The benefits of physical activity for health
Aim & objectives

**AIM**
To understand the health benefits of regular physical activity across the life-course

**OBJECTIVES**

1. Define physical activity, exercise and physical fitness
2. Know some of the health benefits of physical activity: how it can help prevent and treat many non communicable diseases and prevent premature death
3. Know the WHO and UK recommended physical activity guidelines and strategies
4. Be aware of the current physical activity levels in the UK population
5. Understand the importance of making every contact count during NHS or health system consultations by giving physical activity advice
Reading & other resources

1. WHO 2015 Physical activity, Non-Communicable diseases (NCDs)
2. Physical activity strategy for the WHO European Region 2016–2025
3. Chief Medical Officer guidelines on physical activity (2011)
4. YouTube video (10 minutes) “23 ½ hours”
5. Motivate 2 move website
8. Health matters: getting every adult active every day (2016)
10. Factsheets on Health Enhancing Physical Activity WHO Europe Countries (2016)
What is Exercise Medicine?

1. Promoting **health** and **wellness** through the ↑use of physical activity and exercise in the prevention and treatment of disease
2. Providing brief interventions on physical activity advice, every consult
3. To protect and promote the health of patients and the public

1. FSEM 2015, Motivate2Move, Exercise is Medicine
2. NICE Guidance PH44 2013
3. GMC 2009, A Framework for personalised care and population health for nurses, midwives, health visitors and allied health professionals 2014
Exercise Medicine in non-communicable diseases (NCDs)

- Lecture 1: Beneficial health effects
- Lecture 2: Physiological adaptations & risks
- Lecture 3: How to prescribe exercise
- Lecture 4: Physical activity in chronic disease and public health issues

Regular physical activity/exercise
Objective 1. Definitions
Physical activity

Any bodily movement produced by skeletal muscles that requires energy expenditure

Includes a broad range of activities
• Everyday activities (walking, climbing stairs, carrying children)
• Household chores
• Occupational tasks
• Leisure time physical activity
• Exercise

Energy expended a product of FITT
• Frequency
• **Intensity** (effort)
• Time
• Type

World Health Organisation 2015
Physical activity for Adults, For older adults, For children For young people
Exercise

Physical activity that is planned, structured, repetitive, and purposeful (aimed at improving or maintaining one or more component of physical fitness)

Examples
- Walking
- Swimming
- Cycling
- Aerobics
- Yoga
- Tai Chi
- Strength exercise

In clinical practice may discuss physical activity rather than exercise

World Health Organisation, 2015
Physical fitness

A set of attributes that people have or achieve that relates to the ability to perform physical activity

Types of physical fitness
1. Cardiorespiratory endurance
2. Muscular strength
3. Balance and coordination
4. Flexibility

Influenced by genetics, health conditions, physical activity and exercise
## Physical Activity

<table>
<thead>
<tr>
<th>Adaptations &amp; improvements in Physical activity</th>
<th>Adaptations &amp; improvements in Physical fitness</th>
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</thead>
<tbody>
<tr>
<td>Occupational tasks</td>
<td>Cardiorespiratory endurance</td>
</tr>
<tr>
<td>Household chores, everyday activities</td>
<td>Muscular strength</td>
</tr>
<tr>
<td>Leisure time physical activity, exercise</td>
<td>Flexibility</td>
</tr>
<tr>
<td>Environment &amp; active travel</td>
<td>Balance &amp; coordination</td>
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</table>

### Admited health benefits

- **↓** risk of death
- **↓** risk of non-communicable diseases
Objective 2. The health benefits of regular physical activity

The Lancet Physical Activity Observatory: promoting physical activity worldwide

Exercise:
The miracle cure and the role of the doctor in promoting it
Independent risk factor for all-cause mortality

Just as important as all the other recognised risk factors

Poor muscle strength is also a risk factor for CVD and all-cause mortality

Independent risk factor for cardiovascular disease (CVD) mortality

Just as important as all the other recognised risk factors

Low fitness

Risk of death from CVD

Men

Women

National Heart Forum: more CHD deaths attributable to physical inactivity (37%) than smoking (19%) and hypertension (13%) put together


Physical activity reduces the risk of cardiovascular disease

Helping patients increase their physical activity is just as important as helping them stop smoking, lowering their blood pressure and reducing their cholesterol.
PA is a modifiable risk factor: you can reduce your risk of dying prematurely

1. If you remain physically active or improve your levels of physical activity, your risk of death and cardiovascular disease can be halved.

2. Physical activity/fitness needs to be current to maximise the effects.

3. Age is irrelevant, benefits can still be gained at any age.

The more you do, the better (inverse-dose response)

Greatest population health benefits moving people from no physical activity to some physical activity

VOTE – greatest risk of premature death

Acknowledgement: Professor Karim Kahn
VOTE – greatest risk of premature death

Thin & fit

Acknowledgement: Karim Kahn
VOTE – greatest risk of premature death
VOTE – greatest risk of premature death

Obese & unfit

Acknowledgement: Karim Kahn
VOTE – greatest risk of premature death
VOTE – greatest risk of premature death

Acknowledgement: Karim Kahn
Overweight and class 1 obesity (BMI 25-35) are not the best predictors of premature mortality.

Low physical activity = low physical fitness = increased risk of premature death

Risk of premature death

If you are physically active it doesn’t matter if you don’t lose any weight there are still enormous health benefits to be gained.

WARNING: Obesity is still damaging for your health, but it shouldn’t stop you being physically active!
Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality?
A harmonised meta-analysis of data from more than 1 million men and women
Image via © THINKSTOCK
Population attributable risk considers the number of people with that risk factor

Theoretical example (SIMPLIFIED!)

- Premature mortality risk of
  - Walking in front of a train 100%
  - Smoking 33%

- 100,000 people in their lifetime
  - 1 walks in-front of a train in their life = 1 death
  - 25,000 smoke = 8250 deaths due to smoking

- Population attributable risk
  - Walking in-front of a train 0.001% of deaths
  - Smoking 8% of deaths

A high proportion of deaths are due to physical inactivity and low fitness

Population attributable risk of physical inactivity in the UK 15-17% of all premature deaths

Physical activity & obesity

Simple or complex?
Energy intake (diet) > energy expenditure (PA) over time

Relative contribution of each is debatable
Societal causes important

Treatment
1. ↓ energy intake (especially carbohydrates and fats)
2. ↑ energy expenditure (physical activity)

NICE Obesity guidance
Royal College of Physicians: Action on Obesity Report
Physical activity & obesity

The problem
It is not easy to get people to exercise more (or change their diet)

Remember
PA reduces the risk of mortality & improves other health outcomes even without weight loss

NICE Obesity guidance
Royal College of Physicians: Action on Obesity Report
Cancer

• Causes 25% of UK deaths

• 35% of cancers due to 9 modifiable risk factors (including physical inactivity)

• Physical activity
  – Colon (NOT rectal) cancer risk ↓ by ~35%
  – Breast cancer risk ↓ by ~25%
  – Endometrial cancer risk ↓ by ~30%

• Population attributable risk of physical inactivity
  – 15% of colon cancer
  – 10% of post-menopausal breast cancer

World Health Organisation, 2015
Leisure-time physical activity ... reduces the risk of 13 cancers independent of body size or smoking

Type 2 diabetes

- 5.38% of UK population (underdiagnosed)

- 80% preventable with lifestyle changes exercise & healthy diet [NICE guidelines]

- The more you do the better: each ↑ in energy expenditure of 500 kcal.wk⁻¹ = 6% ↓ in risk

- Diet and physical activity as effective as drugs in preventing type 2 diabetes in those with Impaired fasting glucose and impaired glucose tolerance

- Obesity is the main risk factor

Exercise and the elderly

Age = reductions in

• VO$_2$max
• strength
• flexibility
• proprioception
• muscle mass
• mobility

associated with sedentary behaviour

Physical activity

• adaptations throughout life
• improved memory & reduced cognitive decline
• reduced mortality, disease, disability & medical treatment
• linked with increased quality of life
• strength correlated with independence

VO$_2$max = VO2 max is the maximum volume of oxygen that can be utilized in one minute during maximal or exhaustive exercise

Royal College of Physicians falls prevention, Fit for Frailty: BGS, RCGP, Age UK 2014
Musculoskeletal health

• Osteoporotic fractures in those greater than 50 years old
  – 30% females and 12% males (mainly falls)

• Regular physical activity = 55% ↓ risk hip fractures

• ↓ risk due to ↓ risk of falls
  – muscle strength
  – proprioception, coordination, gait and reaction time

• Small ↑ in bone density BMD (1-3%) (osteoporosis prevention) with regular high-impact training
  – strengthening & jogging

What are the health benefits of physical activity?

- Dementia by up to 30%
- Hip fractures by up to 68%
- Depression by up to 30%
- All-cause mortality by 30%
- Cardiovascular disease by up to 35%
- Type 2 diabetes by up to 40%
- Colon cancer by 30%
- Breast cancer by 20%

Regular physical activity reduces your risk of


Everybody active, everyday PHE blog 2016
Exercise “potentially as effective” as many drugs for common diseases

Conditions that physical activity helps to prevent, treat or manage

- **Cardiovascular**: stroke, MI, PVD, CHD, heart failure
- **Respiratory**: asthma, COPD, cystic fibrosis
- **Musculoskeletal**: rheumatoid arthritis, osteoarthritis, hip fractures, low back pain, fibromyalgia
- **Endocrine**: diabetes
- **Psychiatric & neurological**: depression, dementia, schizophrenia, Parkinson’s disease
- **Cancer**: breast, colon
- Beneficial effects on other risk factors: obesity, blood pressure, cholesterol

Physical activity mentioned in >76 NICE guidelines
The cost of physical inactivity in the UK

£7.4 billion per year!

In the time it takes Usain Bolt to run 100m the NHS has spent £10k on treating preventable chronic diseases

DCMS/ Strategy Unit (2002). Game plan
Department of Health (2010). On the state of public health
Public Health England – Everybody Active Every Day (2014)
The cost of physical inactivity in the UK

37,000 and rising premature deaths could be prevented annually in the UK

Cheap
Indiscriminate benefits (>20 conditions)
Independent of other risk factors
Minimal side-effects

“Wonder drug” UK CMOs

Department of Health (2010). On the state of public health
Objective 3.
UK Department of Health and WHO physical activity guidelines across the life-course

Chief Medical Officer (2011). Start active, stay active, Department of Health. WHO Global recommendations on physical activity for health 2010
UK physical activity for early years infographic

Physical activity for early years
(birth – 5 years)
Active children are healthy, happy, school ready and sleep better

Builds relationships & social skills
Maintains health & weight
Contributes to brain development & learning
Improves sleep
Develops muscles & bones
Encourages movement & co-ordination

Every movement counts

Aim for at least
3 Hours
across everyday

Move more. Sit less. Play together


Start active, stay active: infographics on physical activity PHE 2016
Children <5 years old when walking
Minimum physical activity guidelines

3hrs of physical activity each day

✓ physically active play, scootering, cycling, walking, running

Start encouraging activity early
Babies and toddlers

✓ tummy time, crawling, active singing, encouragement, active toys

Chief Medical Officer (2011). Start active, stay active, Department of Health, Start4Life #BetStart 2016
British Heart Foundation Practical ideas for physically active play
UK physical activity infographic for children and young people

Physical activity
for children and young people
(5–18 Years)

Be physically active

Aim for at least 60 minutes everyday

Include muscle and bone strengthening activities
3 TIMES PER WEEK

Sit less

Move more

Find ways to help all children and young people accumulate at least 60 minutes of physical activity everyday

UK Chief Medical Officers' Guidelines 2011 Start Active, Stay Active: www.bit.ly/startactive

Start active, stay active: infographics on physical activity PHE 2016
Children 5-18 years old
Minimum physical activity guidelines

At least 1hr of physical activity each day (moderate-vigorous intensity) up to several hours

Strong evidence for the association between physical activity and health outcomes in 5-11 year olds

![Table showing associations between physical activity and health outcomes]

UK Adult physical activity infographic 2015

What should you do?

For a healthy heart and mind

Be Active

To keep your muscles, bones and joints strong

Sit Less

To reduce your chance of falls

Build Strength

Improve Balance

MINUTES PER WEEK

VIGOROUS MODERATE

75 OR 150

BREAK UP SITTING TIME

2 DAYS PER WEEK

A COMBINATION OF BOTH

VIGOROUS INTENSITY (DIFFICULTY TAKING A STEP)
MODERATE INTENSITY (ABLE TO TALK)

Something is better than nothing.

Start small and build up gradually:
just 10 minutes at a time provides benefit.

MAKE A START TODAY: it's never too late!

UK Chief Medical Officers’ Guidelines 2011

Start active, stay active: infographics on physical activity PHE 2016
How much physical activity should you do?

Adults (19 to 64) should aim for at least **150 minutes** of moderate intensity activity, in bouts of 10 minutes or more, each week.

This can also be achieved by 75 minutes of vigorous activity across the week or a mixture of moderate and vigorous.

All adults should undertake muscle strengthening activity, such as:
- Exercising with weights
- Yoga
- Or carrying heavy shopping

Minimise the amount of time spent sedentary (sitting) for extended periods.
What counts as moderate physical activity

Any physical activity is better than none. It is never too late to get more active to improve health. Activities could include:

- walking
- gardening
- hiking
- dancing
- cycling
- active recreation
- swimming
## Aerobic exercise examples

<table>
<thead>
<tr>
<th>Exercise intensity (effort)</th>
<th>Practical definition (explaining to a patient)</th>
<th>Examples</th>
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<tbody>
<tr>
<td><strong>Moderate-intensity</strong></td>
<td>• ↑ RR &amp; ↑ HR&lt;br&gt;• Feel warmer &amp; may sweat if hot or humid</td>
<td>Brisk walking, stair climbing, bike riding, dancing, swimming</td>
</tr>
<tr>
<td><strong>Vigorous-intensity</strong></td>
<td>• ↑↑ RR &amp; ↑↑ HR&lt;br&gt;• Unable to continue a conversation</td>
<td>Playing sport, running, aerobics, cardio gym equipment</td>
</tr>
</tbody>
</table>

*Chief Medical Officer (2011). Start active, stay active, Department of Health.*

RR: Respiratory rate  
HR: Heart rate
AND “build strength, sit less, improve balance”

Adults (19-64)

Muscle strengthening 2 days per week

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<td>Muscle strengthening</td>
<td>High resistance with a weight where no more than 10-15 repetitions are possible</td>
<td>Standing from sitting, climbing stairs, heavy gardening, carrying heavy shopping, weight training, resistance bands, push ups, sit ups</td>
</tr>
</tbody>
</table>

*Chief Medical Officer (2011). Start active, stay active, Department of Health. Public Health England Health matters: getting every adult active every day 2016*
Exercise in pregnancy

UK CMO Physical Activity Infographic 2017 to be inserted when launched

Tommy's guide to exercise in pregnancy
Older individuals >64 years old
Minimum physical activity guidelines

1. Strengthening
2. Balancing & coordination

Additional health aims to ↓ falls & ↑ independence

British Heart Foundation
advice for working with older frail adults

Chief Medical Officer (2011). Start active, stay active, Department of Health.
How active is your nation?

Over 5 million deaths per year are due to inactivity, ranging from 1% to 19% of all deaths in different parts of the world.
How active are we?

1 in 4 women and 1 in 5 men in England are classed as physically inactive – doing less than 30 minutes of moderate physical activity per week.

Only 34% of men and 24% of women undertake muscle-strengthening activities at least twice a week.

Men are more likely than women to average 6 or more hours of total sedentary (sitting) time on both weekdays and at weekends.
UK Physical activity data
What is the activity level in your area and what impact could you have on non-communicable diseases?

Public Health England, Physical activity data

Public Health England Health matters: getting every adult active every day 2016
Active and inactive groups

Those **most** likely to be active
- males 16-24 years old 83%
- females 35-44 years old 66%

Elderly (>75 years old) **least** likely to be active
- males 30%
- females 13%
Specific groups
Obese

• Less likely to be active

• Preferences
  – Supervised
  – People of the same sex & age
  – Team-based
  – Fixed time with scheduled sessions

Public Health England Health matters: getting every adult active every day 2016
Specific groups
Ethnic origin

• South East Asian & Chinese less likely to be physically active.

• Bangladeshi’s have lowest level of physical activity (double the proportion of sedentary people).

Public Health England Health matters: getting every adult active every day 2016.
Specific vulnerable groups
Learning disabilities

- Poor access and support in health care
- Same need to get active against NCDs risk

- Good projects/practice in football/rugby in the UK
- High risk group for obesity, inactivity, inclusion
WHO targets to reduce non-communicable diseases 25% reduction in non communicable diseases by 2025
NHS commissioners:

• Inspire local action by showing national leadership on physical activity
• Integrate physical activity through clinical commissioning pathways
• Demonstrate local leadership to activate networks of professionals to promote physical activity in clinical care
• Integrate physical activity into clinical assessment and techniques such as motivational interviewing
• Support local physical activity champions in clinical settings to help energise the environment and signpost support and activity opportunities for patients and staff
• Integrate active lifestyle messages into every service, so every contact counts

Public Health England: Everybody active everyday 2014
Health matters: getting every adult active every day (2016)
The impact you can have because... brief physical activity advice works!

- Meta-analysis of advice from health professionals to inactive individuals

- >12 month follow-up (physical activity)

- Brief advice almost as effective as intensive intervention

Physical activity advice: a good choice for all health care professionals and advocates!

Brief advice number needed to treat (NNT)

• Outcome physical activity >12 months
  – Physical activity advice **NNT = 12**

• Outcome not smoking >12 months
  – Smoking cessation advice **NNT = 50-120**

• But only addressed 20-32% of the time in primary care

**References**

YOUR role as a health professional

Make Every Patient Contact Count

From cradle ...... to ...... grave

Help them to be more physically active

Department of Health: A Framework for Personalised Care
Public Health England: Everybody active, every day
Public Health England: Everybody active, every day
In summary

1. Physical activity is ridiculously good for patient health

2. It helps prevent and treat many conditions

3. Most of your patients don’t do enough physical activity

4. Physical activity is a “Wonder Drug” that you can prescribe