15th HKEC Online Symposium on Community Engagement 2021 IT Seminar



DM Screening and Prevention Programme using ICT

糖尿病篩查及預防計劃:數碼科技應用

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Background

- Halting the rise in diabetes and obesity is a globally agreed target by 2025, according to WHO¹.
- Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades;
- In Hong Kong, diabetes mellitus is one of the major root of morbidity and mortality, causing about 15,400 inpatient discharges and inpatient deaths in Hong Kong².

ICT usage

1. Al for eyes (VisionaDR)

- analyse diabetic retinopathy
- glaucoma suspect and
- o age related macular degeneration;

2. InBody 270

- body composition
- obesity diagnosis
- weight control
- segmental lean and
- segmental fat, etc;





ICT usage

3. Zoom and YouTube

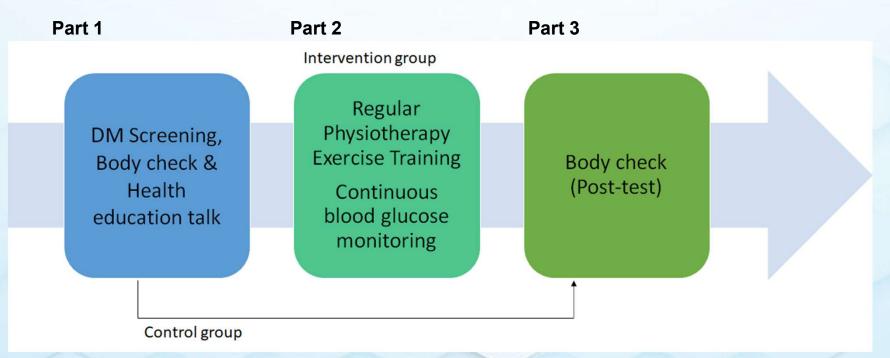
 to deliver online physiotherapy exercise class, twice per week;



4. iSocial plus mobile application

 linking to the i-Cloud that people could make a reference to his blood glucose readings previously recorded in elderly centre by using the Mobile App.

DM Screening and Prevention Programme Programme Design



DM Screening and Prevention Programme





地點:莊士敦道211號活動室/於網上同步進行

2/6 8:30-10:00 4/6 8:30-10:00

9/6 8:30-10:00 11/6 8:30-10:00

二樓活動窓 一樓飯堂

二樓活動室

2.「至Fit」檢查日

日期:16/6/2021 (三)

時間:上午9:00-下午4時00分

地點:灣仔莊士敦道211號二樓活動室

内容:由物理治療師進行InBody身體組成分析

與你回顧運動帶來的成果

報名方法:

前往莊士敦道211號2樓或

軒尼詩道130號修頓中心5樓報名及付款

*参加者可以\$280現金付款或於20/3/2021使用醫療券

(需預先繳付\$100按金,並將於活動當日發還)

DM risk screening (across the programme)

Assessment Tools	Week 1 (Baseline)	Week 2-11 (Intervention)	Week 12 (Post-test)
1. AI-powered retinal image analysis (VisionaDR)	✓ * recommend post- test after 1 year	n/a	n/a
2.Body Composition Analysis (InBody)	✓	n/a	✓
3.Blood glucose monitoring	✓	✓ Weekly measurement	✓

Part 1: DM Risk Screening Day

DM Screening, Body check & Health education talk

DM Risk Screening Day (控糖健康檢查日)

Date: 20/3/2020 (Saturday)

Time: 09:00 - 14:00

Venue: Wan Chai Methodist Centre for the Seniors

Goal:

- To allow early detection of risk for Diabetes Mellitus and/or DM retinopathy using Gerontechnology devices
- 2. To increase patient's awareness and knowledge in DM

Part 1: DM Risk Screening Day

DM Screening, Body check & Health education talk

1. Blood glucose monitoring station

Performed by health worker

2. Body Composition Analysis

- Report explanation by Physiotherapist
- Provide health education and recommendations

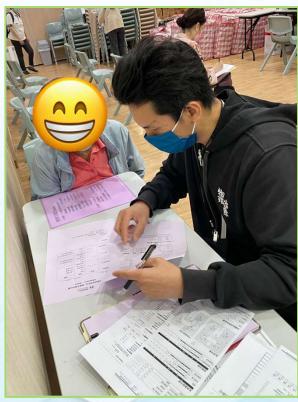
[focus on DM / body weight management]



Body Composition Analysis



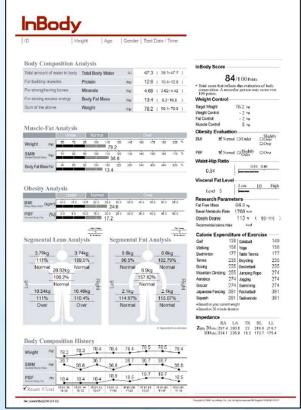
Client is using InBody

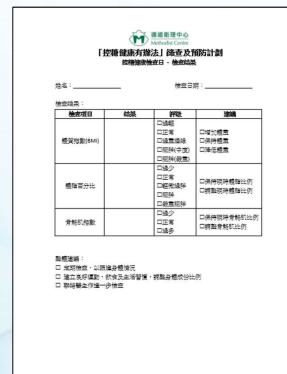


Physiotherapist is providing consultation

DM Screening, Body check & Health education talk

Body Composition Analysis







多考

1. 亞洲成年人的體質指數指標(BMI)及車上嚴重疾病風險的對照表參考

種質指數	分類		患上嚴重突持的風險		
<18.5			低 (種重過輕對健康有其他影響		
18.5 - 22.9		正常	普通		
23 - 24.9		遙線	增加		
25 - 29.9	透重	肥胖(中度)	中度		
≥ 30		肥胖(飯重)	高度		

"音科來源:智符管理思维教育訊託地

2. 機脂百份比多加

	極少	正常	輕微過解	肥胖	級魚肥胖
男性	< 14%	14-23%	25 - 30%	30 - 35%	≥ 35%
女性	< 17%	17 - 27%	30 - 35%	35-40%	≥ 40%

*参考资料来源:流金须長老怪性病如油站

3.60 歲或以上人士正常骨骼肌指數(SMI)

男性	7.70 - 9.20
女性	5.67 - 7.40

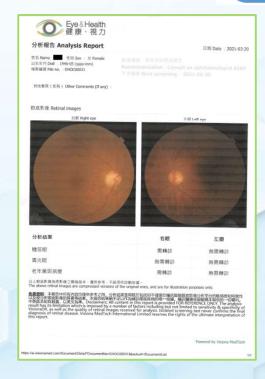
*金考查科交源:C.O. Walowski et al. Reference Values for Skeletal muscle mass – current

Part 1: DM Risk Screening Day

DM Screening, Body check & Health education talk

3. Al for eyes (VisionaDR)

- Analyse diabetic retinopathy
- Glaucoma suspect
- Age related macular degeneration



Visiona DR



Waiting area and report printing



DM Retinopathy screening

Part 1: DM Risk Screening Day

DM Screening, Body check & Health education talk

- 4. Health education on DM delivered by Nurse
 - Diet control
 - BG monitoring
 - Importance of exercise
 - DM complications



Intervention: Health talk by RN

DM Screening, Body check & Health education talk





Notes of healthy diet and diet control

Findings: Body Composition Analysis - InBody (pre-test)

Gender	Assessment item	Intervention group		Control group	
		Range	Mean	Range	Mean
Male	вмі	21- <mark>26.6</mark>	22.62	16.3-30.8	24.31
	Percent Body Fat	13.7-24.1	17.8	11.2-34.6	25.6
	Skeletal muscle mass index	7.1-8.4	7.725	5.2 -9.7	7.32

Findings:

- BMI: I-group slightly overweight, C-group with obese member
 PBF: I-group close to the normal range, C-group with obese member
 SMI: I-group normal, C-group has member under normal range

Impression:

- Body composition of I-group members are average
 C-group has obese member(s)
 C-group also has member lacking skeletal muscles

Findings: Body Composition Analysis - InBody (pre-test)

Gender	Assessment item	Intervention group		Control group	
	Assessment item	Range	Mean	Range	Mean
Female	вмі	19.5- <mark>30.4</mark>	23.05	15.5-25.6	21.3
	Percent Body Fat	18.2-42.6	32.33	15.7-44.2	30.6
	Skeletal muscle mass index	4.7 -7.7	5.86	4.6-6.5	5.56

Findings:

- BMI & PBF: I-group has obese members, while C-group has underweight and overwight members
- SMI: Both I-group and C-group has member under normal range Impression:
 - I-group members shall control weight (correlation with more DM patients?)
 - Body composition of C-group members are more diverse
 - Both groups have members lacking skeletal muscles

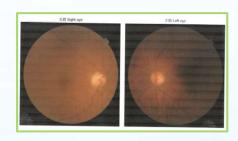
Findings: DM Retinopathy risk

VisionaDR (pre-test)

- No. of retinal screening performed: 41
- Among the reports:
 - > 6 participants require follow up (1 patient has two suspected problems)
 - Suspected diabetic retinopathy = 5 patients
 - Suspected age-related macular degeneration = 2 patients
 - No risk for glaucoma was found
- 2 of the 6 is having DM → helping to find out the DM eye complication

Follow-up:

- o Participants are recommended to consult an ophthalmologist for further check-up
- Their awareness of having DM related complications are raised



DM Screening, Body check & Health education talk

Limitations:

- The result is limited by the clarity of the lens and the size of pupil during measurement
- The retina may not be clearly seen because of having cataract surgery done or other eye diseases
- The extent of pupil dilation in the dark environment may affect the result (Non-pharmaceutical screening test, no pupil-dilating drug was used)

Intervention group

Regular Physiotherapy Exercise Training

Continuous blood glucose monitoring

Part 2: DM complications prevention

Physiotherapy Exercise Training

(「至Fit人生」物理治療運動訓練)

Date: 22/3/2021 - 11/6/2021 (12 weeks)

Time: 09:00 - 10:00

Mode: via YouTube or Zoom

Goal:

- 1. To empower elders in DM control through exercise and regular BG monitoring.
- 2. To monitor elders' risk for DM complications (e.g. DM retinopathy, Hyperglycaemia, Hypoglycaemia).

Part 2: DM complications prevention

Intervention group

Regular Physiotherapy **Exercise Training**

Continuous blood glucose monitoring

Intervention:

- Regular physiotherapy exercise class through video conference application (Zoom or YouTube live);
- 1-hour online classes, two times per week (usually on Wednesday and Friday)
- 30 min self-initiated exercise at home.

Total:

150min / week

Monitoring:

- Weekly BG monitoring through Smart e-Healthcare Project; or
- Self-monitoring of BG and report to programme staff

Part 2: DM complications prevention

Intervention group

Regular Physiotherapy Exercise Training

Continuous blood glucose monitoring

Target:

- 1. Patients with DM diagnosis
- 2. Elderly with risk for DM identified from screening tests
 - Aged 55 or above, and increased body mass index (BMI ≥23kg/m² for Asian, BMI ≥25kg/m² for non-Asian)/ Waist circumference (≥80cm for female, ≥90cm for male);
 - Family history (first-degree relatives) of DM;
 - History of prediabetes, gestational diabetes, big baby (>9 lbs or 4.1kg) or
 - Random blood glucose ≥6.1mmol/L

Intervention group

Regular Physiotherapy Exercise Training

Continuous blood glucose monitoring

Participant demographics

Intervention group:

Age range: 54-85

Average age: 69

Male: 4 Female: 20

Participant with DM: 13/28

Control group:

Age range: 59-94

Average age: 74

Male: 10 Female: 9

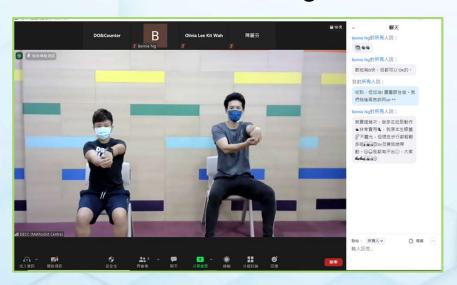
Participant with DM: 4/19

Implication:

- Both groups have similar age range
- Members with DM diagnosis have higher motivation in joining the exercise training course
- Female has higher awareness / motivation to participate in 'long term' exercising program when compared with male members

Weekly exercise class

- Through aerobic and resistance exercises
- To control blood glucose and enhance muscle power





Intervention group

Regular Physiotherapy Exercise Training

Continuous blood glucose monitoring

Isocial Plus mobile application







Intervention group

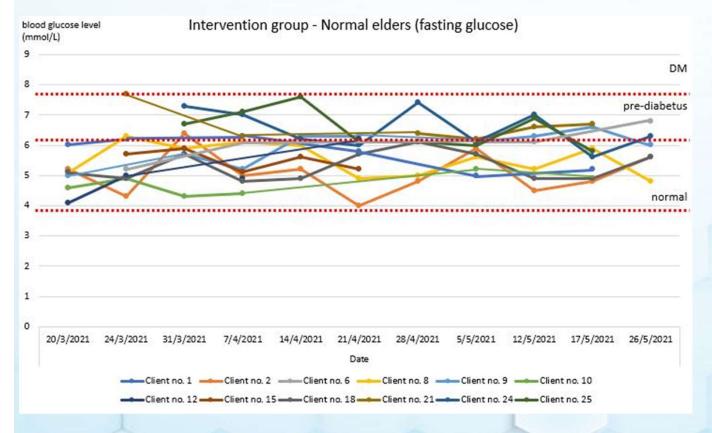
Regular Physiotherapy Exercise Training Continuous

blood glucose

monitoring

25

Findings: Continual monitoring of BG

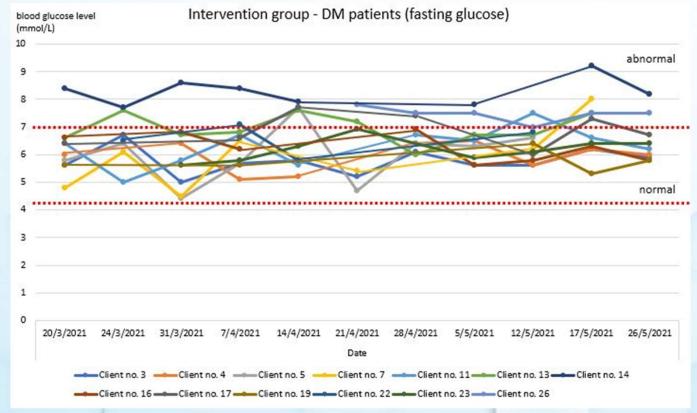


Screening programme results:

Among 12 normal participants,

- Normal: 7 participants
- Between normal and pre-DM: 2 participants (Client no.1 & 9)
- pre-DM: 3 participants(Client no. 21, 24 & 25)

Findings: Continuous monitoring of BG

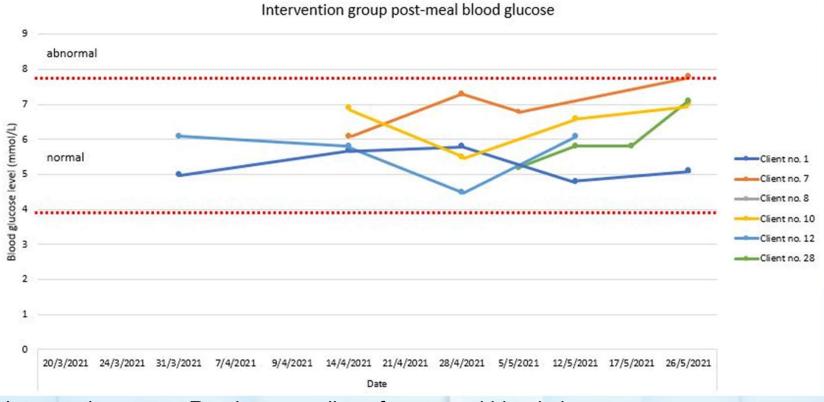


Prevention programme results:

Among 13 DM patients,

- Good control: 8
 patients (Client no.3,
 4, 7, 11, 16, 19, 22 &
 23)
- Fair control (2 or 3 times abnormal):
 2 patients
 (Client no. 5, 17)
- Poor control: 3patients (Client no.13, 14 & 26)

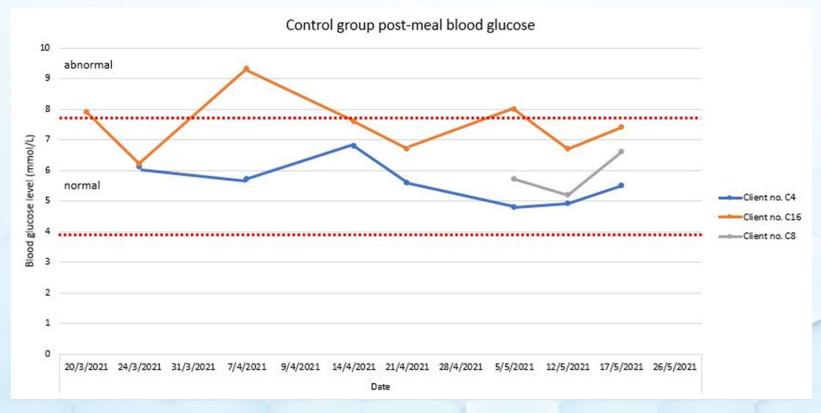
Findings: Continuous monitoring of BG



Intervention group: Random sampling of post-meal blood glucose

- Most findings are satisfactory, under good control
- This programme has some effect in maintaining stable blood glucose level

Findings: Continuous monitoring of BG



Control group: Random sampling of post-meal blood glucose

- Some abnormal findings among members
- o Highly recommend this DM screening and prevention programme to them

What is next?

Body check (Post-test)

Final evaluation: 「至Fit 」檢查日

1. Body Composition Analysis review (pre- and post comparison)

2. Blood glucose level:

- BG record review (12 weeks)
- No. of emergency admission owing to Hyperglycaemia
- No. of emergency admission owing to Hypoglycaemia

2.「至Fit」檢查日

日期:16/6/2021 (三) 時間:上午9:00-下午4時00分

地點:灣仔莊士敦道211號二樓活動室

内容:由物理治療師進行InBody身體組成分析

與你回顧運動帶來的成果

報名方法:

前往莊士敦道211號2樓或

軒尼詩道130號修頓中心5樓報名及付款

|*参加者可以\$280現金付款或於20/3/2021使用醫療券

(需預先繳付\$100按金,並將於活動當日發還)

Positive effects...

- Weekly measurement of BG could raise the awareness of the participants on their BG level
- Coordinating with the health app usage and InBody posttest will make them to be more alert to their BG and body compositions
- A group of people who do exercise together making them to be more determined to participate and continue the exercising plan
- Through weekly exercising, health is improved by increasing their muscle strength

其實這幾次,做多左拉筋動作**△非常實用** ⊗ 我原本左膝蓋不靈光,但現在步行都輕鬆多啦 **△** ↓ ↓ ↓ ↓ 陳 sir 及黃姑娘帶動。 ② ② 我都有汗出 ⑤ , 大家 **⑤ ⑤** ↓ ↓ ↓ ②

吳女士 (糖尿病患者)

多謝你們舉辦這個活動,我未見過有機構 對糖尿的活動是這樣**全面**的。希望你們日 後舉辦更多這些活動。

阮先生(有糖尿家族史的非糖尿病患者)

這個活動對我**幫助很大**,因一向以為甚麼運動都會對糖尿有用,所以一向多做帶氧運動,但糖尿度數是高,但這二個月做肌力,我的糖尿度數減了,無論是空腹或食後度數。所以將來我會繼續做肌力希望中心能繼續舉辦此活動,**有同學一起做,有檢查**,**非常好**。

何女士(非糖尿病患者)

製作**極之認真・很有心思。△❷♥**♥ 感謝各位的努力及付出。**△◎◎** 多謝各位**②**

黃先生 (糖尿病患者)

我每次一定用zoom 跟做,從不缺課。 跟大家一起做運動,**很享受!** 李女士 (非糖尿病患者)

> 本人是一個很懶做運動的人,這個活動令我**可以強迫自己每周做2.5小時運動**,雖然未必令**糖尿病及血壓**立即痊癒,但至少可**降低一些**,多謝各位帶領做運動的老師及安排活動的姑娘和工作人員,希望有機會多舉辦這些活動。 陳女士 (糖尿病患者)

手臂開始有力和雙腳平衡力進步了。

整體身體活動能力好咗。

多留意少食太多甜品, (特別驗血糖之前天優)

喜歡導師的循步漸進教導和解答我們身體不適和對運動的疑惑↓↓

提意多啲這樣有規劃的長programs去幫助有血壓,高脂或其他病患者。能活得健康些,不只係食藥。運動和食療也可以做得到心。

還有謝謝姑娘和她的同事們 🙏 🙏 😊 😊 😊

岑女士 (非糖尿病患者)

Reference

- World Health Organisation. (2021). *Diabetes*. Retrieved from https://www.who.int/health-topics/diabetes#tab=tab_1
- 2. Centre for Health Protection, Department of Health. (2020). *Diabetes Mellitus*. Retrieved from https://www.chp.gov.hk/tc/healthtopics/content/25/59.html