**Practice Integration & Lifelong Learning**

**CME ARTICLE**

**Prescribing health: exercise**

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During a recent consultation, Madam Fong was exceptionally agitated. She was feeling distressed over the number of medications she had had to take for her hypertension and hyperlipidaemia for the past five years. She also shared frankly that there had been many occasions where she had to fight the impulse to simply stop all her medications. She requested that the number of medications prescribed to her at this consultation be reduced, as she felt that they could not treat her problems but were making her more lethargic. She also wanted to know whether there were any alternatives to medications.

**HOW RELEVANT IS THIS TO MY PRACTICE?**

Physical inactivity is a growing public health concern. It causes a variety of chronic diseases and health complications, including obesity, heart disease, diabetes mellitus, hypertension and osteoporosis. The 2010 National Health Survey has found that 39.1% of Singapore residents are physically inactive and 10.8% of residents aged 18–69 years are obese.¹

Increased physical activity has been shown to be effective in the treatment and prevention of chronic diseases, in addition to improving an individual’s overall health.²⁻⁶ Therefore, healthcare providers, including family physicians, should review and assess each patient’s physical activity level at every visit. They should either prescribe appropriate physical activity or refer the patient to a certified health and fitness professional to get an exercise clearance. Exercise Is Medicine Singapore (EIMS)⁷ is a public health initiative that has been set up to advocate exercise as part of the prevention and treatment of chronic diseases.

**BENEFITS OF EXERCISE**

Regular physical activity at the correct intensity:
- Reduces the risk of death by up to 40%²⁻⁶,¹⁰⁻¹⁶
- Lowers the risk of stroke by up to 27%¹⁷⁻¹⁸
- Reduces the incidence of diabetes mellitus by at least 30%³⁻⁵,¹⁹
- Reduces the incidence of high blood pressure by up to 50%²⁰
- Can reduce mortality and risk of recurrent breast cancer by almost 50%²¹
- Can lower the risk of colon cancer by 27%²²⁻²⁴
- Can reduce the risk of developing Alzheimer’s disease by one-third²⁵
- Can decrease depression as effectively as medications or behavioural therapy²⁶

A major concern when prescribing exercise is the increased risk of sudden cardiac deaths and myocardial infarction associated with vigorous physical exertion. However, the risk of cardiac events is very low in healthy individuals performing moderate-intensity activities.¹⁷⁻²⁶ Balancing the benefits of exercise, the risk of inactivity and the relatively rare yet serious side effects of exercise, almost all patients will benefit from physical activity, although some may require modifications to, or restrictions on, their exercise programme. For patients with chronic diseases, risk stratification and exercise screening should be performed prior to the implementation of an exercise regimen.²⁹

**HOW TO PRESCRIBE EXERCISE?**

Preparticipation health screening

Physical Activity Readiness Questionnaire (PAR-Q)³⁰ is a self-guided, seven-question screening tool that can quickly identify conditions or risk factors that require further assessment. It is commonly available at sports facilities and is recommended for those who wish to start exercising. Table I is a summary of the PAR-Q. If an individual answers ‘no’ to all seven questions, the person is at low risk for health complications and it is generally safe to begin an exercise programme at any intensity without supervision. For those who answer ‘yes’ to at least one of the seven questions (e.g. most patients with chronic diseases), risk stratification is necessary before they can proceed to exercise.

**Risk stratification**

The algorithm⁴¹ presented in Fig. 1 outlines the risk stratification process. The purpose of this process is to determine the patient’s risk level based on the recommendations of the American College of Sports Medicine. Table II lists the cardiovascular risk

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factors used in the risk stratification process. Apart from high serum high-density lipoprotein (HDL), a score of 1 is added to the patient’s total risk factor score for each risk factor present. A score of 1 is subtracted if the patient has high serum HDL.

Patients with known cardiovascular, pulmonary or metabolic disease, or those who exhibit signs and symptoms of these diseases, are considered at ‘High risk’. Patients with no signs, symptoms or prior history of disease are stratified into either ‘Moderate risk’ (if they score 2 or more for risk factors) or ‘Low risk’ (if they score less than 2 for risk factors).

Patients who are at ‘Low risk’ may begin exercising without further assessment, while those who are at ‘Moderate risk’ can safely perform light- to moderate-intensity exercises. However, patients at ‘Moderate risk’ should undergo further medical assessment before participating in vigorous-intensity exercise. Patients who are at ‘High risk’, should undergo further medical testing before starting an exercise programme.

COMPONENTS OF AN EXERCISE PRESCRIPTION

When prescribing an exercise programme, it is useful to consider the FITT principle: Frequency, Intensity, Time (or duration) and Type. Fig. 2 shows a sample of an exercise prescription.

**Frequency**

This refers to the number of times the activity is performed each week. The recommended frequency for aerobic exercise is 3–5 times a week, coupled with resistance training 2 times or more a week.

**Intensity**

This refers to the level of vigour at which the activity is performed. Intensity of exercise may be measured in terms of
the following: (a) the percentage of the patient’s maximal heart rate, i.e. HR Max, using the formula, 220 minus the patient’s age (220−age); (b) metabolic equivalents (METs), which represent the absolute energy expenditure as compared to a person’s resting metabolic rate; or (c) the ‘talk test’, which is the simplest but least objective measure of intensity. Tables III and IV illustrate the different measures of exercise intensity and common physical activities with their associated intensity in METs, respectively.[33-35]

### Time

This refers to the length of time that the activity is performed. Bouts of exercise that lasts for 10 minutes are acceptable if the individual accumulates enough to give a total time of at least 20–60 minutes on a given day.

### Type

**Aerobic (cardiovascular)** exercises include walking, jogging, cycling, swimming, dancing and inline skating. A total of 150 minutes[156] of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity aerobic exercise per week is recommended for most adults. To promote or maintain weight loss, 300 minutes per week of moderate exercise or 150 minutes of vigorous exercise per week is recommended. Performing intermittent sessions of 10 minutes to accumulate the minimum duration is an effective alternative to continuous exercise.

**Resistance (strength) training** includes using weight machines at a gymnasium, using free weights, lifting one’s body weight against gravity and using elastic cords.

Flexibility exercises include static stretching, which is recommended in any exercise-training programme for all adults and should be performed at least 2–3 times a week for at least 10 minutes.

### Progression

Progression involves increasing any of the FITT components. The recommended rate of progression depends on the individual’s

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### Table III. Measures of exercise intensity for aerobic activities.

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Talk test (subjective measure)</th>
<th>Maximal HR % (physiological measure)</th>
<th>METs (absolute measure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Talk and sing</td>
<td>&lt; 64</td>
<td>&lt; 3</td>
</tr>
<tr>
<td>Moderate</td>
<td>Talk but can’t sing</td>
<td>64–76</td>
<td>3–6</td>
</tr>
<tr>
<td>Vigorous</td>
<td>Difficult talking</td>
<td>&gt; 76</td>
<td>≥ 6</td>
</tr>
</tbody>
</table>

HR: heart rate; METs: metabolic equivalent units (1 MET = 3.5 mL.kg/min)[13]

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### Table IV. General physical activities defined by level of intensity (modified from the guidelines of US Centers for Disease Control and Prevention[33]).

<table>
<thead>
<tr>
<th>Light &lt; 3 METs</th>
<th>Moderate 3-6 METs</th>
<th>Vigorous &gt; 6 METs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household &amp; occupation</td>
<td>Household &amp; occupation</td>
<td>Household &amp; occupation</td>
</tr>
<tr>
<td>• Watering plants</td>
<td>• Mopping the floor</td>
<td>• Carrying heavy (12 kg or more) loads, e.g. groceries up a flight of stairs</td>
</tr>
<tr>
<td>• Doing light household tasks such as lightly cleaning the sink and toilet</td>
<td>• Hand-washing the car</td>
<td>• Moving, shifting or pushing heavy (35 kg or more) objects, e.g. furniture</td>
</tr>
<tr>
<td>• Making the bed</td>
<td>• Cycling to work or for pleasure</td>
<td>• Vacuuming the carpet</td>
</tr>
<tr>
<td>• Ironing</td>
<td>• Walking the dog</td>
<td>• Gardening and raking the leaves, light shoveling, weeding while standing or bending</td>
</tr>
<tr>
<td>• Food preparation</td>
<td>• Gardening and raking the leaves</td>
<td>• Scrubbing the floor or bathtub while on hands and knees</td>
</tr>
</tbody>
</table>

Leisure time & sports
- Billiards
- Playing musical instruments
- Line dancing
- Ballroom dancing
- Cycling on flat ground
- Badminton, recreational doubles
- Recreational swimming
- Tennis, recreational doubles
- Cycling on steep, uphill terrain
- Stationary cycling using vigorous effort
- Jumping jacks
- Volleyball
- Vigorous cycling
- Aerobic dancing (moderate to high impact) or step aerobics
- Most competitive sports such as football, basketball, soccer and rugby

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**Fig. 2 Sample exercise prescription.**
health status, exercise tolerance and exercise programme goals. Frequency, intensity and duration of exercise are gradually adjusted over the next 4–8 months, or over a longer period for elderly or deconditioned patients. Progression should be made gradually so as to avoid injury. Any adverse effects of the increased volume should be monitored and adjustments should be made if the exercise is not well tolerated.

Motivation
Mobilising motivation is the most difficult part in the process of exercise prescription. In order to engage the patient in behavioural changes, it is important to understand the six stages of change (i.e. precontemplation, contemplation, preparation, action, maintenance and termination) and act accordingly in order to achieve success and prevent relapse. One way to set effective targets is through the use of the SMART (specific, measurable, achievable, realistic and time-framed [i.e. with a target date set]) goal method.27

Madam Fong was risk-stratified as ‘Moderate risk’, and prescribed a moderate-intensity exercise programme, which consisted of brisk walking for 30 minutes, 5 times a week (for a total of 150 minutes per week), starting with shorter sessions (10–15 minutes) and adding 5-minute increments every 2–4 weeks. She was also advised to do resistance exercises twice a week using light weights at the community centre gymnasium, starting with 1–2 sets of 8–12 repetitions per set, with a weight that she could lift comfortably 12–15 times. She focused on the major muscle groups in her upper and lower limbs. She chose to do resistance exercises on Tuesdays and Fridays, which ensured that there was a minimum 48-hour rest period in between sessions. All these measures helped avoid injury and muscle soreness.

Warm-up and cool down exercises lasting 5–10 minutes were performed before and after each session of aerobic or resistance exercises. Stretching exercises were performed after cool-down exercises. She was advised on ‘red flags’ to watch out for when exercising. These include giddiness, chest pain and palpitations. She was also advised on dietary modification.

At her review 3 months later, Madam Fong saw an improvement in her blood pressure and a weight reduction after cool-down exercises. She was advised on ‘red flags’ to watch out for when exercising. These include giddiness, chest pain and palpitations. She was also advised on dietary modification.

ABSTRACT
The healthcare challenges in developed countries centre around the rise of chronic conditions and obesity. There is a call to shift the focus toward the primary prevention of these conditions. Clinicians will need to move beyond the comfort of prescribing pharmaceuticals and expand the scope to prescribing health, i.e. exercise. We discuss an easy-to-follow exercise prescription to highlight some essential principles and useful tools that can help busy family practices achieve this.

Keywords: EIMS, exercise prescription, primary care, Singapore, SMART

REFERENCES
1. Physical inactivity causes a variety of chronic diseases and health complications, including obesity, heart disease, diabetes mellitus, hypertension and osteoporosis.  
2. Exercise is effective in the treatment and prevention of chronic diseases.  
3. All physicians should review and assess each patient’s physical activity level at every visit.  
4. All physicians should be able to either prescribe appropriate physical activity or refer the patient to a certified health and fitness professional to get exercise clearance.  
5. Regular exercise at the correct intensity can reduce depression as effectively as medication or behavioural therapy.  
6. The risk for sudden cardiac death and myocardial infarction is high in healthy individuals performing moderate-intensity activities.  
7. For patients with chronic diseases, risk stratification and exercise screening should be performed prior to starting an exercise programme.  
8. If a patient answers ‘no’ to all questions in the Physical Activity Readiness Questionnaire (PAR-Q), the patient can safely begin an exercise programme at any intensity without supervision.  
9. Based on the recommendations of the American College of Sports Medicine (ACSM), patients with known cardiovascular, pulmonary or metabolic diseases are considered at high risk.  
10. Patients who are at high risk, based on the ACSM’s recommendations, are not required to undergo further medical testing before starting an exercise programme.  
11. Metabolic equivalents represent the absolute energy expenditure as compared to a person’s resting metabolic rate.  
12. The ‘talk test’ is the most objective way to measure exercise intensity.  
13. Brisk walking is an example of a moderate intensity exercise.  
14. Aerobic exercises include walking, jogging, cycling and weight lifting.  
15. Flexibility exercises are recommended in any exercise-training programme for adults and should be performed at least 2–3 times a week for at least 10 minutes.  
16. A total of 150 minutes of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity aerobic exercise per week is recommended for most adults.  
17. To promote or maintain weight loss, 300 minutes per week of moderate exercise is recommended.  
18. Progression of exercise should be made gradually to avoid injury.  
19. Mobilising motivation is the easiest part in the process of exercise prescription.  
20. The SMART goal method is a way to achieve effective targets.