Diabetes Self-Management

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Diabetes Self Management

CONTENTS

• Diabetes Self Management Education (DSME)

• Self Monitoring of Blood Glucose (SMBG)

• Self-injection Techniques

• Summary
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- Summary
Diabetes Self Management Education (DSME)

Diabetes Self-management Education and Support in Type 2 Diabetes: A Joint Position Statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics

- The ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes self-care.
- This process incorporates the needs, goals, and life experiences of the person with diabetes or prediabetes and is guided by evidence-based research.
Overall objectives of DSME

• To support;
  (1) Informed decision making
  (2) Self-care behaviors
  (3) Problem solving
  (4) Active collaboration with the health care team

To improve clinical outcomes, health status, and quality of life!
If DSME was a pill, would you prescribe it?
## Scorecard: DSMES vs Metformin

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Benefits Rating</th>
<th>DSMES¹</th>
<th>Metformin²,³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficacy</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Hypoglycemia risk</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Weight</td>
<td>Neutral/Loss</td>
<td>Neutral/Loss</td>
<td>Neutral/Loss</td>
</tr>
<tr>
<td>Side effects</td>
<td>None</td>
<td>GI</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>Low/Savings</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Psychosocial benefits</td>
<td>High</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Cost-effectiveness of DSME

Diabetes self-management education (DSME) is a critical element of care for all people with diabetes and is necessary in order to improve patient outcomes. The National Standards for DSME are designed to define quality diabetes self-management education and to assist diabetes educators in a variety of settings to provide evidence-based education. Because of the dynamic nature of health care and diabetes-related research, these Standards are reviewed and revised approximately every 5 years by key organizations and federal agencies within the diabetes education community.

A Task Force was jointly convened by the American Association of Diabetes Educators and the American Diabetes Association in the summer of 2006. Additional

The Task Force was charged with reviewing the current DSME standards for their appropriateness, relevance, and scientific basis. The Standards were then reviewed and revised based on the available evidence and expert consensus. The committee convened on 31 March 2006 and 9 September 2006, and the Standards were approved 25 March 2007.

DEFINITION AND OBJECTIVES — Diabetes self-management education (DSME) is the ongoing process of facilitating the knowledge, skill, and ability necessary for diabetes self-care. This process incorporates the needs, goals, and life experiences of the person with diabetes and is guided by evidence-based standards. The overall principles based on existing evidence that would be used to guide the review and revision of the DSME Standards. These are:

1. Diabetes education is effective for improving clinical outcomes and quality of life, at least in the short-term (1–7).
2. DSME has evolved from primarily didactic presentations to more theoretically based empowerment models (3,8).
3. There is no one “best” education program or approach; however, programs incorporating behavioral and psychosocial strategies demonstrate improved outcomes (9–11). Additional studies show that culturally and age-appropriate programs improve outcomes (12–16) and that group education is effective (4,6,7,17,18).
4. Ongoing support is critical to sustain progress made by participants during the DSME program (3,13,19,20).
5. Behavioral goal-setting is an effective strategy to support self-management behaviors (21).
# Cost-effectiveness of DSME

## Table 2. Mean A1C Before, Immediately After, 1 Year After, and 2 Years After DSME

<table>
<thead>
<tr>
<th></th>
<th>Pre-DSME</th>
<th>Immediately Post-DSME</th>
<th>1 Year Post-DSME</th>
<th>2 Years Post-DSME</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients (n = 43)</td>
<td>10.2 ± 3.7</td>
<td>7.8 ± 2.2*</td>
<td>7.8 ± 2.1*</td>
<td>7.8 ± 2.1*</td>
</tr>
<tr>
<td><strong>Subgroups:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n = 16)</td>
<td>11.2 ± 4.6</td>
<td>7.1 ± 1.4*</td>
<td>7.7 ± 2.2*</td>
<td>7.3 ± 1.9*</td>
</tr>
<tr>
<td>Female (n = 27)</td>
<td>9.5 ± 3.0</td>
<td>8.2 ± 2.4*</td>
<td>7.8 ± 2.1*</td>
<td>8.1 ± 2.1*</td>
</tr>
<tr>
<td>Diabetes &lt; 1 year (n = 20)</td>
<td>9.3 ± 3.2</td>
<td>6.7 ± 1.0*†</td>
<td>6.8 ± 1.1*†</td>
<td>6.9 ± 1.7*†</td>
</tr>
<tr>
<td>Diabetes ≥ 1 year (n = 23)</td>
<td>10.9 ± 4.0</td>
<td>8.7 ± 2.4*</td>
<td>8.6 ± 2.4*</td>
<td>8.6 ± 2.0*</td>
</tr>
<tr>
<td>Education &lt; 12 years (n = 19)</td>
<td>9.4 ± 3.2</td>
<td>7.7 ± 2.5</td>
<td>7.4 ± 1.9*</td>
<td>7.6 ± 2.1*</td>
</tr>
<tr>
<td>Education ≥ 12 years (n = 24)</td>
<td>10.7 ± 4.1</td>
<td>7.8 ± 1.9*</td>
<td>8.1 ± 2.4*</td>
<td>7.9 ± 2.1*</td>
</tr>
<tr>
<td>Insured (n = 32)</td>
<td>9.5 ± 3.2†</td>
<td>7.8 ± 2.4*</td>
<td>7.6 ± 1.9*</td>
<td>7.8 ± 2.1*</td>
</tr>
<tr>
<td>Uninsured (n = 11)</td>
<td>12.2 ± 4.5</td>
<td>7.6 ± 1.5*</td>
<td>8.3 ± 2.6*</td>
<td>7.8 ± 2.1*</td>
</tr>
<tr>
<td>Patients with pre-DSME A1C &lt; 9% (n = 21)</td>
<td>7.2 ± 1.0†</td>
<td>6.8 ± 0.8†</td>
<td>6.8 ± 0.9†</td>
<td>6.9 ± 1.6†</td>
</tr>
<tr>
<td>Patients with pre-DSME A1C ≥ 9% (n = 22)</td>
<td>13.0 ± 3.0</td>
<td>8.7 ± 2.6*</td>
<td>8.7 ± 2.5*</td>
<td>8.7 ± 2.1*</td>
</tr>
</tbody>
</table>

*For all patients and for each subgroup, A1Cs immediately post-DSME, 1 year post-DSME, and 2 years post-DSME were compared to pre-DSME A1C (P < 0.05).
†Within each subgroup, A1Cs were compared between groups at each time point, e.g., male vs. female (P < 0.05). Comparisons without notation were not statistically significant.
Cost-effectiveness of DSME

Clinical Care/Education/Nutrition/Psychosocial Research

Original Article

Nutritionist Visits, Diabetes Classes, and Hospitalization Rates and Charges

The Urban Diabetes Study

Jessica M. Robbins, PhD1
Gail E. Thatcher, RN, MSN, CDE2
David A. Webb, PhD3
Vivian G. Valdmanis, PhD4

Objective — We evaluated the association of different types of educational visits for diabetic patients of the eight Philadelphia Health Care Centers (PHCCs) (public safety-net primary care clinics), with hospital admission rates and charges reported to the Pennsylvania Health Care Cost Containment Council.

Research Design and Methods — The study population included 18,404 patients who had a PHCC visit with a diabetes diagnosis recorded between 1 March 1993 and 31 December 2001 and had at least 1 month follow-up time.

Results — A total of 31,657 hospitalizations were recorded for 7,839 (42.6%) patients in the cohort. After adjustment for demographic variables, baseline comorbid conditions, hospitalizations before the diabetes diagnosis, and number of other primary care visits, having had any type of educational visit was associated with 9.18 (95% CI 5.02–13.33) fewer hospitalizations per 100 person-years and $11,371 ($6,377 to $16,765) less in hospital charges per person. Each nutritionist visit was associated with 4.70 (2.23–7.16) fewer hospitalizations per 100 person-years and a $6,503 ($3,421 to $9,586) reduction in total hospital charges.

Conclusions — Any type of educational visit was associated with lower hospitalization rates and charges. Nutritionist visits were more strongly associated with reduced hospitalizations than diabetes classes. Each nutritionist visit was associated with a substantial reduction in hospital charges, suggesting that providing these services in the primary care setting may be highly cost-effective for the health care system.


Cost-effectiveness of DSME

Table 3—Associations with hospitalization rates and charges

<table>
<thead>
<tr>
<th>Educational variable (each educational variable was modeled separately)</th>
<th>Unadjusted models</th>
<th>Adjusted models*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hospitalizations per 100 person-years</td>
<td>Hospital charges</td>
</tr>
<tr>
<td></td>
<td>Parameter (95% CI)</td>
<td>P value</td>
</tr>
<tr>
<td>Any educational visit†</td>
<td>−18.84 (−23.21 to −14.46)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Any nutritionist visit</td>
<td>−22.49 (−27.66 to −17.33)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Any diabetes class</td>
<td>−10.51 (−16.93 to 4.09)</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of educational visits† (per visit)</td>
<td>−2.26 (−3.09 to −1.43)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Number of nutritionist visits (per visit)</td>
<td>−9.46 (−12.11 to −6.82)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Number of diabetes classes (per class)</td>
<td>−1.75 (−2.73 to −0.77)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Adjusted for demographic variables and baseline hospitalizations, heart disease, kidney disease, stroke, lower-extremity ulcers, neuropathy, eye disease, hypertension, and number of other primary care visits.
†Include dietitian visits, diabetes classes, and health education visits.
There are 4 critical times to assess, adjust, provide and refer for DSMES.
# DSME Algorithm: Action Steps

## Diabetes Self-management Education and Support Algorithm: Action Steps

**Four critical times to assess, provide, and adjust diabetes self-management education and support**

<table>
<thead>
<tr>
<th>At diagnosis</th>
<th>Annual assessment of education, nutrition, and emotional needs</th>
<th>When new complicating factors influence self-management</th>
<th>When transitions in care occur</th>
</tr>
</thead>
</table>
| - Answer questions and provide emotional support regarding diagnosis
- Provide overview of treatment and treatment goals
- Teach survival skills to address immediate requirements (safe use of medication, hypoglycemia treatment if needed, introduction of eating guidelines)
- Identify and discuss resources for education and ongoing support
- Make referral for DSME/S and MNT | - Assess all areas of self-management
- Review problem-solving skills
- Identify strengths and challenges of living with diabetes | - Identify presence of factors that affect diabetes self-management and attain treatment and behavioral goals
- Discuss effect of complications and successes with treatment and self-management | - Develop diabetes transition plan
- Communicate transition plan to new health care team members
- Establish DSME/S regular follow-up care |

### Diabetes education: areas of focus and action steps

- Assess cultural influences, health beliefs, current knowledge, physical limitations, family support, financial status, medical history, literacy, numeracy to determine content to provide and how:
  - Medications—choices, action, titration, side effects
  - Monitoring blood glucose—when to test, interpreting and using glucose pattern management for feedback
  - Physical activity—safety, short-term vs. long-term goals/recommendations
  - Preventing, detecting, and treating acute and chronic complications
  - Nutrition—food plan, planning meals, purchasing food, preparing meals, portioning food
  - Risk reduction—smoking cessation, foot care
  - Developing personal strategies to address psychosocial issues and concerns
  - Developing personal strategies to promote health and behavior change
- Review and reinforce treatment goals and self-management needs
- Emphasize preventing complications and promoting quality of life
- Discuss how to adapt diabetes treatment and self-management to new life situations and competing demands
- Support efforts to sustain initial behavior changes and cope with the ongoing burden of diabetes
- Provide support for the provision of self-care skills in an effort to delay progression of the disease and prevent new complications
- Provide/refer for emotional support for diabetes-related distress and depression
- Develop and support personal strategies for behavior change and healthy coping
- Develop personal strategies to accommodate sensory or physical limitation(s), adapting to new self-management demands, and promote health and behavior change
- Identify needed adaptations in diabetes self-management
- Provide support for independent self-management skills and self-efficacy
- Identify level of significant other involvement and facilitate education and support
- Assist with facing challenges affecting usual level of activity, ability to function, health beliefs, and feelings of well-being
- Maximize quality of life and emotional support for the patient (and family members)
- Provide education for others now involved in care
- Establish communication and follow-up plans with the provider, family, and others
How do deliver DSME?

- Interdisciplinary team and/or peer-education
- Personal contact with HCPs
- Combination of group and individual sessions
- Combination of didactic and interactive
Seven self-care behaviors to educate

- AADE7™
- Reducing Risk
- Healthy Eating
- Being Active
- Monitoring
- Taking Medication
- Problem Solving
- Healthy Coping
Seven self-care behaviors: Example

- Setting target glucose
  - Signs, symptoms, causes, treatment (Hyperglycemia & Hypoglycemia)
  - Dose adjustment, Hypoglycemia
  - Take at same time each day
  - Take as prescribed by Dr. – do not skip doses

- Exercise
  - Exercise 2 times for 15 minutes

- Find an "exercise buddy": Take a walk with your child (day) & husband (night)

- Weight training during watching TV / 3 times a week

- Nutritional education (with a dietitian)

- Meal planning: OOOO Kcal/day

- Meal component assessment: restriction of carbohydrate intake/snacking

- Regular 3 times of meals
## Stanford Diabetes Self-Management Program Curriculum

### Week 1
- Introduction to the Workshop
- Group Introductions
- What is Diabetes
- Monitoring
- Healthy Eating
- Introduction to Action Plans

### Week 2
- Feedback/Problem Solving
- Guidelines for a Healthy Eating Plan
- Menu Planning
- Dealing With Stress
- Making an Action Plan

### Week 3
- Feedback
- Preventing Low Blood Sugar
- Focusing on Fat
- Preventing or Delaying Complications
- Making Decisions
- Introduction to Physical Activity and Exercise
- Making an Action Plan

### Week 4
- Feedback
- Dealing with Difficult Emotions
- Food Choices – Putting it All Together
- Menu Planning
- Making an Action Plan

### Week 5
- Feedback
- Dealing with Depression
- Positive Thinking
- Relaxation Body Scan
- Communication Skills
- Endurance Activities
- Making an Action Plan

### Week 6
- Feedback
- Strategies for Sick Days
- Foot Care
- Medication Usage
- Working with Your Health Care Professional and Health Care Organization
- Looking Back and Planning the Future

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This material was prepared by the New England Quality Improvement Network-funded Quality Improvement Organizations (QIN-QIOs) for Massachusetts Quality Improvement Organizations (QIOs) for New England, under contract with the Centers for Medicare & Medicaid Services (CMS), as approved by the U.S. Department of Health and Human Services. The materials presented are not necessarily those of CMS. CMSgrave(03-12-17)
I Can Control My Diabetes
By Working With My Health Care Team!

To team up with my pharmacist, I will—
• Make a list of all my medicines, the exact doses, and include over-the-counter medicines, vitamins, and herbal supplements.
• Update and review the list with my pharmacist every time there is a change.
• Ask how to take my medicine and use supplies to get the best results at the lowest cost.
• Ask about new medicines that I can talk about with my doctor.

To team up with my podiatrist, I will—
• Get a full foot exam by a podiatrist at least once each year.
• Learn how to check my feet myself every day.
• See my podiatrist right away if I develop any foot pain, redness, or sores.
• Ask about the right shoes for me.
• Make sure my feet are checked at every health care visit.

To team up with my eye care provider, I will—
• Ask for a full eye exam with dilated pupils each year.
• Ask how to prevent diabetic eye disease.
• Ask what to do if I have vision changes.

To team up with my dental provider, I will—
• Visit my dental provider at least once a year for a full mouth exam.
• Learn the best way to brush my teeth and use dental floss.
• Ask about the early signs of tooth, mouth, and gum problems.
• Ask about the link between diabetes and gum disease.

To control my diabetes every day, I will—
• Be more active—walk, play, dance, swim, and turn off the TV.
• Eat a healthy diet—choose smaller portions, more vegetables, and less salt, fat, and sugar.
• Quit if I smoke or use other tobacco products—tobacco use increases the risk of health problems from diabetes.
• To quit, call: 1-800-QUIT-NOW (1-800-784-8668).
• Ask all my providers to share my exam results with my other health care providers.
• Learn about managing my diabetes by visiting www.cdc.gov/diabetes/ndep.
• Control my ABCs of diabetes:
  ▶ A1C. This test measures average blood sugar levels over the last 3 months. The goal is less than 7% for most people but your health care provider might set different goals for you.
  ▶ Blood Pressure. High blood pressure causes heart disease. The goal is less than 140/90mm Hg for most people.
  ▶ Cholesterol. Bad cholesterol or LDL (Low Density Lipoprotein) builds up and clogs your arteries.

To get more FREE information on how to prevent or control diabetes, call the Centers of Control and Disease Prevention (CDC) at 1-800-CDC-INFO (800-232-4636), TTY line (1-888-232-4648) or visit www.cdc.gov/diabetes/ndep.

National Diabetes Education Program  NDEP
A program of the National Institutes of Health and the Centers for Disease Control and Prevention

Diabetes Head to Toe Checklist Examination Report
Your organization's name here

From:

To:

Patient Information:
Name: ___________________________ DOB: ____________
Diet: ____________________________

Duration of Diabetes (in years): ____________

Results of Last Finger-stick blood glucose reading (per patient): _______ / N/A
Patient reports under control: ? Yes ? No
Dietary Counseling: ? Yes ? No
Type of Diet: ________________________

Date:
Patient has written med list? ? Yes ? No
OCTC Meds Used: (if none: ?)
Pharmacist reviewed meds on (date): ____________________________
Patient has Rx for: (provide reason if “no”)
Aspirin ? Yes ? No
Cholesterol medication? ? Yes ? No:
ACE inh or ARB ? Yes ? No

Medications:
Medication:

Meds:

Sodium-glucose cotransporter-2 Inhibitor (SGLT-2i): ____________________________
Sodium-glucose cotransporter-2 Inhibitor (SGLT-2i) mediated weight loss?: _______

Hypoglycemia:

Reports Side Effects to Meds: ? Yes ? No
If yes, describe:

Reports hypoglycemia events: ? Yes ? No
If yes, describe:

Does patient know their current:

Home Glucose Monitoring Frequency:

 מצב ת힘ול מחוך: ____________________________

Date:
Risk factors in addition to diabetes:

Foot Exam: Skin, Hair, and Nail Condition
Is the skin thin, fragile, shiny and hairless? ? Yes ? No
Are the nails thick, too long, ingrown, or infected with fungal disease? ? Yes ? No

Foot deformation:

Note Musculoskeletal Deformities:

Toe deformities: Bunions (Hallus Valgus) ? Charcot foot ?
Foot drop ? Prominent Metatarsal Heads

Pedicure “P” for present or “A” for absent
Posterior tibial Left: ____________ Right: ____________ Dorsalis pedis Left: ____________ Right: ____________

Risk Categorization: Check appropriate box:

Low Risk Patient: ____________________________ High Risk Patient: ____________________________

All of the following:

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intact protective sensation</td>
<td>Loss of protective sensation</td>
</tr>
<tr>
<td>Absent pedal pulses</td>
<td>Absent foot deformity</td>
</tr>
<tr>
<td>No foot drop</td>
<td>History of foot ulcer</td>
</tr>
</tbody>
</table>

Eyes:

Visual Acuity (best corrected): Right: ____________ Left: ____________
Intraocular Pressure: Right: ____________ Left: ____________

Dilated Fundus Exam Performed:

Diagnosis: No Diabetic Retinopathy? ? Yes ? No
Non-Proliferative Diabetic Retinopathy? ? Yes ? No
Proliferative Diabetic Retinopathy? ? Yes ? No

Examination Findings:

Intraocular pressure:
Xenon: ____________________________
Fungal infection: ____________________________
Parotid gland changes:

Functional (eating, swallowing, etc) concerns:

Additional Testing/Treatment Recommended:

Other:

Re-evaluate in _______ month(s):

Management:
Follow-up: _______ months
Patient education/discussion:
Referral To:
Other:
Doctor’s Signature

For:

Information pamphlet given
Diabetes Self Management

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• Self Monitoring of Blood Glucose (SMBG)

• Self-injection Techniques

• Summary
The Purpose of SMBG

- Rapid discovery, prevention, and management of hypo/hyperglycemia
- Understanding and management of glycemic response to lifestyle - Exercise, meal, stress, etc.
- Dosage adjustment of insulin or medication
- Supporting data for clinical care and consultation by medical staffs

Control and maintain target blood glucose

Prevent acute/chronic complications of diabetes
Improve quality of life, reduce social cost

1. SMBG = Self Monitoring of Blood Glucose
SMBG Education Plan

What to teach during SMBG education

1. Glycemic target and test method
2. Frequency and time of SMBG
3. Check hyperglycemic and hypoglycemic pattern:
   - Horizontal (24-hour interval), vertical (breakfast, lunch, dinner)
4. Receiving feedbacks from medical staff:
   - lifestyle, medication, insulin injection

## How to SMBG

<table>
<thead>
<tr>
<th>Item</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose meter</td>
<td>Check the code</td>
</tr>
<tr>
<td>Blood sampler</td>
<td>Choose the right depth</td>
</tr>
<tr>
<td>Lancet</td>
<td>No cross-use with others</td>
</tr>
<tr>
<td>Strip</td>
<td>Check for validity date</td>
</tr>
<tr>
<td>Alcohol swab</td>
<td>Use if hand cannot be washed</td>
</tr>
<tr>
<td>Diabetes diary</td>
<td>Bring to hospital</td>
</tr>
</tbody>
</table>
Tips for SMBG

Wash hand with warm water
If using alcohol swap, sample after drying

Choosing sampling site and method

- Massage to ease sampling
- Sides of fingertip are less painful
- Change sampling site everytime (all 10 fingers okay)
Tips for SMBG: Visual guidance helps!

1. 순과 채혈할 부분을 따뜻한 물과 비누로 깨끗이 닦고 잘 건조시킵니다.

2. 채혈기와 채혈침을 준비합니다.

3. 채혈기 두경을 돌려 빼냅니다.

4. 채혈침을 장착구에 끼까지 삽입하고 채혈침 보호판을 살짝 비틀어 떼어냅니다.

5. 채혈기 두경을 돌려 닫습니다.

6. 깃이 조절나사를 돌려 1에서 5까지 원하는 채혈 깊이를 조정합니다. 숫자가 클수록 채혈 깊이가 깊어집니다.
Tips for SMBG: Visual guidance helps!

1. 측정기, 스트립, 채혈기 및 채혈침을 준비합니다.

2. 손과 채혈할 부분을 따뜻한 물과 비누로 깨끗이 닦고 잘 건조시킵니다.

3. 스트립을 삽입구에 삽입 합니다.
   뼈~ 소리가 날 때까지 부드럽게 밀어 놓습니다.
   구부리지지 않도록 주의합니다.

4. 채혈기를 이용하여 채혈합니다.

5. 뼈~ 소리가 날 때까지 혈액 주입부 꼭의 좁은 틈에 혈액 방울을 갖다 뺀다.

6. 5부터 1까지 카운터 된 후 측정결과가 나타납니다.
When SMBG can be especially useful:

- **Intensive insulin therapy**
  - To adjust insulin doses

- **Severe changes in lifestyle**
  - Acute illness, nocturnal hypoglycemia, etc.
  - Irregular meal times, changes in activity

- **Uncontrolled blood glucose levels**
Frequency of SMBG should be individualized

- Type of treatment (lifestyle vs. oral drug vs. insulin)
- Whether target glycemic range is reached
- Economic status

<table>
<thead>
<tr>
<th>Circumstance</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Multiple insulin injection (MDI)</td>
<td>More than 3 times a day (A)</td>
</tr>
<tr>
<td>• Insulin pump / GDM</td>
<td></td>
</tr>
<tr>
<td>- Higher than target glycemic range: combination, insulin, oral drug</td>
<td>At least twice a day (E)</td>
</tr>
<tr>
<td>- Glycemic target reached: insulin, oral drug</td>
<td>At least once a day</td>
</tr>
<tr>
<td>- No medication</td>
<td>Check glucose pattern once/week</td>
</tr>
</tbody>
</table>
Frequency of SMBG should be individualized

- 7 times daily
- 5 times daily
- 'Staggered' monitoring

- Meal-based monitoring
  - Confirming asymptomatic hypoglycemia
  - Confirming fasting hyperglycemia

- 'Staggered' SMBG regimen

- Check Glucose pattern (Gather enough data)
  - before-meals, after-meals, bedtime
  - 7 times/day for 3–7 days

Interpretation of SMBG

Record factors affecting blood glucose and glucose pattern

- If hyper/hypoglycemic, always make note of situation: diet, diet type (total carbohydrate), exercise, medication, stress, etc.

Print SMBG results with computer for use in education and doctor’s meeting.
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Breakfast Before</th>
<th>Breakfast After</th>
<th>Lunch Before</th>
<th>Lunch After</th>
<th>Dinner Before</th>
<th>Dinner After</th>
<th>Bedtime</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/7 (Sat.)</td>
<td>Before</td>
<td>134</td>
<td>189</td>
<td>102</td>
<td>157</td>
<td>119</td>
<td>157</td>
<td>149</td>
<td>Bedford: Fried chicken</td>
</tr>
<tr>
<td>8/8 (Sun.)</td>
<td>237</td>
<td>159</td>
<td>69</td>
<td>205</td>
<td>133</td>
<td>159</td>
<td>121</td>
<td>B: Exercised 2.5 hours, L: No exercise, D: Exercised 0.5 hours</td>
<td></td>
</tr>
<tr>
<td>8/9 (Mon.)</td>
<td>132</td>
<td>156</td>
<td>126</td>
<td>195</td>
<td>121</td>
<td>229</td>
<td>140</td>
<td>L: No exercise, D: Nooodle, rolled rice, Exercised 1 hour</td>
<td></td>
</tr>
<tr>
<td>8/10 (Tue.)</td>
<td>122</td>
<td>200</td>
<td>131</td>
<td>211</td>
<td>128</td>
<td>144</td>
<td>238</td>
<td>B: 0.5 apple after meal, L: Pork thigh soup, D: Popcorns</td>
<td></td>
</tr>
</tbody>
</table>

- **Cause of hyperglycemia after meal:** Excess carbohydrate (grain, fruits), lack of exercise
- **Cause of fasting hyperglycemia:** Excess fish/meat, fat group

**Interpretation of SMBG**

**Hypoglycemia confirmed** → **Fasting hyperglycemia confirmed** → **Postprandial hyperglycemia confirmed** → **Improvement**
Diabetes Self Management

CONTENTS

- Diabetes Self Management Education (DSME)
- Self Monitoring of Blood Glucose (SMBG)
- Self-injection Techniques
- Summary
Insulin Injection Checklist

**Insulin**
- Confirm the type/name of insulin
- Know injection time, expiration date, and volume

**Syringe and needle**
- Choosing the right syringe/needle, for single use only

**Insulin injection chart**
- Confirm/rotate injection site

**Alcohol swab**

**Diabetes tag and snacks for hypoglycemia**
- Food with 15 g of carbohydrate (ex: 3-4 candies) to prepare against hypoglycemia
Choosing the right syringe

Choosing insulin-exclusive syringe

No dead-Space (To prevent unnecessary insulin loss)

Choose based on prescribed dosage

If low dose: Pick 50 unit/30 unit syringe with large, clear marks

30 units (3/10)  50 units (1/2)  100 units
## Choosing the right needle

<table>
<thead>
<tr>
<th>Needle Size</th>
<th>Children (2-6yr)</th>
<th>children Teens(slim)</th>
<th>Children &amp; Teens</th>
<th>slim Adult</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>4mm</td>
<td><img src="4mm" alt="Image" /></td>
<td></td>
<td></td>
<td><img src="4mm" alt="Image" /></td>
<td><img src="4mm" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>If you are at risk of intramuscular injection even with a 4mm needle, insert the skin upright. For slim adults, both methods are available depending on the patient's condition and injection site.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5mm</td>
<td><img src="5mm" alt="Image" /></td>
<td><img src="5mm" alt="Image" /></td>
<td></td>
<td><img src="5mm" alt="Image" /></td>
<td><img src="5mm" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>If there is a risk of IM injection, pick up the skin and inject at 45 degrees.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6mm</td>
<td><img src="6mm" alt="Image" /></td>
<td></td>
<td></td>
<td><img src="6mm" alt="Image" /></td>
<td><img src="6mm" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>Make sure to pick up the skin and inject it at 45 degrees.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8mm</td>
<td><img src="8mm" alt="Image" /></td>
<td><img src="8mm" alt="Image" /></td>
<td></td>
<td><img src="8mm" alt="Image" /></td>
<td><img src="8mm" alt="Image" /></td>
</tr>
<tr>
<td></td>
<td>We recommend using a needle shorter than 8 mm. If it is inevitable, be sure to pick up the skin and inject it at 45 degrees.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Choosing the right needle

- **Needle thickness**: 32 G (thinnest needle) < 31 G < 30 G
- **Choosing the length**
  - 5 mm: For children, thin/muscular body, fear of needles
  - 8 mm: Correctly pinch-up using thumb and index finger before injecting

![Image showing correct and incorrect pinch-up methods]
Choosing the right site

**Site**
- Abdomen, upper arm, thigh, buttock, etc.
- Areas with *subcutaneous tissue*; no nerve or blood vessel

**Interval**
- Shift injection site at 2 cm interval
- Different sites have different absorption rate: use all areas within same injection sites before moving to another area

**When to use upper arm and thigh**
- Full-term pregnancy
- Ascites due to liver diseases
- Peritoneal dialysis
- Wound due to abdominal surgery
For easier choice and rotation of injection site
Prevents fat dystrophy due to repeated injection on same site

- Once daily – Laceration, erythema, infection, lipid atrophy/hypertrophy, etc.
Insulin Injection Site

Absorption rate for each site: Abdomen > Arm > Thigh > Buttock

Insulin absorption by injection sites

Abdomen > Arm > Thigh > Buttock

Glycemic control by injection sites

Factors Affecting Insulin Absorption

**Rapid insulin absorption**

- **Increased blood flow**
  - Exercise after thigh injection improves circulation and absorption
  - Temperature –
    - High (Sauna, spa, etc.)
  - Massage, rubbing
- **Depth: Muscle > SubQ**
- **Dosage: smaller**

**Ultra/short-acting insulins** are more affected by absorption compared to long-acting

**Slow insulin absorption**

- **Localized tissue reaction**
  - fat atrophy/hypertrophy
- **Dosage: large**
- **Smoking**

Haycock P. Insulin Clinical Diabetes 1986:98-118
Insulin Injection Protocol – Pen-type

1. Sterilize rubber part

• Dial to '1', and raise perpendicularly.
• Tap 3 to 4 times, and push the button with thumb
• Check for insulin droplet on needletip

2. Attach needle

3. Remove air

Check for droplet

4. Setting injection volume

5. Inject insulin

Maintain for 10 to 15 seconds
Common mistakes during insulin injection

1. **Not shaking** mixed/intermediate insulin
2. **Not removing** air bubbles
3. One pen-type insulin shared by **multiple users**
4. **Repeated use** of single-use **needle** in pen-type
5. **Immediate removal of needle** after injection in pen-type
6. Storing the pen while **keeping the needle** after injection
7. Pushing injector **before attaching needle**
8. **Forcing the dial rotation** on pen-type insulin
9. **Transferring insulin** in pen-type with syringe
10. Exposing insulin to **freezer or high temperature** during storage
Insulin Injection Checklist

- Always shake mixed or intermediate (cloudy) insulin: if necessary, use sticker to indicate shaking

- Injection is delayed and inaccurate if air bubbles are not removed

- Teach patients to not turn pen dials beyond maximum single dose (80 units or 60 units)
**Insulin Injection Checklist**

- Immediate removal of needle after injection can prevent air entering the pen.
- Wait for **10~15 seconds** after pushing the injector before removing.
- Sharing the pen has risk of infection. Only one person per pen.
- If too hot or too cold, store in cooling pocket or warming bottle when going out.
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DSME Outcomes Measures

Immediate Outcomes

Learning Knowledge Skill Acquisition

Intermediate Outcomes

Behavior Change

Post-Intermediate Outcomes

Improved Clinical Indicators

Long Term Outcomes

Improved Health Status

Health Care Outcomes Continuum

AADE
Wake UP AND Thank you for your attention!