# Topic: Physical Activity/ Exercise & Diabetes: A Guide for DM nurses

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# Benefit of physical activity

For general population

* ↓ BP
* better control of BW
* ↑ level of HDL
* improved mood and better sleep
* stress management

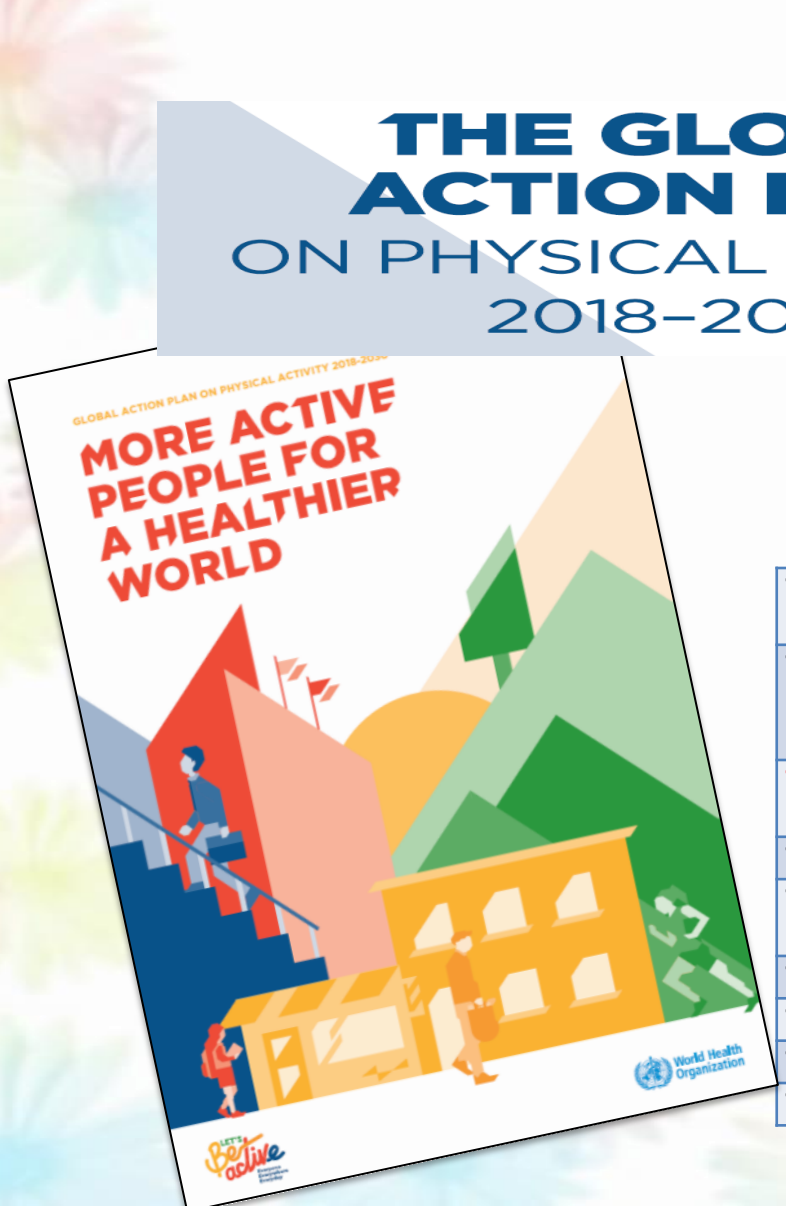
For DM patients

* control blood glucose level
* lower the risk of developing CVD
* lower risk of all-cause and CV mortality (observational studies)

Colberg SR, et al. Diabetes Care 2010; 33:e147-e167

Church TS el al. Diabetes Care 27:83-88, 2004

# Recent WHO and Local Strategy and Action Plan related to PA







| | |
|---|---|
| **Target 1** | A 25% relative reduction in risk of premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases |
| **Target 2:** | At least 10% relative reduction in the prevalence of binge drinking and harmful use of alcohol (harmful drinking/alcohol dependence) among adults and in the prevalence of drinking among youth |
| **Target 3:** | A 10% relative reduction in prevalence of insufficient physical activity among adolescents and adults |
| **Target 4:** | A 30% relative reduction in mean population intake of salt/sodium intake |
| **Target 5:** | A 30% relative reduction in prevalence of current tobacco use in persons aged 15+ years |
| **Target 6:** | Contain the prevalence of raised blood pressure |
| **Target 7:** | Halt the rise in diabetes and obesity |
| **Target 8:** | Prevent Heart attacks and strokes through drug therapy and counseling |
| **Target 9:** | Improve access to technologies and medicines to treat NCD |

# What are the major barriers to PA promotion ?

A systematic review found the major barriers to promote PA:

- Lack of time
- Lack of knowledge/training
- Lack of success with changing patient behaviour
- PA counselling not a priority/not relevant
- Lack of counselling protocols

McKenna et al (1998)

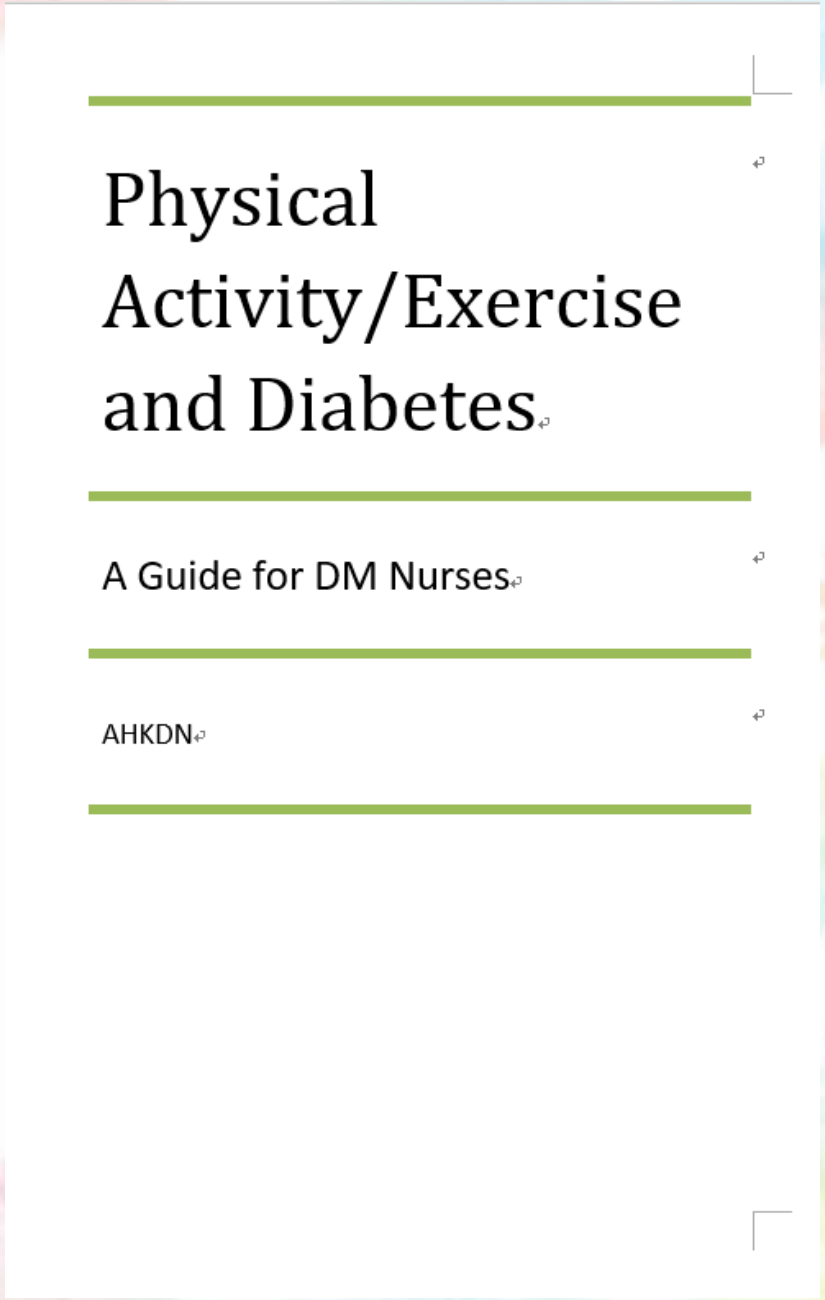
# Local situation : Current practice in promotion physical activity

- A small survey (n=17) to evaluate the knowledge of PA counselling among DM nurses in 4 DM centres

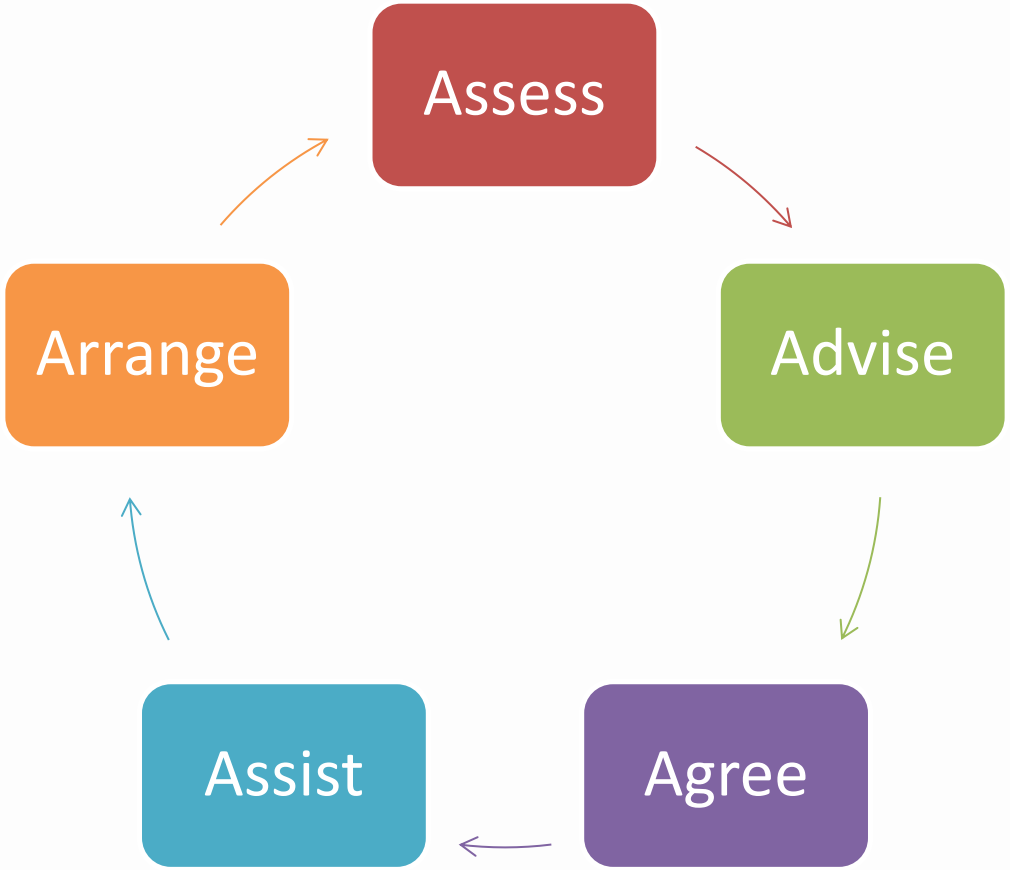
- Summary of results:
  - In general, nurses have good knowledge on PA counselling
  - 88% nurses do collect patient's PA data and assess their PA level and advise some PA to patients
  - Most nurses spend little time (<10min.) on PA counselling to patients
  - Only one-third (35%) frequently give specific activity plan to patients

# Aim of the EBP project

- To develop the evidence-based protocol for diabetes nurses to promote physical activity in clinical settings



# Counseling Protocol




The Five A's Model for Helping Patients Change Physical Activity Behavior
(Meriwether & Lee, 2008)

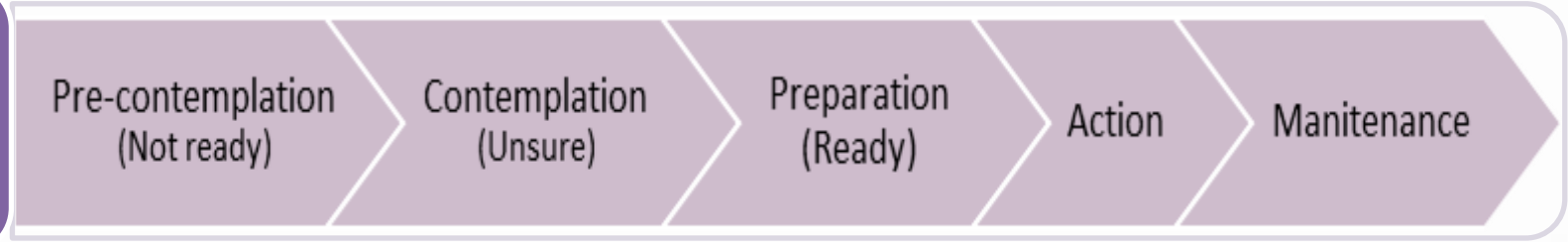
## Assess

- Assessment Tool: International Physical Activity Questionnaire (IPAQ short version for 15 - 69 years old)
- Guidelines for IPAQ data processing and analysis

## Advise

- Recommendation for physical activity

## Agree



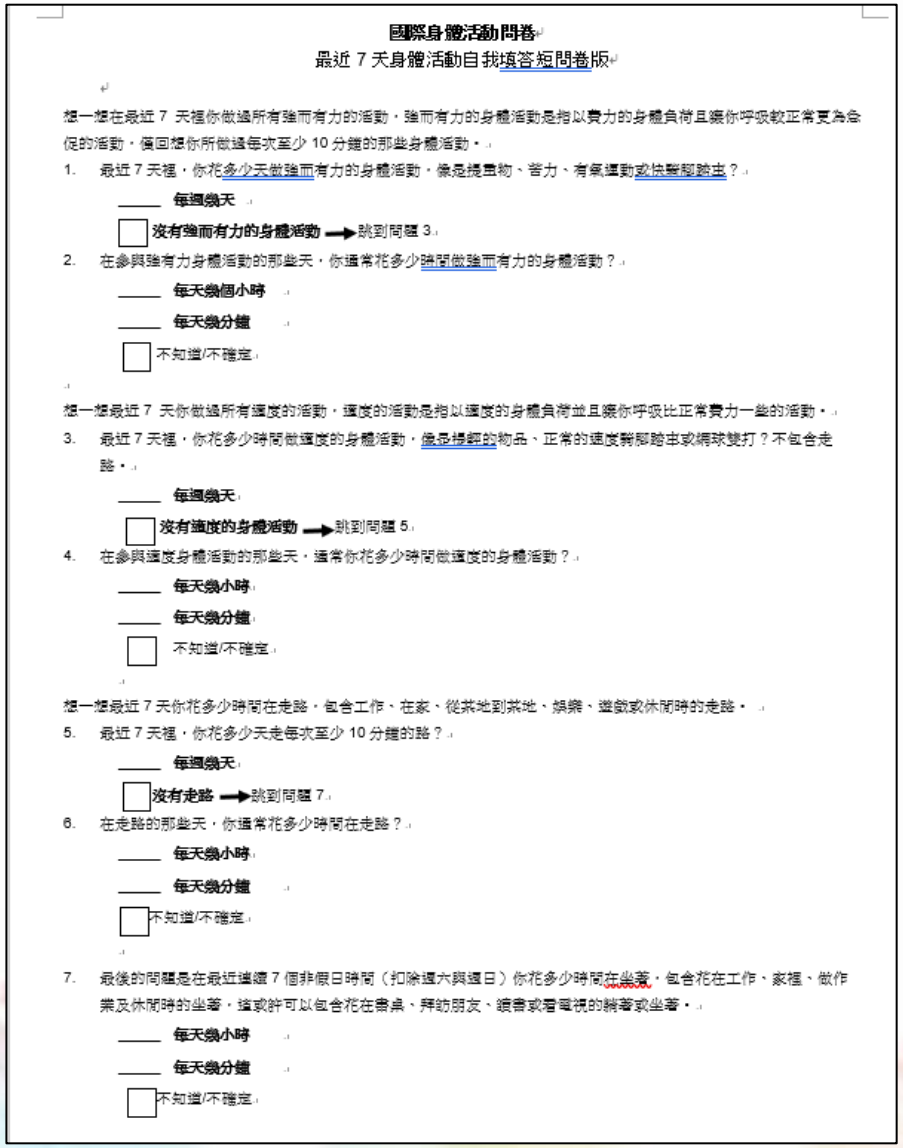

## Assist

- Printed support materials or internet-based resources
- Self monitoring tools e.g. pedometer

## Arrange

- Schedule a follow-up visit, provide phone or e-mail contact
- Refer additional assistance, e.g. physiotherapy
- Community-based programs

# Assessment Tool: IPAQ
# International Physical Activity Questionnaire (Short Version)



**國際身體活動問卷**

最近 7 天身體活動自我填答短問卷版

想一想在最近 7 天裡你做過所有強而有力的活動，強而有力的身體活動是指以費力的身體負荷且讓你呼吸較正常更為急促的活動，僅回想你所做過每次至少 10 分鐘的那些身體活動。

1. 最近 7 天裡，你花多少天做強而有力的身體活動，像是提重物、苦力、有氧運動或快騎腳踏車？

   ____ 每週幾天

   ☐ 沒有強而有力的身體活動 → 跳到問題 3

2. 在參與強有力身體活動的那些天，你通常花多少時間做強而有力的身體活動？

   ____ 每天幾個小時

   ____ 每天幾分鐘

   ☐ 不知道/不確定

想一想最近 7 天你做過所有適度的活動，適度的活動是指以適度的身體負荷並且讓你呼吸比正常費力一些的活動。

3. 最近 7 天裡，你花多少時間做適度的身體活動，像是提輕的物品、正常的速度騎腳踏車或網球雙打？不包含走路。

   ____ 每週幾天

   ☐ 沒有適度的身體活動 → 跳到問題 5

4. 在參與適度身體活動的那些天，通常你花多少時間做適度的身體活動？

   ____ 每天幾小時

   ____ 每天幾分鐘

   ☐ 不知道/不確定

想一想最近 7 天你花多少時間在走路，包含工作、在家、從某地到某地、娛樂、遊戲或休閒時的走路。

5. 最近 7 天裡，你花多少天走每次至少 10 分鐘的路？

   ____ 每週幾天

   ☐ 沒有走路 → 跳到問題 7

6. 在走路的那些天，你通常花多少時間在走路？

   ____ 每天幾小時

   ____ 每天幾分鐘

   ☐ 不知道/不確定

7. 最後的問題是在最近這週 7 個非假日時間（扣除週六與週日）你花多少時間在坐著，包含花在工作、家裡、做作業及休閒時的坐著，這或許可以包含花在書桌、拜訪朋友、讀書或看電視的躺著或坐著。

   ____ 每天幾小時

   ____ 每天幾分鐘

   ☐ 不知道/不確定

- To assess physical activity level of the patients
- Validity and reliability were examined in HK
- Time-efficient for clinical setting in HK
- Free of charge

# Workflow







**Assess**

Evaluate any contraindicating conditions

No

Yes

Advise
Agree
Assist

Progressive exercise

- Uncontrolled HT
- Severe autonomic neuropathy
- Severe peripheral neuropathy
- Unstable proliferative retinopathy
- Presence of non-optimal glycaemic control

Arrange
Follow up

# Recommended Physical Activity participation for persons with type 2 diabetes (from ADA position statement in 2016)

| | Aerobic | Resistance | Flexibility and balance |
|---|---|---|---|
| **Exercise** | 150 min or more of moderate-to-vigorous intensity activity weekly, spread over at least 3 days/week, with no more than 2 consecutive days without activity.<br><br>Shorter durations (minimum 75 min/week) of vigorous-intensity or interval training may be sufficient for younger and more physically fit individuals. | 2–3 sessions/week of resistance exercise on nonconsecutive days. | 2–3 times/week for older adults with diabetes. Yoga and tai chi may be included based on individual preferences to increase flexibility, muscular strength, and balance. |
| **Level of evidence** | Category B | Category B | Category C |

## Recommended Physical Activity participation for persons with type 2 diabetes (from ADA position statement in 2016)

- Adults with type 2 diabetes, interrupting prolonged sitting with 15 min of postmeal walking and with 3 min of light walking and simple body-weight resistance activities every 30 min improves glycemic control. (ADA, 2016)

# How to measure intensity of exercise

- Maximum heart rate
- Ratings of perceived exertion
- Metabolic equivalents (MET)

# Maximum heart rate

- **Moderate-intensity physical activity:** target heart rate = 50 to 70% of his or her maximum heart rate (220 – person's age)

- **Vigorous -intensity physical activity:** target heart rate = 70 to 85% of his or her maximum heart rate (220 – person's age)



# Ratings of perceived exertion

- Based on the subjective physical sensations a person experiences during physical activity, including:
  - increased heart rate
  - increased respiration or breathing rate
  - increased sweating
  - muscle fatigue

| RPE | Exertion Felt |
|---|---|
| 6 | No exertion at all |
| 7 | Extremely light |
| 8 | |
| 9 | Very light (easy walking slowly at a comfortable pace) |
| 10 | |
| 11 | Light |
| 12 | |
| 13 | Somewhat hard (It is quite an effort; you feel tired but can continue) |
| 14 | |
| 15 | Hard (heavy) |
| 16 | |
| 17 | Very hard (very strenuous, and you are very fatigued) |
| 18 | |
| 19 | Extremely hard (You cannot continue for long at this pace) |
| 20 | Maximal exertion |

Borg GA. Psychophysical bases of perceived exertion. Med Sci Sports Exerc. 1982;14(5):377-81.

# Metabolic equivalents (MET)

- Expressed as absolute expenditure of energy for a given activity.
- 1 MET is the rate of energy expenditure while sitting at rest (by convention: oxygen uptake of 3.5 mL/kg/min)
- Recommendation by the joint American College of Sports Medicine and American Heart Association exercise:
  - <3 METs: Light
  - 3-6 METs: Moderate
  - >6 METs: Vigorous

# Examples of Moderate Intensity Exercise ( spot)

| | |
|---|---|
| **Practising Tai Chi for 40 minutes** | 3.5-4.0 METs |
| **Playing table tennis for 40 minutes** | 3.5-4 METs |
| **Going on an excursion for 25 minutes:** | 5.5-6.5 METs |
| **Swimming for 25 minutes:** | 5.5-6.5METs |
| **Low impact aerobics for 30 minutes:** | 4.5-5.5METs |
| **Contemporary dance, jazz dance or hip-hop dance for** | 4.5-5.5 METs |
| **Fitness (multi-gym) for 50 minutes (weight training for main muscle groups with light to medium weights):** | 2.5-3.5 METs |
| **Practising yoga for 60 minutes** | 2.0-3.0 METs |
| **Social dance for 30 minutes (fast tempo)** | 4.5-5.5 METs |
| **Latin dance for 30 minutes** | 4.5-5.5 METs |
| **Cycling for 30 minutes (finish 8 km)** | 4.5-5.5METs |
| **Walking for 30 minutes (finish 3.2 km):** | 4.5-5.5METs |
| **Playing in a volleyball match for 45 minutes:** | 3.0-3.5METs |
| **Playing in a football match for 45 minutes:** | 3.0-3.5 METs |
| **Practising golf swings for 50 minutes:** | 4.5-5.5 METs |

Source: http://www.lcsd.gov.hk/en/sportforall/common/pdf/leaflet_e.pdf

## 體能活動與卡路里消耗

體適能專家根據過去幾十年來的科研報告，建議每週最少透過正規運動訓練消耗1000卡路里熱量，再配合採納活躍主動的生活模式，額外消耗多1000卡路里熱量（綜合而言，每週2000卡路里熱量消耗），可以大幅降低心臟病發風險，正面提升健康狀況。

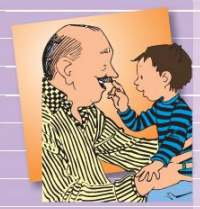
不同活動會因本身的劇烈程度和時間的長短而消耗不同的熱量。以下是一些能夠消耗大約150卡路里的體能活動：（以中等身材成年人為例）



### 日常活動及家務

| | |
|---|---|
| 散步45分鐘 | 3.0-3.5METs |
| 行樓梯 15分鐘 | 4.5-5.5METs |
| 逛街 60分鐘 | 2.5-3.0METs |
| 大掃除40分鐘 | 3.5-4.0METs |
| 掃地 45-60分鐘 | 2.5-3.5METs |
| 吸塵 45-60分鐘 | 2.5-3.5METs |
| 抹窗 45-60分鐘 | 2.5-3.5METs |
| 洗車 45-60分鐘 | 2.5-3.5METs |
| 搬屋 30分鐘 | 4.5-5.5METs |
| 陪伴小孩進行靜態活動60分鐘 | 2.5-3.0METs |
| 陪伴小孩進行跑走活動30分鐘 | 4.5-5.5METs |
| 照顧嬰兒45分鐘 | 3.0-3.5METs |
| 與寵物玩耍、散步45分鐘 | 3.0-3.5METs |
| 彈琴60分鐘 | 2.5-3.0METs |
| 打鼓40分鐘 | 3.5-4.0METs |









### 運動

| | |
|---|---|
| 太極40分鐘 | 3.5-4.0 METs |
| 乒乓球40分鐘 | 3.5-4.0 METs |
| 網球20分鐘 | 7.0-8.0 METs |
| 行山25分鐘 | 5.5-6.5 METs |
| 跳繩 15分鐘 | 9.5-10.5 METs |
| 游泳 25分鐘 | 5.5-6.5 METs |
| 跳健康舞 30分鐘（低撞擊） | 4.5-5.5 METs |
| 跳現代舞、爵士舞及街頭舞蹈 30分鐘 | 4.5-5.5 METs |
| 器械健體 50分鐘（針對主要肌群作低至中負荷訓練） | 2.5-3.5 METs |
| 瑜伽 60分鐘 | 2.0-3.0 METs |
| 跳社交舞 30分鐘（快節奏） | 4.5-5.5 METs |
| 跳拉丁舞 30分鐘 | 4.5-5.5 METs |
| 踏單車 30分鐘（完成8公里） | 4.5-5.5 METs |
| 步行 30分鐘（完成3.2公里） | 4.5-5.5 METs |
| 跑步 15分鐘（完成2.4公里） | 9.5-10.5 METs |
| 排球比賽 45分鐘 | 3.0-3.5 METs |
| 足球比賽 45分鐘 | 3.0-3.5 METs |
| 籃球比賽 20分鐘 | 7.0-8.0 METs |
| 羽毛球比賽20分鐘 | 7.0-8.0 METs |
| 高爾夫球揮杆練習50分鐘 | 4.5-5.5 METs |
| 高爾夫球30分鐘（自攜行裝實地練習） | 4.5-5.5 MET |







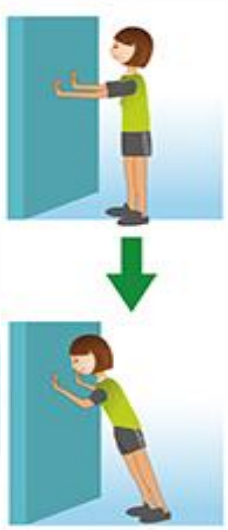



https://www.lcsd.gov.hk/en/sportforall/common/pdf/leaflet_c.pdf

# Resistance Training

| | |
|---|---|
| **Frequency** | At least twice weekly |
| **Intensity** | ● Moderate (50% of 1-repitition maximum [1-RM]) or<br>● Vigorous (75-80% of 1-RM) |
| **Duration** | ● Include 5-10 exercises involving major muscle groups, and involve 10-15 repetitions, progressing over time to heavier weights that can be lifted only 8-10 times |

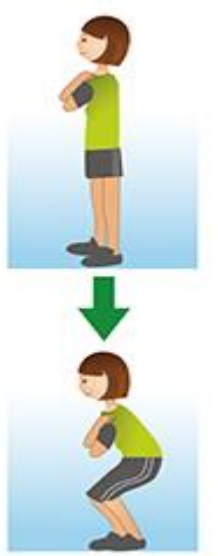
# Resistance Exercise



Press Up (chest, shoulders and triceps)



Dipping (chest, shoulders and triceps)



Squat (thighs and hips)



Lunge (thighs and hips)



Lifting a water bottle can strengthen your muscles in a leisurely manner.

# Flexibility and balance

- 2–3 times/week for older adults with diabetes.

- Yoga and tai chi may be included based on individual preferences to increase flexibility, muscular strength, and balance.

# General Guidance on How to Increase Physical Activity

- Gradual progression of intensity of aerobic exercise and resistance exercise to minimize the risk of injury and to enhance compliance.
- Assess patients' age and previous physical activity levels
- Generally start with relatively moderate-intensity aerobic

| | |
|---|---|
| **Adults with a low level of fitness** | May need to start with light activity, or a mix of light-to moderate-intensity activity. |
| **The elderly and obese patients** | Take longer time for adaptation and may require slower progression. |

# The Recommended Sequence of Progression of Aerobic Exercise

**Increasing Duration:**

E.g. increase duration of exercise session by 5 - 10 mins every 1 - 2 weeks over the first 4 - 6 weeks.

**Increasing Frequency and Intensity:**

E.g. increase frequency and intensity of exercise session as tolerated over the next 4 - 8 months

The individual should be monitored for **any adverse effects** of the increased volume, and downward adjustments should be made if the exercise is not well tolerated.

# Rate of Progression of Resistance Exercise

- An initial increase in the number of repetition is recommended before an increase in load

- Early in training, each session of resistance exercise should minimally include 5-10 exercises and involve completion of 10-15 repetitions to near fatigue per set, progressing over time to heavier weights (or resistance) that can be lifted only 8-10 times.

- A minimum of one set of repetitions to near fatigue for each exercise, but as many as 3 to 4 sets, is recommended for optimal strength gains.

# PA for DM patients with special precautions and contraindications

- Nonoptimal BG control
  - Hyperglycemia
  - Hypoglycemia
- Nerve disease
  - Autonomic neuropathy
  - Peripheral neuropathy
- Eye disease
  - Mild nonproliferative retinopathy (NPDR)
  - Moderate to severe NPDR
  - Unstable proliferative retinopathy
  - Cataract
- Kidney disease
  - Microalbuminuria
  - Overt nephropathy
  - End-stage renal disease
- Cardiovascular disease
  - Coronary artery disease
  - Exertional angina
  - Hyertension
  - Myocardial Infarction
  - Stroke
  - Congestive heart failure
  - Peripheral artery disease

| | Recommend | Consideration | Precautions |
|---|---|---|---|
| **Mild nonproliferative retinopathy (NPDR)** | - All activities okay[23] | - Annual eye exam should be performed to monitor progression | - |
| **Moderate to severe NPDR** | | | – Avoid activities dramatically elevate BP, such as vigorous activity of any type[23]<br>– Avoid vigorous exercise; jumping, jarring, and head-down activities; and breath holding[2] |
| **Unstable proliferative retinopathy** | | – | – No exercise should be undertaken during a vitreous haemorrhage |
| **Cataract** | Do not impact the ability | – Consider supervision for certain activities<br>– Activities that are more dangerous due to limited vision, such as outdoor cycling | |

Thank You

## Levels of Evidence for Therapeutic Studies*

| Level | Type of evidence |
|---|---|
| 1A | Systematic review (with homogeneity) of RCTs |
| 1B | Individual RCT (with narrow confidence intervals) |
| 1C | All or none study |
| 2A | Systematic review (with homogeneity) of cohort studies |
| 2B | Individual Cohort study (including low quality RCT, e.g. <80% follow-up) |
| 2C | "Outcomes" research; Ecological studies |
| 3A | Systematic review (with homogeneity) of case-control studies |
| 3B | Individual Case-control study |
| 4 | Case series (and poor quality cohort and case-control study |
| 5 | Expert opinion without explicit critical appraisal or based on physiology bench research or "first principles" |

*From the Centre for Evidence-Based Medicine, http://www.cebm.net.

Grade Practice Recommendations*

| Grade | Descriptor | Qualifying Evidence | Implications for Practice |
|---|---|---|---|
| A | Strong recommendation | Level I evidence or consistent findings from multiple studies of levels II, III, or IV | Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present |
| B | Recommendation | Levels II, III, or IV evidence and findings are generally consistent | Generally, clinicians should follow a recommendation but should remain alert to new information and sensitive to patient preferences |
| C | Option | Levels II, III, or IV evidence, but findings are inconsistent | Clinicians should be flexible in their decision-making regarding appropriate practice, although they may set bounds on alternatives; patient preference should have a substantial influencing role |
| D | Option | Level V evidence: little or no systematic empirical evidence | Clinicians should consider all options in their decision making and be alert to new published evidence that clarifies the balance of benefit versus harm; patient preference should have a substantial influencing role |

*From the American Society of Plastic Surgeons. Evidence-based clinical practice guidelines. Available at: http://www.plasticsurgery.org/Medical_Professionals/Health_Policy_and_Advocacy/Health_Policy_Resources/Evidence-based_GuidelinesPractice_Parameters/Description_and_Development_of_Evidence-based_Practice_Guidelines/ASPS_Grade_Recommendation_Scale.html. Accessed March 3, 2011

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