Standards and Challenges of Diabetes Self-Management

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Diabetes Academy GABRIC

Gabric Diabetes Education Association
Renovating Diabetes Education

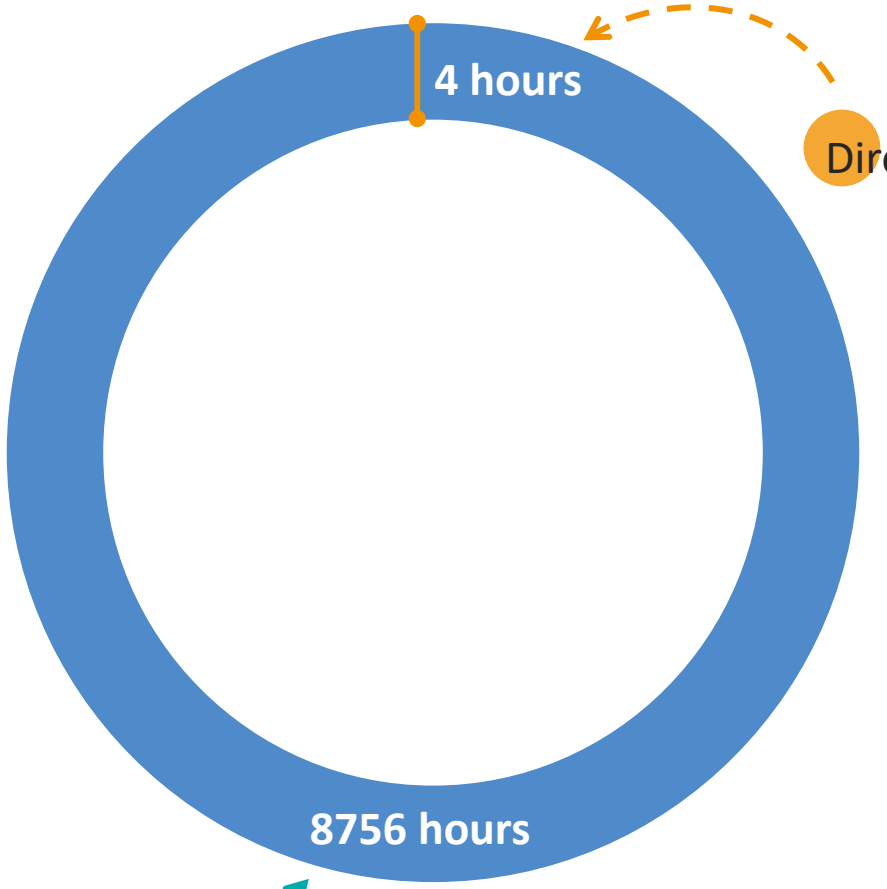
Disclosure to Participants

- Notice of Requirements For Successful Completion
- Conflict of Interest (COI) and Financial Relationship Disclosures:
- Presenter (Sara Sedaghat): Nothing to declare for this presentation, January 2024
- Non-Endorsement of Products:
  - Accredited status does not imply endorsement by any commercial products displayed in conjunction with this educational activity

Presentation Outline

- Standards of Diabetes Self-Management and Support:
  - History of Diabetes Self-management
  - Patient-centered DSME
  - Gabric Diabetes School
- The Role of Blood Glucose Monitoring in Diabetes management:
  - Glucose Monitoring in DM
  - Guideline Review
  - National Iranian Consensus
- Techniques and Challenges of Insulin Injection:
  - Psychological Challenges of Injections
  - Storage of Insulin
  - Needle Length
  - Insulin Injection Technique
  - Injectable Therapies

Each patient has a doctor inside them!



Direct HCP contact per year

More than 95% of diabetes care is done by the patient.

Time needed to be self-managed

More time is needed!

TABLE 1. CDE Estimation of Time Needed for Self-Care Activities for an Adult With Established Type 2 Diabetes on Oral Medications and Performing SMBG Twice Daily

ADA-Recommended Task	Time Needed ± SD (minutes)
SMBG	11 ± 26
Recordkeeping (e.g., fasting serum glucose and blood pressure)	9 ± 13
Taking medications	
Foot care	
Oral care	
Problem-solving	
Obtaining supplies	
Meal planning	21 ± 18
Shopping for food	23 ± 24
Preparing meals	54 ± 32
Exercise	32 ± 17
Stress management	16 ± 19
Support/support groups	13 ± 19
Scheduling medical appointments	9 ± 13

TABLE 2. CDE Estimation of Time Needed for Self-Care Activities for a Child (and Family) With Established Type 1 Diabetes on Basal-Bolus Insulin Therapy (Four Shots/Day) and Performing SMBG Four Times Daily

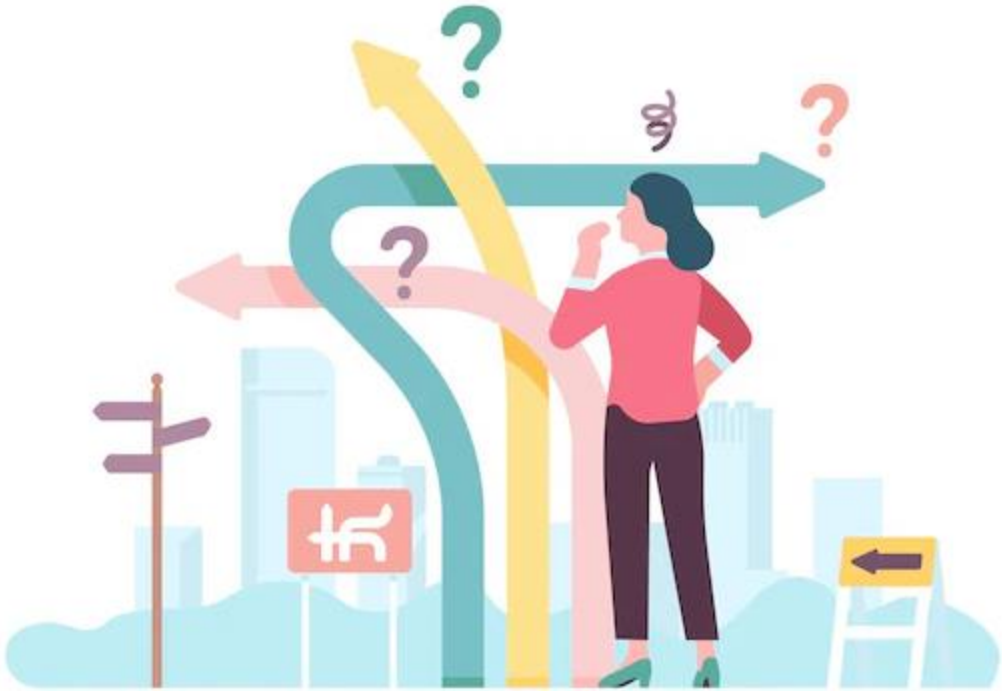
ADA-Recommended Task	Time Needed ± SD (minutes)
SMBG	17 ± 12
Recordkeeping (e.g., fasting serum glucose and blood pressure)	16 ± 18
Insulin drawing and administering	16 ± 12
	4 ± 4
	7 ± 5
	18 ± 21
	20 ± 21
	21 ± 19
Preparing meals	60 ± 265
Exercise/extracurricular activities	53 ± 31
Meal planning for school	13 ± 11
Medications for school	11 ± 11
Parental visits to school for problems (hypoglycemia/hyperglycemia)	15 ± 21
Support/support groups	14 ± 21
Obtaining supplies	11 ± 16
Scheduling medical appointments	9 ± 15

The total estimated time needed daily for recommended diabetes self-care:
~4 hours for adults and >5 hours for children

Shubrook JH et al. Diabetes Spectrum. 13, 2018

Extra decisions, Extra burden!

- T1DM: 180 extra decisions every day, on average



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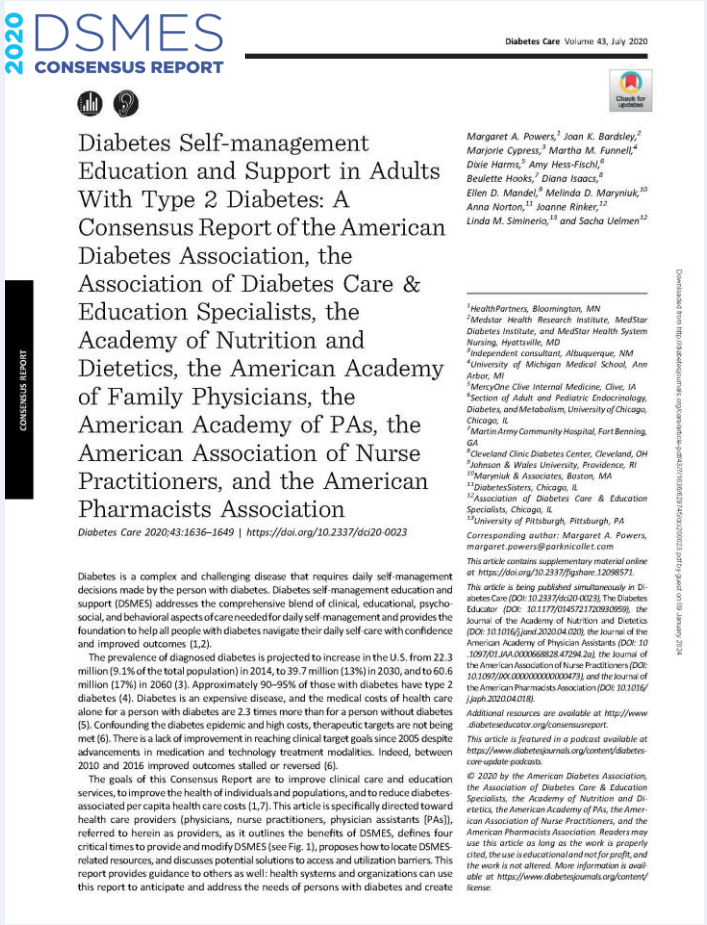
Key clinical Benefits of DSMES



2020 DSMES CONSENSUS REPORT

Diabetes Care Volume 43, July 2020

Diabetes Self-management Education and Support in Adults With Type 2 Diabetes: A Consensus Report of the American Diabetes Association, the Association of Diabetes Care & Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association

CONSENSUS REPORT

Diabetes Care 2020;43:1636–1649 | https://doi.org/10.2337/dci20-0023

Margaret A. Powers, Joan K. Bardsley, Marjorie Cypress, Martha M. Funnell, Dixie Harms, Amy Hess-Fischl, Beulette Hooks, Diana Isaacs, Ellen D. Mandel, Melinda D. Maryniuk, Anna Norton, Joanne Rinker, Linda M. Siminerio and Sacha Uelmen

Diabetes is a complex and challenging disease that requires daily self-management decisions made by the person with diabetes. Diabetes self-management education and support (DSMES) addresses the comprehensive blend of clinical, educational, psychosocial, and behavioral aspects of care needed for daily self-management and provides the foundation to help all people with diabetes navigate their daily self-care with confidence and improved outcomes (1,2).

The prevalence of diagnosed diabetes is projected to increase in the U.S. from 22.3 million (9.1% of the total population) in 2014, to 39.7 million (13%) in 2030, and to 60.6 million (17%) in 2060 (3). Approximately 90–95% of those with diabetes have type 2 diabetes (4). Diabetes is an expensive disease, and the medical costs of health care alone for a person with diabetes are 2.3 times more than for a person without diabetes (5). Confounding the diabetes epidemic and high costs, therapeutic targets are not being met (6). There is a lack of improvement in reaching clinical target goals since 2005 despite advancements in medication and technology treatment modalities. Indeed, between 2010 and 2016 improved outcomes stalled or reversed (6).

The goals of this Consensus Report are to improve clinical care and education services, to improve the health of individuals and populations, and to reduce diabetes-associated per capita health care costs (1,7). This article is specifically directed toward health care providers (physicians, nurse practitioners, physician assistants [PAs]), referred to herein as providers, as it outlines the benefits of DSMES, defines four critical times to provide and modify DSMES (see Fig. 1), proposes how to locate DSMES-related resources, and discusses potential solutions to access and utilization barriers. This report provides guidance to others as well: health systems and organizations can use this report to anticipate and address the needs of persons with diabetes and create

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This article contains supplementary material online at https://doi.org/10.2337/figshare.12098571.

This article is being published simultaneously in Diabetes Care (DOI: 10.2337/dci20-0023), The Diabetes Educator (DOI: 10.1177/0145721720930959), the Journal of the Academy of Nutrition and Dietetics (DOI: 10.1016/j.jand.2020.04.020), the Journal of the American Academy of Physician Assistants (DOI: 10.1097/01.JAA.0000668828.47294.2a), the Journal of the American Association of Nurse Practitioners (DOI: 10.1097/JXX.0000000000000473), and the Journal of the American Pharmacists Association (DOI: 10.1016/j.japh.2020.04.018).

Additional resources are available at http://www.diabeteseducator.org/consensusreport.

This article is featured in a podcast available at https://www.diabetesjournals.org/content/diabetes-core-update-podcasts.

- Average A1C reduction of 0.45–0.57% when compared with usual care for people with T2D treated with a variety of modalities (lifestyle alone, oral and injected medication)
- Reduction in the onset and/or worsening of diabetes-related complications
- Reduction of all-cause mortality

American Diabetes Association. · ADCES Association of Diabetes Care & Education Specialists · eat right. Academy of Nutrition and Dietetics · APhA · AANP American Association of NURSE PRACTITIONERS · AAPA · AAFP AMERICAN ACADEMY OF FAMILY PHYSICIANS

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Patient-centered DSME

ADCES Association of Diabetes Care & Education Specialists

ADCES7™

ADCES7 SELF-CARE BEHAVIORS™

- PROBLEM SOLVING
- REDUCING RISKS
- MONITORING
- TAKING MEDICATION
- HEALTHY EATING
- HEALTHY COPING
- BEING ACTIVE

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Case

65 y/o women
Diabetes duration: 5 years
Dyslipidemia: 15 years
PMHx:
Grade I fatty liver
Diabetic retinopathy: PDR

Daily Medications:
- Glargine U300
- Empa/Met 5/500 mg BID
- Atorvastatin 20 mg Daily
- Aspirin 80 mg Daily
- Losartan 50 mg
- Amlodipine 5 mg

Laboratory Analysis

FBS: 200 mg/dL
$HbA1_C$: 8.8%
Total Chol: 220 mg/dL
TG: 400 mg/dL
LDL: 100 mg/dL
HDL: 40 mg/dL
Cr:1.1 mg/dL (eGFR: 54.5 mL/min/1.73m²)
AST: 34 U/L
ALT: 30 U/L

Rising HbA1c through last 6 months

P/E:

Office BP: 150/90 mm/Hg

BMI: 26 kg/m²

Lower Extremity: ++ non pitting edema

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AST: 34 U/L
ALT: 30 U/L

Last 6 mon
- HbA1c: 8%
- Glargine U300 up-titration

Last 3 mon
- HbA1c: 8.5%
- Adding Empa/Met 5/500 mg BID

Current visit
- HbA1c: 8.8%
- Recommendation?

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checkpoint

این شوخی نیست . منظورم این است که اگر به زودی این کار را نکنید دچار مشکل بزرگی می شوید.

شما باید هرچه زودتر به فکر خودتون باشید و پیگیری جدی داشته باشید! تا خودتون نخواهید اوضاع همینه!

ای وان سی شما خوب نیست و باید با رعایت تغذیه و مصرف منظم انسولین موضوع شرایط را خوب کنید.

حقیقتاً تقصیر شما نیست و اشکالی نداره!

نگران عوارض نباش، اتفاقی نمی افتد.

Ineffective communication

Core Communication Skills

Asking

- develop an understanding of patients' problems and perspectives by using open-ended questions

Listening

- understand patients' experiences, feelings, and meanings correctly by using reflection

Informing

- conveying knowledge about a condition or medical treatment or even share the results

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Effective asking

Effective asking

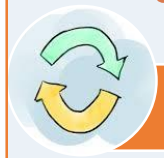
- What special problems have you experienced in relation to diabetes management?
- What is the hardest part of managing diabetes for you?
- What is your opinion about…. (negative behavior and negative result)?
- What is your most important concern about this situation?

Answers heard from the individual

- The food that is recommended for me to eat is small, that's why I am always hungry and I eat a lot also recently my wife passed away and I don't cook anymore because I am alone.
- I am worried that retinopathy will progress and surgery will be needed.
- I inject insulin, but I think my injection Is not correct because sometimes it hurts a lot.
- I don't take the glucose test regularly because the cost of the test strip and the needle is high.

Accurate Empathy

Affirmations



Reflecting

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Listening and empathy

Listening by Reflecting

- From what I understand…
- So you feel that ……..
- It sounds like… Have I understood what you mean?
- what I hear you saying
- You want ……..
- On the one hand you feel that …… and on the other hand
- you mean that …….
- You feel because you think

Affirm Patients' Strengths and Past Efforts

- What challenges of diabetes management were you able to solve?
- Which part of diabetes management is easier for you?
- What strengths of yours can solve this challenge?
- Do you have a similar experience in the past?

Accurate Empathy

Affirmations

Reflecting

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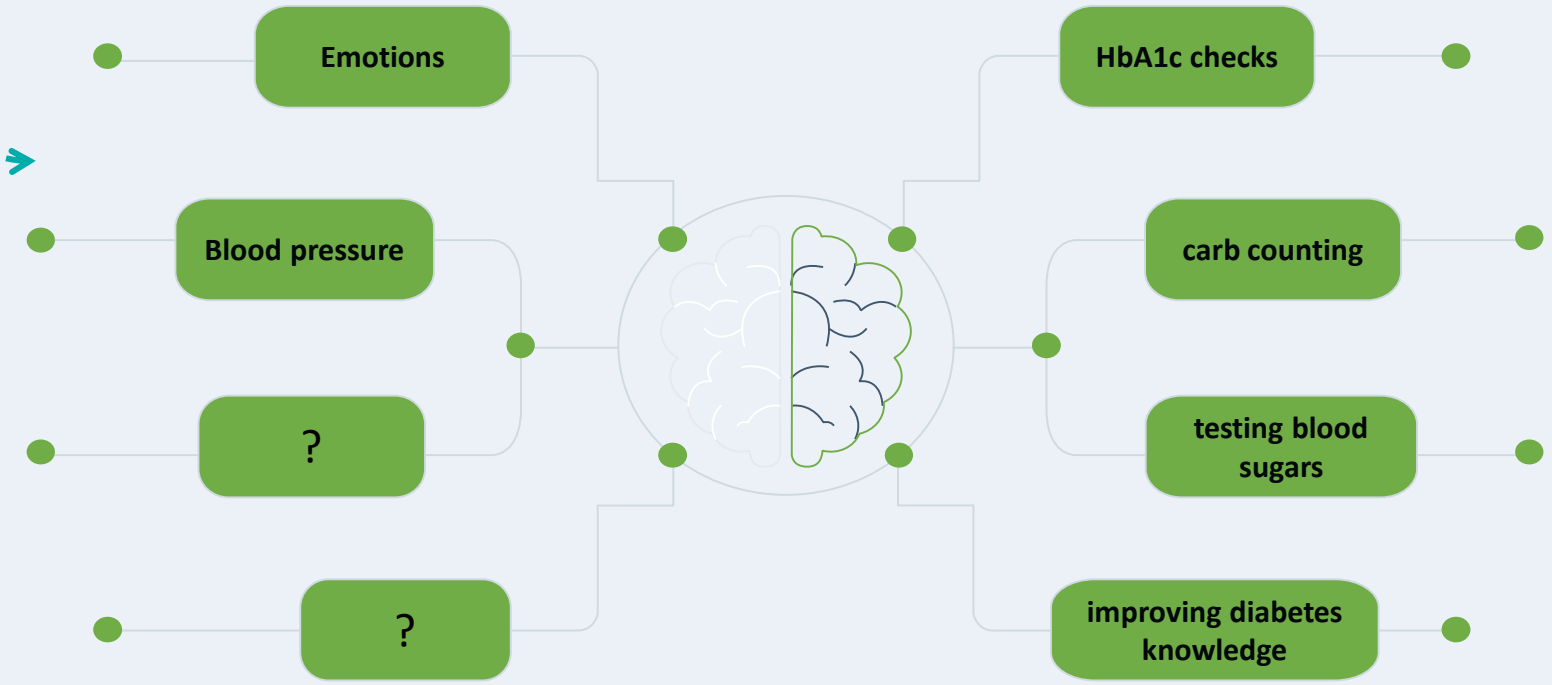
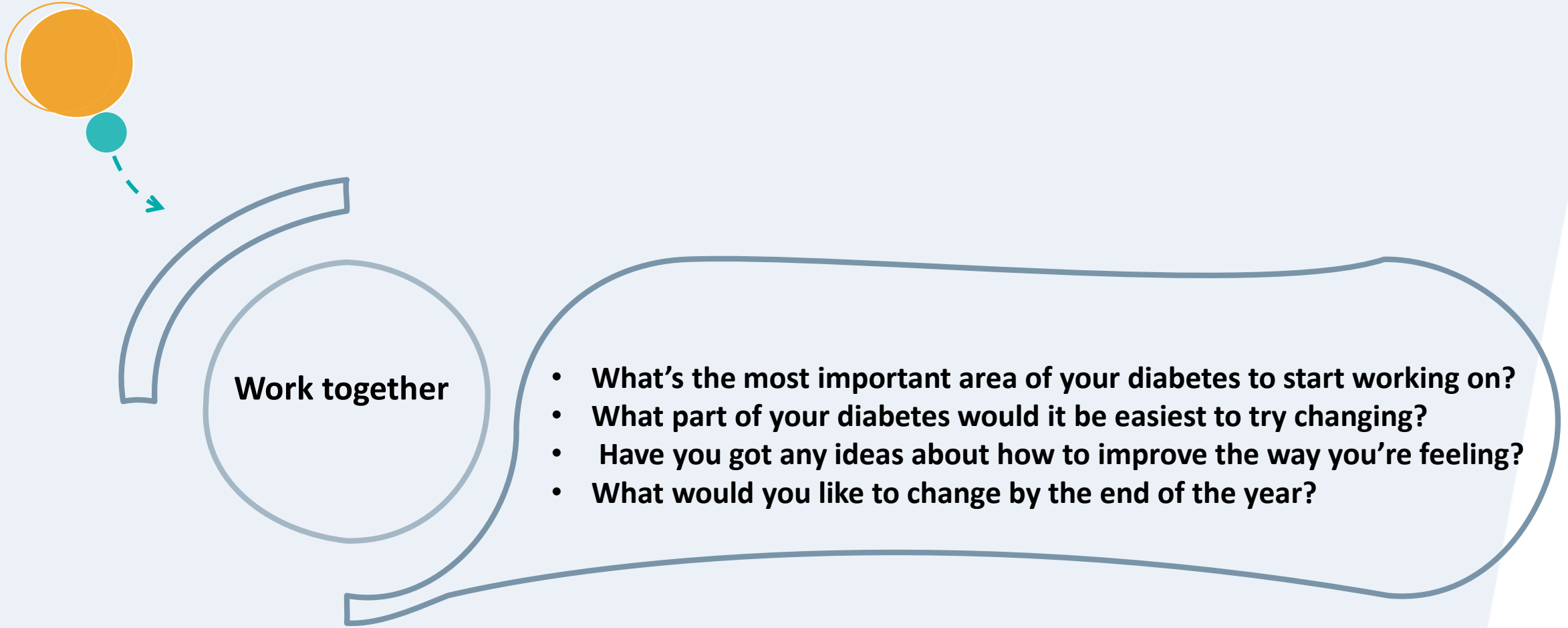
Informing

conveying knowledge about a condition or medical treatment or even share the results



use clear simple language and allow for joint exploration and discussions

Agreed actions



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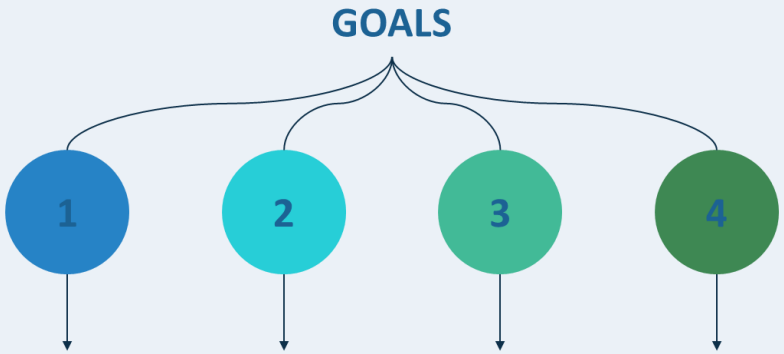

Work together

- **if you agree a goal ask them if they see any barriers to achieving this!**
- **Ask them to write their goal down.**

Effective communication

Asking

در این چند وقت چه مشکل خاصی در رابطه با مدیریت دیابت را تجربه کردی؟ نظرت راجع به نتیجه ای وان سی که افزایش یافته چیست؟

Listening

اینطور که متوجه شدم توجه به از دست دادن همسرتون شرایط سختی را تجربه میکنید و باعث شده انرژی مراقبت از خودتون نداشته باشید و در عین حال مشکلاتی را راجع به تزریق انسولین و رعایت تغذیه دارید و نگران پیشرفت عوارض هستید.

Informing

اگر موافق باشی میتونیم در مورد تکنیک ها تزریق انسولین و روش ها که به بهبود تغذیه تون میشه صحبت کنیم.

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Communication Is The Key!

Reviewing Injection Tech

Resistance and concerns for complications and lifestyle modifications

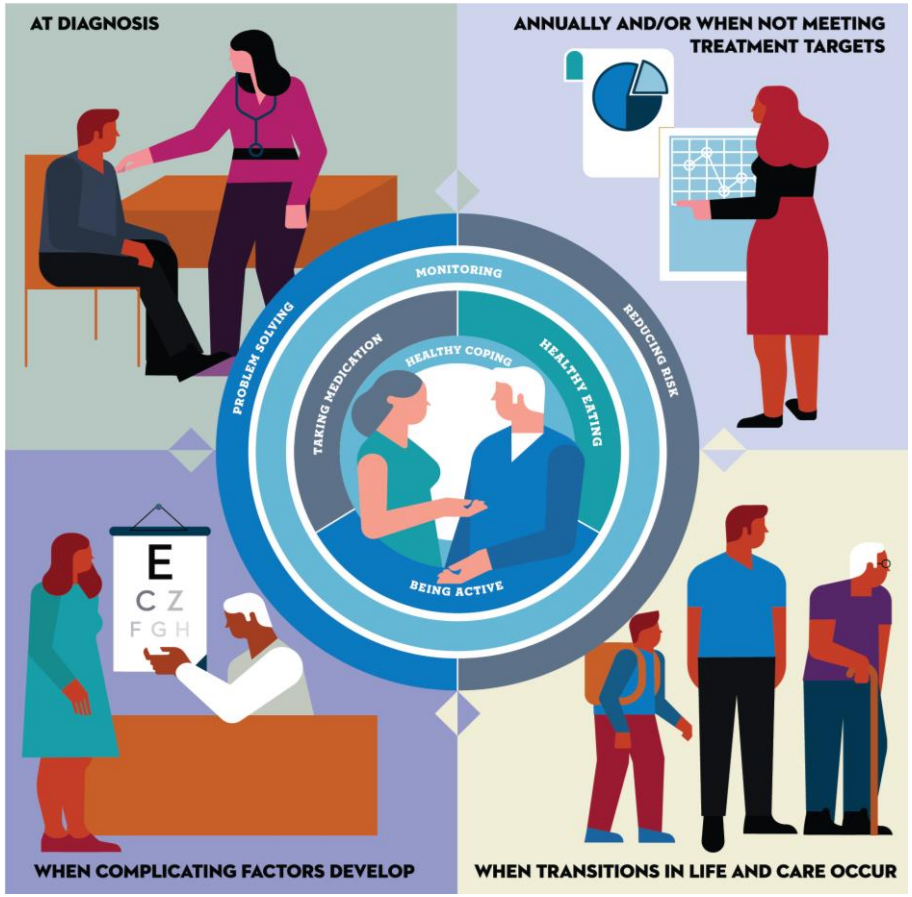
Social Determinant of Health

Patient Communication Toolbox

What’s inside our toolbox ?

- Communication skills
- Your knowledge
- DSMES referral

Four Critical Times to Provide and Modify DSMES



Powers MA, Bardsley JK, et al. DSMES Consensus Report, Diabetes Care Jul 2020, 43 (7) 1636-1649

DSMES Consensus Report Recommendations

DSMES Improves Health Outcomes, Quality of Life, and Is Cost Effective, and People With Diabetes Deserve the Right to DSMES Services. Therefore, It Is Recommended That:
Providers:
1. Discuss with all persons with diabetes the benefits and value of initial and ongoing DSMES.
2. Initiate referral to and facilitate participation in DSMES at the 4 critical times: (1) at diagnosis, (2) annually and/or when not meeting treatment targets, (3) when complicating factors develop, and (4) when transitions in life and care occur.
3. Ensure coordination of the medical nutrition therapy plan with the overall management strategy, including the DSMES plan, medications, and physical activity on an ongoing basis.
4. Identify and address barriers affecting participation with DSMES services following referral.
Health policy, payers, health systems, providers, and health care teams:
5. Expand awareness, access, and utilization of innovative and nontraditional DSMES services.
6. Identify and address barriers influencing providers' referrals to DSMES services.
7. Facilitate reimbursement processes and other means of financial support in consideration of cost savings related to the benefits of DSMES services.

Powers MA, Bardsley JK, et al. DSMES Consensus Report, Diabetes Care Jul 2020, 43 (7) 1636-1649

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Summary of DSMES Benefits to Discuss with People with Diabetes

- Provides critical education and support for implementing treatment plan
- Reduces hypoglycemia
- Addresses weight maintenance or loss
- Enhances self-efficacy and empowerment
- Increases healthy coping
- Decreases diabetes-related distress
- Promotes lifestyle behaviors including healthful meal planning and engagement in regular physical activity
- Improves quality of life
- Reduces all-cause mortality
- Reduces emergency department visits, hospital admission, and hospital readmission
- Lowers A1C

No negative side effects

Medicare / most insurers covers costs

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Powers MA, Bardsley JK, et al. DSMES Consensus Report, Diabetes Care Jul 2020, 43 (7) 1636-1649

If DSMES were a pill, would you prescribe it?

Comparing the benefits of DSMES/MNT vs metformin therapy

	Benefits rating	
CRITERIA	DSMES/MNT	METFORMIN
Efficacy	High	High
Hypoglycemia risk	Low	Low
Weight	Neutral/Loss	Neutral/Loss
Side effects	None	Gastrointestinal
Cost	Low/Savings	Low
Psychosocial benefits*	High	N/A

N/A, not applicable. *Psychosocial benefits include *improvements to* quality of life, self-efficay, empowerment, healthy coping, knowledge, self-care behaviors, meal planning, healthier food choices, more activity, use of glucose monitoring, lower blood pressure and lipids and *reductions in* problems in managing diabetes, diabetes distress, and the risk of long-term complications (and prevention of acute complications).

Powers MA, Bardsley JK, et al. DSMES Consensus Report, Diabetes Care Jul 2020, 43 (7) 1636-1649

Low Utilization of DSME despite its proven benefits is a Global Challenge!

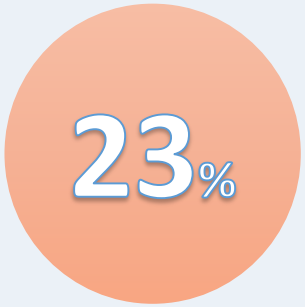
Li, Shrestha et al. 2014

Low Utilization of DSMES

Of **MEDICARE** beneficiaries with newly diagnosed diabetes used DSMT services[1]

Of individuals with newly diagnosed T2D with **PRIVATE HEALTH** insurance received DSMES within 12 months of diagnosis[2]

UK:
of patients with T2DM attended DSME.



Iran:

Phase 2 analysis from nationwide diabetes report of National Program for Prevention and Control of Diabetes (NPPCD-2018)

The prevalence of patients who received education for nutrition therapy or diabetes self-management was 16.3% and 23.3% respectively.

Li R, et al. Morbidity Mortality Weekly Report, 2014
Strawbridge LM, et al. Health Educator, 2015
Li, Shrestha et al. 2014
Esteghamati, A. et al. Primary Care Diabetes, 2020

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Gabric Diabetes School: What we have learned

GABRIC Diabetes School: an innovative education centre for people with diabetes

Alireza Esteghamati [1], Farhad Hosseinpanah [2], Seyed Adel Jahed [3], Hadi Harati [3], Mohammad Taghi Cheraghchi Bashi Astaneh [3], Hormoz Kaykhanzadeh [3] and Sara Sedaghat [3]

[1]Endocrinology and Meatbolism Research Center, Vali-Asr Hospital School of Medicine, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran [2]Obesity research center, Research institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran [3]Gabric Diabetes Education Association, Tehran, Islamic Republic of Iran (Correspondence to: Sara Sedaghat: s.sedaghat@gabric.ir).

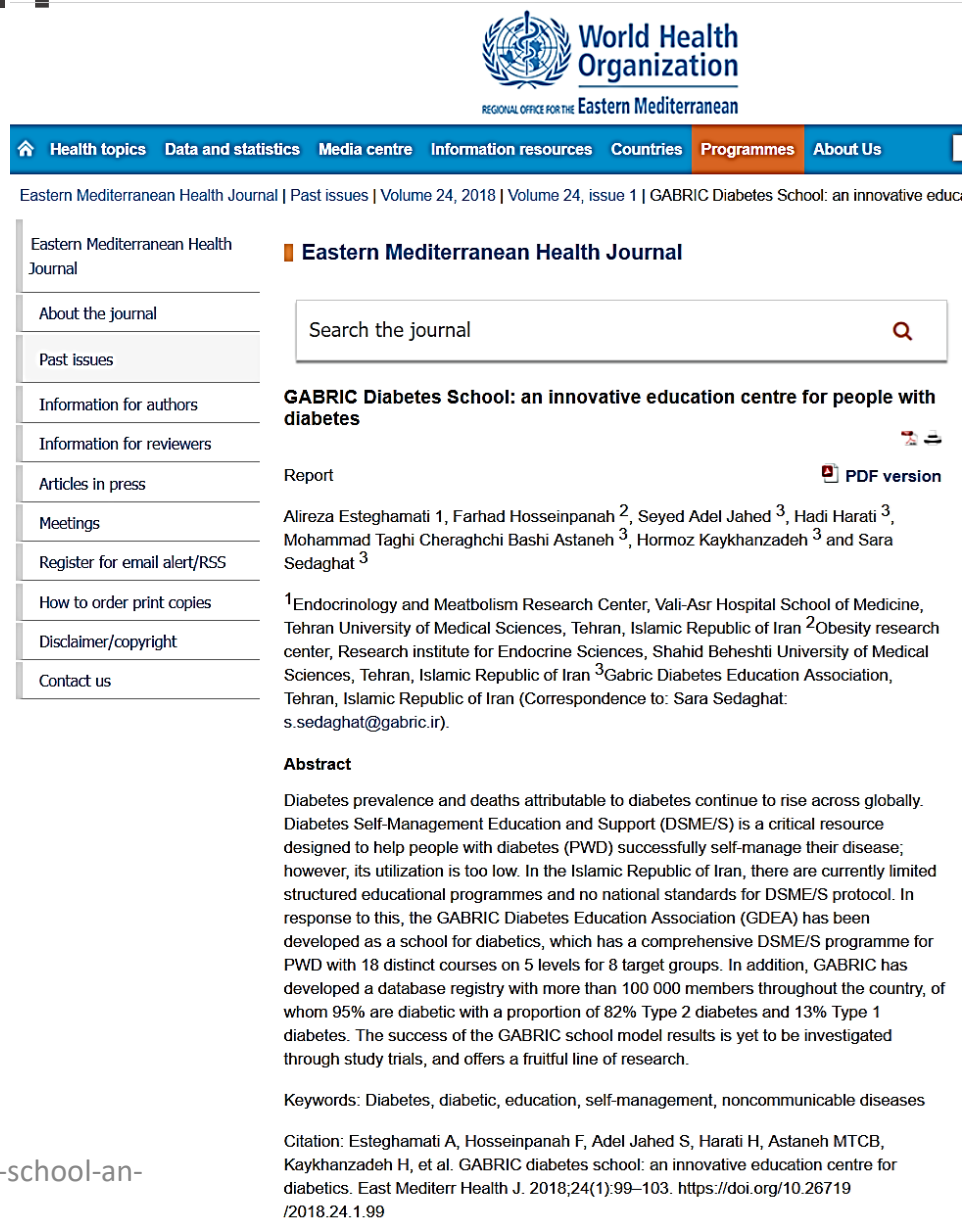
Abstract

Diabetes prevalence and deaths attributable to diabetes continue to rise across globally. Diabetes Self-Management Education and Support (DSME/S) is a critical resource designed to help people with diabetes (PWD) successfully self-manage their disease; however, its utilization is too low. In the Islamic Republic of Iran, there are currently limited structured educational programmes and no national standards for DSME/S protocol. In response to this, the GABRIC Diabetes Education Association (GDEA) has been developed as a school for diabetics, which has a comprehensive DSME/S programme for PWD with 18 distinct courses on 5 levels for 8 target groups. In addition, GABRIC has developed a database registry with more than 100 000 members throughout the country, of whom 95% are diabetic with a proportion of 82% Type 2 diabetes and 13% Type 1 diabetes. The success of the GABRIC school model results is yet to be investigated through study trials, and offers a fruitful line of research.

Keywords: Diabetes, diabetic, education, self-management, noncommunicable diseases

Citation: Esteghamati A, Hosseinpanah F, Adel Jahed S, Harati H, Astaneh MTCB, Kaykhanzadeh H, et al. GABRIC diabetes school: an innovative education centre for diabetics. East Mediterr Health J. 2018;24(1):99–103. https://doi.org/10.26719/2018.24.1.99

Received: 06/01/18; accepted: 17/01/18



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GABRIC Diabetes School: an innovative education centre for people with diabetes

Report PDF version

Alireza Esteghamati 1, Farhad Hosseinpanah 2, Seyed Adel Jahed 3, Hadi Harati 3, Mohammad Taghi Cheraghchi Bashi Astaneh 3, Hormoz Kaykhanzadeh 3 and Sara Sedaghat 3

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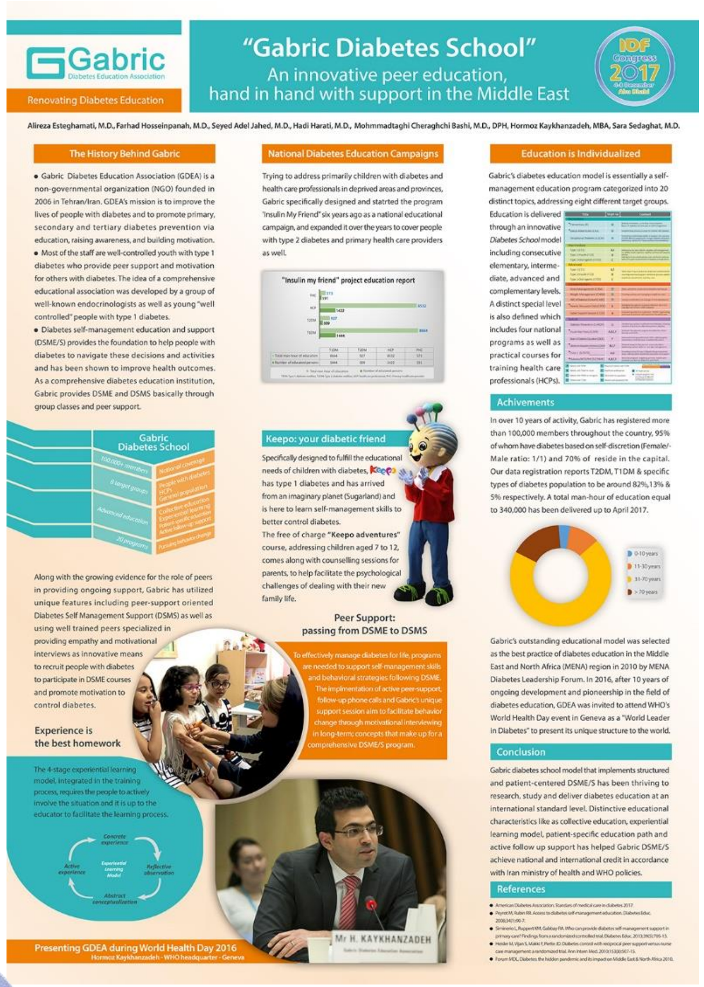
http://www.emro.who.int/emhj-volume-24-2018/volume-24-issue-1/gabric-diabetes-school-an-innovative-education-centre-for-people-with-diabetes.html



IDF Congress 2019
2-6 December
Busan
Korea

IDF Congress 2017
4-8 December
Abu Dhabi

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Tailored Diabetes Education

- Patients with T1DM
- Patients with T2DM (Insulin)
- Patients with T2DM (Oral agents)
- Children with T1DM
- Parents of children with T1DM
- Healthcare professionals
- General/at risk population
- Women with GDM

Individualized Education Path

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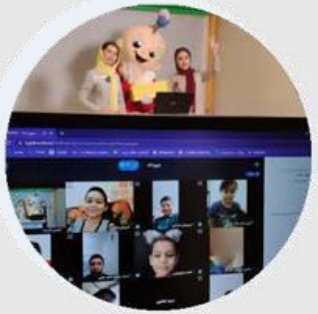
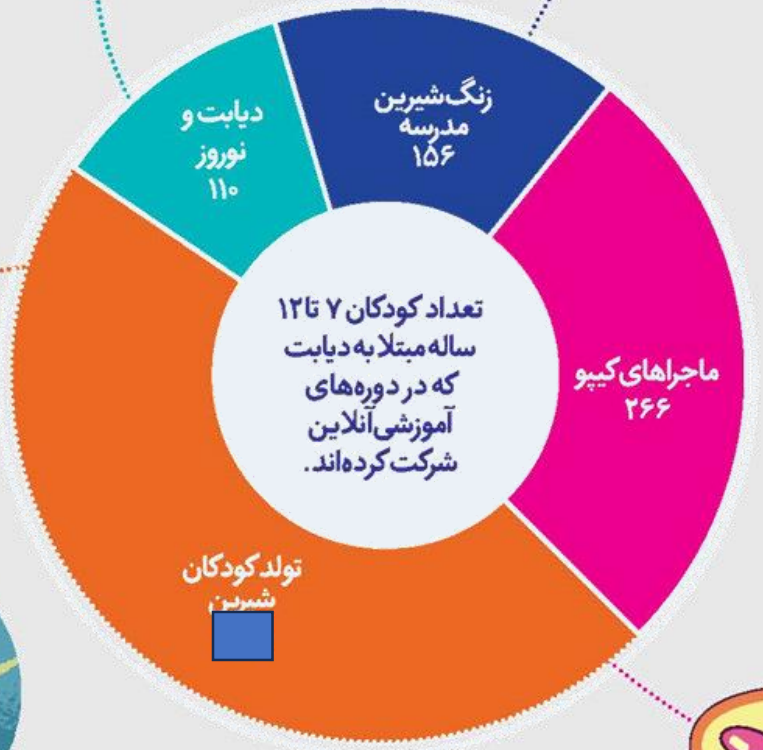
برنامه‌های آنلاین

ویژه کودکان در سراسر کشور



این دوره به طور خاص برای توانمندسازی کودکان در زمینه مدیریت قند خون در تعطیلات نوروز طراحی شده است.

در این کارگاه آموزشی جذاب مهارت‌های مهمی مانند جرات‌ورزی، دوست‌یابی و حل مسئله را یاد می‌گیرند تا بتوانند در محیط مدرسه دیابت خود را به خوبی مدیریت نمایند.



در این دوره کودکان با مهارتهای کنترل قند خون در مهمانی و جشن آشنا می‌شوند.

کیپو موجودی است، فضایی که در سیاره قندی‌ها زندگی می‌کند، سرزمینی که ساکنین آن مبتلا به دیابت نوع یک هستند. انسولین تزریق می‌کنند. کیپو به عنوان قهرمان داستان، تصمیم می‌گیرد برای یافتن راهکارهای مدیریت دیابت، به زمین و انجمن دیابت گابریک سفر کند! کودکان مبتلا به دیابت با ماجراهای کیپو در این مسیر همراه می‌شوند و با مفاهیم مدیریت قند خون آشنا می‌شوند.

در این دوره دو جلسه‌ای به زبانی قابل درک برای کودکان آموزش اصول مدیریت دیابت با کمک شخصیت "کیپو" ارائه می‌شود.

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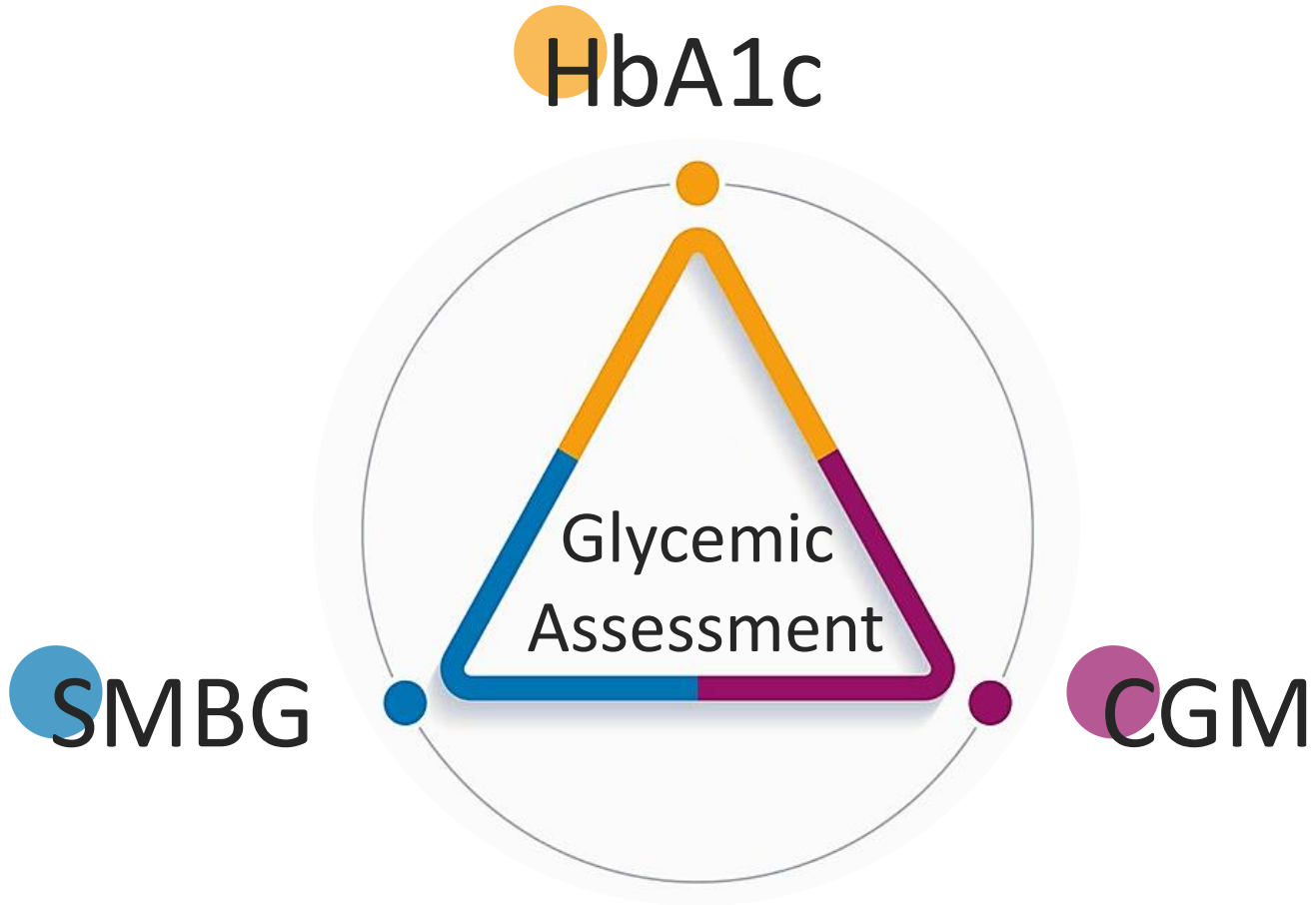
Gabric Diabetes Association

Diabetes Association GABRIC

Presentation Outline

- Standards of Diabetes Self-Management and Support:
  - History of Diabetes Self-management
  - Patient-centered DSME
  - Gabric Diabetes School
- The Role of Blood Glucose Monitoring in Diabetes management:
  - Glucose Monitoring in DM
  - Guideline Review
  - National Iranian Consensus
- Techniques and Challenges of Insulin Injection:
  - Psychological Challenges of Injections
  - Storage of Insulin
  - Needle Length
  - Insulin Injection Technique
  - Injectable Therapies

Glycemic Control Assessment



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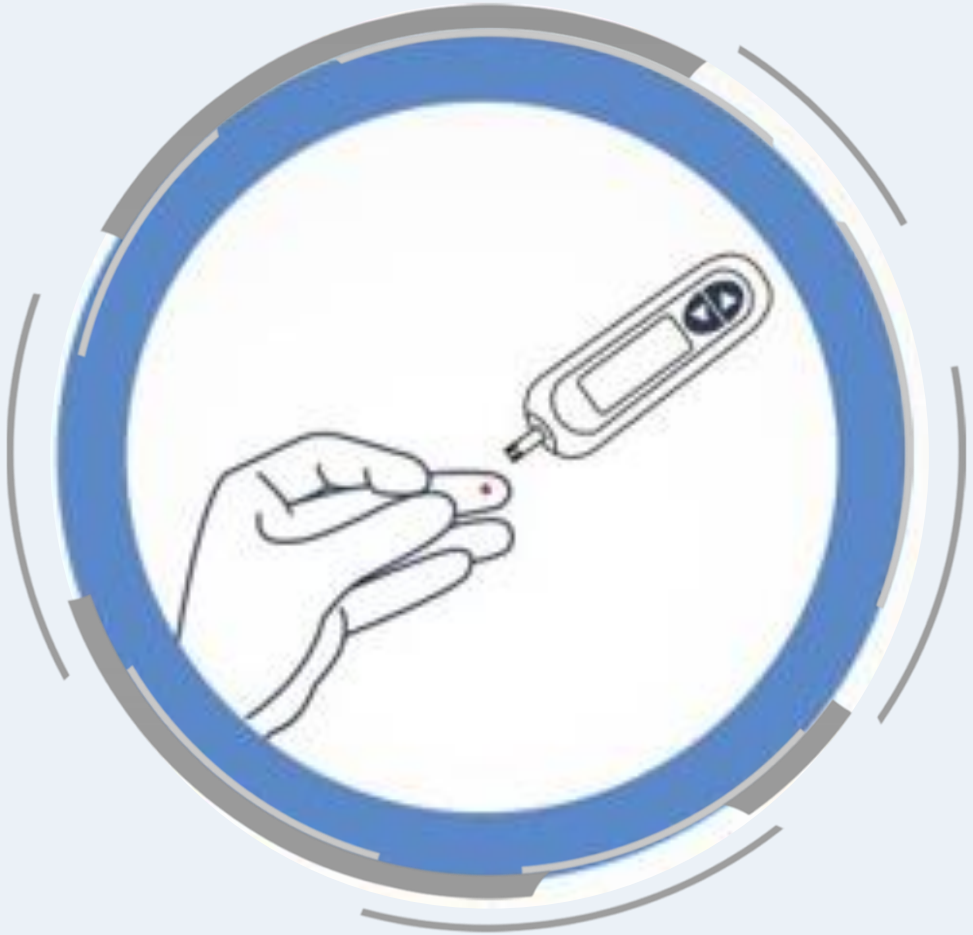
Self Monitoring of Blood Glucose (SMBG)

- SMBG as an integral part of patient self-management:
- SMBG needs to be practiced evidence based.
- SMBG barriers and limitations needs to be addressed.



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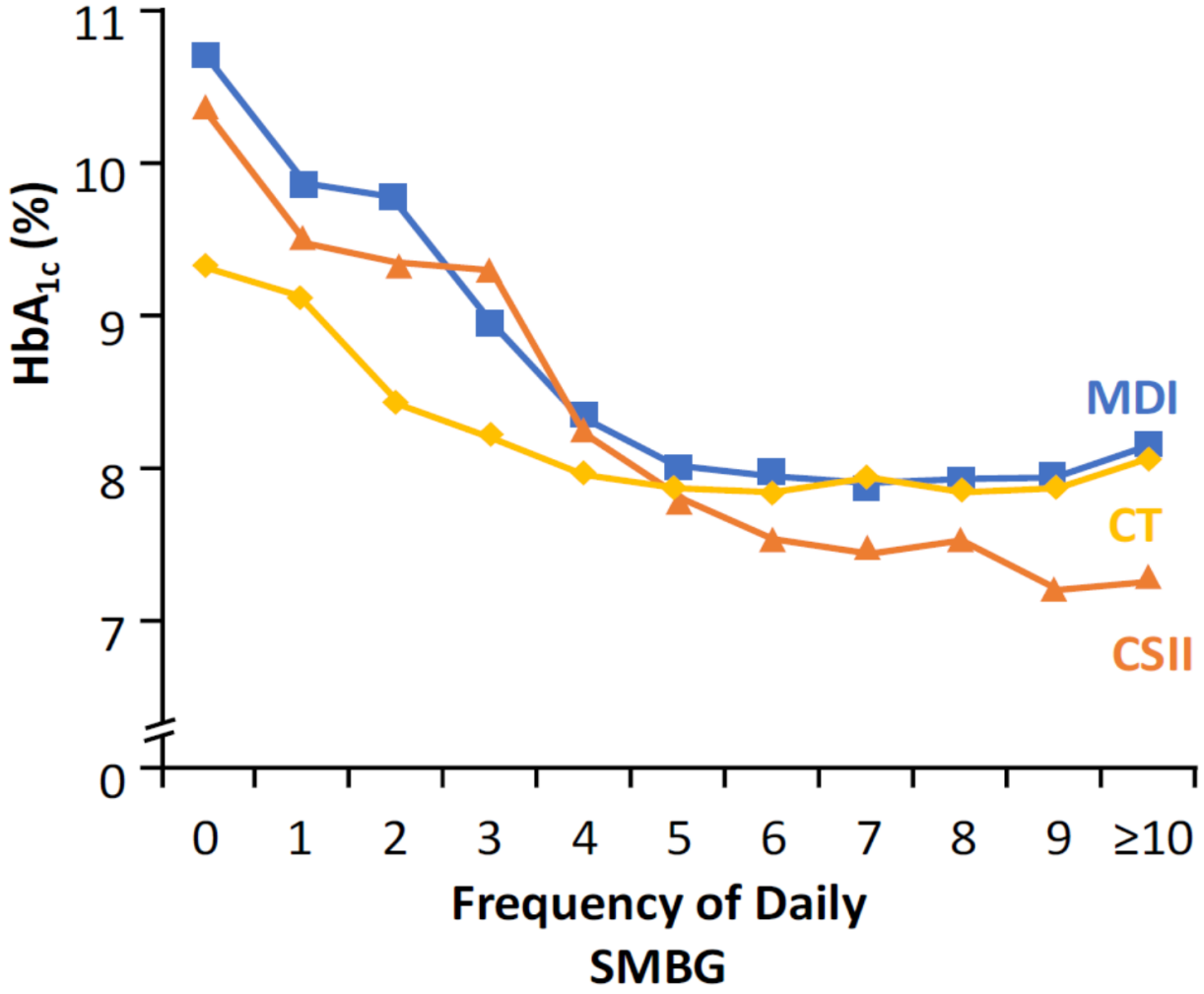
T1DM: Greater SMBG Frequency and Lower HbA1C

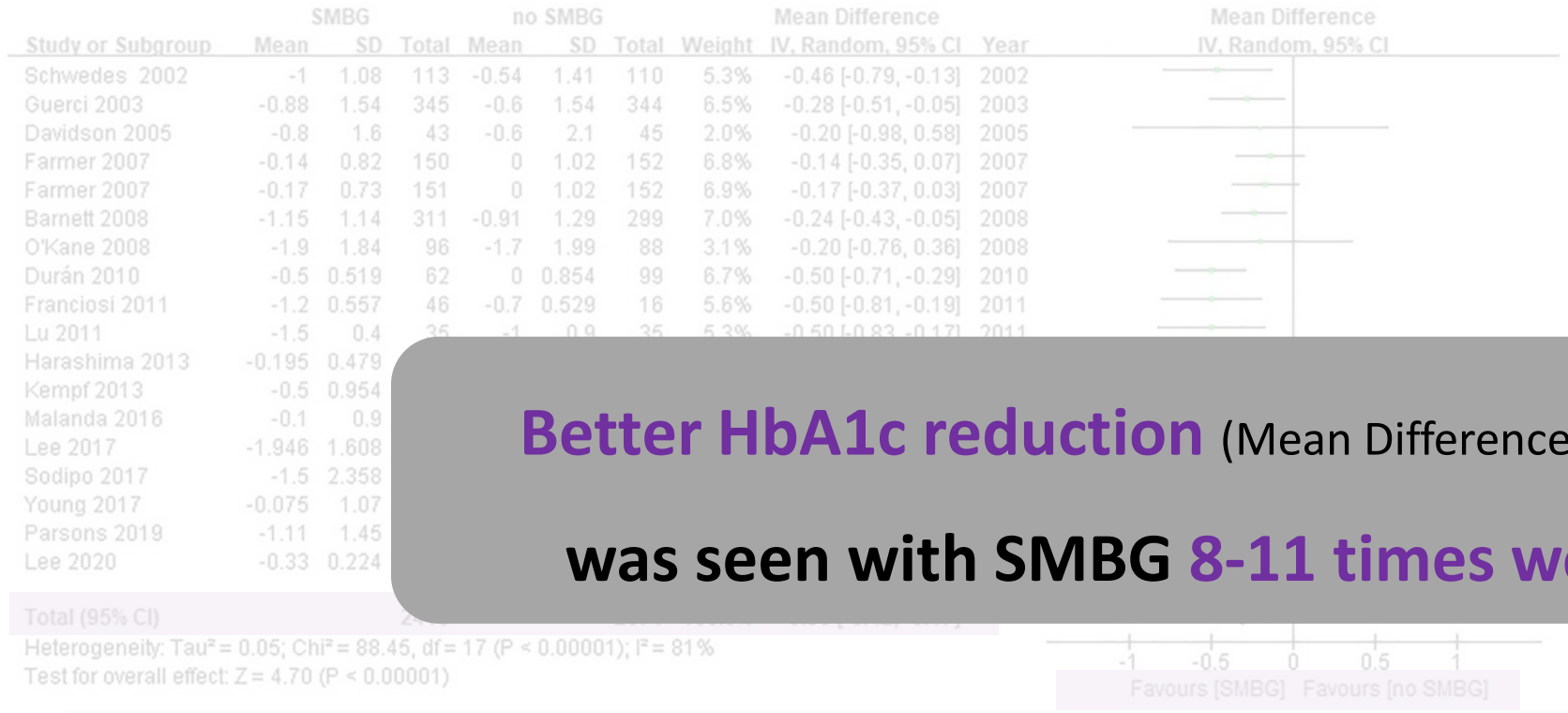


Ziegler R, et al. Pediatr Diabetes. 2011;12(1):11-7.

Miller KM, et al. Diabetes Care. 2013;36:2009-14..

Foster NC, et al, Diabetes technology & therapeutics. 2019 Feb 1;21(2):66-72.

The Efficacy and Frequency of Self-monitoring of Blood Glucose in Non-insulin-Treated T2D Patients: a Systematic Review and Meta-analysis



Better HbA1c reduction (Mean Difference: −0.35%)

was seen with SMBG 8-11 times weekly

J Gen Intern Med. 2023 Feb;38(3):755-764.

International Guidelines and Consensus Review

DIABETES CANADA
CLINICAL PRACTICE GUIDELINES

NICE National Institute for Health and Care Excellence

American Diabetes Association.

AACE

International Diabetes Federation

Diabetes Academy GABRIC

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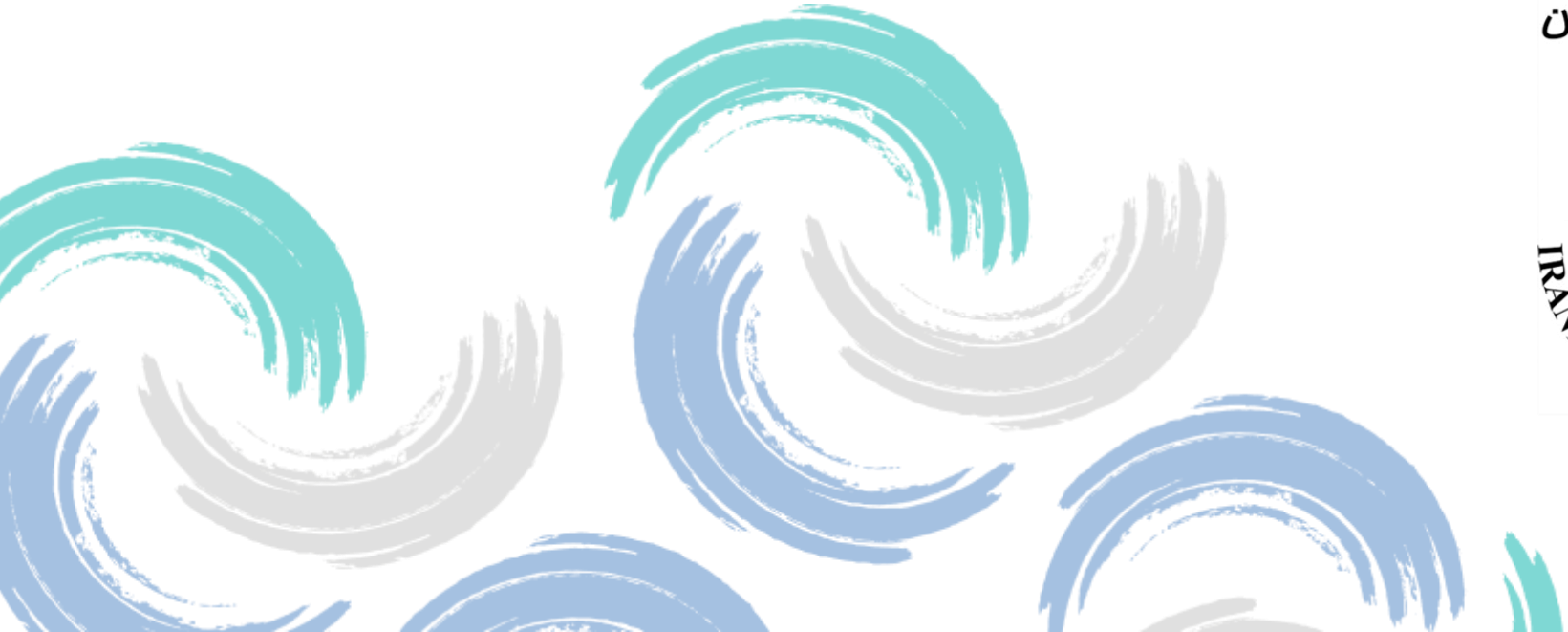
Member

First National Iranian Consensus on SMBG



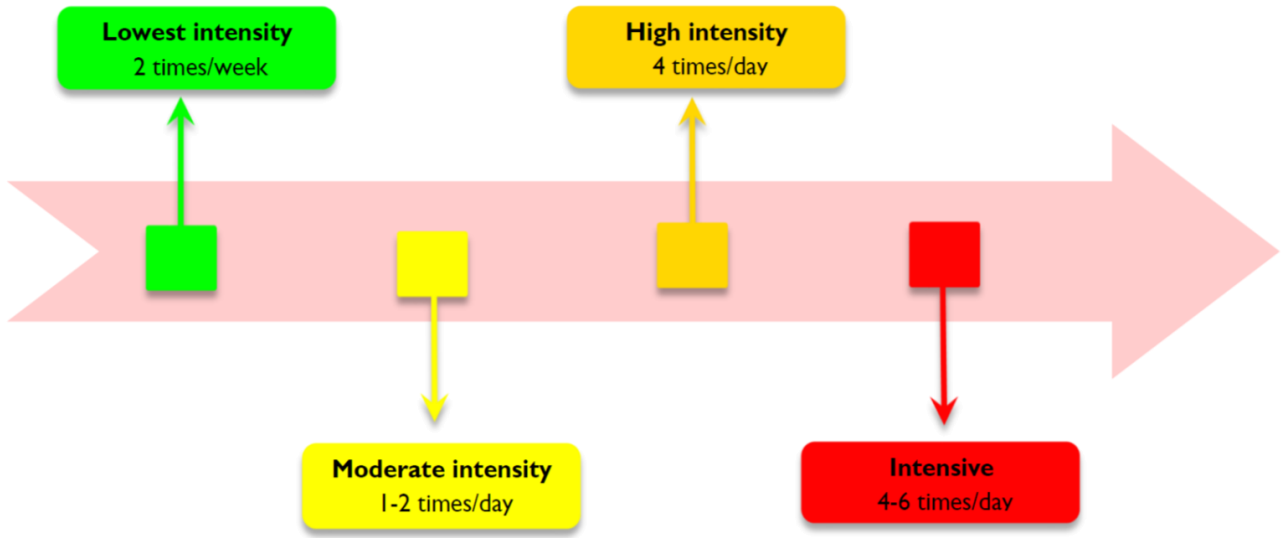
SMBG Protocol Categories

We recommend 4 SMBG protocols, including:

- Lowest intensity: 2 times per week
- Moderate intensity: 1-2 times per day
- High intensity: 4 times per day
- Intensive: 4-6 times per day

<u>Tailored target groups, based on</u>

- Glycemic control
- Type of diabetes
- Therapeutic regimen

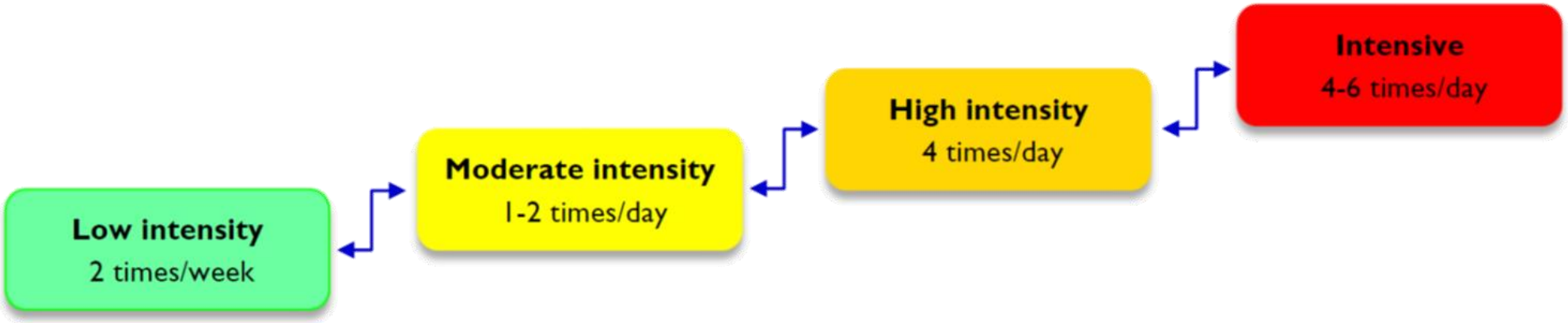


Intensification process

Intensification is needed if the person with diabetes is:

- Newly diagnosed
- Not meeting glycemic target
- Sick days or hospitalized patients
- History of DKA or Severe hypoglycemia during last month

De-intensification based on HCP consultation and re-assessment.



	Status	Table Number
T_1DM	HbA_{1c} in Target	1-3
	HbA_{1c} Not in Target	1-4
	Children ≤ 5 years old	1-4
	Pregnant	1-4
T_2DM	HbA_{1c} in Target, on OAD with no hypoglycemia risk	1-1
	HbA_{1c} Not in Target, on OAD with no hypoglycemia risk	1-2
	HbA_{1c} in Target, on OAD with hypoglycemia risk	1-2
	HbA_{1c} in Target on insulin, not MDI, ± OAD	1-2
	HbA_{1c} Not in Target, on OAD with hypoglycemia risk	1-3
	HbA_{1c} Not in Target, on insulin, not MDI ± OAD	1-3
	HbA_{1c} in Target, on MDI ± OAD	1-3
	HbA_{1c} Not in Target, on MDI ± OAD	1-4
	Pregnant, on insulin	1-4
GDM	HbA_{1c} in Target, only on LSM/metformin	1-2
	HbA_{1c} Not in Target, only on LSM/metformin	1-3
	On Insulin	1-4

Standard Care:
Available and Affordable Standard SMBG Practice

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Limited Care:
Unavailable and Unaffordable Standard SMBG Practice

	Status	Table Number
T_1DM	HbA_{1c} in Target	2-2
	HbA_{1c} Not in Target	2-3
	Children ≤ 5 years old	2-3
	Pregnant	2-3
[Publish Date] T_2DM	HbA1c in Target, on OAD with hypoglycemia risk	2-1
	HbA1c in Target on insulin, not MDI ± OAD	2-1
	If possible:T2DM on OAD with no hypoglycemia risk	2-1
	HbA_{1c} Not in Target, on OAD with no hypoglycemia risk	2-1
	HbA_{1c} Not in Target, on OAD with hypoglycemia risk	2-2
	HbA_{1c} Not in Target, on insulin, not MDI ± OAD	2-2
	HbA_{1c} in Target, on MDI ± OAD	2-2
	HbA_{1c} Not in Target, on MDI ± OAD	2-3
	Pregnant, on insulin	2-3
GDM	HbA_{1c} in Target, only on LSM/metformin	2-1
	HbA_{1c} Not in Target, only on LSM/metformin	2-3
	On Insulin	2-3

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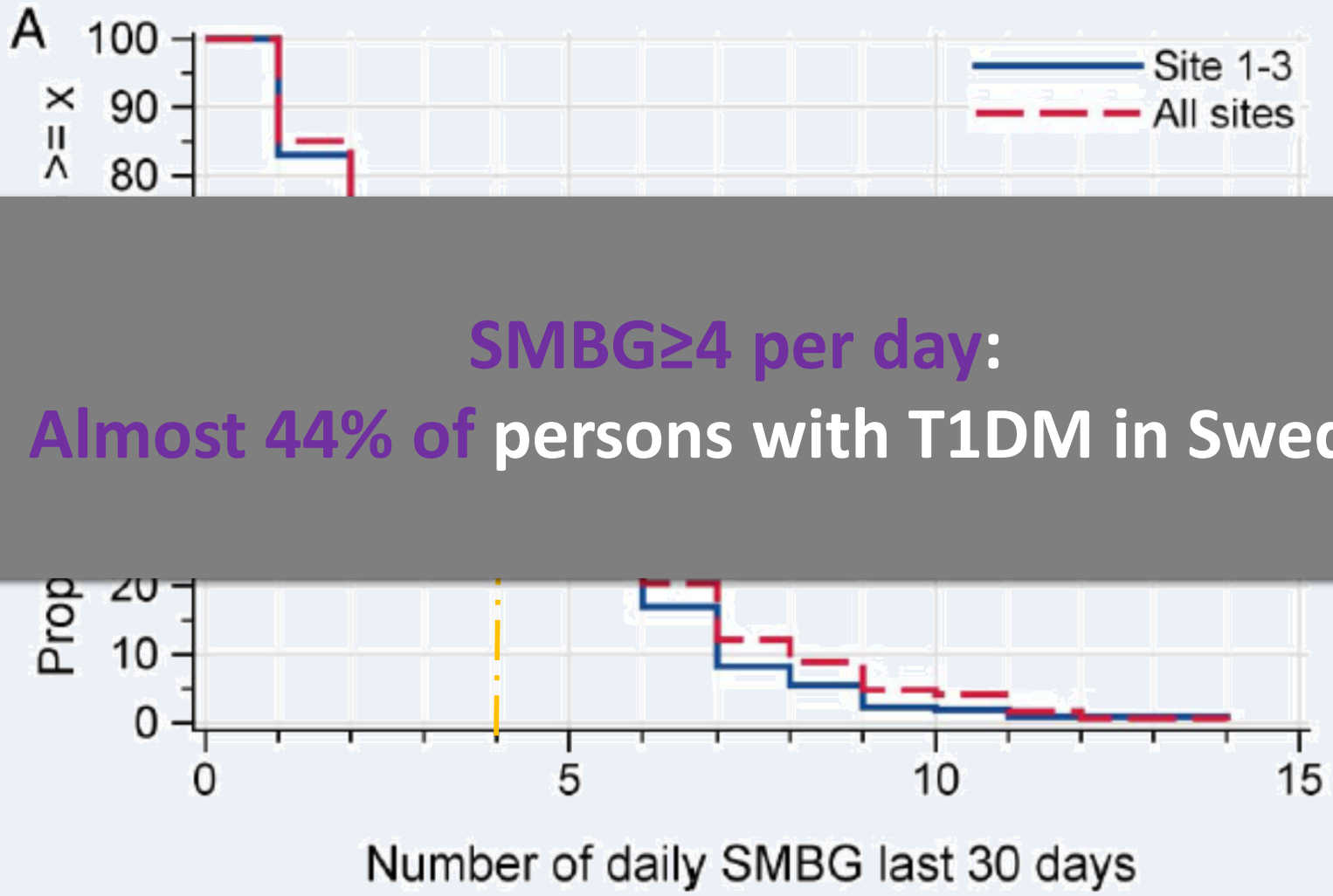
Adherence to SMBG

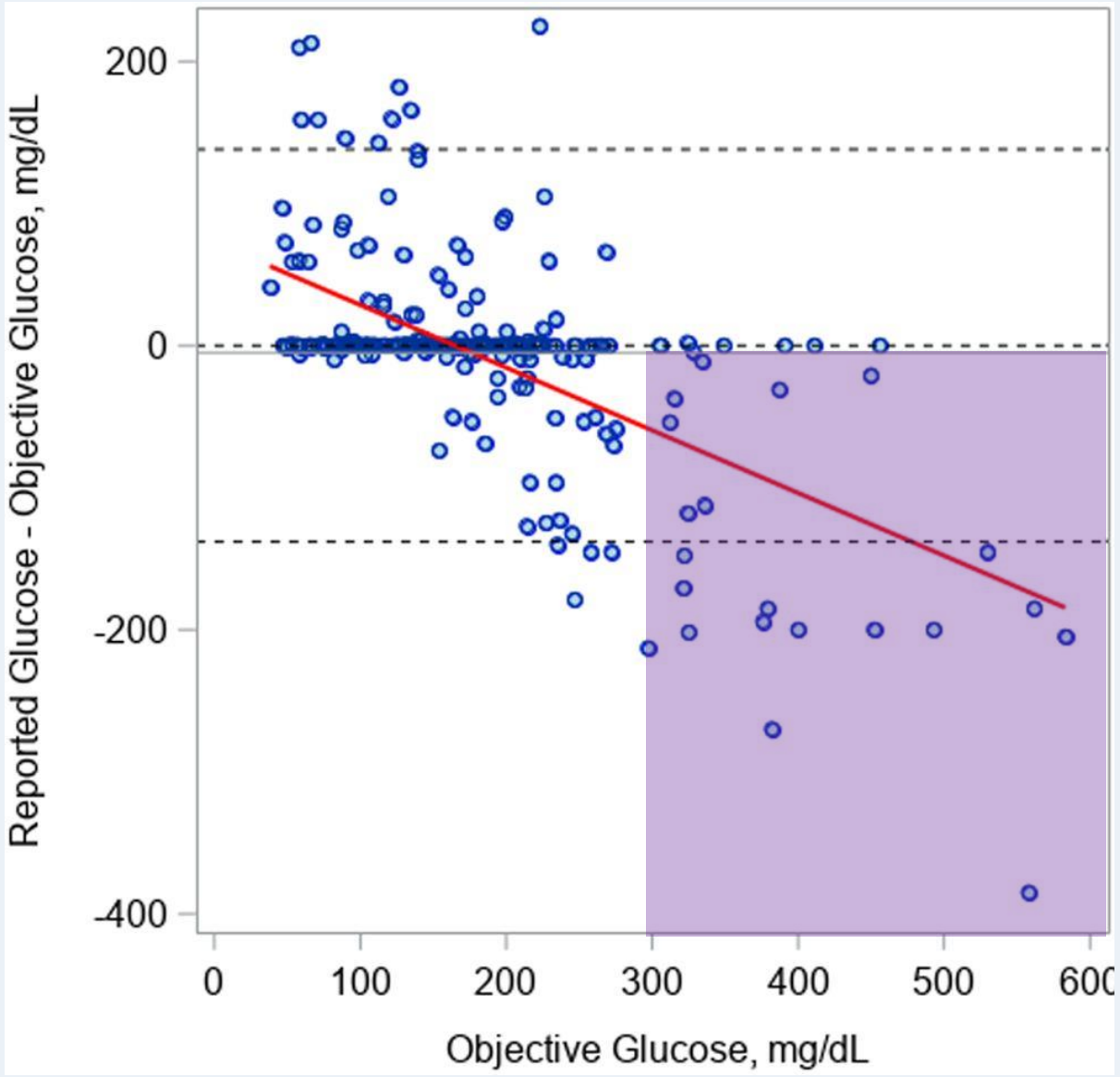


SMBG≥4 per day:
Almost 44% of persons with T1DM in Sweden

Moström P et al, BMJ Open Diabetes Research and Care. 2017;5(1):e000342.

Inaccurate SMBG Reporting: The Hidden Truth

Almost 60% of self-reported SMBG values in youth with T1DM were inaccurate.



Diabetes Spectr 2020;33(3):280–289

Inaccurate SMBG Reporting in Pregnancy: The Hidden Truth

GDM
***N*= 91**

23% of individuals had significant inaccuracy.

Pregnancy and Diabetes
***N*= 85**

% of inaccurate SMBG values:

GDM: 22%

Preexisting T1DM: 37%

Preexisting T2DM:9%

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Diabetes Care 2017;40(9):1181–1186

J Obstet Gynecol Neonatal Nurs. 2005 May-Jun;34(3):329-34

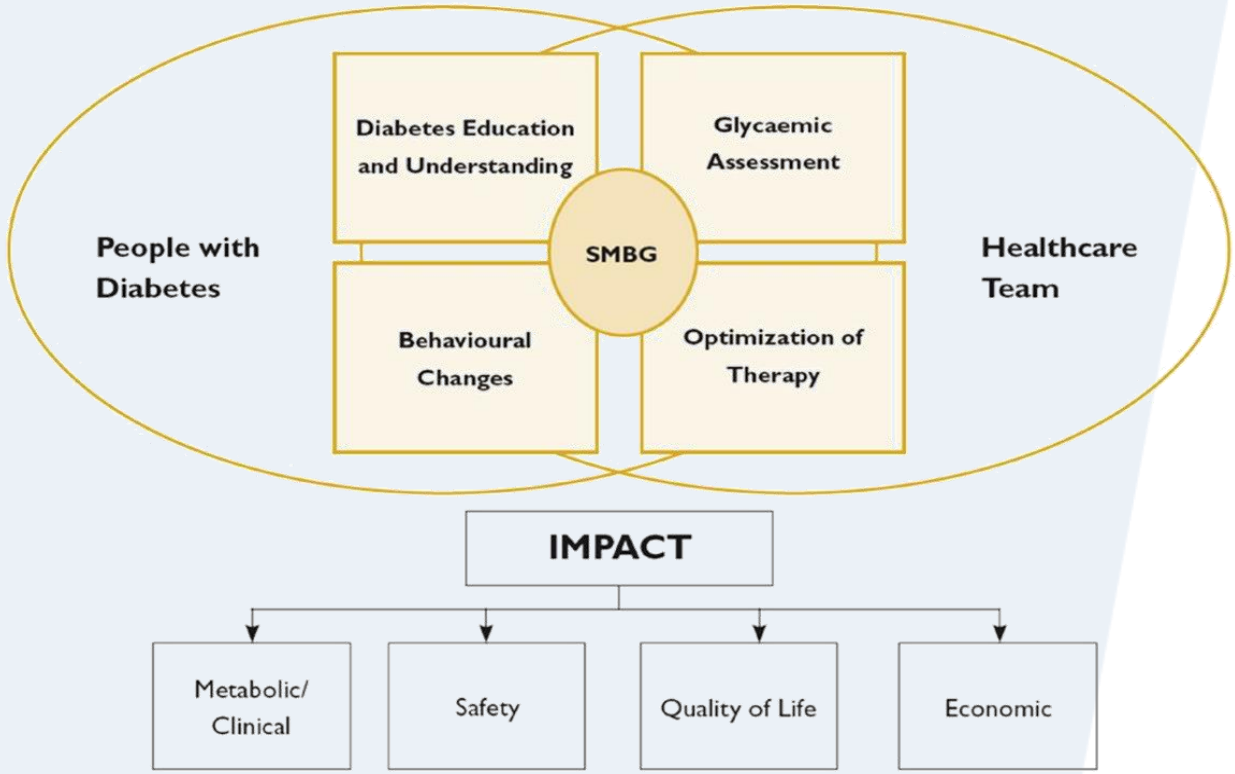
SMBG is a Tool, Not an Intervention

Kaiser Permanente Northern California (KPNC)
Registry
T2DM on Non insulin Therapy
***N*=7320**

15% unused by patient or provider

48% used by **either** patient or provider

37% used **by both** patient and provider



Am J Manag Care. 2015 Feb 1;21(2):e119-29

Continuous Glucose Monitoring

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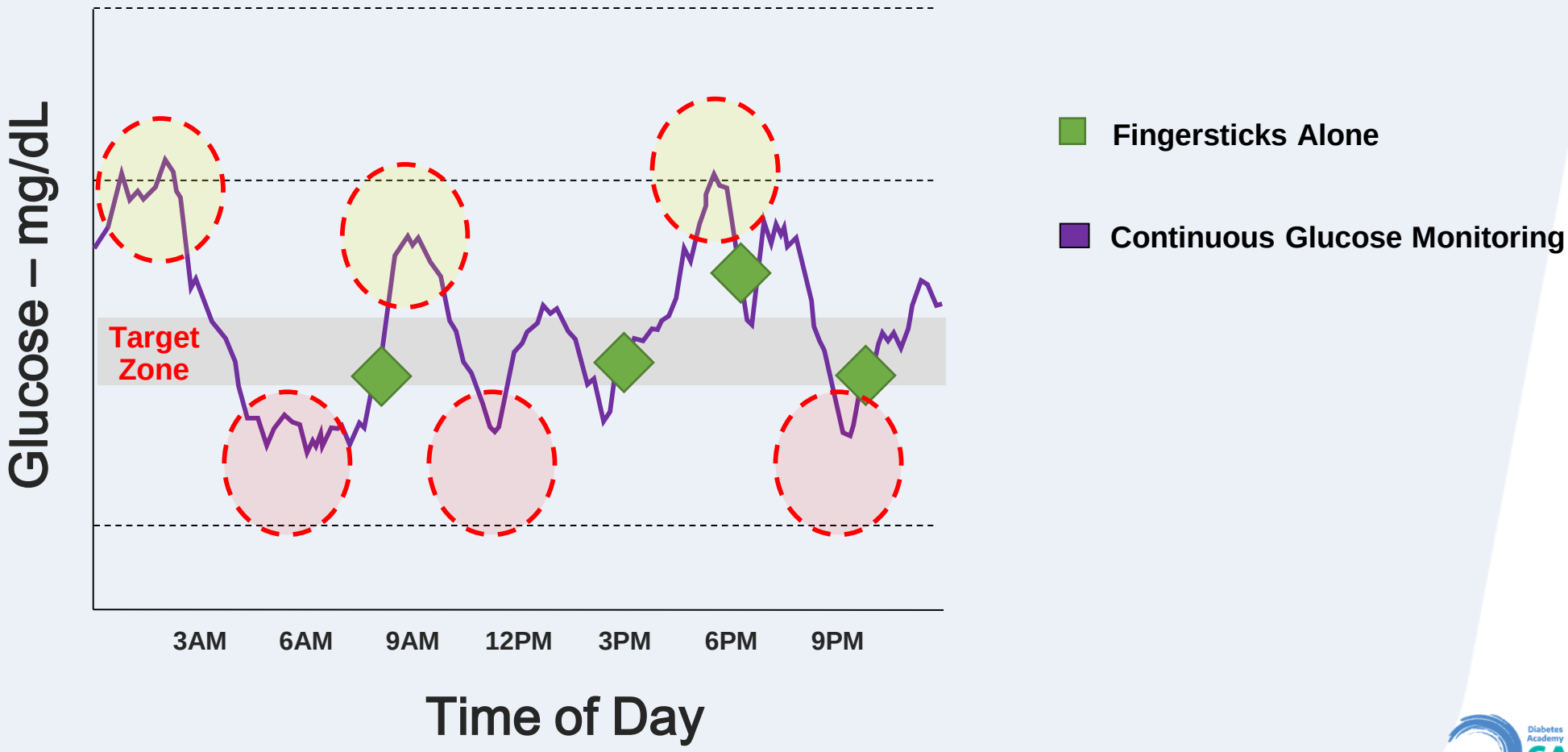
CGM reveals insights beyond SMBG



Components of CGMs

A. Sensor

B. Transmitter

C. Receiver

Sensor + Transmitter

Receiver

Key Players

Medtronic

1999:
Medtronic MiniMed

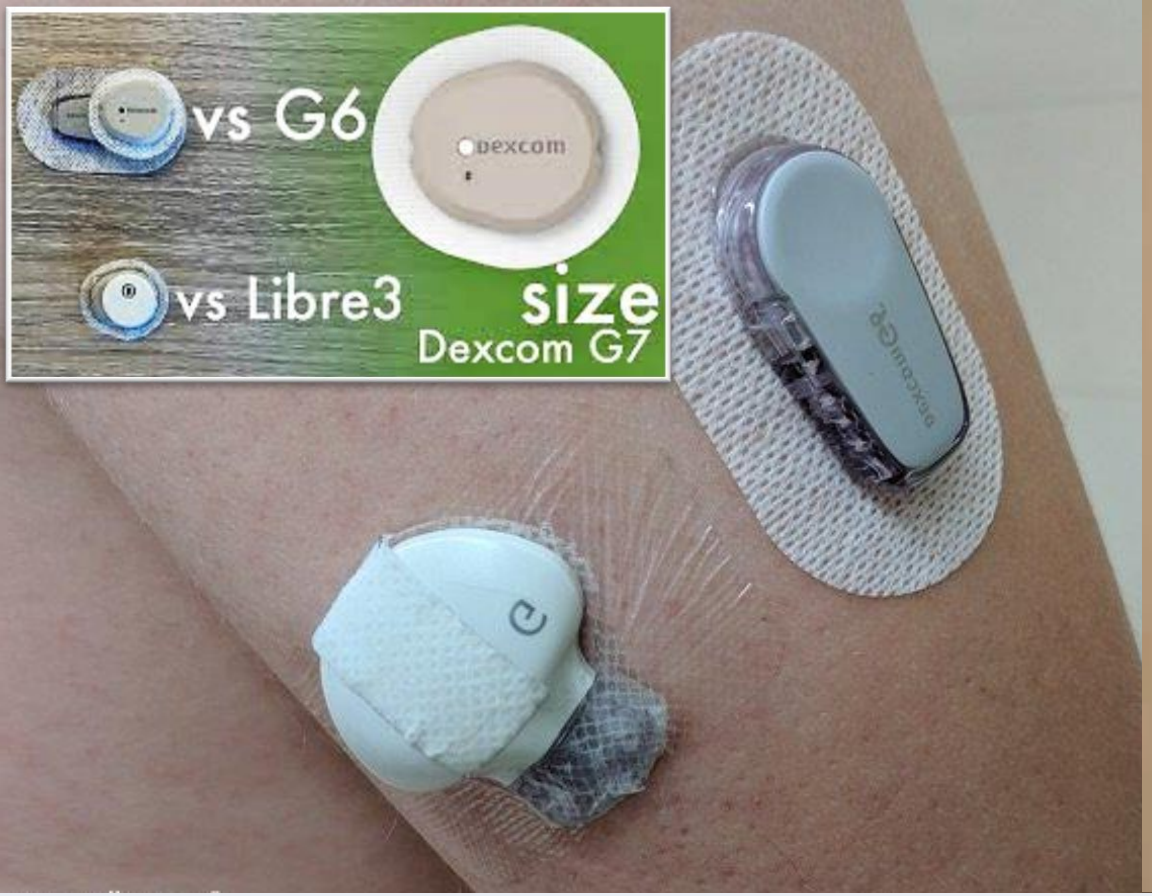
Dexcom®

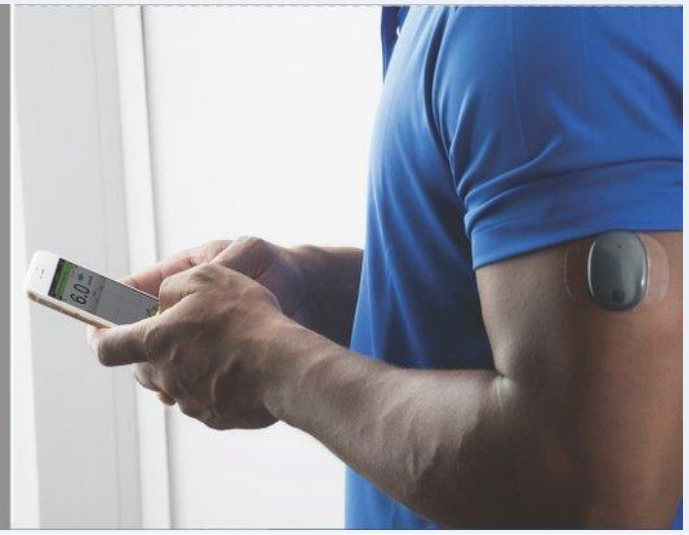
2006:
Dexcome STS

Abbott

2008:
Freestyle Navigator

Olczuk et al.(2017). A history of continuous glucose monitors (CGMs) in self-monitoring of diabetes mellitus. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*.


vs G6
vs Libre3
size
Dexcom G7



Most popular CGMs

FreeStyle Libre

dexcom

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Freestyle libre

FreeStyle Libre

Size: 30*5 mm

FreeStyle Libre 2

Size: 30*5 mm

FreeStyle Libre 3

Size: 21*2.9 mm

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Standardized CGM Metrics

American Diabetes Association.
Connected for Life

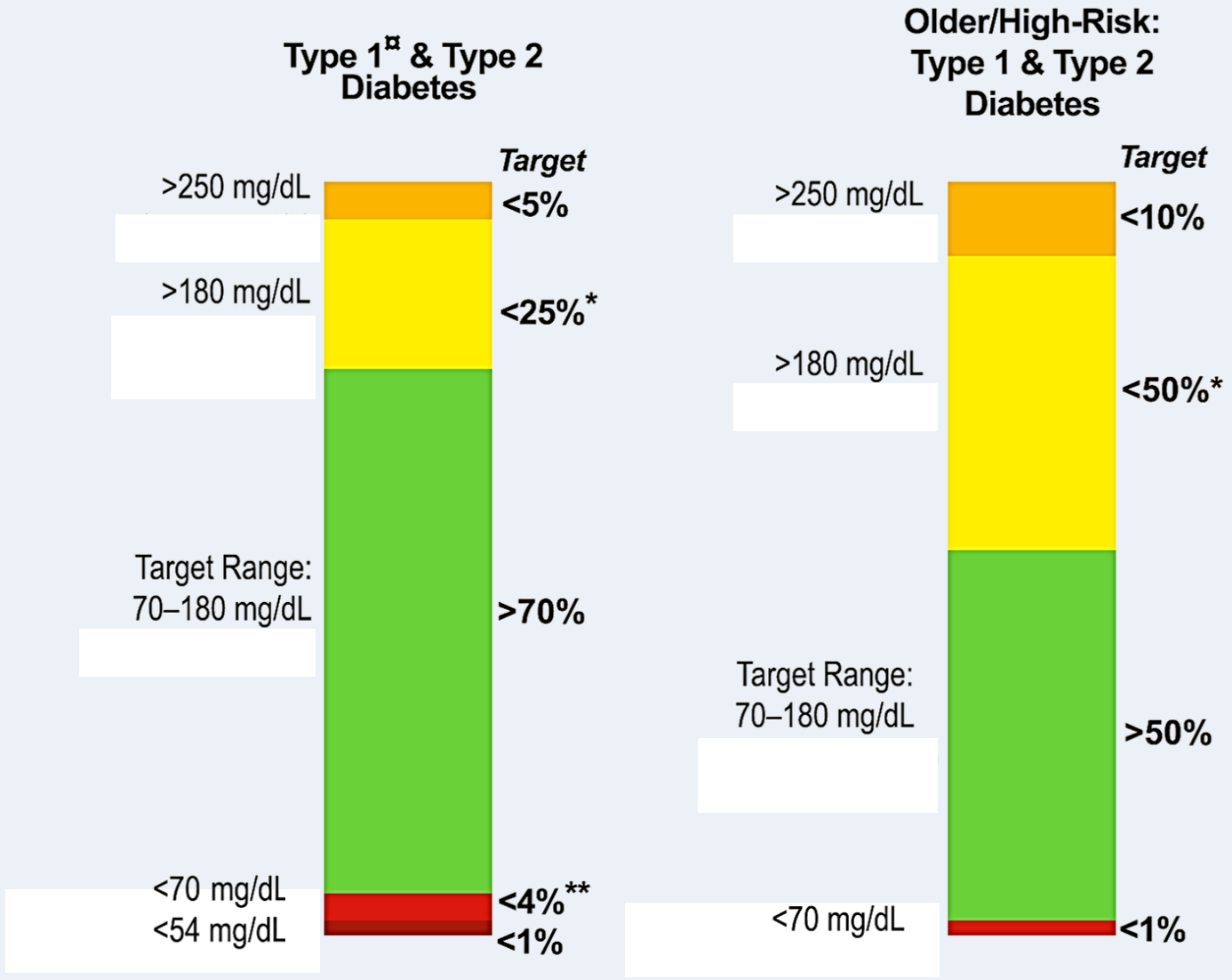
Table 6.2—Standardized CGM metrics for clinical care in nonpregnant individuals with type 1 or type 2 diabetes

Metric	Interpretation	Goals
1. Number of days CGM device is worn		14-day wear for pattern management
2. Percentage of time CGM device is active		70% of data from 14 days
3. Mean glucose	Simple average of glucose values	*
4. Glucose management indicator	Calculated value approximating A1C (not always equivalent)	*
5. Glycemic variability (%CV) target	Spread of glucose values	≤36%†
6. TAR: % of readings and time >250 mg/dL (>13.9 mmol/L)	Level 2 hyperglycemia	<5% (most adults); <10% (older adults)
7. TAR: % of readings and time 181–250 mg/dL (10.1–13.9 mmol/L)	Level 1 hyperglycemia	<25% (most adults); <50% (older adults)‡
8. TIR: % of readings and time 70–180 mg/dL (3.9–10.0 mmol/L)	In range	>70% (most adults); >50% (older adults)
9. TBR: % of readings and time 54–69 mg/dL (3.0–3.8 mmol/L)	Level 1 hypoglycemia	<4% (most adults); <1% (older adults)§
10. TBR: % of readings and time <54 mg/dL (<3.0 mmol/L)	Level 2 hypoglycemia	<1%

CGM, continuous glucose monitoring; CV, coefficient of variation; TAR, time above range; TBR, time below range; TIR, time in range. *Goals for these values are not standardized. †Some studies suggest that lower %CV targets (<33%) provide additional protection against hypoglycemia for those receiving insulin or sulfonylureas. ‡Goals are for level 1 and level 2 hyperglycemia combined. §Goals are for level 1 and level 2 hypoglycemia combined. Adapted from Battelino et al. (32).

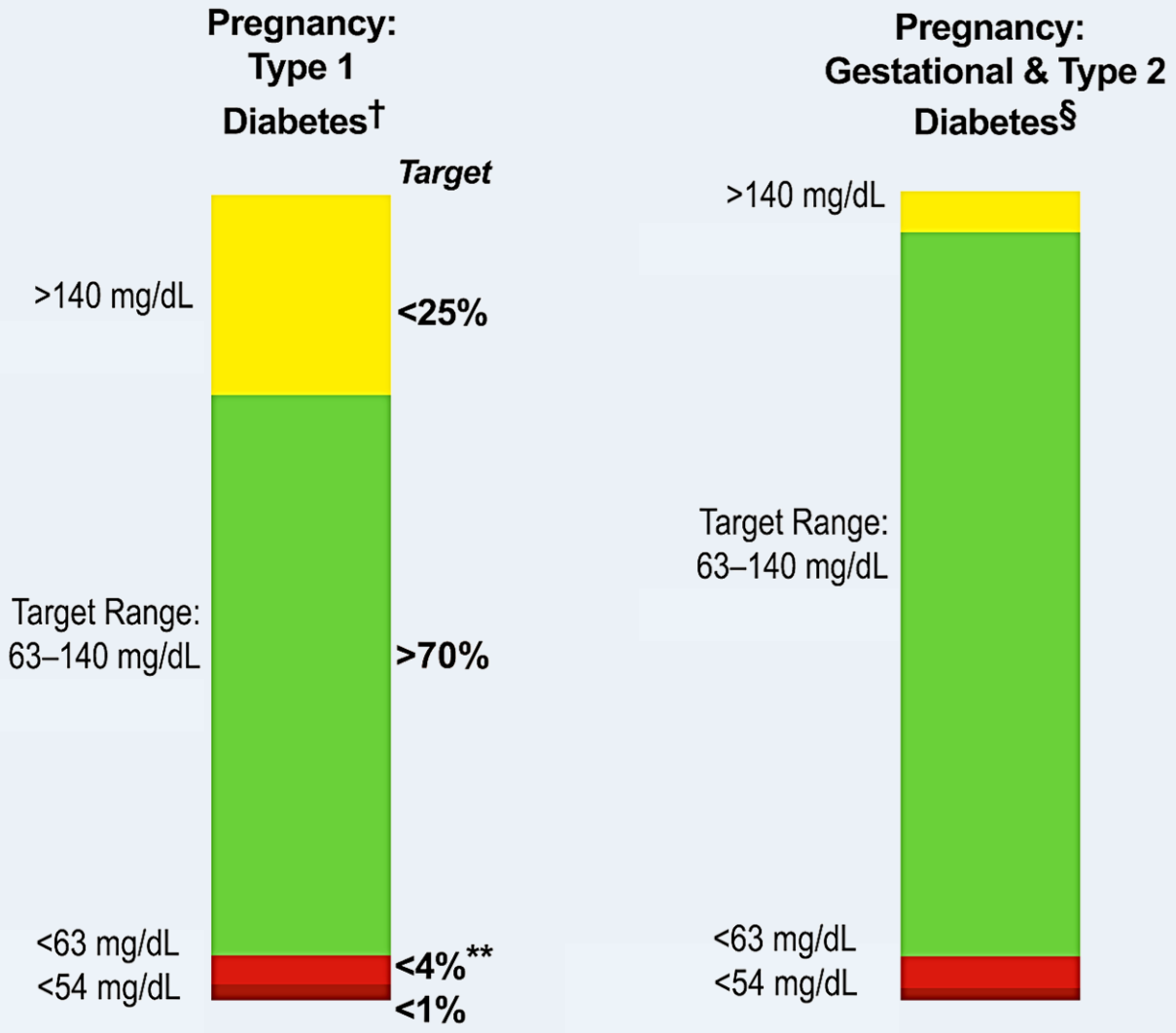
Diabetes Care 2024;47(Suppl. 1):S111–S125 | https://doi.org/10.2337/dc24-S006

CGM-based targets for different diabetes populations



Clinical targets for continuous glucose monitoring data interpretation: recommendations from the international consensus on time in range. Diabetes Care. 2019;42(8):1593-603.

CGM-based targets for Pregnancy



Clinical targets for continuous glucose monitoring data interpretation: recommendations from the international consensus on time in range. Diabetes Care. 2019;42(8):1593-603.

Why PWD Stop Using CGM!

— Poor accuracy due to lag times

— Insurance reimbursement or cost

— False alarms and alarm fatigue

— Having a device attached to the body and discomfort

— Adverse skin reactions

BMJ Open Diabetes Research and Care 2023;11:e003025
Clin Diabetes 2018;36(1):50–58

Individualization

- One size dose NOT fit all!

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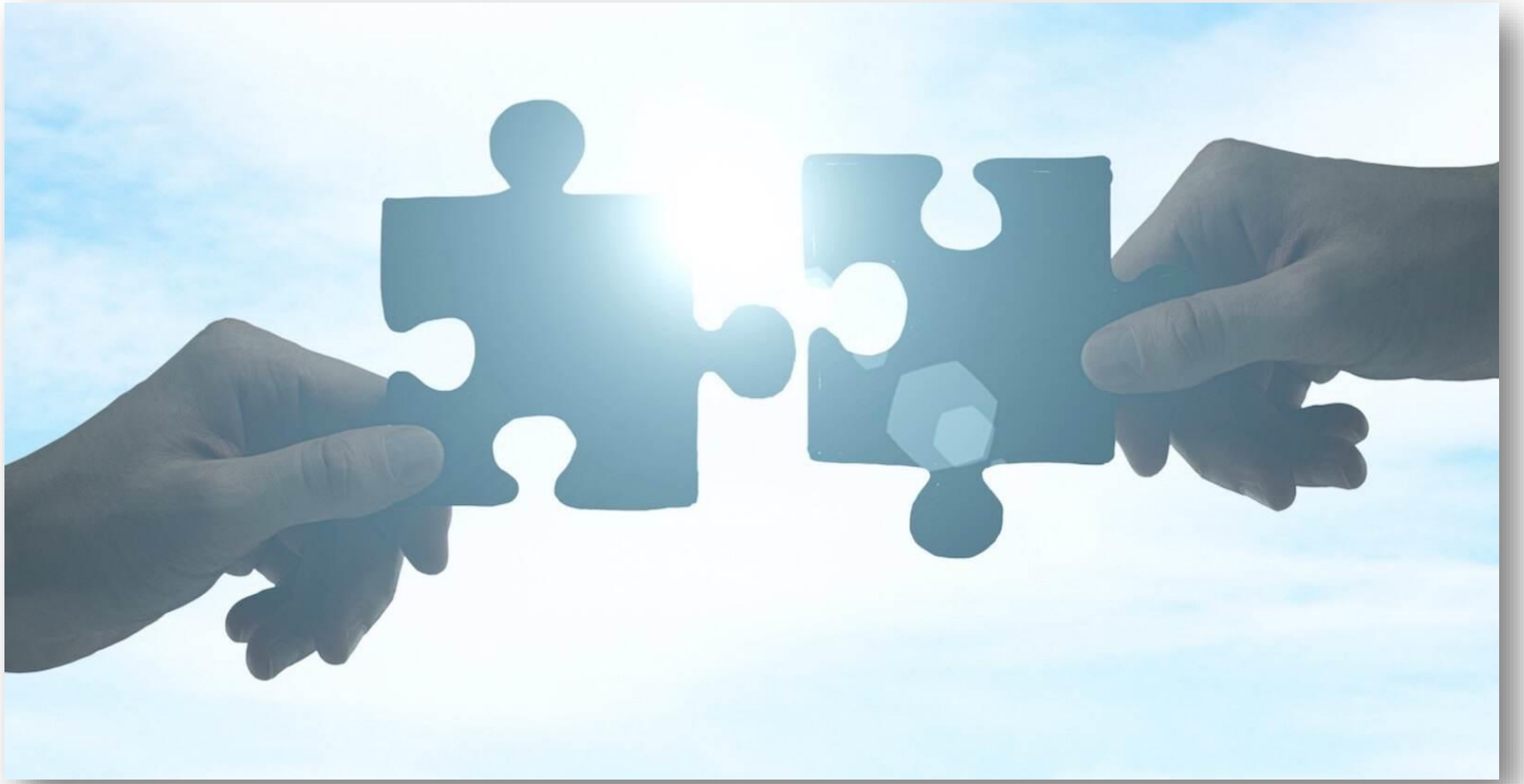
Education

- Teach to Monitor with Meaning



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Communication

- SMBG as a Tool to shared decisions!

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The Road To Cost Effective SMBG

Presentation Outline

- Standards of Diabetes Self-Management and Support:
  - History of Diabetes Self-management
  - Patient-centered DSME
  - Gabric Diabetes School
- The Role of Blood Glucose Monitoring in Diabetes management:
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  - Guideline Review
  - National Iranian Consensus
- Techniques and Challenges of Insulin Injection:
  - Psychological Challenges of Injections
  - Storage of Insulin
  - Needle Length
  - Insulin Injection Technique
  - Injectable Therapies

Case 1

- A 4 year old boy, Newly diagnosed with type 1 diabetes mellitus
- Emaciated at diagnosis with a height of 105cm (75th percentile)
- Weight of 14.5 kg (10-25th percentile).
- On MDI:
  - Basal: Glargine U-100
  - Prandial: Aspart before meals
- Review of potential injection sites indicates that there is minimal subcutaneous tissue at the abdomen, arms and thighs.

Storage of Insulin

- Unopened insulin vials and cartridges should be stored at refrigeration temperature (2 to 8 ^{o}C).
- once insulin is opened for use, it should not be used past the recommended time (usually 28 days but could be up to 56 days).
- Insulin should never be frozen or exposed to extreme heat (greater than 30 ^{o}C).
- Do not store insulin in direct sunlight.
- Insulin administered at room temperature may reduce irritation, burning or pain, and facilitates the re-suspension of cloudy insulin.

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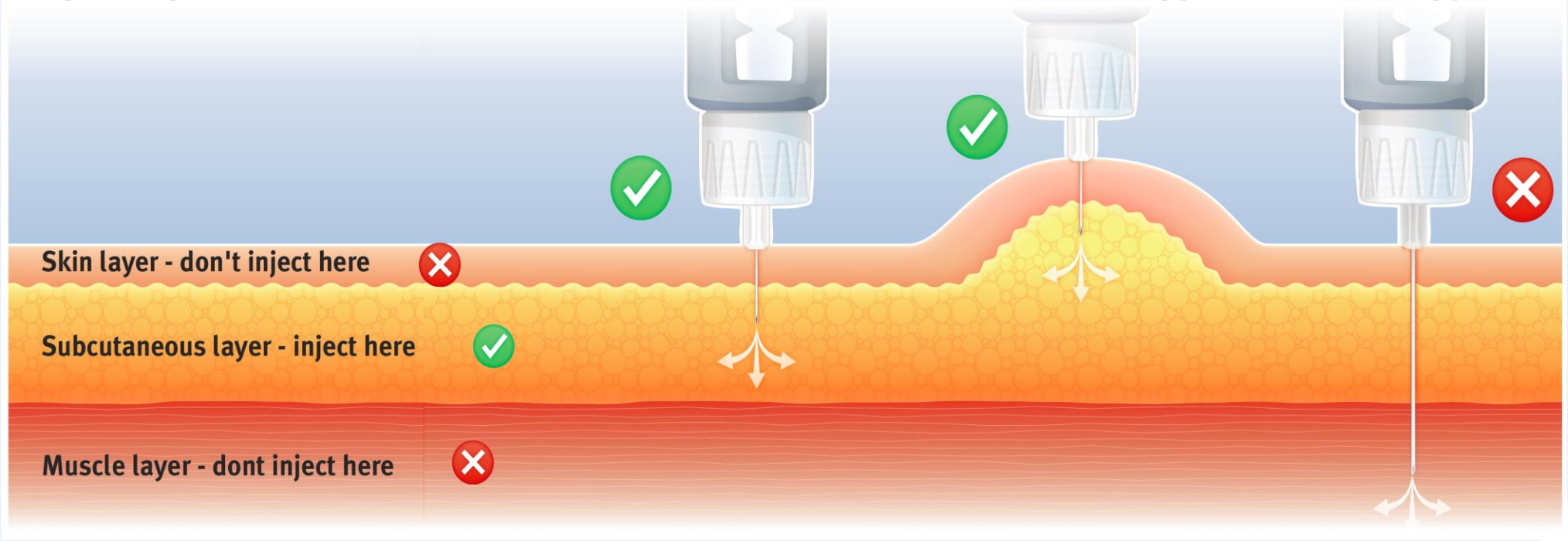
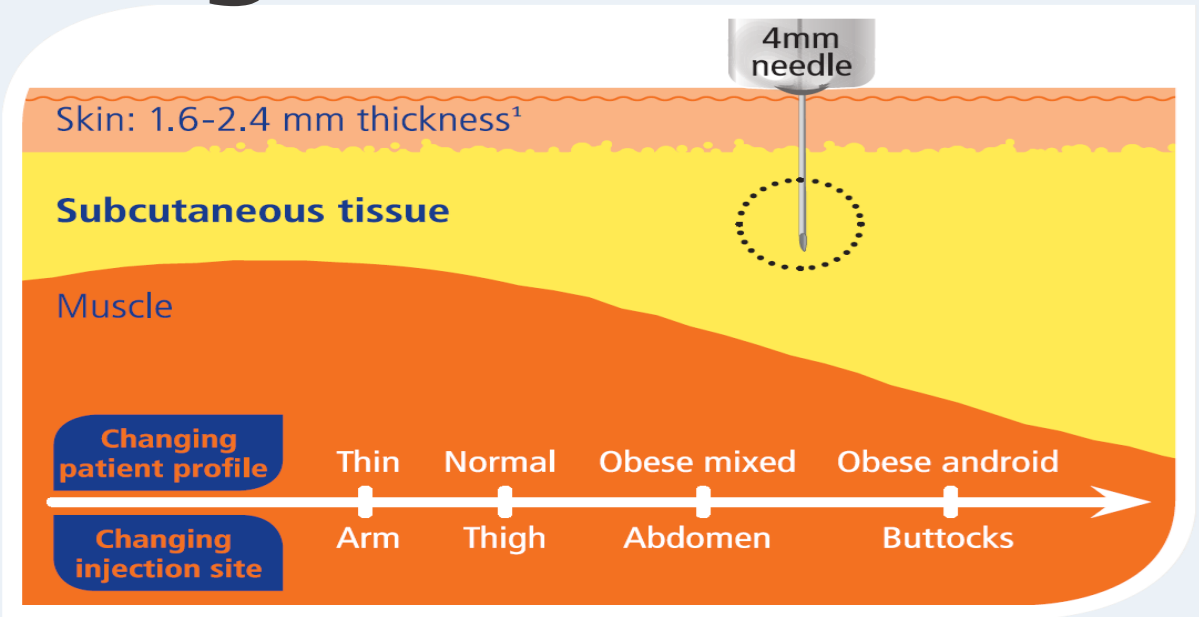
Needle Length

- Insulin is best absorbed in the subcutaneous layer.
- Insulin injected into the muscle will not be absorbed properly. It may be painful and could be the cause of low or high blood sugars.



Needle Length



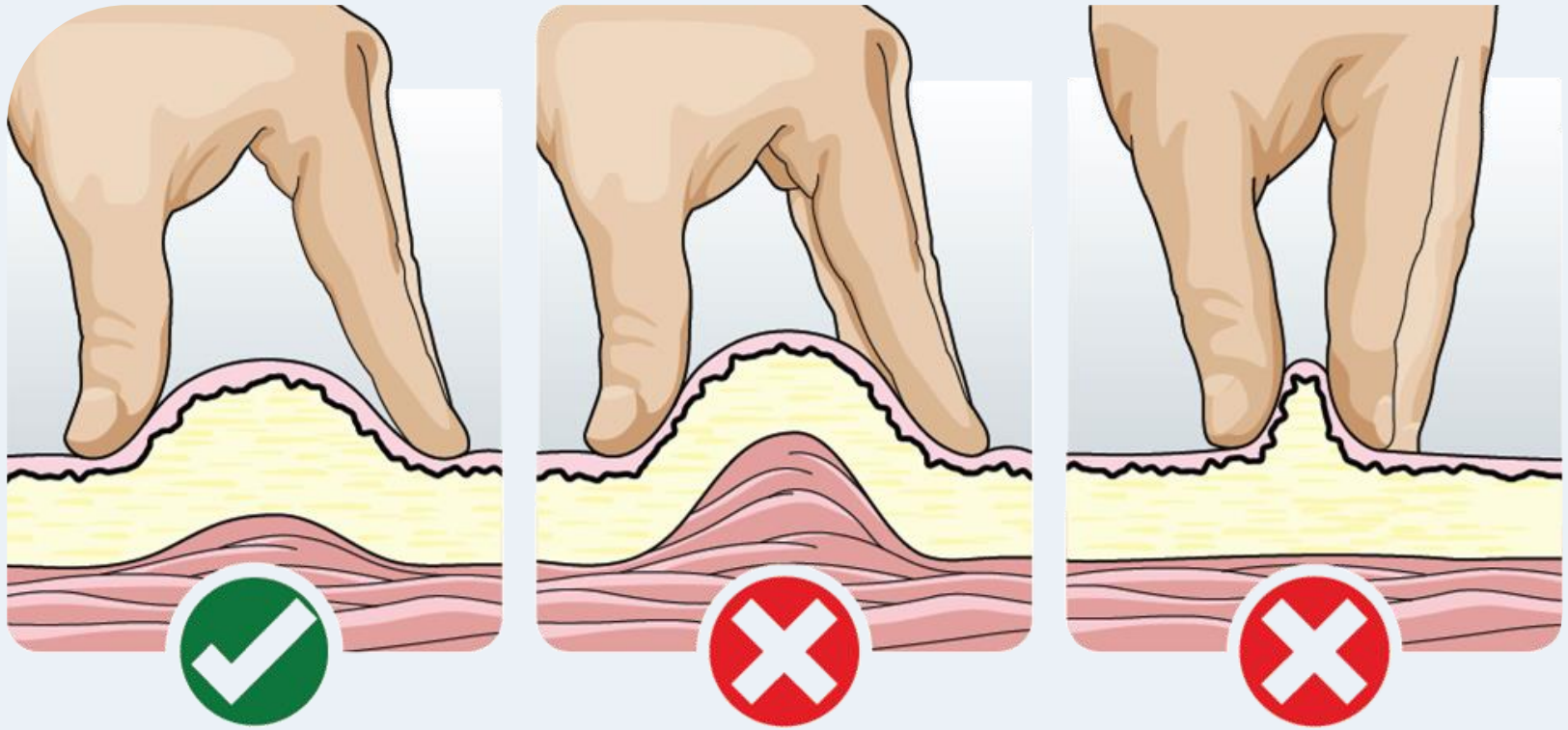
4 mm pen needle is considered the safest pen needle for adults and children regardless of age, sex, ethnicity, or BMI.

4-mm pen needles provide equivalent A1C control to 8-mm and 12-mm pen needles in people with obesity who are taking large doses of insulin.

FIT Forum for Injection Technique Canada. Recommendations for Best Practice in Injection Technique. 4th ed. 2020.
FIT UK & FIT Ireland Forum for Injection Technique. The UK & IRE Injection and Infusion Technique Recommendations. 5th ed. 2020.

Skin Pinch

- A skin lift may be warranted to prevent an IM injection in a slim limb or abdomen, even when a shorter needle is used.



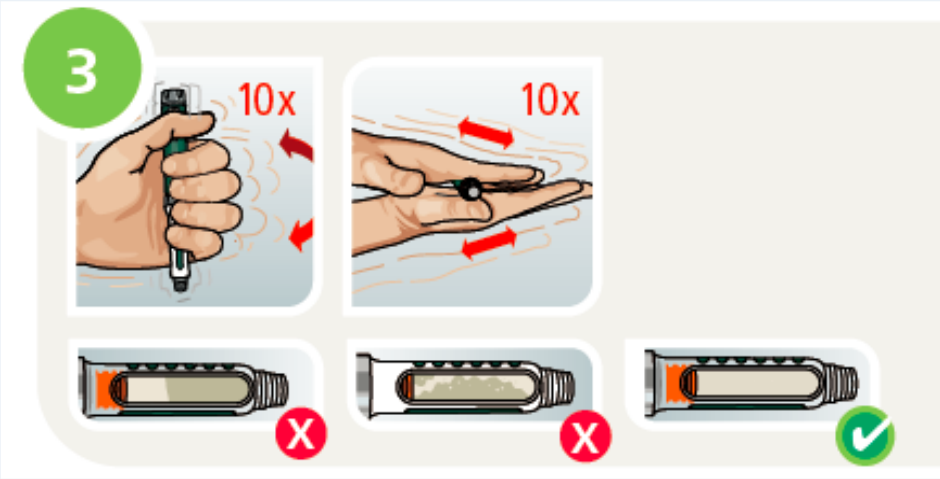
Lifting Skin Fold

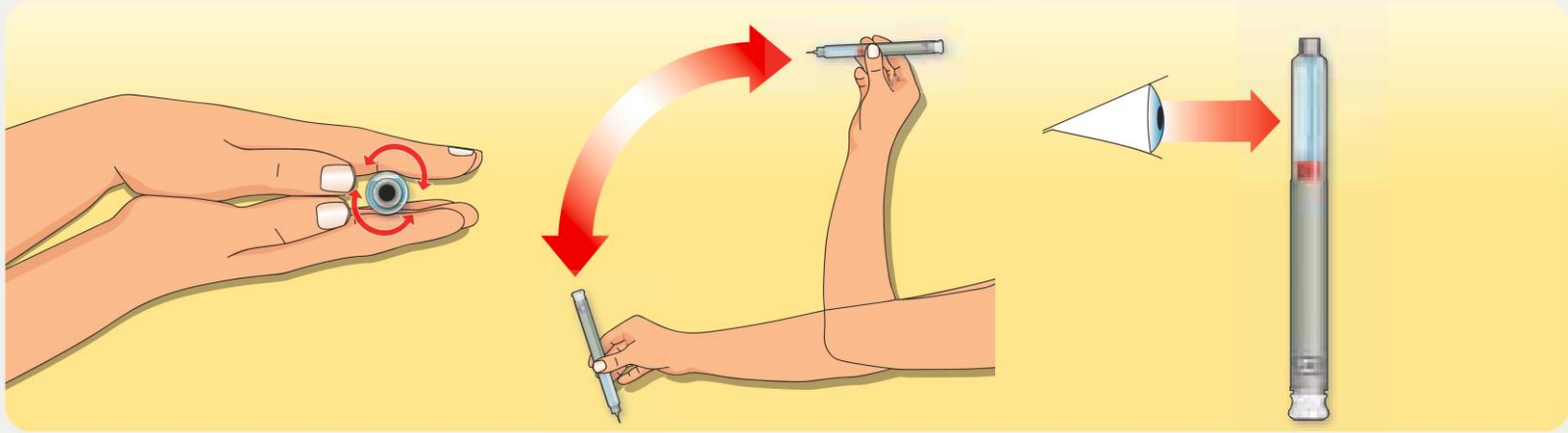
- The optimal sequence when injecting into a skinfold:

4mm	
5mm	
6mm (pen or syringe)	
8mm	Preferable to use shorter pen needles and syringes
8mm (pen or syringe)	
12.7mm	Not Recommended

Insulin Injection Technique

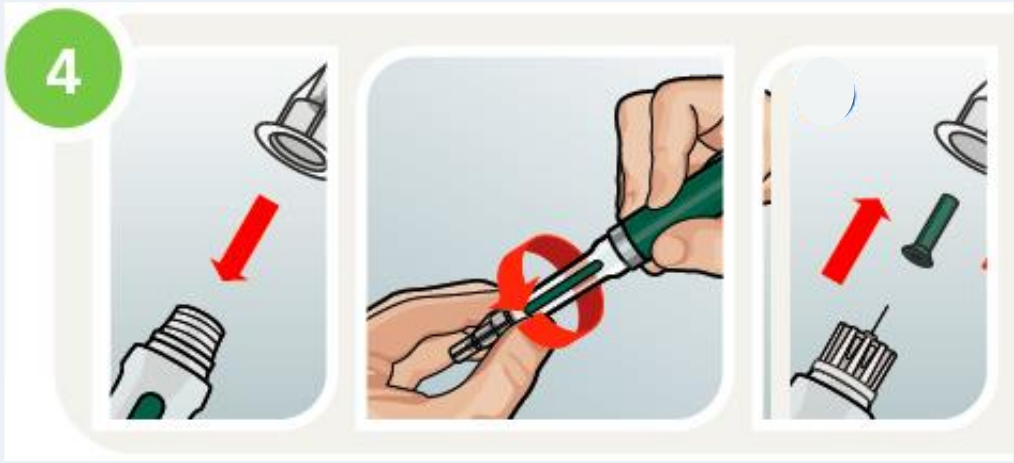
- Mix cloudy insulins:
- roll 10 times, then tip 10 times to see milky white consistency.





Insulin Injection Technique

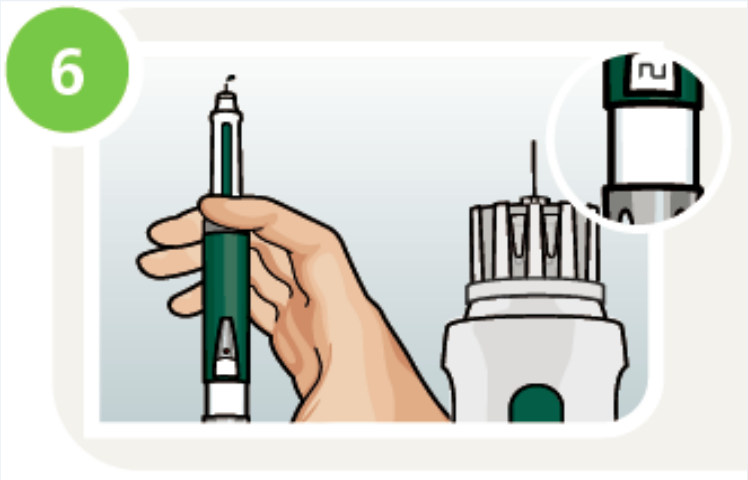
- Attach the pen needle.
- Ensure that the pen needle(PN) is International Organization for Standardization (ISO) certified compatible with the insulin pen.



- Position the PN along the axis of the pen before screwing or snapping it on.
- Pierce straight through the septum of the cartridge.

Insulin Injection Technique

- Prime your pen.
- Prime pen upwards with 2 or 3 units as per pen instructions.
- Repeat if needed until drops come out.
- GLP-1 pens only need to be primed the 1st time you use them.

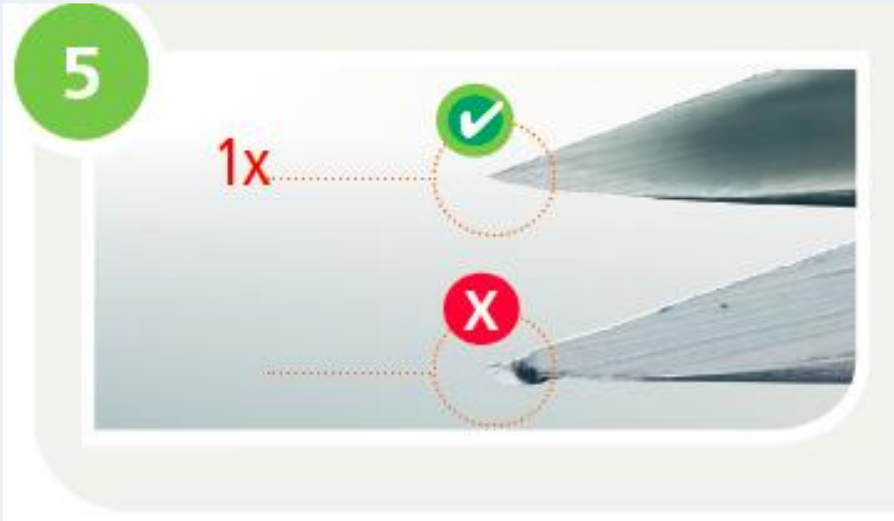


Pen Priming Importance in Correct Dose Delivery

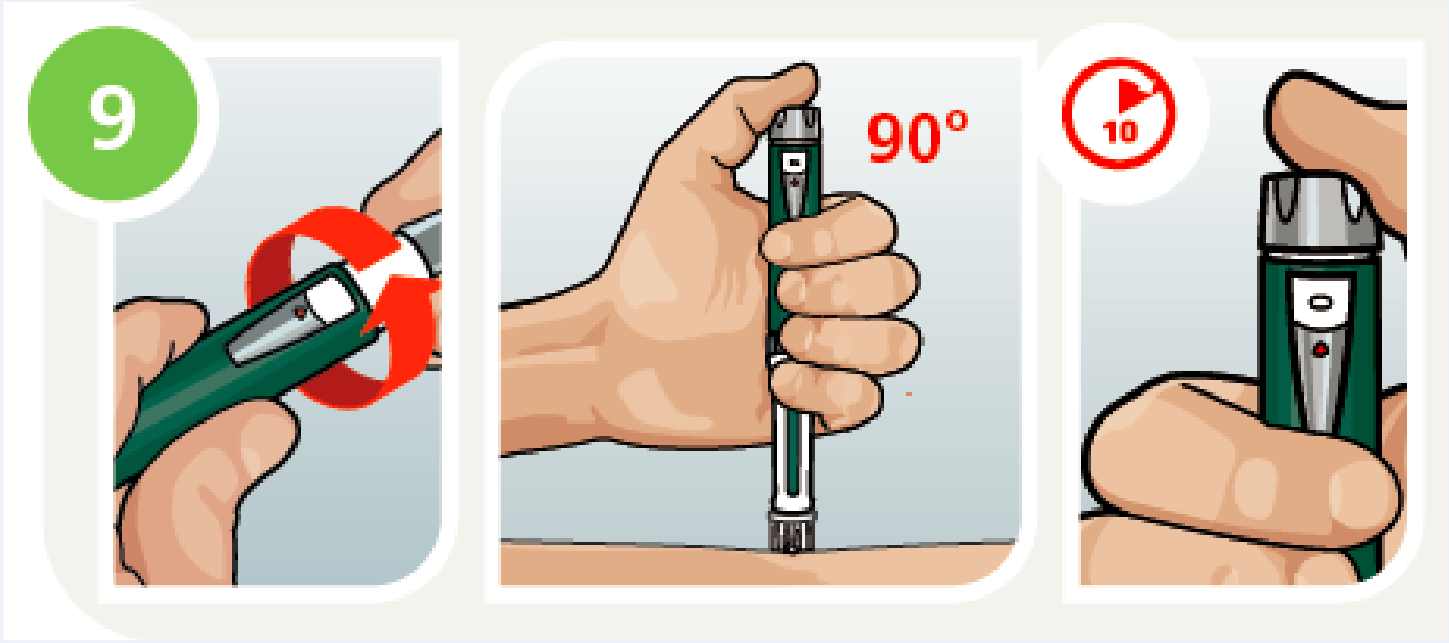
- Greater than 50 µl of air: the accuracy in clinical use might suffer.
- Accumulate 200 µl of air in cartridge, the pen might deliver only 37 % of the dialed dose and a full 2/3 of the dose would be wasted.
- Air buffers the flow rate of the insulin and slows it.
- The greater amount of the air, the slower the flow rate.

Insulin Injection Technique

- Use pen needles and syringes only once.
- Syringe or pen needles should only be used once.
- Reusing insulin needles is not optimal injection practice and patients should be discouraged from doing so.



Insulin Injection Technique



- Dial dose, Insert, push completely and count to 10.
- Always push the button vertically (along the axis of the pen)

Case 2

- 52 year old female
- Type 2 diabetes
- for 12 years
- Injecting 30/70 biphasic mix insulin for the past 7 years.
  - Injecting 50 units before breakfast and 30 units before evening meal.
- Using an 8mm pen needle.

Current Challenges

- HbA1c has been drifting up over the last 18 months from 7.8% to her most recent value of 8.4%
- Unexplained glycaemic variability
- Occasional episodes of unexplained hypoglycaemia.

Patient Injection Technique Review

- Uses her abdomen and occasionally will use thighs but finds injections there “burn”
- Using an 8mm pen needle
- Rotates by moving from left to right on her abdomen, similar location either side, examination indicates evidence of lipohypertrophy
- Injects at a 90° angle, no lifted skin fold

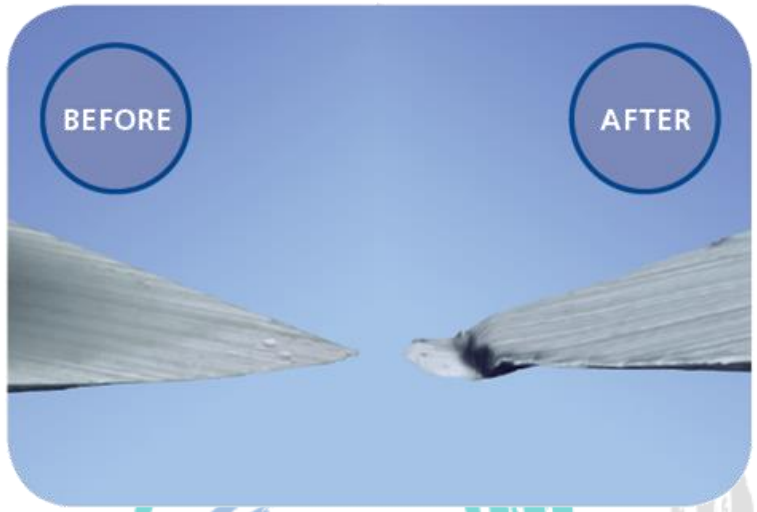
Lipohypertrophy (LH)

- The most common cutaneous complication of insulin therapy
- Change in the SC tissue
- A raised or mound-like, convex pattern with no change in skin color or hair distribution
- A harder, and more rubbery or less bouncy tissue.

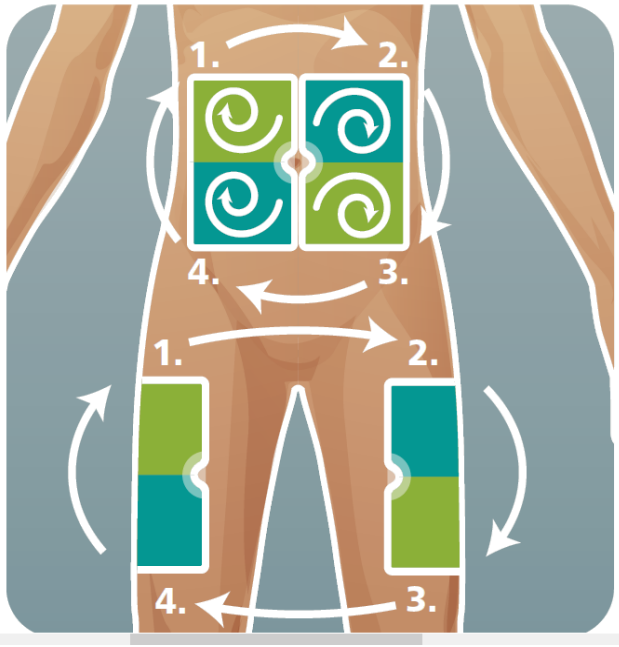
Lipohypertrophy: the Silent Enemy in Diabetes

- Higher HbA1C values
- Unexpected hypoglycemia
- Glycemic variability
- Frequent DKA
- Increased total daily dose of insulin
- Increased cost due to Excessive insulin and Hospitalization

Most important factors associated with LH



Pen needle reuse

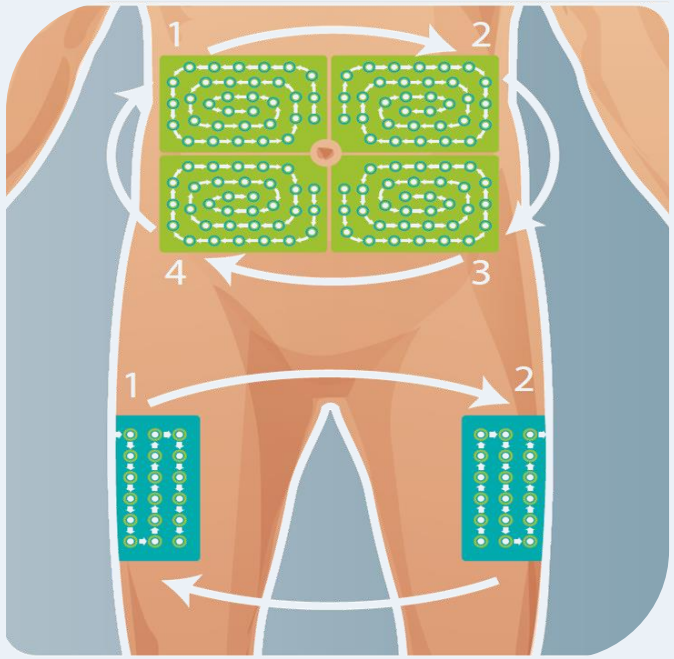


Incorrect rotation

Prevalence and risk factors of lipohypertrophy in insulin-injecting patients with diabetes. Diabetes & metabolism. 2013.
New Insulin Delivery Recommendations. Mayo Clin Proc. 2016
Economic and patient burden of Lipohypertrophy in Chinese

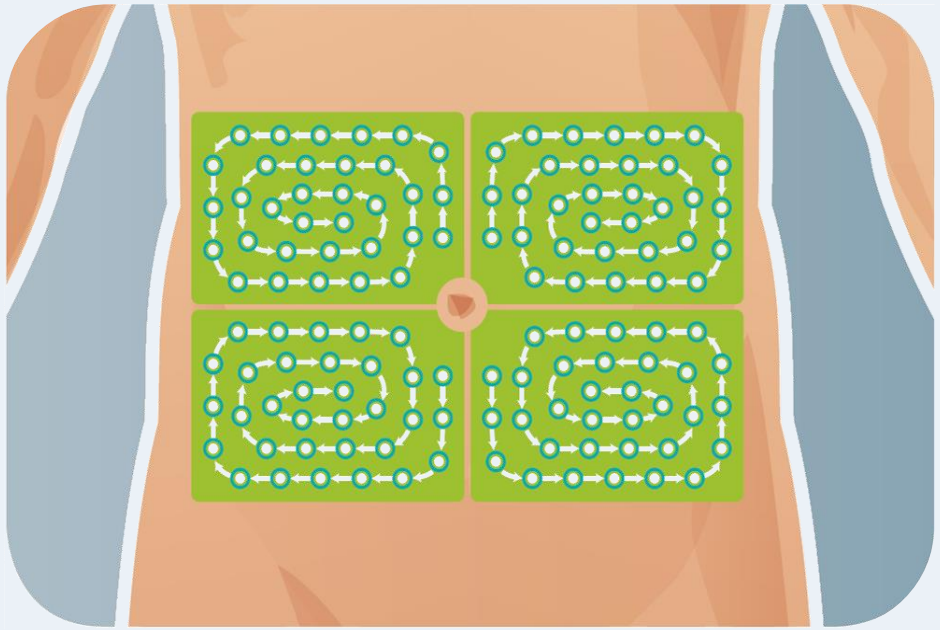
Structured Rotation Plan

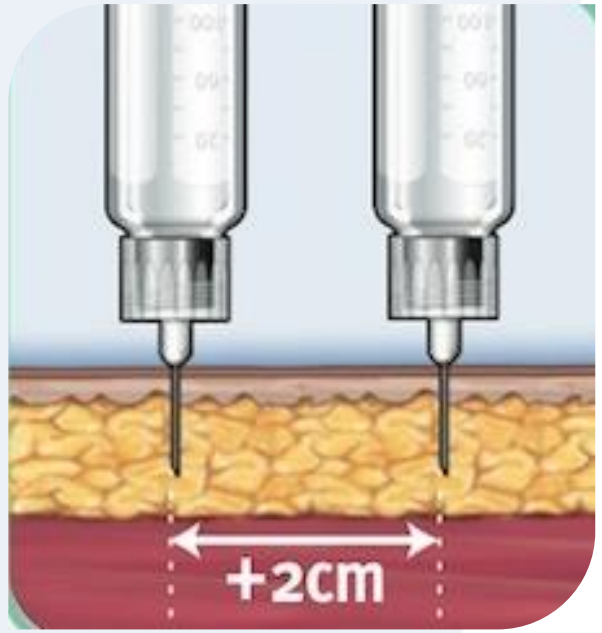
Rotate the site you use



Use 1 zone per week and move clockwise

Rotate within the site you use





Injections within any quadrant should be spaced at least 1-2cm from each other

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LH Examination

- Frequency:
  - At least once a year on all persons injecting insulin.
- Patients with LH lesions:
  - More frequently
- Educate patient for monthly self-examination and to report any change to the HCP.
- Technique:
  - Visual Inspection
  - Palpation
- Documentation and monitoring

LH Management

1- Skip LH lesions

By avoiding injections into lipohypertrophic sites over a 3- to 6-month period, these lesions may decrease by up to 50% in diameter or in some instances resolve completely.

LH Management

2-Decrease insulin dose based on patient BG report

- In order to reduce the risk of hypoglycemia when changing from a lipohypertrophic injection site to a healthy site, patients should be cautioned to reduce their insulin dose initially and monitor their blood glucose levels more frequently.

LH Management

3. Increased glucose monitoring
4. Site rotation education
5. Record LH lesion sites
6. LH lesion site examination

Insulin Injection Technique

- A syringe should NEVER be used to remove insulin from a pen with concentrated insulin, as the scale on insulin syringes is made for U-100 insulin only.
- The use of current insulin syringes with concentrated insulin (U-200, U-300 or U-500) could result in an overdose.

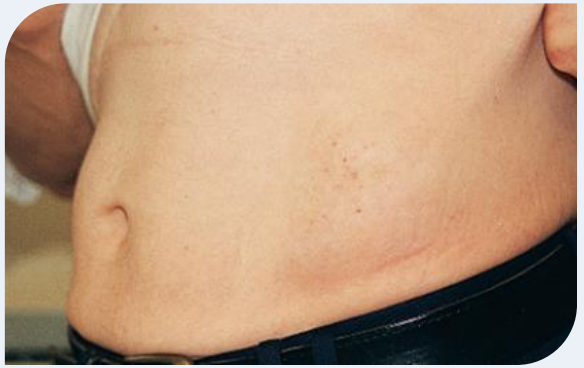
FIT Forum for Injection Technique Canada. Recommendations for Best Practice in Injection Technique. 4th ed. 2020.
FIT UK & FIT Ireland Forum for Injection Technique. The UK & IRE Injection and Infusion Technique Recommendations. 5th ed. 2020.

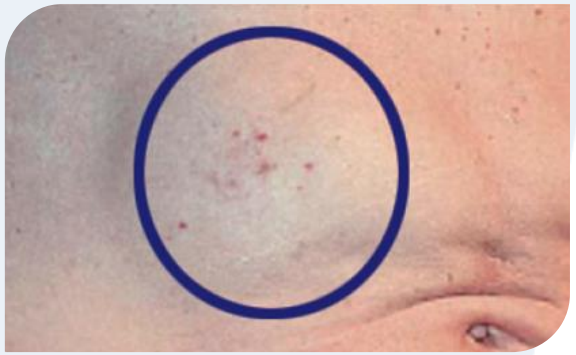
Bleeding and Bruising

- Blood and/or bruising may indicate that a minor capillary has been penetrated
- Bruising and bleeding do not impede medication absorption and does not appear to be associated with choice of injection site.
- Use a thinner gauge pen needle
- Switch to a shorter needle

Bleeding and Bruising

- Avoid indenting the skin & excessive force
- Place the needle into the skin, while maintaining visibility of the needle hub.
- Injection technique review
- Coagulopathy/ drug history





Insulin Leakage

Leakage at cartridge pen and pen needle connection:

- ISO-Certified pen needle compatible with insulin pens
- Position the PN along the axis of the pen before screwing or snapping it on
- Pierce straight through the septum of the cartridge

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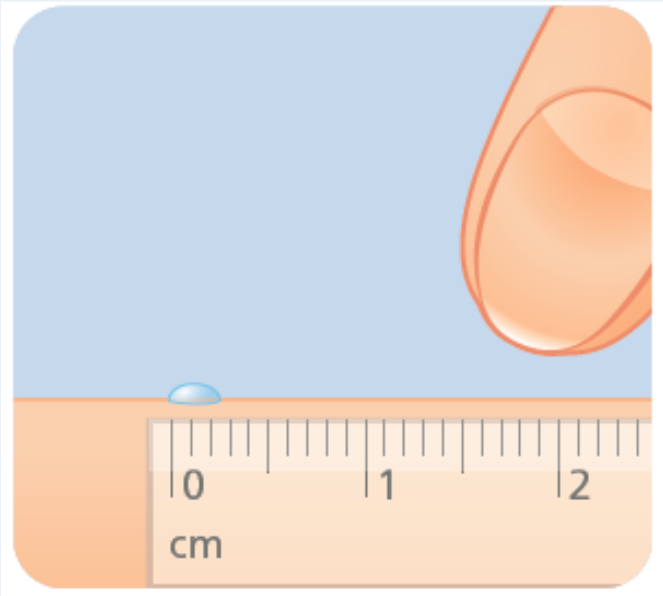
Insulin Leakage



Skin leakage:

- A small amount of skin leakage (little pearl of liquid at injection site) can be ignored.
- Use needles with thin-wall or extra thin-wall technology
- Count to 10 after the plunger is fully depressed(More/ less seconds in higher/ lower dose)
- Frequent skin leakage: a direct observation of their self-injection is important to detect possible technique-related issues

Factors That Affect Insulin Absorption

Inadvertent intramuscular (IM) injections may **increase pain** and/or **adversely affect blood glucose control.**

Injecting into areas of lipohypertrophy can result in a significant **delay in insulin absorption** and cause **fluctuating blood glucose results.**

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FIT UK & FIT Ireland Forum for Injection Technique. The UK & IRE Injection and Infusion Technique Recommendations. 5th ed. 2020.

Factors That Affect Insulin Absorption

Exercise, increased skin temperature and massaging at the injection site can **increase the absorption rate of insulin** and potentially **result in hypoglycemia.**

Some factors can speed up the absorption of your insulin and affect your blood glucose control.

Massage

Exercise

Hot baths

Hot weather

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FIT UK & FIT Ireland Forum for Injection Technique. The UK & IRE Injection and Infusion Technique Recommendations. 5th ed. 2020.

Thank you for your attention…

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