

EVIDENCE-BASED CLINICAL GUIDELINE

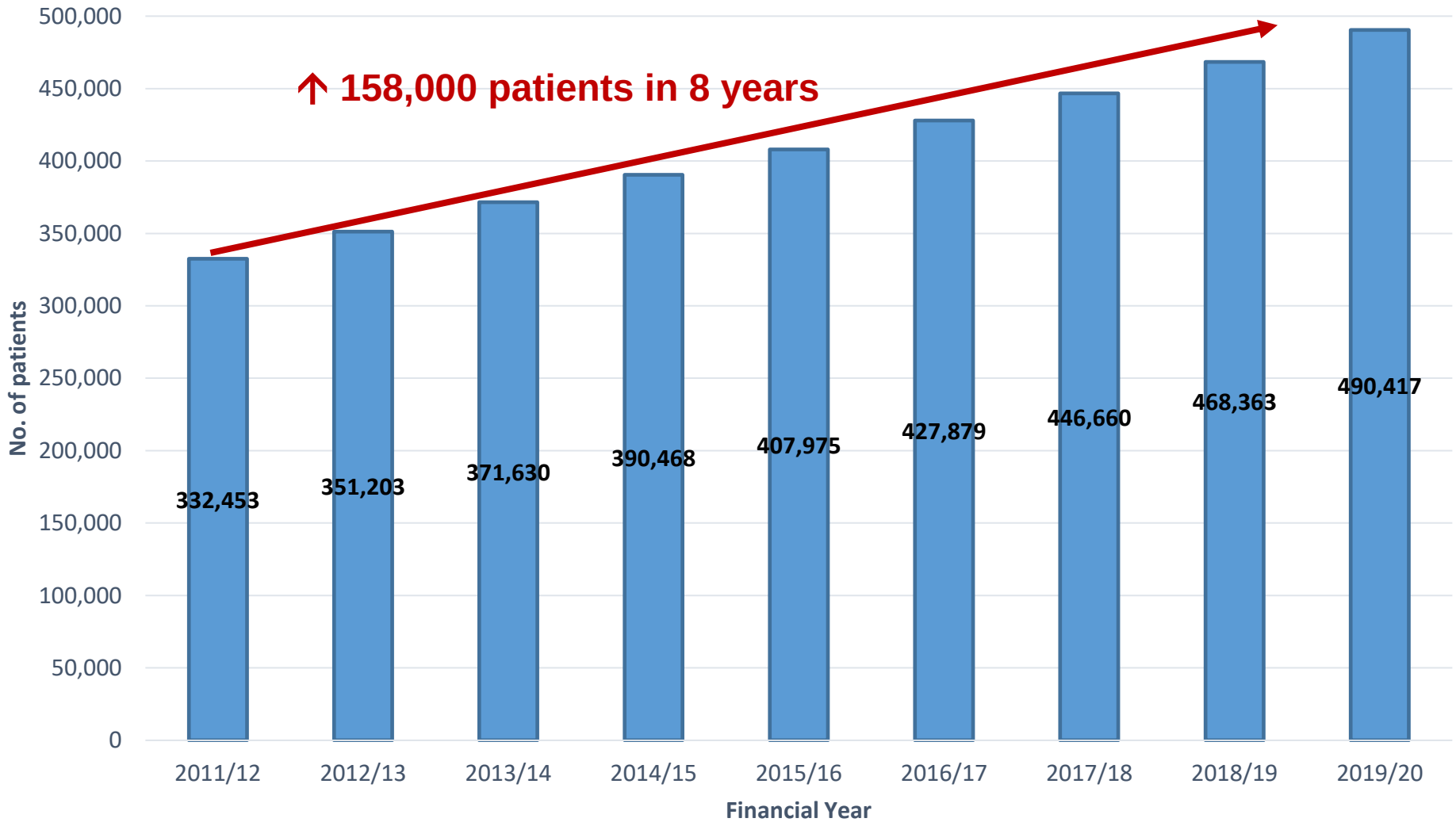
subcutaneous insulin injection for people with diabetes mellitus

27 NOVEMBER 2021

Background

DM Patients Number[1]

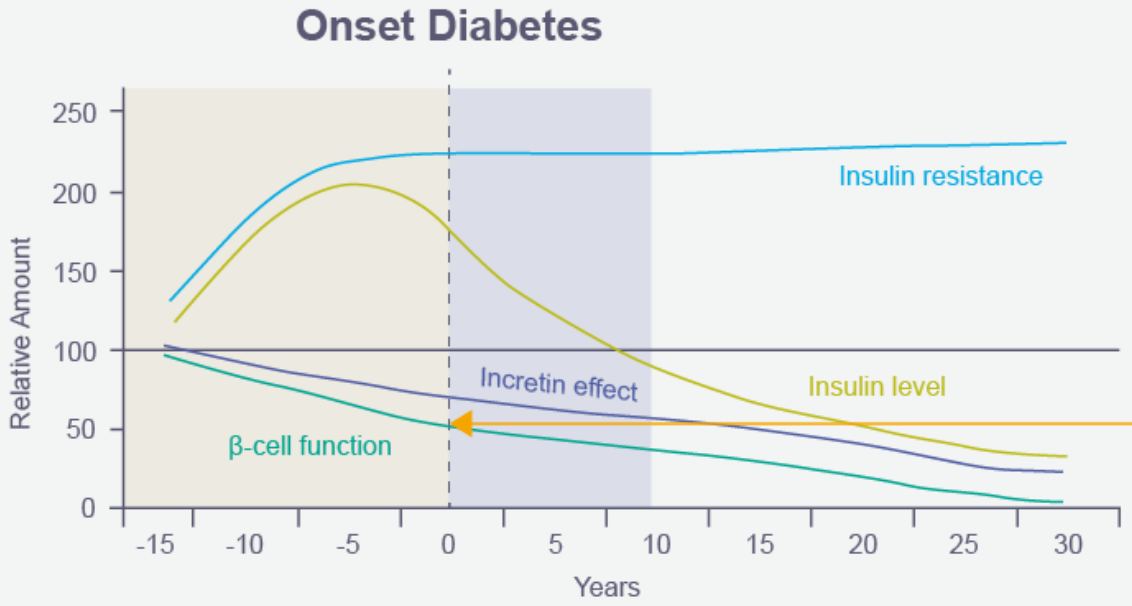
Grow steadily by an Annual Growth Rate of ~5%



1. (KPI definition) DM patients refer to patients with attendances coded with DM diagnosis in FMSCs and GOPCs, or with prescription of any pre-defined DM drugs in SOPCs, FMSCs, and GOPCs in the reporting period.

T2DM and Decline of β-cell Function

With insulin resistance, β-cells are stimulated to increase insulin secretion and are subjected to high workload, which eventually leads to β-cell exhaustion[1]

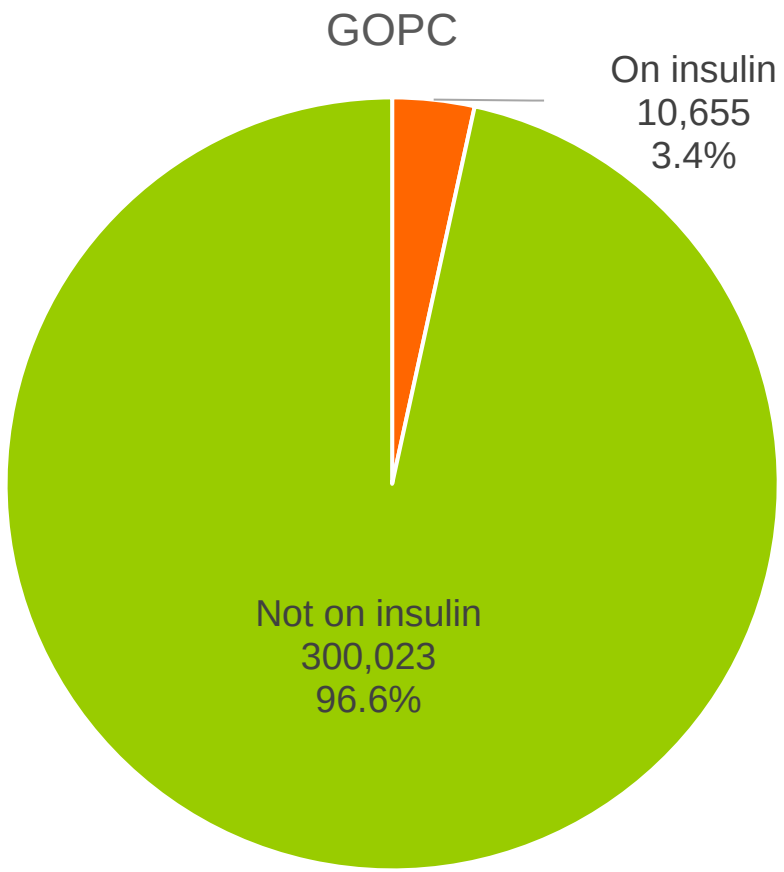


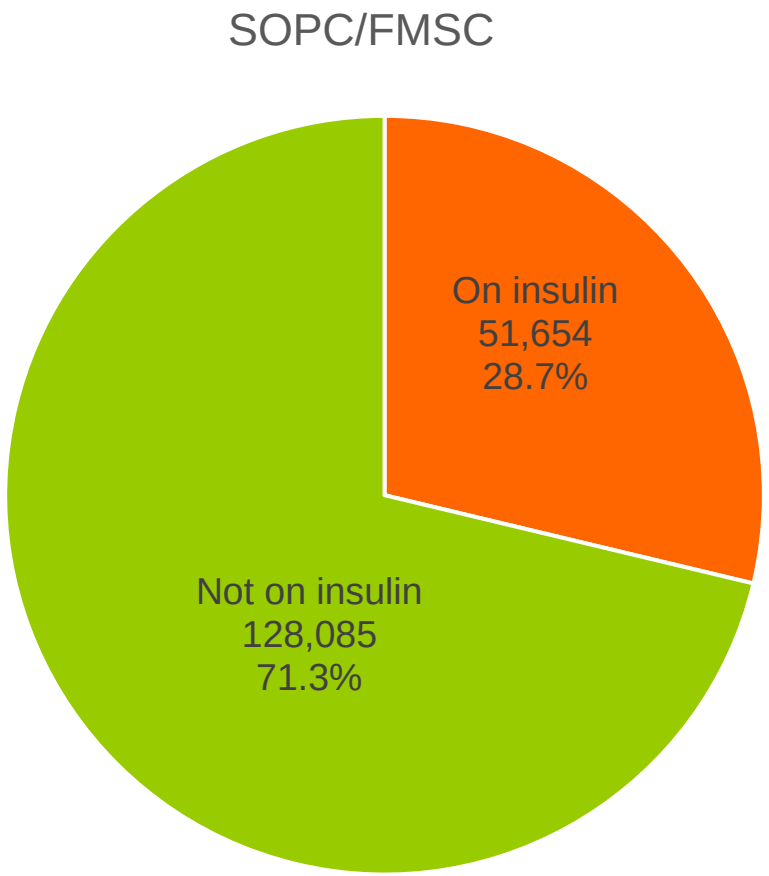
- **~40-50%** of β-cell functions is already lost by the time T2DM is diagnosed[1]
- Further loss of **4-5%** expected each year thereafter[1]

Owing to the lower BMI and a smaller β-cell mass, Asians are more likely to have β-cell dysfunction and higher insulin resistance[6]

1. Wysham C, Shubrook J. Postgrad Med. 2020;132:676-686
6. Eun-Jung Rhee. Endocrinol Metab. 2015;30:263–269

USE OF INSULINS[1] AMONG DM PATIENTS IN 2019/20

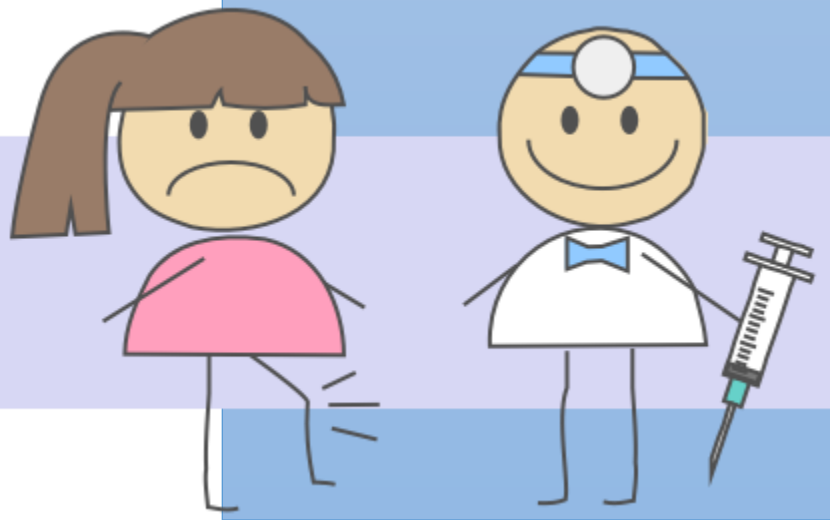




1. Refers to patients with insulin (drugs under BNF section '6.1.1') prescribed in their SOPC/FMSC/GOPC attendance(s) in the reporting period.

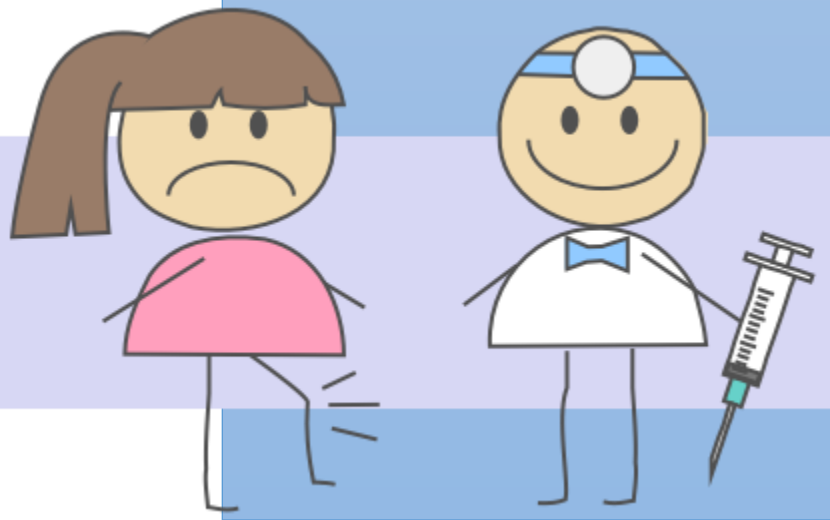
Insulin-using patients

- Type and amount of insulin given, nutrition intake, PA, insulin compliance etc

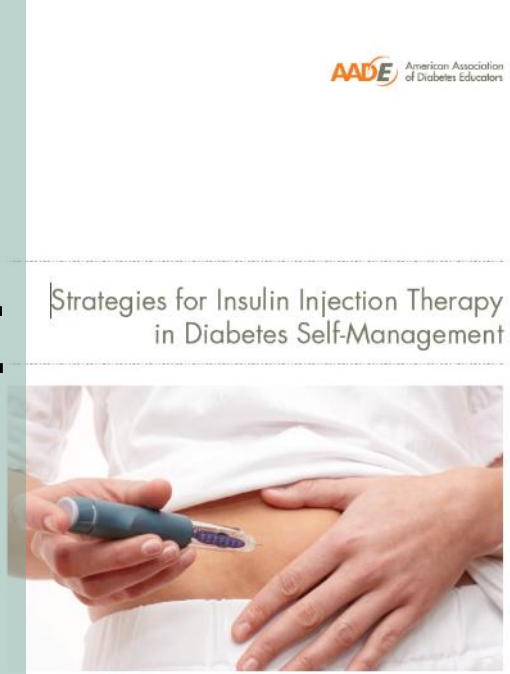


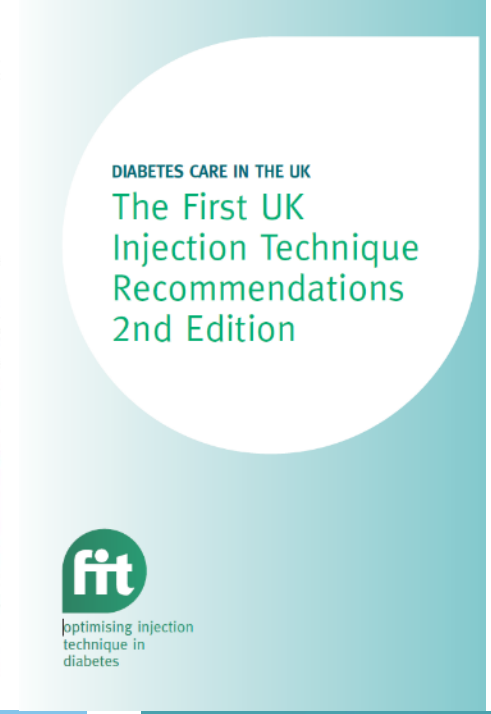
Insulin-using patients

- Type and amount of insulin given, nutrition intake, PA, insulin compliance etc
- Insulin injection technique

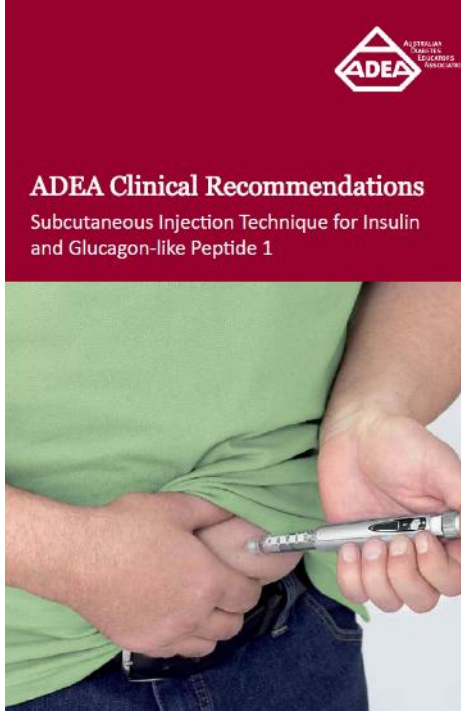


KNOWLEDGE & PRACTICE GAP

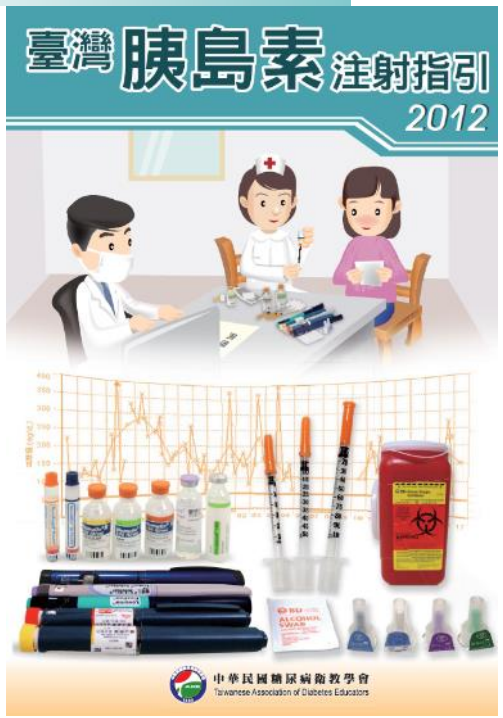














METHOD

2011 2012 2013



Formed a guideline development committee with 5

Research Questions

As a basis for developing the recommendations set forth in the guideline, the guideline development committee addressed six questions relevant to the clinical practice:

1. How should insulin injections be prepared?
2. Which sites should be used for insulin injection?
3. What should be the appropriate needle length?
4. How should insulin injection be performed?
5. How should insulin preparations, insulin pens and pre-drawn syringes be stored?
6. How should lipohypertrophy and lipoatrophy be managed?

METHOD

2011 2012 2013

Developed a draft guideline with 54 recommendations



Formed a panel of experts with 15 diabetes nurses

Expert Consensus Group

Chan Mei Tai May

Chan Woon May Samsonly

Cheng Mei Wan Winnie

Hung Siu Chun Veronica

Kwan Yee Mei Jo Jo

Lau Sau Lin Tracy

Lau Siu Wai Maggie

Law Chin San

Leung Lai Yee Elaine

Leung Sum Ming

Ng Chi Wah Fanny

Tsang Wong Lynn Wah

Wong Yee Man Rebecca

Wong Yin

Yeung Hoi Ming Theresa

METH

2011 → 2012 → 2013



2 March 2013



23 March 2013



27 April 2013

Reviewed and deliberated each recommendation of the draft guideline along with the supporting literature by the expert panel in 3 public hearing meetings

METHOD

2011 2012 2013

Scientific support scale:

I At least one randomized control (RCTs)

II At least one trolled

III C se

rep nt

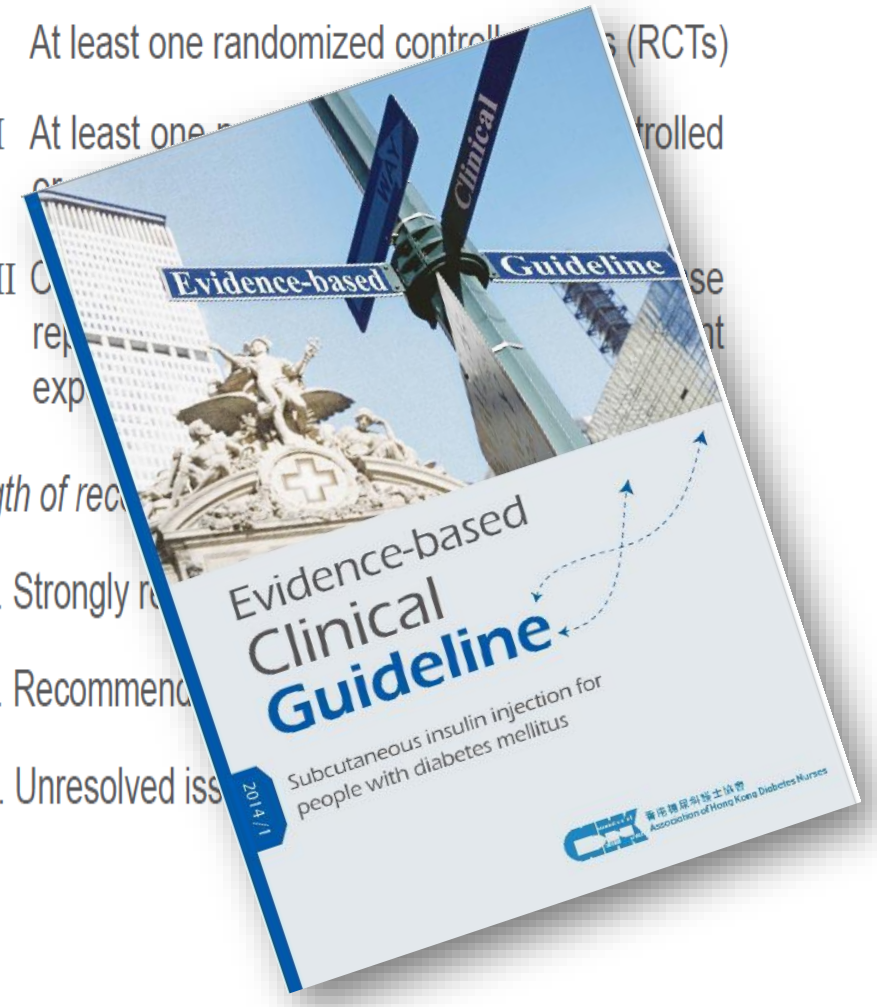
exp

Strength of rec

A. Strongly r

B. Recommend

C. Unresolved iss



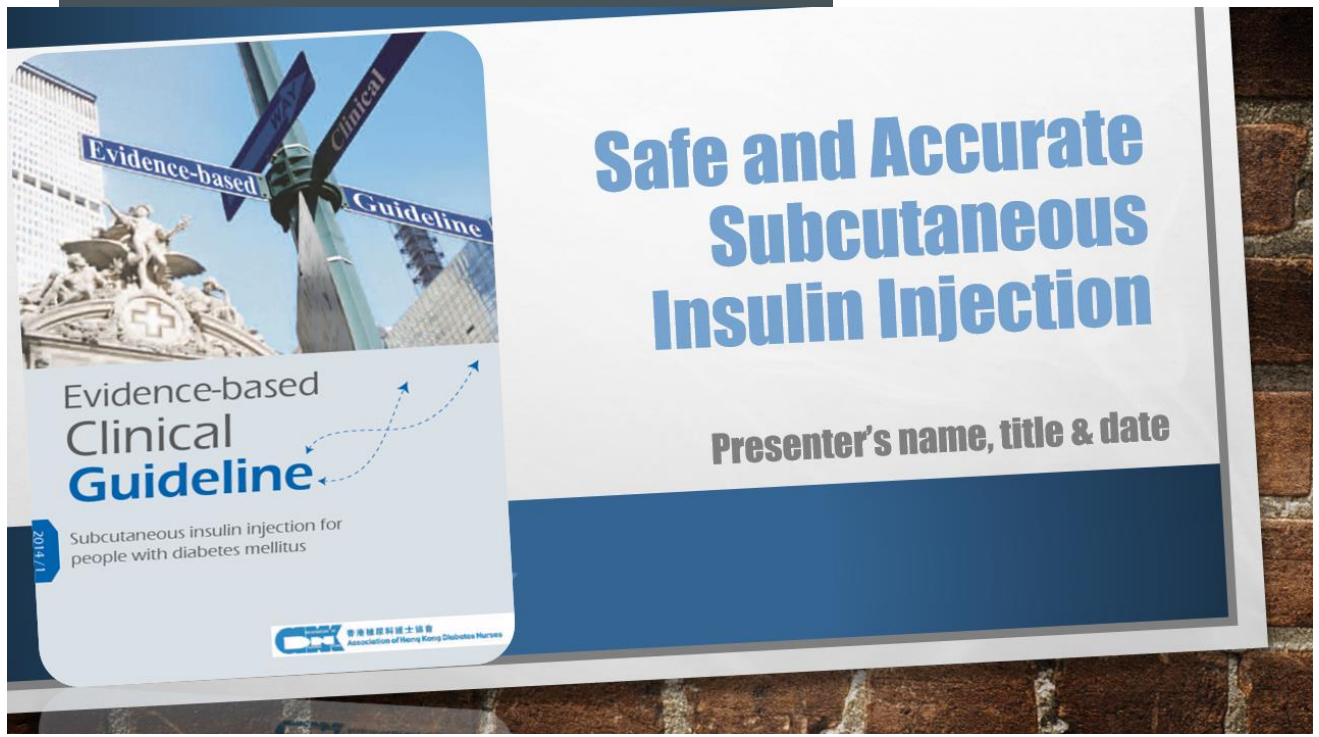
Established expert panel consensus of the guideline, ≥80%

Developed the evidence-based clinical guideline with 45 recommendations

EBP Guideline Promotion

Efforts by 16 DM Centres

March to July 2014: 34 seminars delivered by 16 Diabetes Nurses (NC, NS, APNs), attended by 1358 nurses and 21 nurses been audited





ACKNOWLEDGMENT

The Evidence-based Clinical Guideline on Subcutaneous insulin injection with diabetes mellitus Promotion Team

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AN EVIDENCE-BASED PRACTICE JOURNEY IN PROMOTING SAFE AND ACCURATE SUBCUTANEOUS INSULIN INJECTION IN HONG KONG: A REPORT ON THE SECOND MILESTONE

Safe and Accurate Subcutaneous insulin injection Seminar – Knowledge Test	
1.	Which of the following CANNOT be mixed with other types of insulin in the same syringe?
2.	How many cycles should the insulin pen be tipped by 180° to ensure Protaphane is well mixed?
3.	The pre-loaded insulin syringe (containing NPH) should be placed
4	When using the same type of insulin, where should the next dose of insulin be injected
5.	After insulin injection with syringe, how long should the minimal hold-in time be?
6.	After insulin injection with pen, how long should the minimal hold-in time be?
7.	The desirable length of pen needle for subcutaneous insulin injection should be within the range of
8	The most effective way to prevent lipohypertrophy is to
9.	Which pen needle length requires a lift of skin fold to inject at 45° to 90° in adults with normal body built
10.	The correct pinch up method to hold a skin fold should be using
11.	After insulin injection, the nurse should NOT
12.	To which skin layer should insulin be deposited for the most stable absorption?

AN EVIDENCE-BASED PRACTICE JOURNEY IN PROMOTING SAFE AND ACCURATE SUBCUTANEOUS INSULIN INJECTION IN HONG KONG: A REPORT ON THE SECOND MILESTONE

2. How many cycles should the insulin pen be tipped by 180º to ensure Protaphane is well mixed?

A. 5 cycles
B. 10 cycles
C. 15 cycles
D. 20 cycles

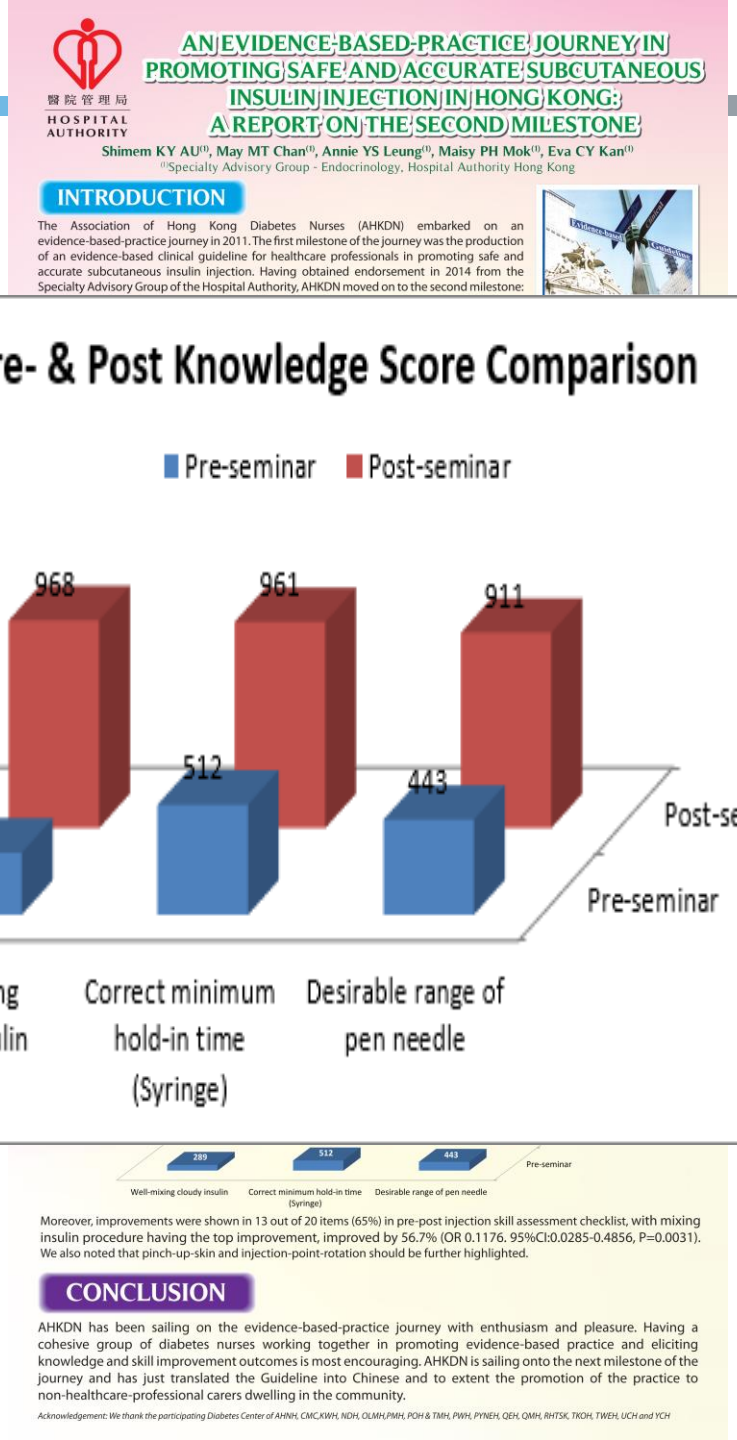
6. After insulin injection with syringe, how long should the minimal hold-in time be?

A. 0 second
B. 3 seconds
C. 5 seconds
D. 10 seconds

7. The desirable length of pen needle for subcutaneous insulin injection should be within the range of:

A. 4, 5 and 6mm
B. 4, 6 and 8mm
C. 5, 6 and 8mm
D. 6, 8 and 12.7mm

AN EVIDENCE-BASED PRACTICE JOURNEY IN PROMOTING SAFE AND ACCURATE SUBCUTANEOUS INSULIN INJECTION IN HONG KONG: A REPORT ON THE SECOND MILESTONE



AN EVIDENCE-BASED PRACTICE JOURNEY IN PROMOTING SAFE AND ACCURATE SUBCUTANEOUS INSULIN INJECTION IN HONG KONG: A REPORT ON THE SECOND MILESTONE

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[1]Specialty Advisory Group - Endocrinology, Hospital Authority Hong Kong

INTRODUCTION

The Association of Hong Kong Diabetes Nurses (AHKDN) embarked on an evidence-based-practice journey in 2011. The first milestone of the journey was the production of an evidence-based clinical guideline for healthcare professionals in promoting safe and accurate subcutaneous insulin injection. Having obtained endorsement in 2014 from the Specialty Advisory Group of the Hospital Authority, AHKDN moved on to the second milestone:

Moreover, improvements were shown in 13 out of 20 items (65%) in pre-post injection skill assessment checklist, with mixing insulin procedure having the top improvement, improved by 56.7% (OR 0.1176. 95%CI:0.0285-0.4856, P=0.0031). We also noted that pinch-up-skin and injection-point-rotation should be further highlighted.

CONCLUSION

AHKDN has been sailing on the evidence-based-practice journey with enthusiasm and pleasure. Having a cohesive group of diabetes nurses working together in promoting evidence-based practice and eliciting knowledge and skill improvement outcomes is most encouraging. AHKDN is sailing onto the next milestone of the journey and has just translated the Guideline into Chinese and to extent the promotion of the practice to non-healthcare-professional carers dwelling in the community.

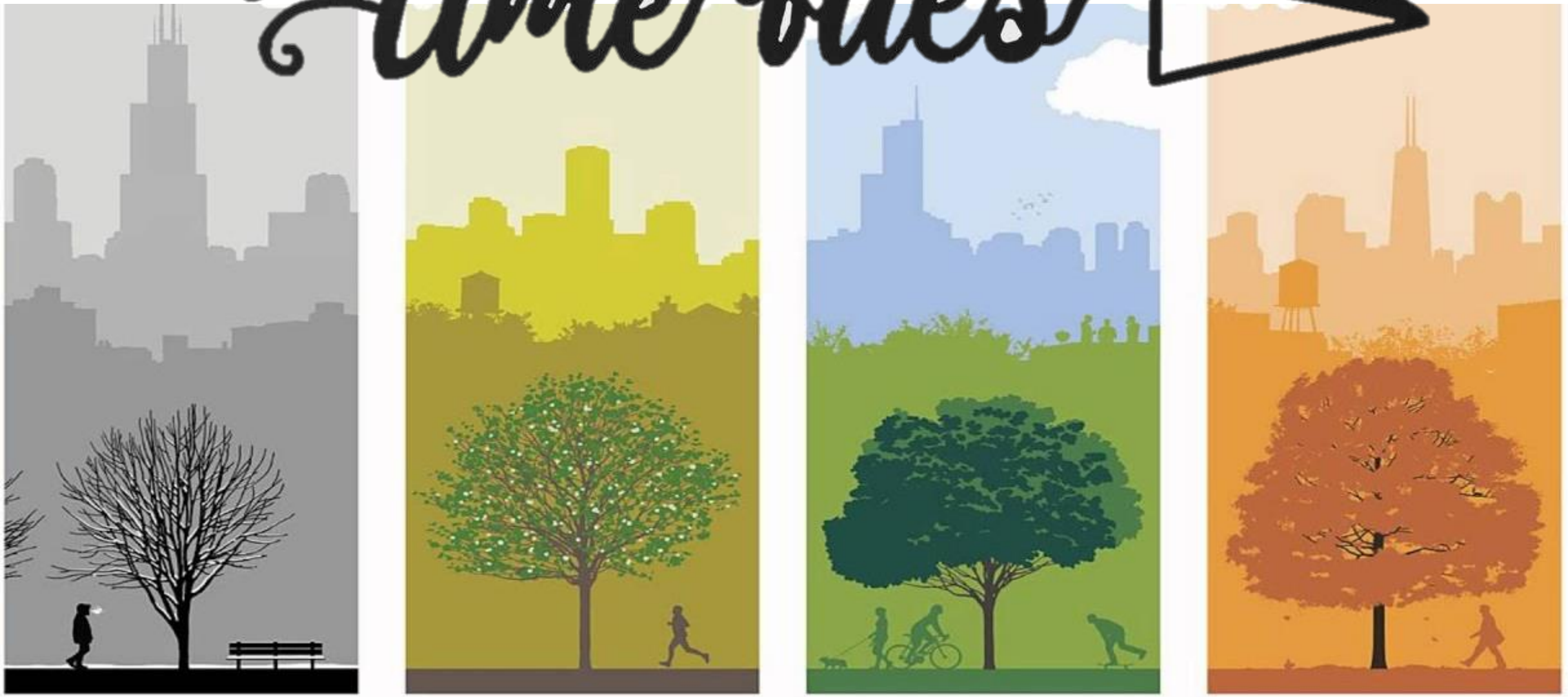
Acknowledgement: We thank the participating Diabetes Center of AHNH, CMC,KWH, NDH, OLMH,PMH, POH & TMH, PWH, PYNEH, QEH, QMH, RHTSK, TKOH, TWEH, UCH and YCH

注射胰島素要訣

Sub-committee members include Ms Shimen AU, Ms May CHAN, Ms Sarita CHAN, Ms Samsonly CHAN & Mr. LEUNG Sum Ming

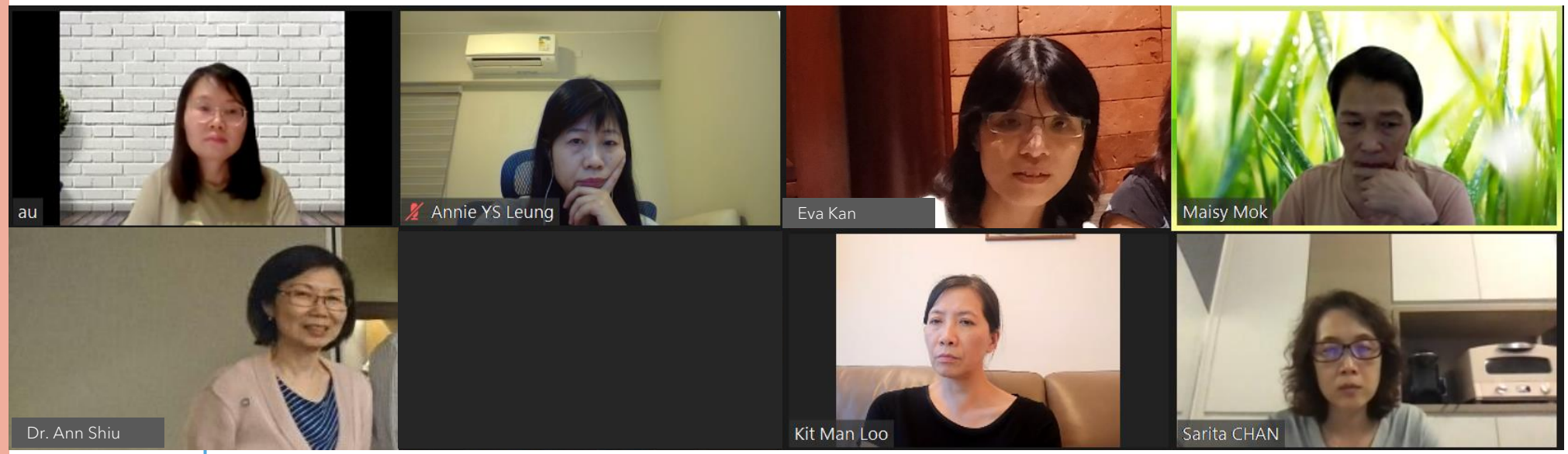


time flies



METHOD

2019 2020 2021



Re-formed a updated guideline development committee with 6 members and an advisor

METHOD

2019 | 2020 | 2021

Searched and reviewed the literature (mostly focused on the period between 2014 to 2019)

METHOD

2019 2020 2021

The workgroup held 7 meetings to scrutinize the literature and each recommendations

Updated the evidence-based clinical guideline with 45 recommendations



Translate the revised part in Chinese

SUMMARY OF CHANGES

How should insulin injections be prepared?

Skin preparation

1. Cleanliness of the skin must be ensured prior to subcutaneous insulin injection in all settings.[22] (III A)
2. Disinfection of the skin is not necessary prior to subcutaneous insulin injection in the home environment.[21,24,38,47,54,73] (I B)
3. If skin swabbing is performed, the skin must be allowed to dry properly before injection.[55,81] (III A)

Insulin vial and penfill membrane preparation

Cleanliness of penfill and vial membrane must be ensured, it is not necessary to disinfect the membrane in the home environment[39,54] (IIIA)

Insulin pen administration system

Insulin administration systems and penfills must be kept strictly for individual use.[41] (II A)

Mixing of cloudy insulin

1. Cloudy insulin (e.g. NPH and pre-mixed insulin) must be well mixed before injection.[4,14,45,54,57] (III A)
2. Tipping the insulin pen (to 180^0) for at least 20 cycles must be done to ensure complete re-suspension of the NPH insulin before injection.[42] (I A)

Drawing of insulin by syringe

When drawing up insulin, air equivalent to the dose should be drawn up first and injected into the vial to facilitate insulin withdrawal.[22] (III B)

Air bubbles should be expelled from the syringe before injection.[22,55] (III A)

Soluble insulin (e.g. rapid or short acting) must be drawn into the syringe before intermediate acting (e.g. NPH) insulin.[61] (III A)

Only compatible insulins can be drawn into one syringe.[4] (III A)

Priming of insulin pen

1. Air generated in the insulin pen should be removed (if any) before injection.[16,29] (II B)
2. Pens devices must be primed before each injection.[4,22] (III B)
3. Priming, when conducted must be ensured by observing at least a drop at the needle tip.[22] (IIIA)

Maximum dose of insulin for each administration

Single insulin doses greater than 50 units should be considered to be given in 2 separate injection.[8,18,31,52] (III B)

How should insulin injection be performed?

Way of insertion: with/ without skin pinch up, insertion angle*

1. Advice should be given with regards to the lifting of a skin fold and the angle of injection.[12,25,28,55,68] (II A)
2. Adults should use 4-5 mm needles and inject vertically.[27,28,31,34,35,37,50,51,67,69,79] (II B)
3. When using a needle of ≥ 6 mm, patients should inject at a 45-degree angle and/ or lifting a skinfold using the thumb and index or middle finger that lifts subcutaneous tissue away from the muscle layer.[31,46,60,66,68,77] (II A)
4. Children and slender patients should use 4 mm needles and may require a skin fold lift.[13,36,37] (II B)

Reuse of needle & syringe

Reuse of needles and syringes should be avoided.[4,17,26,46,56,58,63,70,72,78] (II A)

Length of time and the needle remains in the tissue

1. Syringe should be removed following the completion of insulin injection.[6,27] (III B)
2. The pen needle should be maintained and held within the injection site for at least 10 seconds after the plunger is fully depressed.[4,6,8,22,27,29,70] (II A)

Disposal of needle & syringe

1. When using a pen device, the pen needle should be removed from the device immediately after administering the insulin.[4,16,29,41,46] (II A)
2. Under no circumstance should pen device needles and syringes be directly disposed into rubbish bins.[4,22,27] (III A)
3. Patients should be taught to dispose of pen needles and syringes properly.[9,22,46,70,75] (II B)

Which site should be used for insulin injection?

Areas for injection

1. The appropriate injection areas are different in individuals and professional advice should be provided.[28,66] (II A)
2. Usual areas should include abdomen, upper arm, thigh and buttock.[4,15,20,25,31,46,55,70] (II A)
3. These recommended areas should include:

- Abdomen, avoiding umbilicus[4,15,22,31,55] (III B)
- Thigh, upper lateral and anterior aspect[28,33,46,65] (II B)
- Buttock, upper lateral quadrant[28,31,65,70] (II B)
- Arm, upper lateral and posterior aspect[28,46,65] (II B)

Rotation of injection points

1. Injection points should be rotated in the same area when using the same type of insulin[10,11,31,46,47,66] (II B)
2. Injection points should be rotated regularly.[40,59,70] (II A)
3. Patients should be taught a systematic rotation scheme.[2,22,31,40,55,70,80] (II A)
4. Regular review of injection technique and injection site should be undertaken and documented.[6,19] (II B)

Special consideration

Injection points should not be massaged after injection.[2,23,50,62] (II B)

Pregnant patients who continue to inject into the abdomen during the second and third trimester should administer all injections with a raised skin fold.[2,22] (III B)

How should insulin preparations and insulin pens ~~and pre-drawn syringe~~ be stored?

Storage of insulin

Insulin should be stored according to the manufacturers' instructions.[4,30] (III A)

Insulin pen/ pre-filled syringe

1. The practice of pre-loading insulin is not recommended (III B)
2. Insulin glargine and detemir should not be mixed with other forms of insulin in the same syringe.[4,30,61] (II B)
3. Insulin should not be extracted from the pen devices or penfill.[62] (IIIB)

What should be the appropriate needle length?*

Needle length of syringe

The desired needle length of insulin syringe should be the shortest available needle 6mm.[2,22,27,60,76](II A)

Needle length of pen needle

The desired length of pen needle should be individually defined within the range of 4 or 5 mm needle.[2,3,12,22,27,28,37,46,51,64,65,69,77,] (II A)

How should lipohypertrophy and lipoatrophy be managed?

Lipodystrophy

1. Injection into the hypertrophic and atropic areas should be avoided.[1,19,43,49] (II A)
2. Training of Health Care Professionals is required to identify lipohypertrophic lesions.[30,31] (IIA)
3. Visual inspection and palpation of injection area by the health care professionals (HCP) should be performed routinely and documented.[22,31,46,78] (III B)
4. Intensive patients training on injection technique, systematic rotation and frequent inspection is effective in improving and in preventing lipohypertrophy.[22,32,40] (I A)
5. A decrease in insulin dose may be required when switching injection from areas of lipohypertrophy to normal tissue and should be guided by blood glucose measurement.[19] (II B)