into his working day. He commenced running part of his journey and gradually increased his distances over several weeks. Unfortunately, due to the time taken to complete the journey, a subsequent unremitting patella tendinopathy and pressure from his partner, Mr AY was forced to abandon this activity and returned for further advice.

He was advised to rest his knee and while the tendinopathy was treated with a corticosteroid injection and physiotherapy, Mr. AY was referred to a local scheme focusing on supporting individuals returning to exercise. Having attended the programme, he was introduced to commuter cycling and started travelling to work via bicycle following a weekend safety course. Mr AY found this to fulfilled all his requirements, providing physical activity, avoiding aggravating of his knee symptoms and enabling a quicker mode of transport compared to running thereby finding agreement with his partner. An added advantage of the local service was the availability of other cyclists with whom he formed a ride safety group when travelling to work.

In addition to being excellent exercise, the cycling enabled Mr. AY to wean himself off medication after twelve months and he remained in remission since. As a continued legacy to this approach, Mr. AY established a cycle to work scheme at his firm, extending the benefits to his colleagues.

EXERCISE PRESCRIPTION IN PATIENTS WITH MENTAL ILLNESS

Key points

This case highlights a number of considerations when supporting at patient with mental health conditions.

Establish the patient's objectives, focusing on
- Underlying issues
- An assessment of insight
- What they consider their treatment objectives to be

Ensure the patient is not at risk
- Exclude red flag symptoms
- Ensure they have adequate follow up

Introduce the possibility of physical activity early as an adjunct to therapy or a motivation to avoid drug therapy

Research structured programs in the local area. Preferably these should be
- Easily accessible
- At convenient times
- Free or minimal cost
- For patients with similar health conditions

Discuss the other benefits of physical activity including
Improvement of co-morbidities
Greater opportunities to socialise

Ensure there is regular follow up
With the physical activity group
With the responsible physician
Other members of the multi-disciplinary team

EXERCISE PRESCRIPTION IN THE OLDER ADULT - DR DINESH SIRISENA

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EXERCISE PRESCRIPTION IN THE OLDER ADULT

Introduction

What and who do we consider as being elderly? There is a vast difference between chronological and physiological ageing with some individuals in their fifties having characteristics we might associate with another in their eighties and vice versa. Such differences will influence physical activity, conditioning and associated co-morbidities. In addition there are various connotations of social factors which impact upon physical activity and these must also be accounted for.

As with all patients, exercise must be tailored to individual needs and abilities, but there are some key concepts that must be considered when elderly patients are supported.

Mrs PM is 78-years-old and has been registered with her practice for the past 30 years. Over this time, she developed a number of medical problems but due to her husband's illnesses she largely has disregarded them. Her husband passed away eighteen months ago and while she initially coped poorly, Mrs PM is coming to terms with the loss and decided to address her own health.

In addition to being clinically obese (BMI 34), Mrs PM suffered an anterolateral myocardial infarction ten years ago. Although successfully treated with primary angioplasty, she has experienced mild angina on rare occasions. Her co-morbidities and medication are listed below:

Medical Problem	Medication
Hypertension	Bisoprolol
Hypercholesterolaemia	Amlodipine
Hypothyroidism	Ramipril
Osteoarthritis of the left hip and both knees	Simvastatin
Type II Diabetes mellitus (diet controlled)	Levothyroxine

EXERCISE PRESCRIPTION IN THE OLDER ADULT

Urinary stress incontinence	Citalopram
Post-bereavement depression	Co-codamol Ibuprofen Aspirin Movicol

Unhappy with her weight and medications taken, Mrs PM attended the surgery requesting weight-loss medication on the advice of a friend who lost weight and consequently reduced her medication use.

When questioned about exercise, she admitted this had not crossed her mind and was not sure if it would be possible with her heart disease and osteoarthritis. Mrs PM was resistant to further discussion regarding exercise and the first consultation ended on the agreement that medication would be considered as an adjunct to lifestyle changes rather than the core therapy. As such a period of reflection was provided for her to assess what options she would consider and an open appointment was agreed to for the next follow up. Several weeks passed before Mrs PM returned to continue the discussion.

During a routine blood pressure assessment, Mrs PM initiated a discussion focusing on weight loss and increasing physical activity rather than medication. It transpired that although initially dismayed a prescription had not been provided, Mrs PM had reflected upon her ambition to reduce medications and thought better of additional prescriptions. Having consulted friends of a similar age, they had recommended local structured physical activity programmes, which also provided an opportunity for social contact. Both these factors had prompted a new interest in physical activity.

Following her expression of interest, Mrs PM attended for a health screening before joining a ballroom dancing programme for older people. She found this method of activity to be positive on several levels; while it provided a mode of improving her physical health, dancing had been a pastime she enjoyed with her husband and hence it helped Mrs PM to deal with her bereavement

Considerations in this case

It is evident from this case that patients' perceptions can be challenged; while some may hold rigid views on what is required, others may be more amenable to change and we must strive to support them with their healthy lifestyle choices. With Mrs PM, she expressed an initial reluctance to take up physical activity but the interval between consultations provided time for her to investigate and re-evaluate her choices.

In this situation, the path of least resistance would have been to provide medication, re-assess in some months and if she was not losing weight, cease the treatment or look for an alternative. More challenging are consultations when we address health beliefs and discuss alternatives to primary treatment methods.

With the benefit of time, Mrs PM reflected and reached her own conclusions regarding physical activity. Often as clinicians we give older people advice and expect an instant decision before moving onto other topics. While partly due to time pressures, our poor understanding of challenges faced and motivation required to take the first few steps can also be a hindrance. This is particularly evident with older people; the traditional mantra has been to reduce physical activity as we age, particularly for those with chronic medical conditions. As a result, many older individuals withdraw from activity, losing muscle strength, proprioception and confidence in their movements.

Specific considerations in the case of Mrs PM are her weight, co-morbidities and recent bereavement. While physical activity will potentially help with all of these, it is important to ensure that exercise is tailored and she is not at risk. Therefore a pre-participation assessment was conducted, reviewing her current level of fitness, blood pressure and other observations, and an ECG was requested as a baseline. As Mrs PM occasionally experienced angina symptoms, she was sent for an exercise stress test where no significant abnormalities were identified.

EXERCISE PRESCRIPTION IN THE OLDER ADULT

Other considerations when helping older patients take up physical activity are the frequency, intensity, type and duration of the training. Patients with joint pathologies may experience pain due to their weight and the sudden change in activity levels; this may feedback negatively on their ambitions. Therefore it is sensible to commence with non-weight bearing activity initially and minimise the impact on joints. At the same time it would be prudent to address balance and muscle strength, either at a local gym or under the supervision of a physiotherapy team. As their confidence and conditioning improves, more demanding activities can be pursued provided it is not detrimental to the patient's overall health.

Patient Progression

Once the screening and health checks were carried out for Mrs PM, the options for physical activity were discussed. Although ballroom dancing was not discouraged, the degenerative change in her knees and its potential exacerbation with any impact exercise was highlighted. Consequently, a program was established with the goal of taking up dancing to aid adherence.

Mrs PM commenced two pathways in parallel; the first focused on general fitness with a series of pool based aerobics activities at the local leisure centre while the second, supervised by community based physiotherapy, addressed muscle strength and balance. By addressing both simultaneously, she was provided a safe, structured programme of physical activity with individuals of a similar age group and developed confidence in her movements.

By attending a community-based service, Mrs PM developed her social network and spent time with peers to alleviate many of the depressive symptoms experienced since the loss of her husband. This led to further opportunities, including an invitation to join a local senior ballroom dancing club; she has taken part in this on a twice weekly basis since.

Some months later during a routine appointment, Mrs PM mentioned that she felt ready to start to reduce her antidepressant medication due to the positive impact of the exercise programme. It had provided her with a positive experience and a social network to keep her time occupied.

EXERCISE PRESCRIPTION IN THE OLDER ADULT

Although Mrs PM was unable to stop her anti-hypertensive medication, her blood pressure and diabetic control improved significantly with no additional medication required.

Another key motivator in taking up physical activity was the ambition to lose weight. Although much more gradual, there was a reduction in BMI from 34 to 31 over eighteen months without the assistance of weight loss medication. Having done so, Mrs PM also experienced a reduction in her arthralgia symptoms that were due to her previous body mass.

Presently, despite occasional fluctuation in her mood and weight, Mrs PM has achieved equilibrium with her body mass (currently at 30.4). Indeed, she went on to become an advocate for physical activity amongst her peers and within her community.

Key points

The medical fraternity often presume that older patients are more accepting and adherent of our recommendations. This case has highlighted some key points and challenges when supporting the older patient and their physical activity goals:

- Changing health beliefs in older patients can be as challenging as with younger patients
- Education into the benefits of physical activity should be commenced from the initial consultation
- Education should also include red flags and when to seek help
- Allowing time between consultations can be useful to help understanding
- Screening for red flag symptoms is important to ensure safety and tailor physical activity to ability

EXERCISE PRESCRIPTION IN THE OLDER ADULT

Investigations should be based on past medical history and present symptoms. Ideally all patients would undergo cardiopulmonary exercise testing, but this is time and cost prohibitive

- A combination of cardiovascular, resistance and proprioceptive exercises are suitable when addressing confidence in physical activity
- Regular contact supports the patient and enables monitoring of progress
- Community based interventions are useful for adherence and there are additional benefits to be gained from social interaction with peers

References and Further Reading

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EXERCISE PRESCRIPTION IN CHRONIC LIVER DISEASE
- DR GEOFFREY HAYDON

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EXERCISE PRESCRIPTION IN CHRONIC LIVER DISEASE

1 - Chronic fatigue is the most common symptom in chronic liver disease and this will have an impact on a patient's ability to exercise. However, the perception of fatigue does not necessarily relate to the severity of the liver disease.

2 - Individuals with end-stage chronic liver disease may have VO2max levels reduced by up to 55% of age predicted values. This reduction has a multi-factorial aetiology which includes malnutrition, anaemia, metabolic abnormalities, a decrease in muscle mass and associated cardio-respiratory pathophysiology.

3 - A patient's ability to exercise in end-stage liver disease may fluctuate over time, depending on the presence of clinical signs of hepatic decompensation such as ascites or hepatic encephalopathy.

A 66 year old man was referred from his local secondary care centre to the regional liver centre for an assessment of his fitness for liver transplantation. He had first been demonstrated to have abnormal liver function tests on a routine health check about 2 years prior to this consultation. The aetiology of his chronic liver disease was presumed to be related to his history of excessive alcohol consumption; for most of his life he had drunk 35 to 40 units of alcohol per week. When he discovered that he had abnormal liver function tests, he stopped drinking alcohol altogether and at the time of this consultation, had been abstinent for 2 years. Despite this, his liver disease continued to progress and in 2011 he developed ascites. He had never needed a paracentesis, but had required a progressive increase in the dose of his diuretic therapy. His other main symptoms included lethargy, weight loss and a significant loss of muscle mass; all are strongly associated with chronic liver disease. On examination in the clinic, he had signs of chronic liver disease; he was not encephalopathic, but he did have mild peripheral oedema and quite extensive ascites. None of his abdominal organs were palpable.

The assessment of this patient was that he had developed end-stage alcoholic liver disease. Since his liver disease was significantly decompensated and his prognosis was poor (expected survival of <50% over 2 years), he therefore required an immediate assessment for a liver

transplant. When considering individuals for liver transplantation, there is an immediate paradox; patients need to be sick enough to warrant a transplant, but at the same time, they need to be well enough to survive the transplant anaesthesia and surgery. Discussion of an exercise history is thus a vital part of the initial assessment of such patients. In this case, the patient had been enthusiastic about exercise for large parts of his life. However, prior to this consultation, he had lost confidence as to whether or not he could exercise safely. He had discussed exercise with both his primary and secondary care physicians, both of whom had advised against the patient continuing with his exercise programme. Despite this, the patient himself had continued to exercise; he attended a gym about 5 times a week. Latterly, he had been walking on a treadmill for about 10-15 minutes a session. The patient was keen to continue his exercise programme despite the advice he had already received and was seeking advice with reference to the safety of exercise in his condition, together with guidance over the type and intensity of exercise.

Specific Considerations for This Patient

Exercise and lifestyle change have long been recognised as a fundamental part of the management of some chronic liver diseases, particularly those that are metabolic (e.g. non-alcoholic fatty liver disease) in origin or mild in severity. However, it is relatively unusual to identify a patient with advanced or end stage chronic liver disease, who is willing to exercise. Nevertheless, there is no reason why such patients shouldn't exercise, providing that an exercise programme is tailored to each individual (See Table 1).

There are three specific issues to consider when prescribing an exercise programme for patients with chronic liver disease. Firstly, the presence or absence of decompensated liver disease needs to be assessed by clinical examination (See Table 2).

EXERCISE PRESCRIPTION IN CHRONIC LIVER DISEASE

Barrier	
Chronic Liver Disease	-Fatigue -Low muscle mass -Protein-calorie malnutrition -Changes in carbohydrate/ lipid metabolism -Anaemia -Drug therapy (eg beta-blockers/ diuretics) -Fluid overload -Low VO2max -Poor medical advice with reference to exercise
Associated Co-morbidity	-Cardio-respiratory complications associated with liver disease (eg porto-pulmonary syndrome)
Psychosocial Issues	-Family pressures to assume "sickness role" -Depressive illness

- Table 1: Barriers to exercise in chronic liver disease

Clinical Sign	Grade
Jaundice	
Ascites	
Peripheral oedema	
Hepatic encephalopathy	I-Flapping tremor II-Confusion/ agitation III-Coma (rousable) IV-Coma (unrousable)

- Table 2: Table outlining clinical signs of decompensated chronic liver disease.

EXERCISE PRESCRIPTION IN CHRONIC LIVER DISEASE

Encephalopathy, ascites and peripheral oedema will all influence the patient's ability to exercise. Grade II/II or IV encephalopathy makes exercise unsafe; patients may be confused, drowsy and unsteady on their feet. Patients with grade I encephalopathy should be supervised by a family member or friend. Ascites and peripheral oedema are relative contraindications to exercise; the consequence of both may be that the patient carries in excess of 20kg of extra body weight. However, endurance training such as walking is possible with these clinical signs and of course, successful treatment using diuretic therapy (oedema/ ascites) or in the case of ascites, through paracentesis, may permit light jogging on a treadmill. Recumbent stationary biking is also an excellent option for exercise in patients with fluid overload and may in itself help to treat peripheral oedema and prevent muscle breakdown. Our own experience is that recumbent biking is the most useful form of endurance training for patients hospitalised by decompensated liver disease, whether or not they have oedema or ascites. Swimming should be avoided because of the extra weight the patient is carrying and should never be attempted by a patient with any grade of encephalopathy; ascites and oedema also prevent the flexibility required for rowing (See Table 3).

Secondly, the patient should be assessed for portal hypertension complicated by varices; the investigation of choice is an endoscopy. Patients with varices should avoid the Valsalva manoeuvre with its consequent rise in intra-abdominal pressure because of the risk of it precipitating bleeding. Thus, patients with varices or those in whom it is unclear whether or not they have varices should avoid all types of resistance training. Endurance training such as walking, light jogging or recumbent biking is still possible in patients with varices and is not associated with an increased risk of bleeding from varices.

Finally, an assessment of the patient's drug history is fundamental before prescribing an exercise programme. The usual haemodynamic response to end-stage liver disease is the development of hypotension. This may be compounded by the prescription of selective beta-blockers such as propanalol or carvedilol; these drugs are routinely prescribed as both primary and secondary prophylaxis against variceal haemorrhage in patients with endoscopically proven varices.

EXERCISE PRESCRIPTION IN CHRONIC LIVER DISEASE

Mode of Exercise	Indication in Patients with Chronic Liver Disease	Contraindications
Endurance Training		
-Walking	Strong indication	Rare
-Jogging	Limited	Relative (usually limited by fluid excess)
-Recumbent stationary biking	Strong indication	Rare
-Upright stationary biking	Limited	Relative (ascites)
-Rowing	Rarely indicated	Absolute if patient has varices (risk of bleeding) or ascites (risk of herniation)
-Swimming	Rarely indicated	Absolute if patient encephalopathic
Resistance Training	Rarely indicated	Absolute if patient has varices (risk of bleeding) or ascites (risk of herniation)
Flexibility/ Stretching	Limited	Relative (usually limited by fluid excess)

- Table 3: Possible modes of exercise in patients with chronic liver disease. All modes of exercise should always be supervised in these patients

EXERCISE PRESCRIPTION IN CHRONIC LIVER DISEASE

Although low grade endurance training such as walking on a treadmill or recumbent biking is unlikely to be affected by hypotension, resistance training or flexibility programmes are very likely to be. Indeed, patients with hypotension undertaking this type of training may be at risk of significant injury during resistance training if they develop dizziness during exercise (See Table 4).

Clinical Assessment	
History	Dietary Drugs (e.g. beta blockers might precipitate hypotension and collapse)
Clinical Examination	Sa02 Pulse Blood pressure "Wet" and "dry" weight BMI Nutrition Signs of decompensated CLD (Table 1)
Investigations	Endoscopy (presence of varices)

- Table 4: Specific assessment of a patient with chronic liver disease required before starting an exercise programme. This table assumes each patient will also have a standard clinical assessment as described in previous chapters.

EXERCISE PRESCRIPTION IN CHRONIC LIVER DISEASE

Patient Progression

In the case history described, the patient was not encephalopathic, but he did have some mild peripheral oedema and ascites. It was unclear whether or not he had varices at the initial consultation. Therefore, the exercise programme discussed was based solely on endurance training and some light flexibility work. He was already undertaking treadmill based exercise and the patient was reassured that this was safe to continue. For variety, swimming and recumbent cycling were also encouraged as alternative modes of endurance training. The intensity of exercise recommended was light and it was suggested that the patient was accompanied and supervised by his supportive partner at all times. The individual concerned was exercising prior to the consultation for about 10-15 minutes 5 times a week; he was unaware of any national guidelines for exercise, so it was agreed that he should aim to increase the duration of exercise undertaken to 30 minutes, a maximum of 5 days a week, but only if this was tolerated. The reason for the absolute contraindication of resistance training was also explained to both the patient and his partner.

This patient was motivated to exercise, so the exercise programme discussed in the context of his disease process was well received. Indeed, by the next consultation the patient had incorporated recumbent biking into his programme and had progressed to 20 minutes of exercise, 5 days a week; a longer duration of exercise was limited by fatigue. He was also accepted onto the liver transplant waiting list; his persistence with exercise, despite his chronic illness, is viewed very favourably by the transplant team.

Ultimately, this particular patient had a liver transplant with an excellent outcome; he had complete clinical resolution of his oedema and ascites. For the first year, post-transplant, he has continued with some light endurance training and flexibility. His surgeon specifically advised against any abdominal or core work until at least 6 months after his transplant when wound healing was complete. Although not specifically assessed in this individual, VO2max levels have been demonstrated to improve significantly in individuals who undergo liver transplantation and thus, the intensity of any exercise undertaken may increase dramatically, unless new medical problems have developed, within 2 years of the transplant surgery.

EXERCISE PRESCRIPTION IN CHRONIC LIVER DISEASE

Learning Points from This Case

1 - That it is possible for many patients with end-stage chronic liver disease to perform low intensity endurance training
2 - Patients with chronic liver disease can perform a variety of modes of endurance training if they are able; these include walking, light jogging, recumbent biking and in some cases, swimming
3 - Resistance training, since it may involve the Valsalva manoeuvre, should be avoided because of the risk of a rise in intra-abdominal pressure precipitating variceal bleeding
4 - Light flexibility work is also possible in end-stage liver disease, but this may be impractical for patients with oedema or ascites
5 - The VO2max levels of patients with chronic liver disease may improve both with endurance training and also in the context of liver transplantation
6 - Finally, patients with chronic liver disease are often advised not to do any exercise at all and are thus lacking in confidence when an exercise programme is suggested to them. In this context, the role of a partner or friend, who can support and encourage them to undertake some physical activity, is extremely valuable to both the patient and their Physician

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PHYSICAL ACTIVITY IN CHRONIC KIDNEY DISEASE

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PHYSICAL ACTIVITY IN CHRONIC KIDNEY DISEASE

Introduction

Chronic kidney disease (CKD) is a collective term used to describe various disorders affecting the function and structure of the kidney. Physical inactivity is a major cause for concern in the CKD population. Daily activity levels in CKD patients are compatible with a sedentary lifestyle. In CKD patients, a sedentary lifestyle is often coupled with reduced exercise capacity, which can be attributed to reduced activity levels, renal anaemia and skeletal muscle dysfunction.

Ultimately, decreased physical activity levels and fitness represent the beginning of a vicious cycle of declining fitness, physical function and disability which, if left unchecked will continue to escalate as the disease worsens.

Anaemia-diminished exercise capacity is managed for these patients using erythropoietin stimulating agents, the effectiveness of which is improved in combination with physical activity. However, muscle wasting combined with reduced aerobic capacity continues to prevent patients performing activities of daily living independently and participating in their interests. An increase in physical activity levels can be beneficial for all CKD patients whether they appear physically fit or weak. Research in the exercise and CKD field is still in its infancy; nonetheless the preliminary findings appear positive. Outside of the normal exercise contraindications, most CKD patients should be encouraged to exercise more regularly, as encouraged by the NICE guidelines for CKD and the American College of Sports Medicine.

Pre-Dialysis Patient Case Study

Mr X, 64 years old, was diagnosed with vasculitis three years ago which caused CKD. Alongside thus, he has also developed hypertension which has persistently remained uncontrolled over several months. His eGFR is now stable at 32mmol/L and his latest GP visit recorded a blood pressure reading of 131/90. In addition CKD, Mr X suffers with osteoarthritis in both knees.
Mr X works part time as a gardener, however has noted that he no longer has the strength to do heavy duty work, especially in his legs. Since being

PHYSICAL ACTIVITY IN CHRONIC KIDNEY DISEASE

diagnosed with CKD, he is often too tired to participate in his hobbies that he previously used to enjoy with friends and family.
The GP advised Mr X to try 30 minutes of walking, 5 times a week, at a pace that causes him to be breathless whilst exercising, but still able to hold a conversation. As an alternative, cycling on a stationary bicycle at the gym could also be encouraged at a similar intensity and duration.
In terms of resistance training, Mr X was advised to combine leg extension and leg curl exercises at the local gym. At his first session, a gym instructor performed a 10-repetition maximum (RM) assessment in order to prescribe an appropriate intensity (60 – 80% of the calculated 1-RM) at which Mr X can perform exercises to improve leg strength. The trainer also described to Mr X that he should stop exercise immediately if he experienced the onset of dizziness, chest pain, worsening pain elsewhere or difficulty breathing.

At 6 weeks, the GP reviewed Mr X at a follow up appointment. It was discovered that Mr X was unable, as well as hesitant, to exercise at the advised intensity. The pain in his knees and lack of strength was of concern to him. The doctor discussed the current evidence regarding serious adverse events related to exercise in this patient group. To date, aside from minor musculoskeletal injuries, no serious adverse events have been reported from CKD patients participating in exercise programmes. Therefore to minimise the risk patients should be advised to warm up thoroughly prior to exercise, avoid high-impact activities and begin programmes at a low intensity and progress gradually. This follow up appointment reassured Mr X that the low-intensity exercise regime would not cause him any further harm.

Mr X also felt uncomfortable attending the gym, since it was a new experience for him. Luckily, Mr X found strength-training class at his local gym that catered for individuals with health problems, with appropriate supervision and social interaction, aiding any compliance issues.
After 9 months of attending the classes, Mr X has slowly progressed through the exercise regime, increasing the intensity at which he can perform both leg extension and curl exercises with functional improvements. He commented that he feels he has regained strength in his legs, enough to increase his gardening jobs by an extra day per week.

PHYSICAL ACTIVITY IN CHRONIC KIDNEY DISEASE

In addition, Mr X now feels motivated to start walking regularly with his wife, since he prefers walking in the outdoors than on the treadmill at the gym. He has also enquired about performing similar strength-training exercises for his upper body, as he believes that his lower limbs have significantly benefitted from the exercise. As well as physical and functional benefits, exercise can lead to improvements in self-confidence and other psychological parameters.

End-stage Renal Disease Patient Case Study
Patient Y is 65 years old and has been receiving haemodialysis for 6 months and has noticed a gradual decline in her ability to walk to the shops and carry her shopping. She is diabetic and her blood glucose is controlled through regular insulin. Her blood pressure is lowered through medication and stable. She finds haemodialysis difficult and the 4 hour sessions long and, as a result, she often wants to terminate her treatment early. Aside from this the patient appears upbeat.

As a particularly vulnerable population haemodialysis patients can gain great improvement in physical function and well-being from regular exercise. Improvements in psychological and physical quality of life are especially important.

Patient Y was fortunate enough to be based at a haemodialysis clinic that offered exercise during dialysis. She was advised to take part in an intradialytic exercise programme at her dialysis unit where she built up to cycling for 30 minutes during each session with a gradually increasing gear. Physiotherapist interaction was initially frequent to ensure the patient was comfortable and confident in exercising, and to reiterate the benefits of regular exercise which can be obtained.

Currently only a few dialysis centres around the country offer specifically designed cycle ergometers for patients to exercise during the haemodialysis procedure; however, these programmes are successful and becoming more widespread. Where possible, participation in such programmes should be encouraged.

PHYSICAL ACTIVITY IN CHRONIC KIDNEY DISEASE

Mrs Y enjoyed the cycling during dialysis and commented how exercising in the middle of dialysis made the sessions seem shorter and more bearable. She also noticed a gradual improvement in fitness and found the exercise increasingly easy.

After 12 months of regularly participating in exercise during dialysis Mrs Y joined her local gym. She now swims once every week and does cardiovascular exercise and some low weight resistance training under supervision from the instructors at the gym.

Outside of dialysis, frequent cardiovascular exercise (e.g. walking 3-5 times per week) with an aim of 30 minutes duration should be encouraged. The proposed intensity is "somewhat hard" or 12-14 on the Rating of Perceived Exertion (RPE) scale. Progressive resistance exercise improves muscle function and inhibits uraemia-associated muscle atrophy. Weight training in this population has been shown to be safe when supervised and progressed carefully.

Mrs Y no longer requires insulin to control her blood glucose levels and has noticeable improvements in lower limb muscle mass. Measures of muscle function have improved over time as have her perceptions of uraemic symptoms. She finds walking to be less effort and continues to enjoy exercising during dialysis and at her local gym.

It should be noted that lower limb vascular access could inhibit exercise during dialysis. Furthermore, when exercising during dialysis, it is not advised during the first 30 minutes, to allow the access to settle, or during the final hour of dialysis due to fluid shifts and possible hypotensive episodes. Exercise is precluded if the patient is overloaded. Blood pressure should be checked prior to exercise for excessive hyper- or hypotension (SBP 90-180 mmHg).

Screening and Contraindications

It is likely that CKD patients have an increased risk of cardiovascular events during exercise as compared to healthy populations due to the number of other risk factors they present with (e.g. hypertension, calcification).

However, it is unlikely they are at a greater risk than patients undergoing diagnostic tests for cardiovascular disease.

CKD patients often exhibit co-morbidities so exercise guidelines for each specific condition should be considered. In CKD, severe cardiovascular or liver disease, uncontrolled diabetes, excessive hyper- or hypotension and clinically overt infections are contraindications to exercise. Conditions which severely affect mobility or balance will require greater levels of supervision.

It is important that patients are advised to halt exercise upon any of the following symptoms: light-headedness, chest pain, any other excessive pain or excessive breathlessness.

Exercise Prescription

Since research in this area is still evolving, no concrete guidelines exist on exercise practices in CKD. Current research has included aerobic and resistance training, hence recommendations offer a combination of both forms of training.

Aerobic training predominantly improves cardiovascular fitness. Walking exercises or other forms of aerobic exercise such as cycling and the cross-trainer are recommended. In line with national guidelines, patients should aim to progress up to a minimum of thirty minutes, up to five times a week. While this is the optimum aim, any improvement in physical activity is beneficial and therefore realistic targets should be set. As many CKD patients receive β-blocker therapy, exercise intensity is not prescribed based on heart-rate; therefore patients are encouraged to exercise at an intensity they find "somewhat hard" or 12-14 on the rating of perceived exertion scale. It may be useful to describe this as exercise that makes you breathless, but still able to hold a conversation.

Resistance training addresses the issue of muscle wasting in CKD patients; potentially providing a way of regaining muscular strength and function. Based on experience of training these patients, a reasonable recommendation would be to suggest resistance training for the lower

extremities at a load of 60-80% of the patient's 1-RM (which can be calculated using an equation from the 10- RM), 3 sets of 8-12 repetitions, approximately three times per week. Strength assessments and subsequent exercise prescriptions should be calculated using a 10-RM measurement, rather than 1-RM to minimise risk of musculoskeletal injury. In hypertensive patients isometric exercises should be avoided; furthermore, upper body training raises blood pressure more than lower extremity work so caution should be observed before recommending this to hypertensive patients.

Compliance

A clear restriction on the benefits exercise training can have is the level of compliance of patients. Most patients are quite compliant to exercise at the beginning of a training programme but this often declines over time. Supervision of physical activity is the most practical means of improving compliance and therefore we would recommend CKD patients be enrolled in GP referral schemes to gyms and exercise classes. Patients should also be educated about the possible benefits of exercising regularly and given encouragement throughout. An effective way of increasing motivation and compliance is when groups of patients exercise together, as this increases social interaction and can be very enjoyable for the patients.

Key Points

Exercise has many potential benefits for patients with CKD. National guidelines on exercise frequency and duration can be followed (150 minutes of moderate intensity exercise per week plus two sessions to improve muscle strength) with a subjective measure of "somewhat hard" as the preferred method of describing exercise intensity. Motivation and enjoyment are important to improve compliance.

Prior to vigorous exercise standard cardiovascular screening is required; furthermore it is important that patients begin training programmes at a low-intensity and slowly progress as tolerated.

PHYSICAL ACTIVITY IN CHRONIC KIDNEY DISEASE

Aside from the extra care required when exercising limbs with vascular access and fluid accumulation precluding exercise there appear to be no renal contraindications to exercise other than those from cardiovascular and musculoskeletal co-morbidities.

Despite being recommended in national guidelines, exercise advice and provision for renal patients is rarely offered in the UK. This situation is regrettable, as patients benefit greatly from increased physical activity levels, with no serious adverse events reported so far. All renal healthcare staff has a role to play in routinely asking patients about their habitual physical activity levels and providing advice and encouragement to increase them.

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EXERCISE IN BREAST CANCER - DR DANICA BONELLO SPITERI

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EXERCISE IN BREAST CANCER

Exercise recommendations for cancer patients are the same as for healthy people. However, if they are unable to achieve that amount due to their condition, the patient should be encouraged to do what they are able to, but overall, to avoid inactivity.

All types of activity are beneficial, with the effect being more significant in postmenopausal women, normal weight women, non-caucasians, women without a family history of breast cancer and women who are parous.

Effects are also stronger for activity that has been done over the lifetime or after menopause, vigourous activity and activity of longer duration.

Postmenopausal breast cancer risk is higher for overweight/obese women than for those of normal weight. There is a positive correlation between breast cancer and an increase in BMI. Interestingly, the energy balance (intake versus expenditure) is more important in determining a woman's risk of breast cancer. Physical activity decreases lifetime risk by 25%.

Effects of overweight and obesity in relation to breast cancer causation/ recurrence

- ↑ oestrogen, ↑ testosterone, ↓ SHBG (sex hormone binding globulin)
- ↑leptin, ↓ adiponectin, ↑insulin, ↑IGF (insulin like growth factor), ↑cholesterol
- Immune system dysfunction
- ↑ inflammatory cytokines

Exercise Prescription

There is insufficient evidence for precise recommendations regarding the optimal exercise prescription for each different type of cancer. The American College of Sports Medicine (ACSM) guidance for cancer patients are similar to the recommendations set by the American Cancer Society, of 30 to 60 minutes of moderate to vigorous intensity physical activity at least 5 days a week for cancer survivors.

EXERCISE IN BREAST CANCER

Aerobic Exercise

- Frequency: 3-5 days per week
- Intensity: 40-60% of the maximal oxygen uptake or of the heart rate reserve.
- Time: 20-60 minutes. This may also include accumulated shorter bouts if necessary
- Type: repetitive, rhythmic activity that utilizes large muscles groups

Resistance Exercise

- Frequency: 2 – 3 days per week with a minimum of 48 hours recovery between each session
- Intensity: 40-60% of their one repetition maximum (1-RM). 1RM is the maximum load that a person can lift for one repetition. It may not be ideal to subject a cancer patient to performing such a test, hence a rough estimate of the load that a person can lift for the above mentioned repetitions should be sought
- Time: 1-3 sets of 8-12 repetitions per group of muscles. No more than 15 repetitions recommended
- Type: weights, machines, weight bearing activities aimed at the major muscle groups

Flexibility Exercise

- Frequency: 2-7 days per week
- Intensity: slow, static stretches until tension is achieved
- Time: 4 repetitions of 10-30 seconds per stretch
- Type: stretching or range of movement (ROM) exercises targeting the major muscle groups

The exercise prescription regime should target specific areas in the body that have been affected by the surgery, chemotherapy (including steroids) and/or radiation. This would include increasing the ROM and flexibility in joints and strengthening weakened musculature.

EXERCISE IN BREAST CANCER

Special considerations

- Cancer related fatigue occurs in patients undergoing or who have recently undergone chemotherapy and/or surgery. This fatigue may persist for months or even years post treatment
- Bone metastasis are common (e.g. prostate, breast, lung) and often are located in the vertebrae and hip, which are weight bearing bones. High impact exercise and contact sports should be avoided to minimize the risk of fractures.
- Cachexia and muscle wasting, depending on the extent and severity, may limit exercise tolerance
- Patients who have received bone marrow transplantation or are prone to low white cell counts are at higher risk of infection, so communal exercise areas should be avoided, due to high risk of infection
- Any patient receiving radiation, with indwelling catheters, central lines or feeding tubes should avoid swimming

Contraindications to exercise testing and/or training whilst undergoing treatment (chemotherapy, radiation)

- On the day of chemotherapy and within 24hours of receiving treatment
- Severe reaction to radiation therapy
- No exercise before blood withdrawal
- Haematological: platelets <50x109/L, white cell count <3.00X109/L haemoglobin <10g/dl
- Acute infections
- Fever >100ºF (38ºC)
- General malaise
- Severe nausea, vomiting and/or diarrhea within the last 24-36 hours
- Dehydration
- Inadequate fluid and nutritional intake
- Bone, neck or back pain of new onset
- Severe cachexia
- Unusual or extreme muscular weakness and/or fatigue

EXERCISE IN BREAST CANCER

Mrs JB was a healthy, 55year old lady (BMI 23) who received in invitation from the national breast screening programme for breast cancer screening. She had not noticed any breast lumps in the past, although she was not in the habit of checking her breasts on a regular basis. She attended her appointment and to her dismay, the mammogram showed areas of calcification in her right breast. She was subsequently diagnosed with a right breast carcinoma. She underwent a lumpectomy of her right breast along with right axillary lymph node sampling. Histology showed a moderately differentiated breast carcinoma with complete excision. None of the lymph nodes removed showed any malignancy. She recovered well from surgery with no complications and received local radiotherapy. She was seen at a follow up appointment one week after finishing her radiotherapy and was concerned as to how to prevent a recurrence of her breast cancer, as she considered herself to be a very healthy person. She never smoked or drank throughout her life and there was no family history of breast cancer in her family. Her oncologist took the opportunity to provide her with healthy lifestyle advice on physical activity to decrease her recurrence risk.

Mrs JB is a housewife with 4 grown up boys, two of which still live with her. She however, has a large extended family and friends who constantly visit her, especially during the summer months, as she lives by the seaside in a warm climate. She is kept busy attending to her family and guests, so she admits to constantly feeling tired and not having much free time for herself. She has never been a person who goes to the gym, nor does any particular exercise, but she does enjoy a nice walk.

She was very interested in seeking further information regarding physical activity once she learnt that exercise can considerably decrease her risk of a recurrence, as she considers herself very lucky that her breast cancer was caught at an early stage through the breast screening programme. She feels that she still needs to be around to care for her children that are still at home, and she also wants to start enjoying time with her first grandchild. She feels that she may lack the energy to go exercise regularly, or that she may not have time, due to the demands of her family and friends being present.

EXERCISE IN BREAST CANCER

Considerations in this patient:

A 'healthy' lady who was previously inactive, yet due to her diagnosis, she wishes to initiate regular physical activity. Her main concerns are the lack of time and the fatigue that she experiences. If these issues are not addressed and the patient not provided with advice and options as to how to get around these barriers, it is less likely that she will take up this lifestyle. Her present level of activity needs to be assessed, and this should include the physical exertion of her house chores. She is a housewife, who does all the house chores herself (with no help from her children or husband!), so she tends to be up and about all the time. She also needs to be assessed with regards to any side effect of the surgery, as these issues need to be addressed in conjunction with exercise initiation (See Box 1).

She also mentions that she is constantly kept busy with the presence of her family, friends and relatives, and this does not leave time to herself. Detailed information about this should be obtained, in order to work around this, as ideally the physical activity intervention should have the least interruption to her normal active social life, as this is important to her.

Box 1 - Potential changes that result from surgery as 'side effects'

- -Fatigue
  - o Evaluate factors known to cause fatigue. If none are present, or fatigue persists, then non pharmacological interventions may include activity enhancement with exercise programmes, psychological interventions for stress/anxiety management, nutrition counseling and sleep therapy.
- -Pain
  - o The patients with highest risk for pain are those having treatment within the last five years, more intensive treatment, lower socioeconomic status and those with damage to the tissue and nerves from the surgery and treatment
- -Pulmonary changes
  - o Effects of the radiotherapy may include pulmonary fibrosis

EXERCISE IN BREAST CANCER

-Neurological changes
  - o The tumour itself may invade nerves (brachial plexus), causing burning, tingling pain.
-Endocrine changes (reproductive): infertility, early menopause, impaired sexual function
-Body weight changes (increase/decrease), including increase in fat mass and loss of lean muscle
- Musculoskeletal soft tissue change and/or damage
- Lymphoedema
- Skin changes

Specific questioning and examination of her upper limb where the axillary lymph nodes were removed is essential. If lymphoedema of the upper limb was present, further investigation may be required, but does not exclude her from exercise participation.

The skin was analysed at the sites were the radiotherapy and surgical incision were done, to ensure no skin breakdown, burns or infection were present, as these would require treatment prior to exercise initiation.

She had normal power and sensation in her right hand, indicating that there was no neurological damage to the brachial plexus from the surgery or the tumour (if it was extending this far, although not in this case). If this was present, adjustments to the type of exercise performed would be required (eg. in peripheral neuropathy, free weights should be avoided, as this may cause the person to drop the weights and injure themselves).

Traditionally, breast cancer patients have been discouraged from performing upper limb exercises, due to the risk of lymphoedema. However, recent research suggests that progressive resistance training improves muscle strength, endurance and functional ability, without increasing the risk of developing upper limb lymphoedema. The skeletal muscles of the upper limb act as a pump for lymphatic drainage and may actually improve lymphatic flow. There is also some evidence that physical activity may result in development of new lymphatic vessels to help drain lymph fluid in the upper limb, but research is limited.

EXERCISE IN BREAST CANCER

Patients with pre-existing lymphoedema are also encouraged to perform such exercises as studies have demonstrated fewer exacerbations of lymphoedema in a group of patients performing prescribed exercise (14%) as compared to a control group (29%).

Although no research supports a benefit to this, patients who are worried about lymphoedema may be encouraged to wear compression sleeves during their resistance exercise sessions. This is thought to attenuate the increase in the upper limb volume that occurs as a result of exercise, thus alleviating stress on the lymphatic system.

If a patient develops symptoms of worsening lympoedema (swelling and heaviness of the upper limbs), they require further assessment by a specialist.

At the outset, the benefits of physical activity in her case were outlined to her. Following this a more detailed assessment of the patient's physical activity was conducted.

It was calculated that the patient was already exercising for 100 minutes a week through her house chores, hence she was encouraged to include a further 50 minutes of aerobic activity during the week. She had mentioned that she does enjoy walks, especially on the seafront. A suggestion of going for a seafront walk and/or going for a gentle swim in the sea 2-3 times a week was quite to her liking. She preferred to walk for 2x20 minutes and to swim for 10 minutes.

She also liked the idea of going for the walk with her friends and/or relatives when they come to visit her, as that meant she could have company during her exercise routine, and at the same time she would be encouraging them to be active too.

She was advised to perform her exercise in the mornings, or early afternoon (after her nap), as these were two times she identified when her energy levels were at their highest. She would find difficulty to exercise in the evenings, when all her family was around and she would be tired.

EXERCISE IN BREAST CANCER

Box 2 – Benefits of physical activity in Breast Cancer

- Positive psychological effect of exercise
- Cardiorespiratory fitness; many cancer patients will be deconditioned following surgery and cancer treatment; hence activity should be started at a low baseline level. Physical activity will improve cardiorespiratory fitness. The recommendation is 150 minutes of moderate intensity exercise or 75 minutes of vigorous activity per week (or an equivalent combination).

However, if a cancer survivor is unable to achieve this target, they should be encouraged to be as active as their abilities and condition allow, and to overall avoid inactivity

- Timing; during treatment aerobic exercise helps to maintain cardiorespiratory fitness, or possibly, slightly improve fitness, rather than the decline that is normally seen in patients who are undergoing treatment, but not exercising. During treatment, the amount of exercise that a person may have been used to may need to be decreased in duration or intensity, depending on how they are feeling
- Muscular strength and endurance; can be improved through resistance exercise training

The patient was enthusiastic and very receptive to the information as she was keen to alter her lifestyle in view of her recent diagnosis. She started by informing her friends and relatives about her lifestyle decisions and she was pleasantly surprised at the amount of support she received. Her friends and relatives also admitted that they were not exercising enough, and were quite keen to increase their weekly exercise. Mrs JB and her friends started to walk regularly, and they were still able to keep up with their talking whilst exercising as it enabled them to gauge their exercise intensity.

Compliance and motivation was maintained as she took the opportunity to read up more on the internet about the benefits of exercise and health. She then passed on the information to her friends, where they had 'health' discussions during their regular 'health walks'. Motivation was also maintained as it started to become a social activity that Mrs JB and her friends started to look forward to. Additional benefits included that some of

them started to lose weight, but overall, they all admitted that they started to feel better in themselves.

Key Points

The important aspect of advising about exercise is first to understand the patient and their lifestyle.

- Obtaining information about the barriers to exercise for the individual patient

- Understanding what are the motivating factors towards engaging in exercise

Once the medical practitioner understands these two aspects, and provides information related to these, the patient is more likely to accept and relate to the advice and recommendations that are given to them. Remember, once the patient is already interested in exercise advice they are in a state of ambiguity. There are more negatives that discourage a person to exercise, in comparison to the number of positives. The medical practitioner's role is to enhance these positives and provide courage, and motivation to exercise. Suggestions on how to overcome the barriers towards exercise are also provided by the medical practitioner as this will help tip the balance towards encouraging physical activity.

A person diagnosed with a cancer and requesting information about physical activity is at a stage where they are more likely to take up advice and change to a lifelong healthy lifestyle. This opportunity should not be missed and accurate information should be provided. The recommendations for exercise are the same as for everybody else – 150 minutes of moderate intensity exercise or 75 minutes of vigorous activity per week (or an equivalent combination). However, if a cancer survivor is unable to achieve this target, they should be encouraged to be as active as their abilities and condition allow, and to overall avoid inactivity.

EXERCISE IN BREAST CANCER

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www.livestrongcareplan.org – a person can fill in their type and name of treatment received. The online programme then produces information about potential long term and late side effect of treatment, which may impact upon the planning of an exercise and rehabilitation programme.

EXERCISE IN ASTHMA - DR NEIL MARTIN

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DR NEIL MARTIN IS A CONSULTANT PHYSICIAN AT THE UNIVERSITY HOSPITALS OF LEICESTER NHS TRUST.

EXERCISE IN ASTHMA

1. Regular exercise improves asthma control, reduces exacerbation frequency and improves lung function in mild to moderate disease
2. Exercise is the single biggest trigger of asthma symptoms and is highly prevalent in young people with the disease
3. Asthma symptoms on exercise are a marker of poor disease control and should lead to a review of treatment and an increase in therapy along the national disease guidelines stepwise treatment algorithm

A 34 year old female asthmatic patient presents asking for your advice about how best to exercise and train for a local 10km road run that they wish to do for charity. How would you assess their disease control and how would you advise them to manage their asthma to allow them to train for and participate in this event?

Important supplementary information:

1. What is her current asthma control like?
2. Does she smoke?
3. What are her motivating factors?
4. What is her previous exercise experience?
5. Are there any other co-morbidities that may affect this endeavour?

Asthma Control

During any asthma consultation (but especially during ones related to exercise) the patient's underlying asthma control should be assessed using the well validated and clinically useful Asthma Control Test. In particular it is necessary to ascertain the following facts:

i. Do you currently have nocturnal symptoms of asthma?
ii. Do you have daytime symptoms?
iii. Do you need to use your reliever medication, if so how often?
iv. Does your asthma limit your daily activities?
v. Lung function measurement (either PEFR or FEV1)
vi. Exacerbation frequency and any medications used

EXERCISE IN ASTHMA

Definitions for asthma control are included in Figure 1.
Poorly controlled asthma is a significant risk factor for exacerbations and for the presence of exercise related symptoms. Exercise is the single biggest precipitator of asthma symptoms and is more common in poorly controlled disease. It is essential then to consider control and adjust for under-treated disease before suggesting exercise participation. Medications should be increased and adjusted in line with the British Thoracic Society guideline on asthma therapy (See Figure 2). In patients with severe disease (step 4 or 5 therapy), assessment by a Chest Physician may be necessary prior to significant exercise participation; to confirm diagnosis, improve asthma control and risk assess the patient.

Asthma and smoking:

There is very good evidence that smoking with asthma makes disease control difficult to attain, lessens the effects of inhaled medications and leads to higher incidence of fixed airflow obstruction. There is also good evidence that incorporating exercise programs with smoking cessation significantly increases the quit rate. Therefore, this is an opportunity to make significant lifestyle changes in one consultation.

Motivating factors:

People take part in charity events for many reasons, some for fitness, others because they are supporting a charity or disease organisation that has a particular emotional link to them or their friends and families. Understanding these motivating factors can help when giving sensible exercise participation advice and training suggestions.

Previous exercise experience:

This is an important part of any pre-participation screening and is essential to determine the baseline level of fitness of the individual. Many people who do not do regular exercise may struggle initially with weight bearing exercise such as running and may need to develop a cardiovascular baseline with the help of cross-trainers, exercise bikes, treadmills or swimming initially before increasing the outdoor running training.

This is particularly true in respiratory disease and starting within the controlled environment of a local gym may help bolster confidence and improve outcomes.

Other co-morbidities:

The presence of significant other co-morbid conditions may be more important than the presentation concerned about asthma. Obesity co-exists with asthma in many patients and may itself result in significant dyspnoea on exercise often misinterpreted as asthma symptoms. Many asthma patients also suffer from a dysfunctional breathing pattern that can affect exercise participation with no real evidence of underlying bronchoconstriction. Significant cardiac co-morbidities would also be more of a concern than mild asthma for exercise performance and safety.

This lady is a non-smoker with good asthma control and no significant co-morbid conditions. She has a normal resting PEFR, normal blood pressure and normal 12 lead ECG. She currently takes inhaled corticosteroids and occasional short acting bronchodilator (salbutamol). How should she manage her inhalers with exercise?

She should continue to use her inhaled steroids regularly throughout this period and should be encouraged to take 2 puffs of her short acting bronchodilator about 10 minutes prior to exercise to prevent any asthma symptoms during this period. It is unlikely she should need it again during exercise (duration of action is about 4 hours) but she may get piece of mind from carrying it with her initially and during her race.

Take home messages

- This lady is safe to train and participate in this event and should be encouraged to increase her activity as this will also increase and improve her already good asthma control
- Asthma is not a barrier to exercise participation

EXERCISE IN ASTHMA

Are you in control of your asthma? Or is your asthma in control of you? Here's how to find out

Step 1: Read each question below carefully, circle your score and write it in the box.

Step 2: Add up each of your five scores to get your total Asthma Control Test™ score.

Step 3: Use the score guide to learn how well you are controlling your asthma.

Q1 During the **past 4 weeks**, how often did your asthma prevent you from getting as much done at work, school or home? — Score:

All of the time 1	Most of the time 2	Some of the time 3	A little of the time 4	None of the time 5

Q2 During the **past 4 weeks**, how often have you had shortness of breath? — Score:

More than once a day 1	Once a day 2	3-6 times a week 3	1-2 times a week 4	Not at all 5

Q3 During the **past 4 weeks**, how often did your asthma symptoms (wheezing, coughing, chest tightness, shortness of breath) wake you up at night or earlier than usual in the morning? — Score:

4 or more times a week 1	2-3 nights a week 2	Once a week 3	Once or twice 4	Not at all 5

Q4 During the **past 4 weeks**, how often have you used your reliever inhaler (usually blue)? — Score:

3 or more times a day 1	1-2 times a day 2	2-3 times a week 3	Once a week or less 4	Not at all 5

Q5 How would you rate your **asthma control** during the **past 4 weeks**? — Score:

Not controlled 1	Poorly controlled 2	Somewhat controlled 3	Well controlled 4	Completely controlled 5

Total Score

What does your score mean?

Score: 25 – WELL DONE

- Your asthma appears to have been UNDER CONTROL over the last 4 weeks.
- However, if you are experiencing any problems with your asthma, you should see your doctor or nurse.

Score: 20 to 24 – ON TARGET

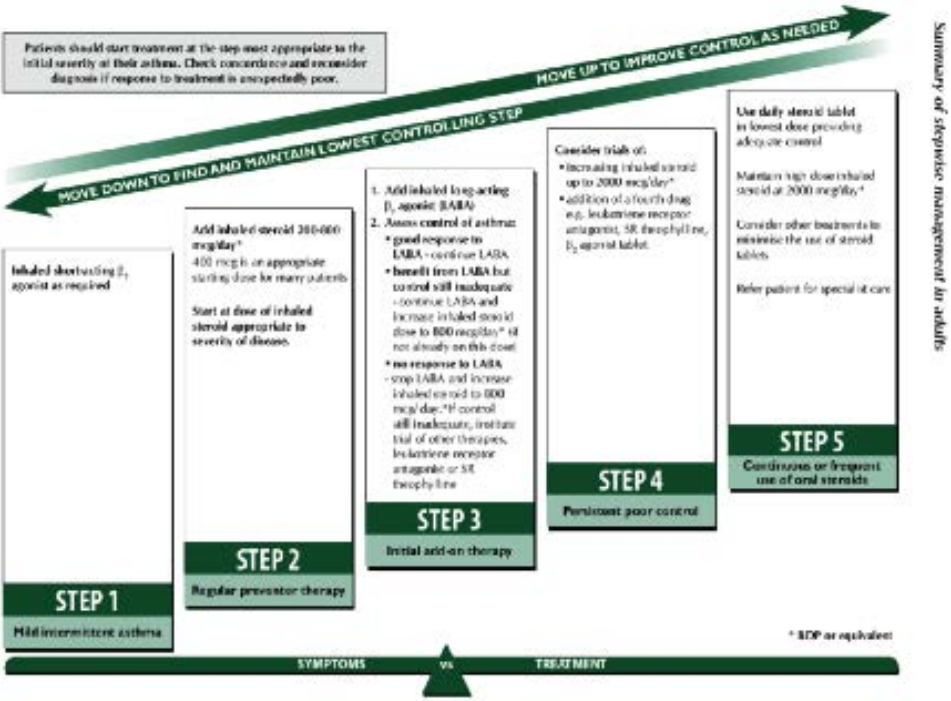
- Your asthma appears to have been REASONABLY WELL CONTROLLED during the past 4 weeks.
- However, if you are experiencing symptoms your doctor or nurse may be able to help you.

Score: less than 20 – OFF TARGET

- Your asthma may NOT HAVE BEEN CONTROLLED during the past 4 weeks.
- Your doctor or nurse can recommend an asthma action plan to help improve your asthma control.

- Figure 1 - Asthma control test (from Asthma UK)

EXERCISE IN ASTHMA



- Fig 2 – British Thoracic Society stepwise guide to asthma therapy

<u>Exercise in COPD-Chronic Obstructive Pulmonary Disease – Neil Martin</u>

1. Exercise limitation is often the initial presenting feature of COPD
2. Exercise therapy in the form of pulmonary rehabilitation is an essential component of intervention in people with even quite severe disease
3. Regular exercise significantly improves quality of life, reduces exacerbation frequency and helps reduce functional decline in COPD

EXERCISE IN ASTHMA

A 67 year old male smoker presents complaining of worsening shortness of breath on exertion but is very keen to continue playing his 18 holes of golf per week. He has recently noticed he is breathless walking up to the green at the 5th hole on the local course and has on one occasion had to use a golf buggy, something he is embarrassed to admit and does not want to repeat. How would you assess, treat and advise him further?

Supplemental information needed:

1. Does he still smoke?
2. Has he ever had his lung function checked?
3. Is he on any inhaled medication for his breathing?
4. Are there any co-morbidities, particularly related to concurrent cardiac disease and chest pain?
5. Does he simply become breathless or does he de-saturate on exercise?

Does he still smoke?

Whilst not all smokers will develop COPD, those that do can expect to have a continuing and accelerated decline in lung function if they continue to smoke. It is, therefore, essential hat all smokers are encouraged to stop smoking at the earliest stage in their disease possible and a presentation such as that above should be used to encourage cessation with the aid of the local smoking cessation service.

Lung function and treatment

The diagnosis of COPD rests on the demonstration of reduced and obstructed lung function by the guideline criteria (See Figure 3). This allows a gradation of disease severity based on spirometric values and can be used to help direct therapy through the NICE guidelines (See Figure 3). However, this may not give an accurate representation of functional limitation (as reduced gas transfer capacity requires specialist measurement) and the BODE index (BMI, airflow obstruction, dyspnoea and exercise capacity) can help assess prognosis.

All of these measurements are essential to stratify disease risk, start appropriate pharmacological therapy and to advise on best treatment options.

Chest pain / cardiac problems

Due to the co-existence of cardiac disease with COPD it is essential to exclude significant cardiac disease before encouraging exercise participation in this patient group. Many patients present with breathlessness on exertion as the only symptom of their angina and a detailed cardiac and chest pain history is required to exclude concomitant cardiac disease. This may require specialist testing if there is a high suspicion and standard cardiac exercise tolerance tests or cardio-pulmonary exercise testing may be required. However, in the vast majority of patients it is possible to make a clinical diagnosis supported with spirometric evidence of lung disease.

Breathlessness or de-saturation?

In those with more severe disease this is an important issue. Breathlessness on exertion in COPD is most often due to a physiological limitation of lung function known as 'dynamic hyperinflation'. Patients who experience this can become incredibly distressed by physical exertion but on testing very rarely drop their oxygen saturations below acceptable levels. The increased respiratory rates generated by exertion lead to increasing gas trapping, reduced residual capacity and create a feeling of trying to breathe with already full lungs. A cessation of exertion, a reduction in respiratory rate and resting allow the hyperinflation to decrease and breathing to return to normal. The slow and steady onset of exercise limits this experience as does effective bronchodilator therapy and an adaptation to exercise through pulmonary rehabilitation. Desaturation on exercise on the other hand is most often due to severe limitations in gas transfer and patients may require ambulatory supplemental oxygen therapy to help them to maintain an active lifestyle.

EXERCISE IN ASTHMA

This gentleman is a continued smoker of 5 cigarettes per day, with a 30 pack year history. He has never had his lung function measured and is on no medication. Following advice about smoking cessation, his spirometry shows mild obstruction with an FEV1 of 67% predicted. He is started on a long acting bronchodilator and continues to enjoy his golf.

Patients with more severe disease or with more concerns about co-morbidities may find it better to start a graduated exercise programme in a controlled environment. Your local hospital will have dedicated pulmonary rehabilitation team that can facilitate this level of activity in a set exercise program delivered by respiratory physiotherapists in such a controlled way with other patients with the same disease.

Take home messages

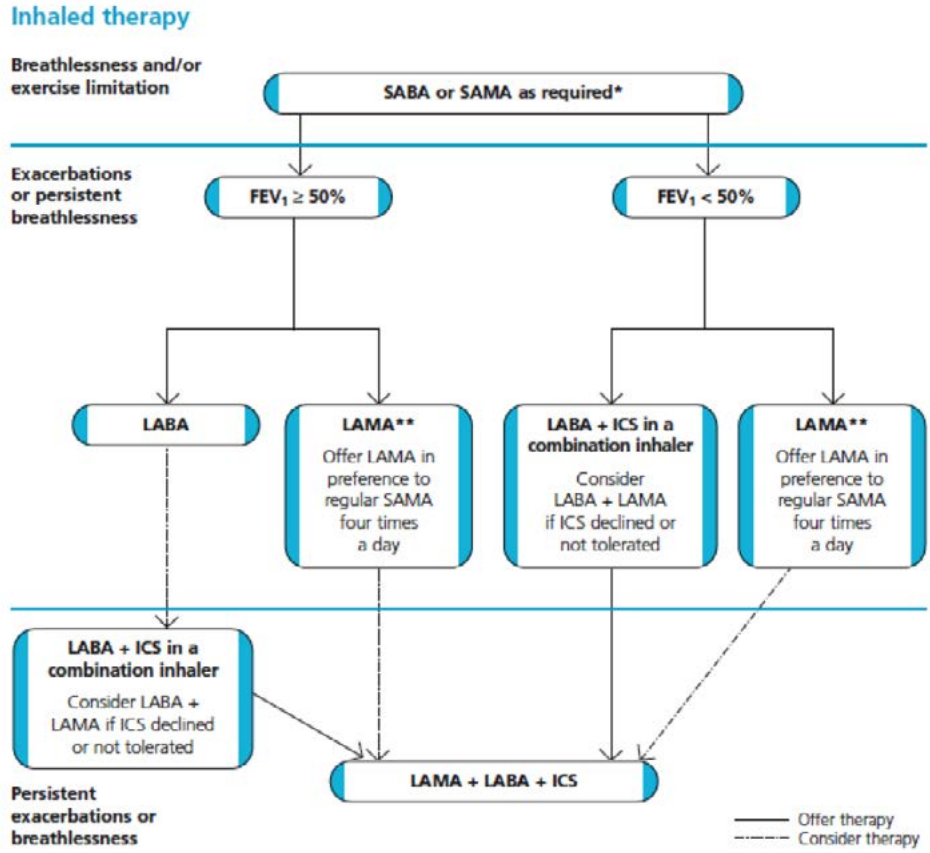
- Early diagnosis and detection of COPD is important as is early intervention for smoking cessation
- More than in any other disease exercise therapy (pulmonary rehabilitation) has been integrated in to standard care for COPD
- All patients should be encouraged to maintain an active and healthy lifestyle

Table 1. Severity of airflow obstruction

		NICE clinical guideline 12 (2004)	ATS/ERS 2004[3]	GOLD 2008[4]	NICE clinical guideline 101 (2010)
Post-bronchodilator FEV_1/FVC	FEV_1 % predicted		Post-bronchodilator	Post-bronchodilator	Post-bronchodilator
< 0.7	≥ 80%		Mild	Stage 1 – Mild	Stage 1 – Mild*
< 0.7	50–79%	Mild	Moderate	Stage 2 – Moderate	Stage 2 – Moderate
< 0.7	30–49%	Moderate	Severe	Stage 3 – Severe	Stage 3 – Severe
< 0.7	< 30%	Severe	Very severe	Stage 4 – Very severe**	Stage 4 – Very severe**

* Symptoms should be present to diagnose COPD in people with mild airflow obstruction
** Or FEV_1 < 50% with respiratory failure
ATS, American Thoracic Society; ERS, European Respiratory Society; FVC, forced vital capacity; GOLD, Global Initiative for Chronic Obstructive Lung Disease

- Figure 3 - COPD severity of airflow obstruction (NICE)



- Figure 4 – NICE Algorithm for COPD management

EXERCISE IN ASTHMA

References and Further Reading

Asthma UK. Asthma control test. *http://www.asthma.org.uk/Sites/healthcare-professionals/pages/asthma-control-test* (Last Accessed October 19th 2013)

British Thoracic Society. Asthma guidelines. *http://www.brit-thoracic.org.uk/guidelines/asthma-guidelines.aspx* (Last Accessed October 19th 2013)

National Institute for Health and Care Excellence. Chronic Obstructive Pulmonary Disease Guidelines. *http://guidance.nice.org.uk/CG101* (Last Accessed October 19th 2013)

CALL TO ACTION

Thank you for taking time to read our exercise prescription booklet for medical students. We would suggest reading cases relevant to the patients you are seeing and then taking the time to discuss physical activity with patients and your tutors in order to understand how it can be used as part of a wider treatment strategy. If you have questions or comments on this booklet please contact:

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