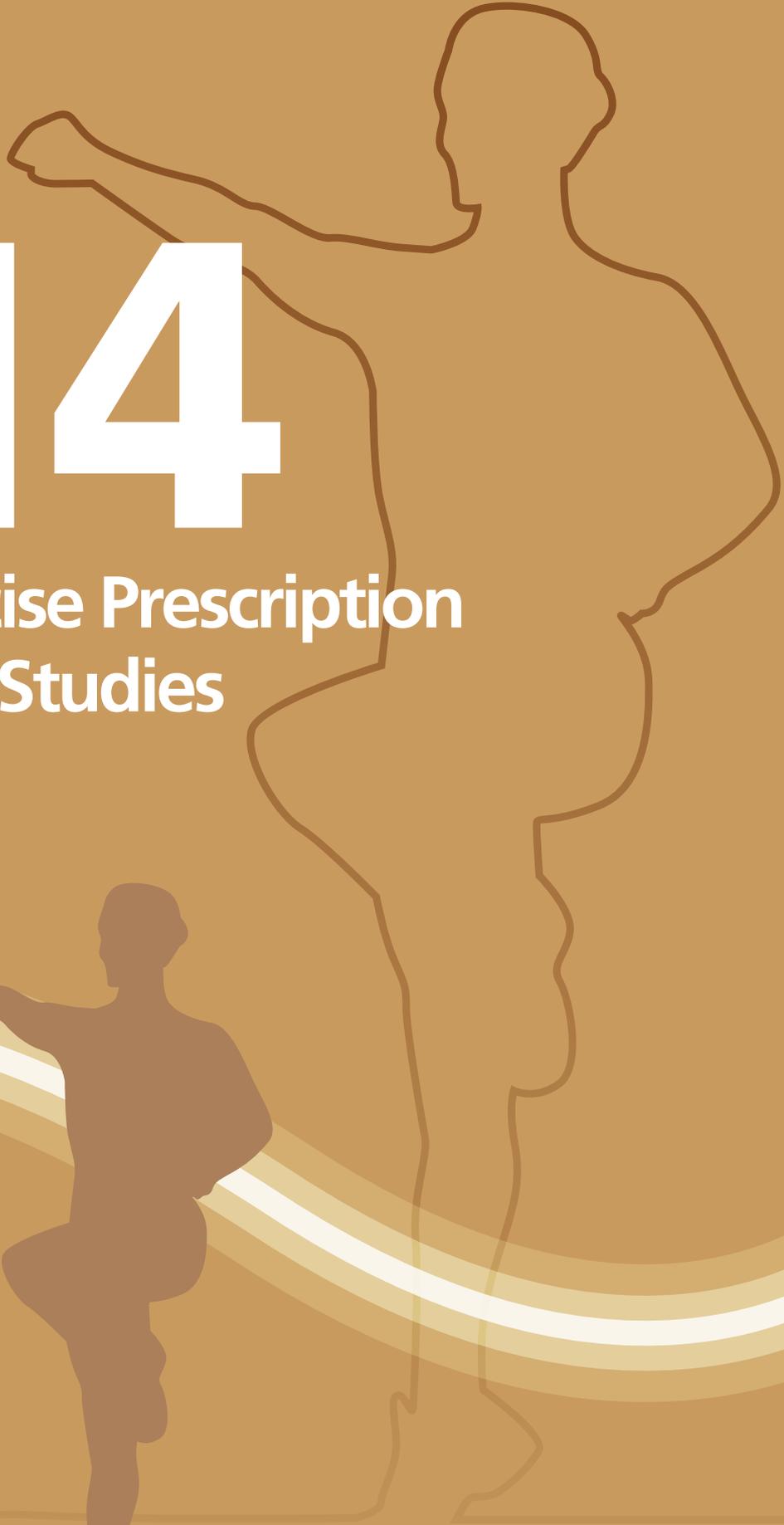


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Exercise Prescription Case Studies



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Case 1 – Risk Stratification

CY CHAN is a 43-year-old man with known history of hypertension on medication under good control. He works as a construction site labourer. He smokes one and a half pack of cigarettes per day, and has done so for over 25 years. His father died from a heart attack at age 60. CY has no signs and symptoms of cardiorespiratory disease. He has just completed a body check-up and the report showed body height of 173cm and body weight of 80kg, whereas blood test showed total cholesterol was found to be 8 mmol/L and fasting glucose of 5.4 mmol/L.

You are going to suggest CY to perform regular aerobic and muscle-strengthening exercises as some primary preventive measures for future cardiovascular events. Before that, you would like to stratify his risk to see if he should need further medical workup or exercise testing before increasing his physical activity level.

What risk stratification category is Mr. CHAN in?

Mr. CHAN has FOUR risk factors: cigarette smoking, hypertension (because he is on medication, even though his current blood pressure is under controlled), hypercholesterolaemia (based only on knowing his total cholesterol), and obesity (his BMI is 26.7kg/m^2 , which is regarded as obese according to the WHO's standard Asian classification of weight status).

He would not be classified as sedentary because of his physically active job nature. He does not have a family history of heart disease for screening purposes, because his father's heart attack occurred after the age of 55. His fasting glucose is normal. Although Mr. CHAN is considered to be young (less than 45), he is in the moderate-risk category, because he does not have any signs or symptoms of cardiorespiratory disease or know cardiovascular, pulmonary or metabolic disease.

At this stage, for performing low- to moderate-intensity physical activity, further medical workup and exercise testing are not necessary, although a sub-maximal exercise test of his cardiovascular fitness can offer a comprehensive appraisal of his condition. However, for embarking

on a vigorous exercise programme, he would need further medical clearance from specialists or equivalent professionals according to the recommendations from the American College of Sports Medicine.



Case 2 – Prescribing Exercise Intensity

KC CHAN is a 56-year-old, moderate-risk male client. His old friend suffered a heart attack a week ago and he is worried about his own health. He wants to control his body weight so as to reduce his risk of heart disease. You are going to advise him to embark on moderate-intensity aerobic exercises on regular basis. His resting heart rate is 86 bpm.

What would be an appropriate target heart rate (HR) range for Mr. CHAN?

You could estimate Mr. CHAN's maximal heart rate (HR_{max}) as $220 - 56 = 164$ bpm.
You may prescribe his target HR range by the following methods:

(1) % HR_{max} Method

The target HR range for performing moderate-intensity aerobic physical activity is 64 – 76% of HR_{max} .

$$\text{Lower target HR} = 164(0.64) = 105\text{bpm}$$

$$\text{Upper target HR} = 164(0.76) = 125\text{bpm}$$

(2) %HRR (Heart Rate Reserve) Method

The target HR range for performing moderate-intensity aerobic physical activity is 40 – 59% of HRR.

$$\text{Lower target HR} = (0.4)(164-86)+86 = 117\text{bpm}$$

$$\text{Upper target HR} = (0.59)(164-86)+86 = 132\text{bpm}$$

% HR_{max} Method of prescribing exercise intensity is simple to use and therefore very popular. However, it does not account for resting HR, which means clients with a slower resting HR would have a relatively higher exercise intensity compared to those with a faster resting HR. The %HRR Method avoids the problems association with these variations in resting HR.

Case 3 – Prescribing Exercise to Healthy Adult

SH CHAN is 40-year-old housewife seeing you for contact dermatitis. She enjoys good past health and has got no other significant risk factors for cardiovascular disease and is in the low risk category for exercise participation. Upon further exploration, she is interested in embarking on more physical activity for better health.

Design a comprehensive exercise prescription for Ms. CHAN.

You could apply the FITT principle (Frequency, Intensity, Time [duration] and Type [mode]) for devising an appropriate exercise prescription for Ms. CHAN.

▲ Aerobic Physical Activity

(1) Frequency

Perform moderate-intensity aerobic physical activity on at least 5 days per week or vigorous-intensity activity on at least 3 days per week, or a weekly combination of 3 to 5 days per week of moderate- and vigorous-intensity exercise.

(2) Intensity

A combination of moderate- and vigorous-intensity aerobic exercise is recommended. You could calculate a target heart rate range based on 64-93% maximal heart rate or based on 40-84% heart rate reserve.

(3) Time [duration]

Perform moderate-intensity aerobic exercise for at least 30 mins per day to a total of at least 150 mins per week, or vigorous-intensity exercise for at least 20 mins per day to a total of at least 75 mins per week. Performance of intermittent exercise of at least 10 mins in duration to accumulate the minimum duration prescribed above is an effective alternative to continuous exercise.

For additional and more extensive health benefits, you could advise her to increase her aerobic physical activity to 300 mins (5 hours) a week of moderate-intensity, or 150 mins a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity activity.

(4) Type [mode]

Aerobic exercise should be rhythmic in nature that involves large muscle groups and best require little skill to perform. Depending on Ms. CHAN's present skill and fitness, exercise and sports requiring skill to perform or higher level of fitness could also be recommended.

▲ Muscle-strengthening Physical Activity

(1) Frequency

Perform resistance exercise of each muscle group on 2 to 3 days per week with at least 48 hours separating the exercise training sessions for the same muscle group.

(2) Intensity

A load of 60 to 80% of 1 repetition maximum is recommended for resistance exercises.

(3) Time [duration]

8 to 10 resistance exercises are recommended. Each muscle group should be trained for a total of 2 to 4 sets with 8 to 12 repetitions per set and a rest interval of 2 to 3 mins in between.

(4) Type [mode]

Progressive weight training programme, weight bearing calisthenics, stair climbing and other muscle strengthening activities that use all major muscle groups are recommended. Multi-joint exercises involving more than one muscle group and targeting agonist and antagonist muscle groups are recommended, while single-joint exercises targeting major muscle groups may also be included. You should advise her to receive professional instruction in proper resistance exercise techniques.

▲ Others

A stretching exercise of at least 10 mins involving the major muscle tendon groups of body (i.e., neck, shoulder, upper and lower back, pelvis, hips and legs) with 4 or more repetitions (with 10 to 30 seconds for a static stretch) per muscle group performed on a minimum of 2 days per week is also recommended. Preferably, stretching activities are performed on all days that aerobic or muscle-strengthening activity is performed.

▲ Initiation and Progression of Exercise

Besides setting the recommended level of physical activity, you could also prescribe the rate of progression of exercise. Gradual increase in the volume of physical activity over time to pursue the above prescribed level is recommended.

▲ Follow Up

You must monitor Ms. CHAN's response to the exercise prescription. If she has difficulty completing this level, you need to reduce the intensity/duration. If she finds that at this level is very easy, increase the intensity/duration until it feels somewhat hard.

Case 4 – Prescribing Exercise to Sedentary Old Man

WM CHAN is 68-year-old man, who used to enjoy a sedentary lifestyle. His past medical history is unremarkable and he has got no other significant risk factors for cardiovascular disease and is in the moderate risk category for exercise participation.

Design a comprehensive exercise prescription for Mr. CHAN.

You could apply the FITT principle (Frequency, Intensity, Time [duration] and Type [mode]) for devising an appropriate exercise prescription for Mr. CHAN.

▲ Aerobic Physical Activity

(1) Frequency

Perform moderate-intensity aerobic physical activity on at least 5 days per week.

(2) Intensity

Moderate-intensity aerobic exercise is recommended. On a scale of 0 to 10 for level of physical exertion, 5 to 6 is for moderate intensity. Alternatively, you could calculate a target heart rate range based on 64-76% maximal heart rate or based on 40-59% heart rate reserve. (For embarking on vigorous-intensity aerobic exercise, further medical workup and exercise testing is necessary.)

(3) Time [duration]

Perform moderate-intensity aerobic exercise for 30 to 60 mins per day to a total of 150 to 300 mins per week. Performance of intermittent exercise of at least 10 mins in duration to accumulate the minimum duration recommended above is an effective alternative to continuous exercise.

(4) Type [mode]

Walking is most commonly recommended type of activity. Aquatic exercise and stationary cycle exercise may be advantageous for a sedentary old man with limited tolerance for weight bearing activity.

▲ Muscle-strengthening Physical Activity

(1) Frequency

Perform resistance exercise at least 2 days per week.

(2) Intensity

Moderate-intensity (5 to 6) on a 10-point scale is recommended.

(3) Time [duration]

8 to 10 resistance exercises are recommended and each muscle group should be trained for a total of 1 or more sets with 10 to 15 repetitions per set.

(4) Type [mode]

Progressive weight training programme, weight bearing calisthenics, stair climbing and other muscle strengthening activities that use all major muscle groups are recommended. For resistance training involving use of weight-lifting machines, initial training sessions should be supervised and monitored by personnel who are sensitive to special needs of older adults.

▲ Others

For enhancing Mr. CHAN's physical flexibility, stretching exercise of at least 10 mins involving the major muscle tendon groups of body with 4 or more repetitions (with 10 to 30 seconds for a static stretch) per muscle group performed on a minimum of 2 days per week is recommended.

For improving balance, agility and proprioception, neuromuscular exercises is also recommended at least 2 days per week.

▲ Initiation and Progression of Exercise

Besides setting the recommended level of physical activity, you could also prescribe the rate of progression of exercise. Since Mr. CHAN used to be sedentary, the intensity and duration of physical activity to be performed should be low at the beginning of the exercise programme for enhancing compliance and ensuring safety. Gradual increase in the volume of physical activity over time to pursue the above prescribed level is recommended. Subsequent to a period of adaptation and improved musculo-tendinous conditioning, Mr. CHAN may also choose to follow guidelines for younger adults in the long run.

▲ Follow Up

You must monitor Mr. CHAN's response to the exercise prescription. If he has difficulty completing this level, you need to reduce the intensity/duration. If he finds that at this level is very easy, increase the intensity/duration until it feels somewhat hard.

Case 5 – Prescribing Exercise to Obese Adult

CT CHAN is 35-year-old female with a BMI of 28.5kg/m². She asks you for the types of exercise she should do for shaping up her body. Her past medical history is unremarkable and she has got no other significant risk factors for cardiovascular disease and is in the low risk category for exercise participation.

Design a comprehensive exercise prescription for Ms. CHAN.

You could apply the FITT principle (Frequency, Intensity, Time [duration] and Type [mode]) for devising an appropriate exercise prescription for Ms. CHAN.

▲ Aerobic Physical Activity

(1) Frequency

Perform aerobic physical activity on at least 5 days per week.

(2) Intensity

Moderate- to vigorous-intensity aerobic exercises are recommended. Subject to Ms. CHAN's availability and ability, she may prefer doing vigorous exercise as it is less time consuming. You could calculate a target heart rate range based on 64-93% maximal heart rate or based on 40-84% heart rate reserve.

(3) Time [duration]

Perform 45 to 60 mins of moderate-intensity activity a day (corresponding to approximately 225 to 300 mins/week of moderate-intensity physical activity or lesser amounts of vigorous physical activity)

(4) Type [mode]

Walking is most commonly recommended type of activity. Weight-bearing physical activity may be difficult for some obese individuals particularly for those with joint problems. For these individuals, gradually increasing non-weight-bearing moderate-intensity physical activities (e.g. cycling, swimming, water aerobics, etc.) should be encouraged.

▲ Muscle-strengthening Physical Activity

(1) Frequency

Perform resistance exercise of each muscle group on 2 to 3 days per week with at least 48 hours separating the exercise training sessions for the same muscle group.

(2) Intensity

A load of 60 to 80% of 1 repetition maximum is recommended for resistance exercises.

(3) Time [duration]

8 to 10 resistance exercises are recommended. Each muscle group should be trained for a total of 2 to 4 sets with 8 to 12 repetitions per set and a rest interval of 2 to 3 mins in between.

(4) Type [mode]

Progressive weight training programme, weight bearing calisthenics, stair climbing and other muscle strengthening activities that use all major muscle groups are recommended.

▲ Initiation and Progression of Exercise

If Ms. CHAN is sedentary, she should build up to her physical activity targets over several weeks, starting with 10 to 20 mins of physical activity every other day during the first week or two, to minimise potential muscle soreness and fatigue for enhancing compliance.

If she chooses to incorporate vigorous intensity activity into her programme, she should do this gradually and after an initial 4–12 week period of moderate-intensity activity.

With additional social and technical support (e.g. inclusion of family members in programme, small group meetings with exercise coaches or small monetary incentives), prescribing higher physical activity targets (i.e. >300 mins per week of moderate-intensity physical activity) may result in significantly greater weight loss.

▲ Follow Up

You must monitor Ms. CHAN's response to the exercise prescription. If she has difficulty completing this level, you need to reduce the intensity/duration. If she finds that at this level is very easy, increase the intensity/duration until it feels somewhat hard.

