



Royal College
of Physicians

Exercise for life

Physical activity in health and disease

Recommendations of the Sport and Exercise
Medicine Committee Working Party of the Royal
College of Physicians

June 2012

Royal College of Physicians

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Details are accurate as of the period during which Working Party was in progress

Executive summary

Background

In 2008, a Royal College of Physicians (RCP) working party was established, with the support of the Faculty of Sport and Exercise Medicine (FSEM), the Faculty of Public Health (FPH) and the Royal College of General Practitioners (RCGP), to review the 1991 RCP publication *Medical aspects of exercise: benefits and risks*.¹ Since then, the landscape of sport and exercise medicine (SEM) has changed dramatically, with the creation of a new specialty, a UK faculty, and the appointment of London as the hosts of the 2012 Olympic Games.

The working party identified the need to review the contribution of the medical profession to exercise in the general population, and consider the role that the royal colleges and their faculties should have in advocating its use in injury and illness.

It is important to reinforce the notion that exercise is critical in the prevention of disease, but also to raise the profile of exercise in the management of established disease. The Working Party has established that there is a need for increased medical engagement in the delivery of exercise in injury and illness. There is already considerable activity in this area, involving exercise and fitness providers, GPs, and some specialist rehabilitation services, but there is a lack of leadership and coordination of this activity, and consequently provision is piecemeal and subject to a series of well-meaning but often transient initiatives.

There is evidence for the benefit of exercise in many forms of disease. It is effective, inexpensive, with a low side-effect profile, and can have a positive environmental impact. Despite this, there remains a reluctance within the medical profession to use exercise as a treatment. This probably reflects a lack of knowledge among doctors of the benefits of exercise, and a lack of practical skills in the prescription of exercise in disease states. Frequently, the risks of exercise are misunderstood and overestimated.

The working party has concluded that there needs to be a concerted effort directed at improving medical knowledge and engagement in this process, and that there is an opportunity for the medical colleges and faculties to show leadership in this area and thus drive health improvement.

The challenge – obstacles to exercise

There are many excellent examples nationally of exercise prescription and referral systems (see Appendix A). However, it has become apparent that there are many organisational limitations to the systems currently available, including:

- a lack of national coordination
- healthcare professionals lacking confidence in the services to which they are referring and being apprehensive about using exercise as a treatment for medical conditions
- a scarcity of referral pathways
- concerns over quality assurance of the services providing exercise-based therapy (there is a lack of regulation of the providers of exercise therapy for patients)

- the referral process having no financial or quality incentive attached, such as Quality and Outcomes Framework (QOF) points.

It is clear that the medical profession must take a more active role in the promotion of exercise in both health and disease.

The profession has ready access to the general population, with an opportunity for positive influence. Across the UK, there are almost 900,000 GP consultations occur daily.² The average patient will visit their GP about four times per year, with 78% of the population consulting their GP at least once a year.³ This represents a huge opportunity to promote exercise as a therapeutic tool.

The risk of ‘medicalising exercise’ – particularly in the context of ill health, is unfounded. The type of patient groups which would most benefit from exercise should do so under the guidance of an appropriately trained medical professional. The healthy population welcome advice from their doctors on issues of ‘wellness’.

Recommendations

The Working Party recommends that the medical royal colleges and faculties take a more active lead in the use of exercise prescription in the management of disease. This should also include promoting physical activity for the prevention of chronic disease.

The key areas where the medical profession has a specific role to play are outlined below and recommended actions are set out in an action matrix opposite.

A national strategy for physical activity, health and wellness

There should be a medically driven national strategy to use exercise in the prevention *and* treatment of disease.

The medical specialty of SEM

This new specialty needs to be integrated into the care pathways available to NHS patients. There should be action to establish NHS consultant posts in SEM and develop their roles within the exercise medicine care pathway, eg regional exercise medicine services.

QOF incentives

These are required for physical activity interventions.

Undergraduate curriculum

Medical students should receive education in SEM and training in the areas of preventive medicine and exercise prescription.

Physical activity provider regulation

The providers of exercise instruction to those injured or ill should work to appropriate professional standards, and statutory regulation of exercise therapists who treat patients should be considered.

Information management systems

These should be developed to aid primary care in the risk stratification of patients and the identification of care pathways. Systems of this nature would enable primary care practitioners to initiate exercise programmes through their practice electronic patient records. This should be the first step towards a 'British National Formulary for exercise'.

London 2012 Olympics legacy

There is a clear opportunity to ensure a health legacy from the London 2012 Olympics through the development of pilot projects.

Issue	Description	Action
A national strategy for physical activity, health and wellness	Delivering a national plan for the use of exercise in health: primary prevention and use of therapeutic exercise	Driven by Academy of Medical Royal Colleges; supported by the Departments of Health / chief medical officer, Public Health Outcomes Framework
QOF incentives for physical activity interventions in accordance with National Institute of Health and Clinical Excellence clinical guidelines and quality standards	Establish NHS consultant posts in SEM and develop their roles within an exercise medicine care pathway	Driven by Faculty of Sport and Exercise Medicine (UK) in collaboration with Department of health SEM service options presented to consortia: 'a fresh approach'
Education in SEM to be included in the undergraduate curriculum	To include preventive medicine and exercise prescription	Requires guidance from General Medical Council, Academy of Medical Royal Colleges and support from the Universities
Physical activity provider regulation: the providers of exercise instruction to those injured or ill should be regulated	Appropriate professional standards established and statutory regulation of exercise therapists	Health Professions Council with support from Department of Health
Information management systems	Primary care information systems required to support risk stratification of patients and the identification of care pathways	Department of Health, aided by research bodies
London 2012 Olympics legacy	Ensure a health legacy from the London 2012 Olympics through the continued support of the new specialty of SEM and the development of a national network of excellence in SEM	Department of Health; London Organising Committee of the Olympic Games

1 Introduction

Background

In 1991 the Royal College of Physicians (RCP) published a report entitled *Medical aspects of exercise: benefits and risks*.¹ This publication comprised a series of monographs which covered the psychological aspects of exercise, the effects of exercise on the skeletal and reproductive systems, physiological changes following regular exercise, and many other topics. Contributors were experts in their field and members of the Working Party on Medical Aspects of Exercise. This was an excellent and clear description of the relationship between exercise physiology and medicine, but was not designed as a guide for doctors in the prescription of exercise.

In 2008 an RCP Working Party was established in conjunction with the support of the Faculty of Sports and Exercise Medicine (FSEM), the Faculty of Public Health (FPH) and the Royal College of General Practitioners (RCGP). The Working Party was tasked with reviewing this publication and targeting certain audiences with its final report, including the Department of Health (DH) and the Department for Culture, Media and Sport (DCMS). As the working party formed, it was clear that an update of the original publication would not address the key issues affecting sport and exercise medicine (SEM) in the UK at this time. In the intervening period since the original booklet, there had been many such publications, some with practical advice for specialist practitioners. Indeed, the American College of Sports Medicine (ACSM) was involved in a similar process, which resulted in the major publication, *Exercise is medicine*.⁴ There had also been considerable developments in the delivery of SEM, with the creation of a new specialty, a UK faculty, and the appointment of London as the hosts of the 2012 Olympic Games.

Discussion within the Working Party and with others led us to change our focus away from producing a series of reports, and towards examining the issues surrounding the use of exercise in the prevention and management of disease, and to examine the barriers to exercise prescription. The possibility of developing a practical guide which could be used as a tool for exercise prescription for non-SEM specialists (a 'British National Formulary (BNF) for exercise') was considered.

We have set out to highlight the public health benefits of exercise and the value of exercise as a therapeutic agent, while drawing attention to the new medical specialty of SEM. SEM physicians should play a vital role in developing a national service to address these major public health issues. The working group supports the initiatives outlined in the White Paper *Choosing health*.⁵ The London 2012 Olympics is a great opportunity to highlight the benefits of exercise to a wider audience than ever before and leave a real health legacy for future generations.

Working Party aims

The aims of the Working Party were:

- to highlight the public health benefits of active living, exercise and sport, and to introduce the concept that exercise is critical in the prevention and management of disease^{1,4-14}
- to examine the systems by which exercise can be used in the treatment and rehabilitation of illness, and to identify any obstacles to this aim

- to examine the feasibility of producing a practical guide to exercise prescription for medical generalists and professionals allied to medicine, specifically relating to disease states; for example, the development of a 'BNF' for exercise – a text- or internet-based service giving clinicians clear evidence-based guidance and the capacity for risk stratification
- to draw attention to the new medical specialty of SEM,⁹ and to highlight the role of SEM in the NHS.¹⁵

Multidisciplinary consultation

The delivery of exercise as a therapy to a population suffering from disease involves a wide variety of agencies and multidisciplinary partners. Consequently, the Working Party collaborated with a variety of professional organisations with a specific interest in supporting physical activity initiatives at a national level. Medical representation on the committee came from the RCP, the FSEM, the FPH and the RCGP. In addition there was representation from:

- the DH Physical Activity Group
- the Physical Activity Alliance (PAA)
- the British Heart Foundation National Centre (BHFNC)
- the Fitness Industry Association (FIA)
- *BMJ Learning*
- the Register of Exercise Professionals (REP)
- the RCP Patient and Carer Network.

The Working Party sought the opinions of these professional groups and undertook a review of the evidence for exercise in health,⁴⁻¹⁴ as well as considering recent national and local physical activity initiatives (see Appendix A).

Exercise and the benefits to health

There are two ways in which the medical profession can contribute to health benefits from exercise:

- raising the overall participation rate in physical activity and hence reducing disease
- prescribing exercise to manage illness and injury.

In both areas, the medical profession has a key role in informing patients, giving guidance and linking with other services.

Raising physical activity participation in society

There is an acceptance that the level of physical activity in the UK is suboptimal. The DH's *Health Survey for*

England 2006 reported that 60% of men and 72% of women are insufficiently active to benefit their health.¹¹ A conservative estimate of the average cost of this inactivity to each primary care trust (as of 2009 and not including mental health costs) is £5 million per annum.¹⁶

In 2009, the government published *Be active, be healthy*,¹⁶ which describes the healthcare-related costs of physical inactivity, the aspiration to deliver a health legacy from the London 2012 Olympics, and an action plan to achieve this target. This includes the Department of Culture, Media and Sport (DCMS) taking the lead on getting people more active through sport, with other departments working on increasing wider physical activity.

There are currently a wide variety of national initiatives which include:

- ‘Change4Life’ – a £75m programme developed to encourage healthy eating, increased activity and longer life by changing lifestyle
- ‘Walking the Way to Health’ – in partnership with Natural England
- projects with the Department for Transport (DfT) and the Department for Environment, Food and Rural Affairs (DEFRA) to reduce the total number of daily car journeys made by the population
- employers increasing incentives for active commuting
- the ‘Bike4Life’ initiative – to boost participation in cycling
- ‘Learn to Swim’ and free swimming programmes
- enhancing the role of dance and movement activities in health
- ‘Fit for Future’ – in liaison with the FIA and local authorities, to offer 5,000 subsidised gym memberships for 16- to 22-year-olds
- planning the environment to encourage physical activity
- ‘Walk England’ – to develop 2,012 ‘active challenge routes’.

All of these approaches are aimed at raising the level of overall physical activity in the general population, improving wellness, and reducing ill health.^{17,18}

There is no shortage of enthusiasm at government and local levels to support these relatively low-cost initiatives. However, it is recognised that it is difficult to change societal attitudes to exercise fundamentally. There have been a number of government-, charity- and sports-driven initiatives over the years, with varying degrees of success and carry-over into everyday life, although there has been a rise in UK sporting activity. The engagement of the medical profession in these initiatives has been limited, with a tendency to exclude the profession in an effort to avoid ‘medicalising the issue’. A list of the more significant initiatives is included in Appendix A.

2 The role of health and social care in exercise delivery

The role of primary care in exercise delivery

Promoting active lifestyles could save NHS spending and significantly ease the burden of chronic disease on medical and other public services.^{16,19–21} Primary care has the greatest opportunity of all areas of medicine to raise the general levels of physical activity participation throughout society, and also to guide patients along the right exercise treatment pathway.

Spreading the word

Across the UK, almost 900,000 GP consultations occur daily,² meaning primary care has by far the greatest exposure to the population as a whole within the NHS system. The average patient will visit their GP about four times per year, with 78% of people consulting their GP at least once a year.³ One in four people stated that they would become more active if they were advised to do so by a doctor or a nurse.¹⁶

Primary care is therefore ideally positioned to be the interface with the population, in screening patients regarding their physical activity status, promoting the health benefits of physical activity, and using exercise to deliver therapeutic benefits. Increasingly, the responsibility for chronic disease management rests in general practice, which means that the clinicians most frequently dealing with the complex medical issues which may benefit from exercise operate in primary care.

Primary care is suited to be an advocate of exercise as:

- there is close, daily contact with the target audience
- the risks associated with taking part in physical activity, at a level that promotes good health, are low; more importantly, the health benefits far outweigh the risks
- general practice is the gatekeeper to onward referral to specialist services, and will increasingly control the commissioning of healthcare.

The people who will benefit the most from small increases in physical activity are inactive people who begin to take part in regular, moderate-intensity activity.^{13,14,16,19} In a practice population of 10,000 (made up equally of men and women), a total of 6,600 men and women were *not* doing enough physical activity to benefit their health. The real challenge is that 75% of men and 67% of women within this practice population believed that they *were* active enough.²²

Physical activity screening tools, such as the GP physical activity questionnaire (GPPAQ)²³ can aid practitioners in quantifying patients' activity levels and identify those patients at the highest risk. GPs should be encouraged to recognise that the physical activity status of a patient is as important as their smoking status. This could be encouraged by the use of Quality Outcomes Framework (QOF) points.

DH primary care initiatives for raising physical activity participation

The DH has an initiative to introduce the concept of exercise assessment into the GP consultation. The 'Let's get moving' (LGM) physical activity pathway¹⁹ is a programme that aims to target brief interventions for inactive adults using healthcare practitioners to encourage sustained behavioural changes. A small number of primary care trusts (PCTs) are being funded to trial this approach, and the aim is for it to be a component of the delivery of exercise to the population presenting to a GP.²⁴ A large proportion of the population will consult a GP during a year, so this provides an opportunity to screen people for their activity level in the primary care setting. It is focused on raising overall activity levels, not on the use of exercise to manage disease.

The LGM initiative (August 2009)¹⁹ is based on the recommendations of the National Institute for Health and Clinical Excellence (NICE) public health guidance, and uses brief interventions, for which there is positive economic evidence, to assess physical activity and encourage participation. NICE established that a brief intervention for physical activity in primary care costs between £20 and £440 per quality-adjusted life year (QALY), with net costs saved, per QALY gained, of between £750 and £3,150.²⁵

LGM has been designed to provide a physical activity care pathway which can be used in primary care to screen for inactivity using a validated questionnaire. Patients identified as not meeting the current chief medical officer's (CMO) recommendations for physical activity will be offered a brief intervention. This draws on motivational interviewing techniques, to work through key behaviour change stages to produce a physical activity goal set by the patient. The aim is to identify local opportunities to be active, including exercise referral schemes where appropriate. Participating patients are followed up after three, six and twelve months to check progress, encourage and reset goals. LGM has been tested in a feasibility trial in 14 surgeries, which demonstrated that it was capable of delivery in primary care setting and could be more widely implemented.

The programme still needs to demonstrate its effectiveness at improving physical activity and changing long-term behaviour, and is likely to be beset by the problems of the many previous initiatives, including:

- under-investment
- limited visibility of the programme to those in primary care who are expected to deliver the service
- insufficient research to determine the benefits, or otherwise, of the programme
- lack of incentives for medical staff to take on additional work and hence persist with the programme
- lack of long-term powerful advocates in the Department of Health to develop such programmes.

Financial incentives have been shown to enhance medical compliance with such programmes, but this would require a system of national targets, QOF points or funding for enhanced services at PCT level. This will be further complicated by the advent of GP commissioning consortia. However, the uptake of exercise in the prevention and management of disease will ultimately rely on an understanding of its benefits and the desire of doctors, and other healthcare professionals, to provide the highest levels of clinical care.

Irrespective of specific initiatives, healthcare professionals from primary and secondary care should always look to advise patients to increase their levels of physical activity for the prevention and treatment of health problems. This needs to be given priority equal to offering dietary or smoking cessation advice.

Currently the healthcare team (wherever it sits) can aid this process by assessing:

- individual patient risk

- patient activity levels

and then:

- advising on interventions based on this predicted risk
- counselling for behaviour change
- involving other health professionals such as counsellors, physiotherapists and practice nurses
- encouraging patients to identify their own strategies to become more active, including identifying leisure industry professionals to aid them
- using formal exercise referral systems which could equally be accessed from primary or secondary care.

This process relies on the appropriate training of the professionals involved, and having the resources and facilities available in which to refer. In reality, many doctors are not in the position to make these judgments. There is little or no undergraduate training in SEM or rehabilitation medicine (RM). The use of exercise-based rehabilitation, although by no means new, is barely understood outside a few clinical specialists. The physiology of exercise is poorly taught and the risks of exercise are not clear, and therefore tend to be overestimated.

The role of secondary care in exercise delivery

Apart from specialties where the use of exercise is fundamental to the delivery of the therapeutic effect (for example in certain branches of RM) the current use of exercise in secondary care is limited to a few examples of specific rehabilitation programmes, such as respiratory, cardiac and some pre-anaesthetic assessment services. The degree of engagement of doctors in these programmes varies, and the potential for exercise in routine outpatient care is frequently missed. The principles of assessment and advice outlined above could be used, and the issues of training and access to services are equally applicable to secondary care. There has, of course, been a development in the provision of specialist exercise medicine in the last few years.

The specialty of SEM

The Intercollegiate Academic Board of Sport and Exercise Medicine (IABSEM) was established in 1998 as a forum for the development of principles and practice of SEM in the UK. Mr Richard Caborn MP, the minister of sport, gave his approval to a working party to prepare the application for medical specialty status in 2003, and status was finally granted in 2005. The Faculty of Sport and Exercise Medicine (UK) was established in 2006, hosted by the RCP and Royal College of Surgeons of Edinburgh (RCSEd).

Although the contribution of SEM to elite athletics is important, particularly in the context of the London 2012 Olympics, it is recognised by the FSEM and the RCP that it cannot be seen as an elitist specialty, purely for the benefit of a few athletes. Recreational sportsmen and women must have equal access to SEM specialist advice on training and injury prevention and management. Critically, the general population must also have access to the best specialist advice on exercise for the prevention of illness, for the management of injuries sustained during exercise and the prescription of exercise to treat illness and injury.

The curriculum of SEM places the trained specialist in the ideal position to advise and support exercise programmes for the prevention and management of disease, particularly when supported by an appropriately trained multidisciplinary team consisting – for example – of physiotherapists, exercise therapists, psychologists, dietitians and physiologists.⁹

The specialty remains underdeveloped, but the main limitation to the use of these specialists is a reluctance on the part of NHS trusts to establish consultant posts. The consequence is that many of the specialists trained in SEM have to seek employment either in the private sector (including working for professional sports teams) or overseas. This is a waste of an NHS training programme and will ultimately place the specialty in jeopardy.

Exercise referral schemes

In the last 20 years, there has been a significant growth in the number of exercise referral schemes – based on many different models – which has led to requests for models of practice or guidelines. In 2001, the National Quality Assurance Framework (NQAF) for exercise referral schemes was published by the DH, and outlined the standards according to which clinicians should recommend exercise.²⁶

Exercise referral systems were introduced in a number of sites around the UK to produce a more systematic approach to the delivery of exercise to patients, and to link the medical team with the exercise deliverers – usually from local authorities and the private sector.

The concept is to provide an individualised care pathway for those with mild to moderate medical conditions for which a conditioning programme would be helpful. Although usually not involving the local rehabilitation services, it uses the principles of exercise-based rehabilitation. Many patients entering a referral scheme may find leisure facilities such as gyms undesirable for maintaining an increased level of physical activity. Therefore, exercise referral schemes need to be tailored to provide an experience that motivates patients for long-term change. Walking and cycling in the community may well be the most popular options, particularly if they are convenient, safe, affordable and can be sociable. Long-term compliance remains a challenge, as is the case with any behavioural change.

The strength, and also the weakness, of the process is the link between healthcare and the local authorities (and other providers) who are not from a health background. Since this draws in professionals with experience in exercise – not held in the healthcare sector – there may be issues around communication and standards.

Communication between GPs and the exercise provider is facilitated by referral criteria and proformas. However, GPs may be apprehensive about their ability to assess the fitness of their patients to participate in physical activity. Fitness providers complain that GPs are reluctant to refer into the schemes, and some GPs do not have access or are unaware of local services. There are also those who do not have trust in the care pathway.

This reflects a lack of confidence in the standards and quality of the service. The 2001 framework sets out standards for practice. It makes it necessary to establish a formally agreed process for the selection, screening and referral of specific patients. It outlines how to conduct appropriate assessment of patients prior to the exercise programme, and provides a specific range of appropriate physical activities. This is with the aim of maximising the likelihood of long-term participation in physical activity.

The framework aims to ensure that the assessments and the exercise programmes are delivered by professionals with ‘appropriate competencies and training.’ The problem is that, although the framework is explicit on the required standard of training, there is no statutory governing body, and industry standards for training vary.

Although there is evidence of the beneficial effects of exercise, it is difficult to demonstrate the effectiveness of exercise referral schemes, despite their popularity.^{24,25} This problem was compounded by the NICE report from June 2006, which questioned the health benefits of the relatively short-term UK exercise referral programmes.²⁵

The FIA assembled a forum of interested parties at the beginning of 2008 to consider the role of the industry and how best to engage the government in the provision of exercise referral. They came to a number of conclusions. It was clear that there were a considerable number of schemes (possibly over 500) operational in the UK, but many areas where there were no existing formal schemes. There are a number of different models and no health-driven quality-assurance mechanisms, and there are very few long-term data on the health benefits of such schemes.

There is uncertainty within the medical profession about the professionalism and the understanding of those working in exercise referral schemes, and a lack of confidence within the medical profession for referring into these schemes.

Currently, there is a 'two-tier' exercise referral system in existence. However, it is clear that not all doctors and staff working in exercise referral understand this pathway.

- Level/pathway 1 (often called 'exercise referral') is intended by the NQAF to be for lower-risk patient populations, for example weight management or management of low mood, and should be supervised by Level 3 qualified exercise referral instructors.
- Level/pathway 2 is for patients usually referred from secondary care for exercise prescription in the context of a significant condition or pathology ('specialist exercise'). They must be supervised by Level 4 qualified exercise referral instructors.

This should not imply that all those who will benefit from exercise need see a professional exercise instructor. Much exercise can, and should, be safely self-delivered very effectively, for example through walking schemes or employer-supported active commuting. However, the complex medical conditions seen in a Level 2 setting require more training and resources to be safely managed. The SEM consultant-led multidisciplinary team could fulfil some of these roles.

The FIA Joint Consultation Forum (JCF) is actively engaged in the review of these issues, and in particular is attempting to provide a route through which the industry can internally coordinate more effectively and also input into public policy. This requires a close partnership between fitness and healthcare professionals, who seldom have direct contact with each other. The effectiveness of any care pathway will rely on the ability of these two groups to interact effectively for the benefit of the patient. The development of SEM consultants in the NHS could help to bridge this gap.

The FIA is very keen to develop links with the medical profession generally, and the JCF is currently chaired by a doctor. There is a definite rise in interest in this process and the FIA is clearly a key collaborator in this activity.

3 Exercise-based management of disease

There is considerable evidence for the benefits of exercise in the management of disease processes; it offers benefits to patients across most medical specialty groups. Conditions relating to respiratory, cardiovascular, musculoskeletal and mental health – and others – have been shown to benefit from these interventions.²⁷⁻³⁷

A review of the evidence behind the effectiveness of exercise in improving health and managing disease is contained in Appendix B.

Guidelines and documents currently available

The British Heart Foundation National Centre (BHFNC) for Physical Activity and Health has been active in the provision of guidelines for the prescription of exercise in a variety of conditions, principally cardiovascular.¹³ They have produced evidence-based guidelines for GPs, with detailed exercise advice. These have been paper-based, and there has been a lack of progress in recent years, as there has been limited funding available for the publication of these documents and the active dissemination of the guidelines. There is recognition that these should now be electronically based.

The BHFNC produced *A toolkit for the design implementation and evaluation of exercise referral schemes*.³⁹ This is a highly significant contribution to the development of exercise referral services. It summarises current policy, research and practice, and includes recommendations for best practice. The BHFNC approached the Departments of Health of the devolved governments for funding of a further study. It would be important to collaborate with this organisation given their experience, knowledge and resources.

In the US there has been a comprehensive review of the evidence behind exercise prescription in the textbook *Exercise is medicine*,⁴ from which much detail on the practice of exercise prescription can be drawn.

Risk assessment

Risk assessment is a significant challenge. There are two elements of risk assessment, which often become confused:

- assessing the lifetime risk to that individual of their medical condition(s)
- the risk or potential side effects of exercise.

It may be that focusing on the concept of the side effects of exercise – rather than the more absolute concepts of injury or harm – would make doctors more likely to consider delivering exercise as a ‘prescription’, as they would medication. Doctors frequently balance the benefits with the risks and side effects of a drug, and make an appropriate clinical judgment. It requires a cultural change to think of exercise in the same way, and improved knowledge and confidence to use this ‘new’ therapeutic agent.

Information technology options

Advantages

It has become apparent that to aid GP referral to exercise schemes, information on appropriateness of referral, treatment options, benefits and side effects should be instantly available to the GP. Developing a 'BNF for exercise' would be a step towards making the therapeutic modality of exercise more accessible. Any such information solution would need to be electronic. General practice is increasingly based on the use of IT support for electronic patient records (EPR), audit and prescribing. Any useful system for a GP would need to integrate with the IT system on their desktop.

An IT solution would include the following:

- There should be links to the proprietary medical software system so that data already entered into such systems could be imported to the web system described.
- It should allow the GP, or other healthcare worker, to enter a diagnosis and other comorbidities, which would lead them on to a series of questions to stratify the risk of that individual patient:
 - the risk of this patient suffering acute harm as a consequence of the exercise, ie the potential side effects of the treatment
 - the lifetime risk of this patient's condition; allowing the GP to assess the severity of the condition, but also allowing them to measure improved outcome as a result of the exercise intervention.
- The GP should be able to document other background information, including blood pressure, heart rate, weight, height and medication. Ideally this should be able to be downloaded from the current EPR.
- There should be background information available to the GP, explaining key points and the benefits and risks of physical activity.
- There should be a list of references and supporting links.
- There should be an information sheet available for the patient during the consultation. This could include general and background information outlining the benefits and risks of physical activity, with specific recommendations for physical training of that individual.
- There should be a link to the nearest exercise referral scheme.
- There should be links to the local consultant in SEM or services which provide exercise-based rehabilitation for specific diseases.
- This would offer the opportunity of recording data for Quality Outcome Framework (QOF) points or other financial incentives.

Limitations

An IT system able to produce a stratification of risk for exercise side effects would need to be able to take into account current data available in the literature on such a risk. It would have to combine multiple risk factors in order to provide the overall risk of the individual patient presenting to the GP. This is a considerable technical challenge, and may be beyond current standard risk stratification systems, possibly requiring the use of artificial intelligence predictive techniques. Nevertheless, the main priority concerning the GP will be whether delivering a particular exercise-based treatment to a particular individual would expose them to a high or unacceptable level of risk. This must be one of the main deliverables of any system.

For example, the risk of exercise in mild heart failure would be considerably less than that in severe heart failure, and the system would allow the GP to identify to whom to refer the patient. Someone with mild hypertension, controlled by medication, could be referred to a local exercise referral scheme based in a leisure centre. However, someone with more complex morbidity would benefit from assessment by experts in the field. For example, someone with severe chronic obstructive pulmonary disease (COPD) may need to be referred to a Level 2 pulmonary rehabilitation service, or an appropriately trained MDT led by an SEM consultant.

The challenge – obstacles to exercise

There has been considerable work undertaken to develop a network of exercise prescription and referral systems. There are many good examples nationally of how this can best be achieved. However, it has become apparent that there are many organisational limitations to the systems currently available, outlined below.

Poor coordination

There is a lack of regional and national coordination of these systems.

Lack of integrated care pathways

There is a lack of knowledge of what services are available to the local prescriber and how they might be optimally used for the benefit of the patient. GPs cannot access exercise delivery because of inadequate referral pathways.

Lack of financial incentive

There is no financial incentive for the GP, such as QOF points, to assess a patient's level of exercise, encourage exercise participation, or refer on to exercise programmes. The NICE review of QOF may offer an opportunity to incentivise the process for primary care.

Poor communication

The link between exercise professionals – who have the knowledge to provide exercise therapy – and medical and nursing professionals, is poor. A number of professional and industry groups are already involved in the delivery of exercise to patients, but coordinating the efforts of medical and exercise professionals has been difficult.

Risk of adverse events

GPs and other healthcare professionals are apprehensive about using exercise as a treatment for certain medical conditions. This may reflect a lack of knowledge of the benefits of exercise, but also concerns that exercise may lead to sudden death or injury. Any successful system for delivery of exercise to patients must attempt to alleviate these concerns through information delivery and quality assurance.

Quality assurance of the service

The NQAF for exercise referral programmes requires updating, and until recently there has been limited medical engagement in the process. Currently, it recommends that health professionals only refer to professionals on the Register of Exercise Professionals (REP).

'Referral' versus 'recommendation'

The GMC states that when GPs refer, they will usually do so to another registered medical professional.³⁹ If that is not the case, then the GP should be satisfied that such healthcare workers are accountable to a statutory regulatory body, and that a registered medical practitioner, usually the GP, is required to retain overall responsibility for the management of the patient. Currently there may be no Health Professions Council (HPC) registered professionals providing exercise programmes on current referral schemes.

The Medical Protection Society (MPS) has stated:

The introduction of the exercise professional who will be registered with a national body and have an indemnity in respect of his work is welcomed. We see no difficulty in GPs providing the exercise professional with details of the patient's past medical history with the consent of the patient and it will then be for the exercise professional to assess the suitability of the patient for a planned programme of exercise, the content of which would be his responsibility. With this framework we would see the GP's involvement as forming part of his responsibilities as a general practitioner and provided he was paying the appropriate subscription then he could look to the Society for advice and an indemnity in respect of this part of his practice.

Medical Protection Society
29 March 2000

This approach depends on the appropriate registration of the exercise instructor, which at present constitutes the REP – a voluntary body with no statutory role.

Guidance from the Medical Defence Union is that GPs may *recommend* exercise rather than formally referring the patient to an exercise intervention, in order to circumvent the legal consequences arising from injury or ill health as a consequence of the exercise.⁴⁰ But this approach fails to ensure proper engagement of the medical profession in the process, and puts them at a distance from the consequences (good and bad) of delivery. These issues place obstacles in the way of delivering a potentially beneficial, low-risk treatment to patients – what are the medico-legal consequences of denying an effective treatment?

Lack of professional standardisation

At present, exercise professionals delivering programmes in exercise prescription schemes are usually not registered with the HPC. This generates variations in training and professional development, and raises questions of quality.

The professionalisation of exercise delivery is on the agenda of many groups working in this area, including the British Association of Sport and Exercise Science and the Directorate of Defence Rehabilitation for the British Armed Forces. Discussions with the HPC have generally been positive, and reiterate the need for appropriate professional standards, assurance of qualification, and continued professional development. It would require considerable work to standardise training and clinical governance for such a professional group. However, the HPC have questioned the likelihood of governmental support for the registration of many other professional groups, because of financial constraints and a philosophical reluctance to implement additional regulation.

4 Care pathways

The role of SEM consultants in physical activity care pathways

In 1999, Calman *et al* predicted the 'role of sport and exercise medicine within the NHS',¹⁵ but as the specialty has developed over time, this role has extended significantly. The training of SEM consultants could allow for the development of regional SEM MDTs to manage, or coordinate the management of, these more complicated patients, in addition to providing SEM support at the elite and general population levels.

Rather than supplanting the established pulmonary or cardiac rehabilitation teams, it would supplement their services and aim to extend the principle to other groups of diseases. These regional groups could support primary care activity groups – based around GPs with a specialist interest (perhaps trained to diploma level) with an exercise referral instructor / physiotherapist or specialist nurse practitioner. This approach has been described in more detail in the NHS document *Sport and exercise medicine: a fresh approach*,⁴¹ which outlines to commissioners the potential for exercise in the prevention and treatment of disease.

SEM consultants are ideally placed to act as the link between PCTs (or GP consortia), secondary care trusts, and the fitness industry providers. They would be able to develop and coordinate integrated physical activity care pathway programmes in meeting local health needs.

Appendix C was developed by the Working Party through collaboration with the DH, the British Heart Foundation (BHF) and the FIA in proposing an integrated patient care pathway model. This model supports GPs in primary care in screening, motivating and prescribing exercise safely to the vast majority of their patient populations. For those patients deemed 'high-risk', the opportunity exists for onward referral to SEM or other consultant-led teams for specialist opinion. This could include exercise testing, in order that safe and appropriate exercise programmes can be prescribed.

Suggested exercise medicine care pathway

There are already considerable clinical and workforce resources available for an exercise medicine pathway. However, there needs to be better coordination of activity and better use of the resources available. Appendix C illustrates a suggested care pathway which uses primary and secondary care assets already available, and proposes the development of SEM consultant-led services.

Physical activity needs assessment and motivational interview

A patient presenting to a GP, secondary care consultant, or other appropriate healthcare worker with a diagnosis should undergo a physical activity needs assessment. This could use already established screening tools to identify current exercise levels, such as questionnaire- or web-based systems. This initial approach would raise awareness of the issue of exercise, both to the patient and the healthcare deliverer. If a simple increase in activity is required, then a brief motivational interview is conducted (practice nurse / nurse specialist / exercise instructor / physiotherapist), as advocated in the 'Let's get moving' programme. Guidance

on appropriate levels of exercise, local facilities available and options for support would be given. The recording of patient exercise data and referral for interview could be encouraged by the allocation of QOF points to the activity.

Risk stratification

If a specific condition can be addressed by exercise, for example mild to moderate depression, then entry of a diagnostic code into the EPR could trigger the electronic presentation of a suggested care pathway. Web-based instruments such as the 'Map of medicine' could be used in this context. Entry of appropriate cardiovascular and other risk factors into a risk stratification system would identify those at the highest risk from side effects of exercise.

Regional exercise medicine service

Ongoing referral, if needed, could be allocated based on the potential side effects of exercise. High-risk patients – or those requiring complex interventions – could be referred to regional exercise medicine service (REMS), which would be led by an SEM consultant. This would bring the capacity for a specialist assessment by an MDT equipped and trained to perform exercise testing and to prescribe exercise under close supervision. These teams do not currently exist, but there are active NHS training pathways for consultants in SEM for whom there is currently no NHS role.

Referral schemes and services

For those patients who would benefit from a programme of exercise, which does not require complex intervention and is in a moderate-risk patient, then a locally provided primary care physical activity referral service could be used. This would normally be supported by a GP with specialist interest in SEM (who may hold a diploma in SEM), a physiotherapist, exercise therapist, or appropriately trained practice nurse. The sort of conditions seen by this group might include osteoarthritis of the knee, back pain or controlled hypertension, in the absence of serious contraindications for exercise. In many cases these teams could link in with the local exercise referral schemes (ERS) already in place.

For low-risk individuals, self-management, after appropriate advice or supported by local ERSs, may be sufficient to deal with their needs.

Critical to the development of an exercise medicine strategy is the recognition that there needs to be active support and review of these populations. This should be accompanied by a measurement of outcome for the programmes, using patient-reported outcome measures, long-term concordance with exercise, and metabolic/physiological markers to determine improvements in overall lifetime risk.

5 The future

Government's legacy action plan for 2012

In 2002, 'Game plan' was launched by the prime minister, as part of the government's London bid to the International Olympic Committee (IOC) for the 2012 Olympic and Paralympic Games.⁴² This cross-government strategy (involving the Department for Culture Media and Sport, the Department for Education, the Department of Health (DH), the Department for Transport and the Department for Environment, Food and Rural Affairs) aimed to provide additional recreational spaces and sporting facilities throughout the UK, and to reduce inequalities in access and opportunity for participation in sport and physical activity.

In 2008/09, £1 million was provided to help county sports partnerships to develop ongoing plans for the delivery of physical activity, with a further £3 million being invested in 2009/10 to coordinate physical activity alongside sport. The government's ambition for 'Game plan' was to achieve a 'healthier and fitter nation, irrespective of age' by 2012 and beyond, through the delivery of a world-class infrastructure for physical activity.

In 2009, the DH's 'Be active, be healthy' initiative identified the need to deliver a health legacy for the 2012 Olympic Games,¹⁶ and the government set an ambitious target for their legacy action plan (LAP) to get 2 million more people active by 2012. The progress towards the LAP target will be monitored and measured through Sport England's 'active people survey'.

The 'Let's get moving' initiative was launched by Andy Burnham MP, the secretary of state for health (in August 2009).¹⁹ He described the need for cultural change within the NHS, in order that promoting physical activity could move from the periphery to the mainstream. He said that there was 'a unique opportunity for NHS bodies to lead from the front, striking up new partnerships to deliver better opportunities for people to become more active'.

With the new coalition government of 2010 has come a more stringent approach to public financial planning, and the initial aspiration for significant Olympic legacy for activity health has become less clear. Nevertheless, the development of an exercise medicine strategy, together with the structure to support it, such as pilot examples of PARS and REMS (perhaps in the locality of the Olympic site) would be a potential long-term legacy for health in the NHS.

Recommendations

There is a significant opportunity to raise the profile of exercise in medicine, both by increasing participation and also as a treatment for disease. This would support the DH initiatives to increase activity in the general population and to improve standards of exercise referral interventions.

This requires leadership. The Working Party has identified a need for the medical profession to take a more active lead in the excellent initiatives in physical activity currently taking place in the UK. There is

a requirement to coordinate the efforts of medical and allied health professionals with their non-medical partners in the leisure industry, and across other physical activity care pathways.

There is a role for the Academy of Medical Royal Colleges (AoMRC) in coordinating these initiatives and translating policy into practice. The practical implementation of this policy will result in a larger proportion of the population becoming more active, with the benefit of reducing the level of chronic disease and injury within the community.

The Working Party recommends that the RCP, the FSEM, the FPH and the RCGP – through the AoMRC – provide a focus to enhance the delivery of exercise prescription in the management and treatment of disease. This should also extend to promoting physical activity for the prevention of chronic disease.

There are seven key areas, outlined below, where the medical profession has a specific role to play in changing the culture of exercise in health.

A national strategy for physical activity, health and wellness

The medical royal colleges have a powerful voice, which can drive the exercise and wellness agenda. At present, although there are a number of excellent initiatives in this area, there is a lack of leadership. There should be a medically driven national strategy to use exercise in the prevention *and* treatment of disease.

The medical specialty of SEM

This new specialty needs to be integrated into the care pathways available to NHS patients. There should be action to establish NHS consultant posts in SEM.

- PCTs / GP consortia should be encouraged to commission services in the area of exercise medicine.
- The establishment of NHS consultant posts in SEM is required to support this initiative and to act as a link between primary and secondary care and other elements of the exercise medicine care pathway, eg REMS.
- SEM services will provide clinical support in the management of soft tissue and overuse injuries, which occur as a consequence of increased participation in physical activity. They will also act as a focus for exercise prescription in disease.

QOF incentives for physical activity interventions

There is a requirement for greater medical, NHS and PCT engagement in commissioning the services necessary for the maintenance of health. The Working Party therefore recommends that:

- NICE adopts QOF indicators for physical activity in the management of patients
- physical activity be recognised as a vital sign within the operating framework, and its promotion for prevention and the management of chronic diseases become a standard medical approach.

Undergraduate curriculum

Medical students should receive SEM education and training in the areas of preventive medicine, physical activity, health and wellness. They should be trained in the management of disease through the use of exercise. This will embed at an early stage the promotion of physical activity for the prevention and management of chronic disease.

Physical activity provider regulation

The RCP and the FSEM should work with all stakeholders to ensure that a system of regulation is mandatory for all providers of exercise to patients. Appropriately trained exercise practitioners should be registered with the HPC in order to standardise training, maintain standards, and reassure healthcare professionals of their competence.

Information management systems

These should be developed to aid primary care in the risk stratification of patients and the identification of care pathways. Systems of this nature would enable primary care practitioners to initiate exercise programmes through their practice EPRs.

London 2012 Olympics legacy

There is a clear opportunity to ensure a health legacy from the London 2012 Olympics, through the development of pilot projects based on the pathway illustrated in Appendix C, with a network of exercise providers and healthcare workers supported by a consultant in SEM at the PCT level.

Conclusion

There is a unique opportunity for the medical profession to support the various Department of Health initiatives to encourage the population to participate in regular physical activity and in the development and implementation of a national physical activity plan.

Exercise as therapy is underused, but with appropriate training could be an effective adjunct in many medical conditions. For this strategy to be effective, a coordinated approach will be required to plan health professional education, IT support, screening, delivery of interventions and evaluation.

Establishing a national physical activity strategy and an exercise medicine care pathway would have major health and cost-saving benefits, as well as ensuring a health legacy from the London 2012 Olympics.

Appendices

Appendix A

National strategies, initiatives and research into improving the health of the nation through lifestyle modification, physical activity, smoking status, diet and obesity, and alcohol intake programmes

Initiative	Date	Agencies
<p>‘Cycle to work’ scheme Finance Act (1999) introduced an annual tax exemption allowing employers to loan cycles and cycle safety equipment to employees as a tax-free benefit.</p>	February 1999	<ul style="list-style-type: none"> • Department for Transport (DfT)
<p>‘Sporting future for all’ The government’s vision for sport in the 21st century, promising a new deal with the governing bodies in sport.</p>	April 2000	<ul style="list-style-type: none"> • Department for Culture, Media and Sport (DCMS)
<p>‘Walking the way to health’ Encouraged people to enjoy local natural spaces and benefit their health by taking part in ‘health walks’.</p>	September 2000	<ul style="list-style-type: none"> • Countryside Agency • Natural England • British Heart Foundation (BHF)
<p>‘EPIC-Norfolk study’ – findings</p> <ul style="list-style-type: none"> • ‘healthy living can add 14 years’ • ‘physical activity improves longevity’ • ‘obesity increases the risk of cancer’ • ‘eating fruits and vegetables reduces the risk of an early death’ • ‘high-impact sports may preserve bone density’ 	<p>Study period: March 1993 – December 1997</p> <p>Published January 2001</p> <p><i>Brit Med J</i> 2001; 322(7279):140–6.</p>	<ul style="list-style-type: none"> • Ten-nation ‘European prospective investigation of cancer’ – showed the importance of general lifestyle measures in regards to physical activity, nutrition, alcohol and smoking
<p>‘Domesday Book’ of sport facilities</p>	August 2001	<ul style="list-style-type: none"> • Tessa Jowell MP, secretary of state for culture, media and sport
<p>Securing our future health – taking a long-term view – ‘the Wanless report’ Examined the future health trends and identified the key factors which would determine the financial and other resources required to ensure the NHS can provide a publicly funded, comprehensive, high-quality service available on the basis of clinical need and not ability to pay.</p>	January 2002	<ul style="list-style-type: none"> • Department of Health (DH)

continued...

Initiative	Date	Agencies
'Five-a-day' Initiative to encourage eating five portions of fruit and vegetables per day.	March 2002	<ul style="list-style-type: none"> • DH • NHS
'Walk in to work out' A randomised controlled trial of self-help intervention to promote active commuting	April 2002 <i>J Epidemiol Community Health</i> 2002;56:407–12	<ul style="list-style-type: none"> • Public Health Department, Glasgow University
'Move for health' 55th World Health Assembly recommended an annual 'Move for health' day	May 2002	<ul style="list-style-type: none"> • World Health Organization (WHO)
'Game plan' A strategy for delivering government's sport and physical activity objectives	December 2002	<ul style="list-style-type: none"> • Government strategy
'Review of health and social care in Wales'	July 2003	<ul style="list-style-type: none"> • NHS • National Audit Office • Welsh Assembly
'Active places' project Website to identify sporting facilities available to the public	July 2004	<ul style="list-style-type: none"> • Sport England • DCMS
'HSE 2003 report' Cardiovascular disease (CVD) and behavioural risk factors associated with CVD – drinking, smoking and eating habits	December 2004	<ul style="list-style-type: none"> • Health Survey England
Health Challenge Wales	February 2005	<ul style="list-style-type: none"> • Welsh Assembly
'Active England' project To increase population participation in sport and physical activity across nine regions in England	April 2005	<ul style="list-style-type: none"> • Sport England • The Big Lottery (£108.5m)
'Forecasting obesity to 2010'	July 2006	<ul style="list-style-type: none"> • Government paper using HSE 2003
'GPPAQ' Established physical activity questionnaire, PA Index	December 2006	<ul style="list-style-type: none"> • DH
'Small change, big difference' initiative	February 2007	<ul style="list-style-type: none"> • DH
'Local exercise action pilots' (LEAPs)	February 2007	<ul style="list-style-type: none"> • Ten PCTs
'National healthy living week'	September 2007	<ul style="list-style-type: none"> • Welsh Assembly

continued...

Initiative	Date	Agencies
<p>‘Physical activity care pathway’ Pilot across a small number of GP practices within London, to support patients in obtaining advice on becoming more active</p>	Oct 2007	<ul style="list-style-type: none"> • DH
<p>‘Chips or champs’ DVD</p>	Jan 2008	<ul style="list-style-type: none"> • Welsh Rugby Union
<p>‘A sustainable future for cycling’ Encouraging more people on to their bikes means more opportunities for exercise and a healthier nation. Budget £110m over three years.</p>	Jan 2008	<ul style="list-style-type: none"> • DfT • Cycling England
<p>‘Take on life’ Campaign to get people leading healthier lifestyles by following simple and achievable steps</p>	June 2008	<ul style="list-style-type: none"> • Shona Robison MP, minister for public health, Scottish government
<p>‘Age well on wheels’ Initiative for the over-60s ‘aiming to get older people active’. Pilot in Hammersmith and Fulham, London.</p>	June 2008	<ul style="list-style-type: none"> • London Cycling Campaign • Funded through Bike Hub
<p>‘Walk England initiative’ Established to encourage increased participation to walking to work and socially</p>	June 2008	<ul style="list-style-type: none"> • Walk England
<p>‘Change4Life’ Included subtypes: Breakfast4Life, Swim4Life, Walk4Life, Bike4Life, Play4Life, Cook4Life, Dance4Life</p>	January 2009	<ul style="list-style-type: none"> • DH • Partner: Chartered Society of Physiotherapists (CSP)
<p>‘Be healthy, be active: a plan for getting the nation moving’ New framework for the delivery of physical activity up to London 2012 Olympics</p>	February 2009	<ul style="list-style-type: none"> • DH
<p>‘Play and exercise in early years’ project</p>	Mar 2009	<ul style="list-style-type: none"> • DCMS
<p>‘Free swimming’ initiative Free swimming to children under 16 and adults over 60</p>	Apr 2009	<ul style="list-style-type: none"> • DCMS • DH • DWP • DCSFC • Local government • Amateur Swimming Association (ASA) • Sport England

continued...

Initiative	Date	Agencies
Free swimming lessons	Apr 2009	<ul style="list-style-type: none"> • ASA • Sport England
‘Get a life, get active’ Encouraging the population to become more active.	Jun 2009	<ul style="list-style-type: none"> • Northern Ireland Public Health Agency
‘Move for health’ In support of DH Change4Life campaign	July 2009	<ul style="list-style-type: none"> • CSP
Bike industry grant In support of a two-year pilot to encourage schoolgirls in Scotland (9–16 years), to tackle their decreasing activity levels – aiming to increase cycling levels from 2% to 15%	July 2009	<ul style="list-style-type: none"> • Bike Hub (committee of bicycle retail suppliers) • Sustrans (sustainable transport charity)
Natural health service To encourage people to utilise their nearest green space	July 2009	<ul style="list-style-type: none"> • Natural England
‘Let’s get moving’	August 2009	<ul style="list-style-type: none"> • DH

Appendix B Evidence for the benefits of exercise

Table A1 The relationship between physical activity (PA) and health outcomes			
Health outcome	Association with physical activity	Effect size	Evidence strength
All-cause mortality	Clear inverse relationship between PA and all-cause mortality	Approximate 30% risk reduction across all studies	✓✓✓✓
Cardiorespiratory health	Clear inverse relationship between PA and cardiorespiratory health	There is a 20–35% lower risk of cardiovascular disease, coronary heart disease and stroke	✓✓✓✓
Metabolic health	Clear inverse relationship between PA and risk of type 2 diabetes and metabolic syndrome	30–40% lower risk of metabolic syndrome; 35–50% lower risk of type 2 diabetes in moderately active people	✓✓✓✓
Energy balance	Favourable and consistent effect of aerobic PA on achieving weight management	Aerobic PA has a consistent effect on achieving weight maintenance (<3% change in weight).	✓✓✓✓
		PA (in large volume) can achieve weight loss, and dietary control throughout intervention.	✓✓✓✓
		Following weight loss, aerobic PA has a consistent effect on weight maintenance.	✓✓✓
Musculoskeletal health	Bones Inverse association with PA and risk of hip fracture and vertebral fracture	36–68% risk reduction of hip fracture	✓✓✓
	PA can increase spine and hip bone marrow density	Effect on bone mineral density is 1–2% (weak evidence for vertebral #)	✓✓
	Joints No evidence of regular moderate PA promoting OA	Risk reduction of osteoarthritis (OA) for walking is 22–83%	✓✓
	Moderate intensity PA has disease-specific benefits in terms of pain, function, quality of life and mental health	In adults with OA, pooled effect sizes for pain relief 0.25–0.52, function =0.14–0.49, disability electrical stimulation =0.32–0.46	✓✓✓✓
	Muscular Increase in PA enhances skeletal muscle mass, strength, power and neuromuscular activation	Resistance type PA on muscle mass and function is variable and dose-dependent.	✓✓✓✓
Cancer	There is an inverse relationship between PA and risk of breast and colon cancer.	There is a 30–50% lower risk of colon cancer, and a 20% lower risk of breast cancer.	✓✓✓✓

Table from: Department of Health. *Let's get moving – a new physical activity care pathway for the NHS: commissioning guidance*. London: DH, 2009.

Disease prevention

As demonstrated in Table A1, physical activity has been identified as positively contributing to the prevention and management of over 20 chronic conditions, including coronary heart disease (CHD), diabetes, cancer, mental health, osteoporosis and obesity.^{1,4,14,16,19} The *World health report 2002* estimated that around 3% of disease burden in developed countries is caused by physical inactivity, and that over 20% of CHD and 10% of stroke in developed countries is due to physical inactivity.⁷ Physical inactivity is a primary risk factor for CHD. CHD by itself is the most common cause of premature death in the UK, and estimates have shown that more CHD deaths can be attributed to physical inactivity (37%) than to smoking (19%) or high blood pressure (13%).¹³

Individuals who are inactive are 1.9 times more likely to have a myocardial infarction than their active contemporaries.^{4,7,13,16,19} Lack of physical activity is a modifiable risk factor for all forms of stroke. Moderately intense physical activity is sufficient to achieve risk reduction by lowering blood pressure.³⁷

Obesity levels in the UK are rising at an alarming rate, and the current increases have been linked to the declining levels of physical activity, among many other factors.^{13,16,19} In 1993, 13.2% of men were obese, rising to 22.9% in 2003. For women, the figures were 16.4% and 23.4% respectively.⁴⁴

Forecasting obesity to 2010,¹² prepared for the Department of Health (DH), predicted that:

- girls would overtake boys in obesity rates, with nearly 1 in 5 girls aged 2–10 expected to be obese by 2010
- statistics for 2003 showed that boys in middle-class (non-manual) households were more obese than those from manual backgrounds
- nearly a third of men would be obese by 2010, with figures increasing from 4.3m in 2003 to 6.7m in 2010
- in households with two obese parents, 1 child in 4 is obese, compared to 1 child in 8 in households where one parent is obese and 1 in 20 where no parents are obese.

Latest published data for 2010

Statistics on obesity, physical activity and diet: England, 2012 presented new statistics.

For obesity in England:

- Just over a quarter of adults (26% of both men and women aged 16 or over) were classified as obese in 2010 (body mass index (BMI) 30 kg/m² or over).
- A greater proportion of men than women (42% compared with 32%) were classified as overweight in 2010 (BMI 25 to <30 kg/m²).
- Women were more likely than men (46% and 34% respectively) to have a raised waist circumference in 2010 (over 88 cm for women and over 102 cm for men).
- Using both BMI and waist circumference to assess risk of health problems, 22% of men were estimated to be at increased risk, 12% at high risk, and 23% at very high risk in 2010. Equivalent figures for women were 14%, 19% and 25% respectively.
- In 2010, around three in ten boys and girls (aged 2–15) were classed as either overweight or obese (31% and 29% respectively), which is very similar to the 2009 findings (31% for boys and 28% for girls).
- In 2010, 17% of boys and 15% of girls were classed as obese, an increase from 11% and 12% since 1995.

- In 2010/11, around one in ten pupils at Reception age (aged 4–5) were classified as obese (9.4%), which compares with around a fifth of pupils in Year 6 (aged 10–11) (19%).

For physical activity in England:

- In 2010, 41% of respondents in Great Britain (GB) (aged 2+) said they made walks of 20 minutes or more at least three times a week, and an additional 23% said they did so at least once or twice a week. However, 20% of respondents in GB reported that they took walks of at least 20 minutes 'less than once or year or never'.
- The most popular sports activity carried out by children aged 5–10 in 2010/11 outside school hours was 'swimming, diving or life-saving', with 48% participating in the previous four weeks. This was followed by football (36%) and cycling or riding a bike (28%).
- For children aged 11–15, the most popular sport activities participated in during the past four weeks, both in and out of school, were football (50%), basketball (27%) and 'swimming, diving or life-saving' (27%) in 2010/11.
- Pupils in Years 1–13 of the schools surveyed spent an average of 117 minutes in a typical week in 2009/10 on curriculum PE. The long-term trend shows an increase in the average number of minutes pupils take part in PE each week.

Globally, there are more than 1 billion overweight adults, with at least 300 million of them being obese.⁴⁵ By 2050, 9 out of 10 adults are predicted to be obese, and two-thirds of children will be overweight or obese. The cost to the UK of this obesity epidemic is likely to treble to £50 billion a year unless urgent action is taken.^{2,16,46}

There is a clear causal relationship between degree of physical activity and all-cause mortality. Increasing the physical activity levels of all adults who are not meeting the chief medical officer's recommendations is vital for the health of the nation and the economy. However, targeting those adults who are most sedentary (ie engage in less than 30 minutes' activity per week) will produce the greatest reduction in the risk of chronic disease.

There is a significant inverse dose–response relationship between total physical activity and disease in adults; the higher the level of physical activity or fitness, the lower the risk of disease.^{4,16,19}

UK physical activity targets

The recommended daily amount (RDA) of physical activity for adults is 30 minutes on five or more days of the week; for children it is one hour daily for five days per week.^{14,16,19,47,48} The government set a target in England and Wales for 70% of the population (in Wales, people up to the age of 65) to be 'reasonably active' by 2020.^{14,16,19,47} This is a very ambitious target; it requires the levels of participation to double over a period of 15 years. In Scotland, the target was set lower at 50%, for adults to achieve the minimum levels of physical activity by 2022.⁴⁸

A report by the chief medical officer (CMO) for England suggested that 'shorter bouts of physical activity, of 10 minutes or more, interspersed throughout the day are as effective as longer sessions of activity'.¹⁴ According to the Welsh Assembly's strategy for physical activity and sport, 'Climbing higher', 'physical activity can be broken down during the course of the day, because moderate physical activity, even if accumulated in short bouts, can achieve health-related benefit'.⁴⁷

The CMO for England stated that the target levels of exercise will only be achieved by helping people to build activity into their daily lives. The 2004 report on physical activity identified that 'for most people, the easiest and

most acceptable forms of physical activity are those that can be incorporated into everyday life. Examples include brisk walking or cycling instead of driving. Physical activity does not have to be vigorous to confer protection.¹⁶

UK physical activity levels

The two main sources of data relating to rates of physical activity in England are the *Health survey for England* (HSE)^{22,49,50} and Sport England's *Active people survey*.⁵¹

- The HSE collects data on sport, recreational and occupational physical activity, walking and cycling for any purpose, and includes heavy housework and gardening.
- The *Active people survey* collects data on more-than-30-minute bouts of sport, walking, cycling, dance, gardening and active conservation. Prior to 2009, the survey only included data on sport, dance, recreational walking and cycling.

In 2007/08, 11.73 million people chose to participate in physical activity at least three times a week, for a minimum of 30 minutes at a moderate intensity, through sport, active recreation and active travel.^{22,51} This figure reflects a significant increase in the number of adults who regularly play sport, of more than half a million over the two years prior to this.

40% of men and 28% of women meet the CMO recommendations for physical activity.¹¹ This represents an increase from levels recorded in 1997 (32% and 21% respectively).

The comparisons of physical activity levels internationally are difficult to assess due to differences in measurement techniques. However, estimates drawn from two datasets, Euro barometer and the international physical activity prevalence survey for developed nations, place Great Britain just outside the top 20 most active nations.¹⁶

The Netherlands appears to lead Europe in maintaining high levels of physical activity, by embracing active travel policies. Beyond Europe, New Zealand shows high levels of adults meeting national guidelines for physical activity, and Canada stands out as the only country that has achieved a sustained increase in physical activity levels, of approximately 0.75% per annum.

Physical activity and health inequalities

There are clear and significant health inequalities in relation to the prevalence of physical inactivity according to gender, age, children, ethnicity, disability and income.^{11,22,49,50}

Physical activity is higher in men compared with women, at all ages. Participation in physical activity declines significantly with age for both sexes. Only 17% of men and 13% of women between the ages of 65 and 74 meet the CMO recommendation for physical activity. This drops to 8% and 3% of men and women over the age of 75. In children, boys achieve higher weekly levels of physical activity than girls. While for boys similar levels of activity are seen across all age groups, girls' participation generally decreases during teenage years.

With the exception of the black Caribbean and Irish populations, all other minority ethnic groups have lower rates of adherence to the CMO's recommendations on physical activity for adults.

Inequalities are greatest for South Asian women. Only 11% of Bangladeshi and 14% of Pakistani women were reported to have done the recommended amounts of physical activity, compared with 25% in the general population.

People with disabilities are at particular risk of inactivity.¹⁶ Disabilities ranging from physical and neurological to sensory impairments and learning disabilities all create different barriers to participation in physical activity. The *Active people survey* showed that only 9.1% of people aged 16 years and over with a limiting long-standing illness or disability had participated in at least 30 minutes of moderate-intensity sport or active recreation on three or more days per week.⁵¹ This is compared with 23.6% of all adults.

Physical activity is lower in low-income household groups than in high-income household groups.

The economic cost implications of physical inactivity

Inactive lifestyles result in an economic burden to the NHS, in terms of additional costs in the treatment of long-term conditions and associated acute events such as myocardial infarctions, strokes, falls and fractures, as well as the costs of social care arising from the loss of functional capacity. Inactivity also has consequences on the wider economy as a result of sickness absence and premature deaths of productive individuals, costs to the individuals themselves, and the loss of productivity of their carers.^{16,19}

The annual costs to the NHS as a result of physical inactivity are estimated to be in between £1 billion and £2 billion. The cost of lost productivity to the wider economy has been estimated at around £5.5 billion from sickness absence, with an additional £1 billion from premature death of people of working age.^{20,21}

Collectively, the total cost of physical inactivity is estimated at £8.3 billion every year. These figures represent conservative estimates for the costs of inactivity based on available published data, and they exclude the cost implications of other diseases and health problems influenced by physical activity, such as osteoporosis and falls – which affect many older people.^{16,20,21}

A recent report²¹ estimated that for just five conditions,* in one year alone, the burden of physical inactivity caused:

- over 35,000 deaths
- 3.1% of morbidity and mortality in the UK
- an additional £1.8 billion to the direct health cost burden on the NHS.

The cost-effectiveness of implementing a physical activity initiative was indicated by an economic modelling study commissioned by Cycling England. This calculated that a 20% increase in cycling by 2015 would save £107 million in reducing premature deaths, £52 million in lowered NHS costs and £87 million from fewer 'sickness absences' from work.⁵²

Exercise interventions in disease

The benefits of exercise prescription have been well documented in reducing the rates of CHD, cerebrovascular accidents, hypertension, dyslipidaemia, carcinoma of the colon, type 2 diabetes mellitus, obesity, osteoporosis,

* Post-menopausal breast cancer, gastrointestinal cancer, cerebrovascular disease, cardiovascular disease and type 2 diabetes

falls in the elderly, anxiety, depression and dementia.^{1,2,4,6,7,11-14,19,37} Increasing total volume of activity, increasing intensity of aerobic exercise from low to moderate and from moderate to high, and adding weight training to the exercise programme, are among the most effective strategies to reduce the risk of CHD in men.³⁴

Physical activity and physical fitness are inversely associated with the clustering of metabolic abnormalities. With regard to physical activity, it seems that intensity, and more specifically higher intensity, is the main characteristic of physical activity determining its effect on CVD risk factors. However, physical fitness exerts greater effects on each of these individual CVD risk factors and its combination when compared with physical activity.³⁸

Morris *et al* described exercise prescription in the prevention of CHD as today's best buy in public health back in 1994.²⁸ At the time it was recognised that, for those individuals who were inactive, their relative risk of CHD was of the same order of magnitude as for hypertension, hypercholesterolaemia and smokers.

Exercise prescription in older people is particularly beneficial, improving overall health, exercise capacity, proprioception, balance, their quality of life (QoL) measures, and their level of independence.

The benefits of physical activity in chronic disease such as severe congestive heart failure is strongly supported by research which demonstrates that exercise improves maximal exercise capacity,³³ decreases symptoms,^{30,31} improves quality of life,⁵³ and decreases hospital admissions.

Additionally, exercise training has been shown to have a significant impact on pathophysiological mechanisms of CHF, including improvements in endothelial function²⁹ and autonomic activity, by reducing sympathetic activation and improving heart rate variability. Resting levels of angiotensin II, aldosterone, vasopressin, and atrial natriuretic peptide³² are reduced and respiratory function is also often improved.

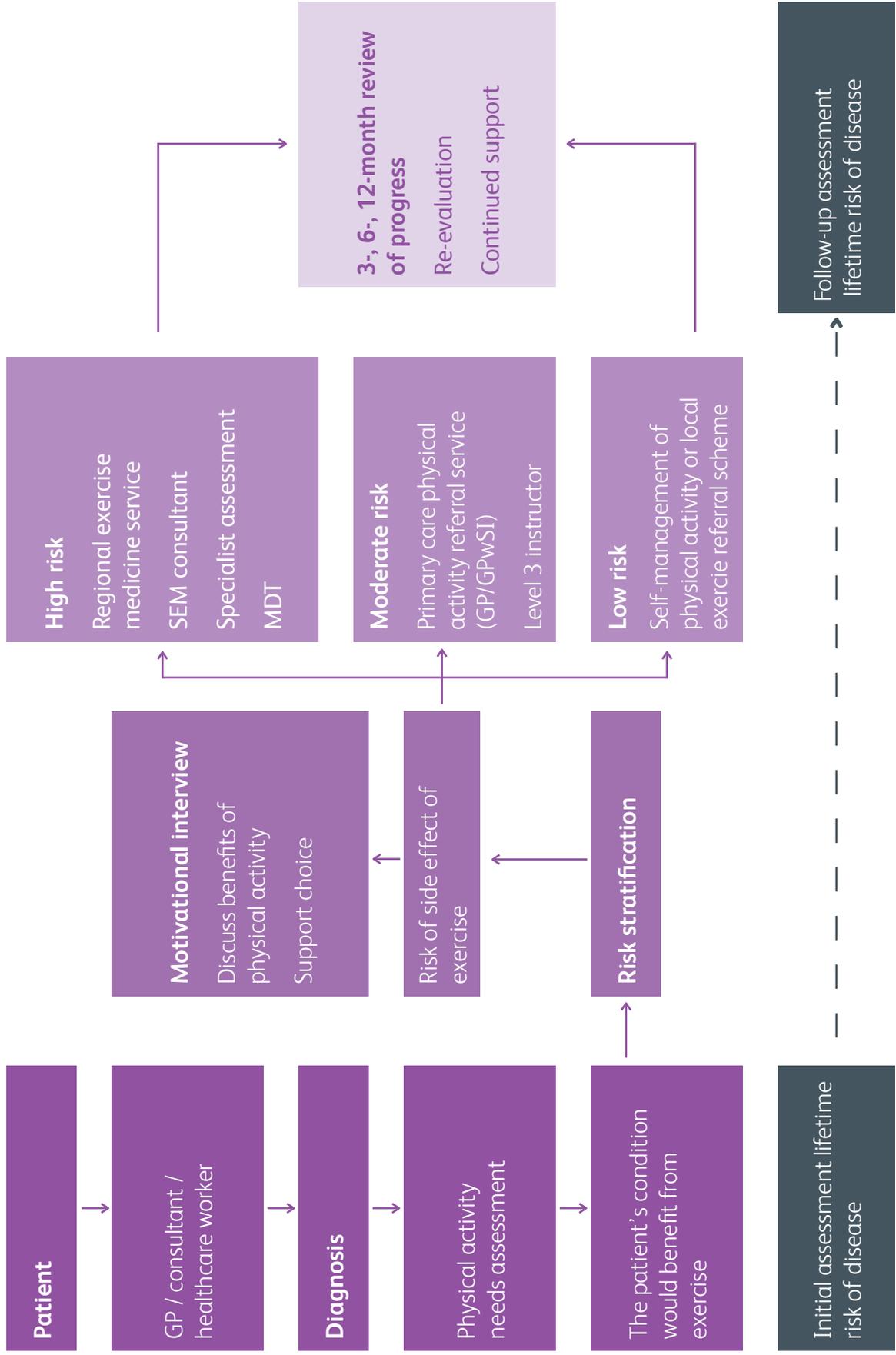
Patients with chronic obstructive pulmonary disease (COPD) have been shown to respond well to regular exercise therapy, with a notable reduction in their risk of COPD exacerbations. For those individuals exercising at a moderate to high intensity level, there was a reduced lung function decline, as well as a reduced risk of COPD among smokers.³⁶

Long-term regular physical activity, including walking, is associated with significantly better cognitive function and reduced cognitive decline in older women. Higher levels of activity are associated with better cognitive function and a 20% lower risk of cognitive impairment in the highest quintile of activity.^{35,54,55}

The evidence for the association between obesity and chronic disease is extensive and it is now a public health problem of epidemic proportions across the western world.⁴⁵ In addition to the cardiovascular and metabolic consequences, there are many other diseases associated with obesity, including: carcinoma (endometrial, breast, colon) liver and gallbladder disease, sleep apnoea, osteoarthritis and gynaecological dysfunction (abnormal menses and infertility).^{4,6,12,19,44-46}

These patients will benefit from participation in physical activity for the potential health benefits.^{16,19,46,56} However, exercise prescription in this group should not be focused on weight management alone, but on the long-term health benefits of engaging in a regular exercise programme. The data regarding exercise and weight management suggests that there is a need for up to twice the volume of exercise activity, ie 5 x 60 minutes or a total of 300 minutes per week of moderate-intensity activity, in conjunction with a reduction of daily calorific intake in order to effect a significant benefit.

Appendix C Exercise medicine care pathway



References

- 1 Royal College of Physicians. *Medical aspects of exercise: benefits and risks*. London: RCP, 2009.
- 2 Department of Health. *Our NHS, our future: NHS next stage review – interim report*. London: DH, 2007.
- 3 Royal College of General Practitioners. *You and your GP*. Patient information leaflet. London: RCGP, 2010. [www.rcgp.org.uk/pdf/NI GP Leaflet.pdf](http://www.rcgp.org.uk/pdf/NI_GP_Leaflet.pdf)
- 4 Jonas S, Phillips EM (eds). *ACSM's exercise is medicine: a clinicians guide to exercise prescription*. Indianapolis, IN: American College of Sport Medicine, 2009.
- 5 Department of Health. *Choosing health: making healthier choices easier*. London: DH, 2004.
- 6 US Department of Health and Human Services. *Physical activity and health: a report of the surgeon general*. Washington, DC: US DHHS, 1996.
- 7 World Health Organization. *World health report 2002: reducing risks to health, promoting healthy life*. Geneva: WHO, 2002.
- 8 Department of Health. *At least five a week – evidence on the impact of physical activity and its relationship to health*. A report from the chief medical officer. London: DH, 2004.
- 9 Faculty of Sport and Exercise Medicine. *Curriculum for specialist training*. London: FSEM, 2004.
- 10 Wanless D. *Securing good health for the whole population: final report*. London: DH, 2004.
- 11 Department of Health. *Health Survey for England 2006: CVD and risk factors adults, obesity and risk factors children*. London: The Information Centre, 2008.
- 12 National Centre for Social Research. *Forecasting obesity to 2010*. Prepared for the DH. London: NatCen, 2006.
- 13 British Heart Foundation (BHF) National Centre for Physical Activity and Health. *Physical Activity and Health Factsheet 2009*. London: BHF, 2009.
- 14 Department of Health. *At least five times a week – evidence on the impact of physical activity and its relationship to health*. A report from the chief medical officer. London: DH, 2004.
- 15 Calman K, Waring M, Warburton P. Role of sport and exercise medicine in the NHS. *Br J Sports Med* 1999;33:374 .
- 16 Department of Health. *Be active, be healthy: a plan for getting the nation moving*. London: DH, 2009.
- 17 National Institute for Health and Clinical Excellence. *Four commonly used methods to increase physical activity: brief interventions in primary care, exercise referral schemes, pedometers and community-based exercise programmes for walking and cycling*. Public health guidance PH2. London: NICE, 2006.
- 18 National Institute for Health and Clinical Excellence. *Behaviour change at population, community and individual levels*. London: NICE, 2007.
- 19 Department of Health. *Let's get moving – a new physical activity care pathway for the NHS: commissioning guidance*. London: DH, 2009.
- 20 Ossa D, Hutton J. *The economic burden of physical inactivity in England*. London: MEDTAP International, 2002.
- 21 Allender S *et al*. The burden of physical activity-related ill health in the UK. *J Epidemiol Community Health* 2007;61:344–8.

- 22 Department of Health. *Health Survey for England 2006*. London: DH, 2007.
- 23 Department of Health. *The general practice physical activity questionnaire (GPPAQ)*. London: DH, 2006.
- 24 Dugdill L, Graham R, McNair F. Exercise referral: the public health panacea for physical activity promotion? A critical perspective of exercise referral schemes; their development and evaluation. *Ergonomics* 2005;48:1390–1410.
- 25 National Institute for Health and Clinical Excellence Public Health Collaborating Centre. *A rapid review of the effectiveness of exercise referral schemes to promote physical activity in adults*. London: NICE, 2006.
- 26 Department of Health. *Exercise referral systems: a national quality assurance framework*. London: DH, 2001.
- 27 Eakin EG, Brown WJ, Marshall AL, Mummery K, Larsen E. Physical activity promotion in primary care. *Am J Prev Med* 2004;27(4):297–303.
- 28 Morris JN. *Exercise in the prevention of coronary heart disease: today's best buy in public health*. London: London School of Hygiene and Tropical Medicine, 1994.
- 29 Hornig B, Maier V, Drexler H. Physical training improves endothelial function in patients with chronic heart failure. *Circulation* 1996;93:210–14.
- 30 Wielenga RP, Huisveld IA, Bol E. Exercise training in elderly patients with chronic heart failure. *Coron Artery Dis* 1998;9:765–70.
- 31 Belardinelli R, Georgiou D, Cianci G. Randomized controlled trial of long term moderate exercise training in chronic heart failure. Effects on functional capacity, quality of life and clinical outcome. *Circulation* 1999;99:1173–82.
- 32 Braith RW, Welsch MA, Feigenbaum MS. Neuroendocrine activation in heart failure is modified by endurance exercise training. *J Am Coll Cardiol* 1999;34:1170–5.
- 33 McKelvie RS, Teo KK, Roberts R. Effects of exercise training in patients with heart failure. The exercise rehabilitation trail (EXERT). *Am Heart J* 2002;144:23–30.
- 34 Tanasescu M, Leitzmann MF, Rimm EB. The dose–response relationship between exercise, heart disease in men. *JAMA* 2002;288:1994–2000.
- 35 Saxena S, Van Ommeren M, Tang KC, Armstrong TP. Mental health benefits of physical activity. *J Ment Health* 2005;14(5):445–51.
- 36 Garcia-Aymerich J *et al.* regular physical activity modifies smoking-related lung function decline and reduces risk of chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2007;175:458–63.
- 37 Whelton SP, Chin A, Xin X, He J. Effect of aerobic exercise on blood pressure: a meta-analysis of randomized, controlled trials. *Ann Intern Med* 2002;136:7493–503.
- 38 Sassen *et al.* Physical fitness matters more than physical activity in controlling cardiovascular risk factors. *Eur J Cardiovasc Prev Rehabil* 2009;16(6):677–83.
- 39 BHF National Centre, Physical Activity and Health: *Exercise referral toolkit*. Loughborough: BHFNC, 2010.
- 40 General Medical Council: 'Delegation and referral'. *Good medical practice guidance* paragraphs 54–55. London: GMC, 2006.
- 41 Medical Defence Union. 'GPs more flexibility in exercise referrals'. Press release. London: MDU, 2001.
- 42 Jones NSC, Weiler R. *Sport and exercise medicine: a fresh approach*. Manchester: NHS North West, 2011.
- 43 Department for Culture, Media and Sport / Strategy Unit. *Game plan: a strategy for delivering government's sport and physical activity objectives*. London: Cabinet Office, 2002.
- 44 Social Issues Research Centre. *Obesity and the facts: an analysis of data from the Health Survey for England 2003*. Oxford: SIRC, 2005.

- 45 World Health Organization. *Obesity and overweight*. Fact sheet. Geneva: WHO, 2007.
- 46 National Heart Forum. *Lightening the Load: tackling overweight and obesity*. London: NHF, 2007.
- 47 Welsh Assembly. *Climbing higher: sport and active recreation in Wales*. Strategy for consultation. Cardiff: NAW, 2003.
- 48 Physical Activity Task Force. *Let's make Scotland more active: a strategy for physical activity*. Edinburgh: Scottish Executive, 2003.
- 49 Department of Health. *Health Survey for England 2002*. London: DH, 2003.
- 50 Department of Health. *Health Survey for England 2003*. London: DH, 2004.
- 51 Sport England. 'National results for Active People 2'. Survey results. www.sportengland.org/research/active_people_survey/active_people_survey_2/national_results.aspx
- 52 SQW. *Valuing the benefits of cycling: a report to Cycling England*. Cambridge: SQW, 2007
- 53 Willenheimer R, Rydberg E, Cline C *et al*. Effects on quality of life symptoms and daily activity 6 months after termination of an exercise training programme in heart failure patients. *Int J Cardiol* 2001;77(1):25–31.
- 54 Weuve J, Kang JH, Manson JE *et al*. Physical activity, including walking, and cognitive function in older women. *JAMA* 2004;292(12):1454–61.
- 55 National Institute for Health and Clinical Excellence. *Mental wellbeing and older people*. Public health guidance 16. London: NICE, 2008.
- 56 Department of Health. *Healthy weight, healthy lives: a cross-government strategy for England*. London: DH, 2008.

