



Diabetes Monitoring Forum (DMF) Blood Glucose Monitoring Workshop

Participant Workbook

Who are the DMF?

- The Diabetes Monitoring Forum is an independent group of diabetes healthcare professionals: consultant diabetologists, GPs, and Diabetes Specialist Nurses.
- It is sponsored by Abbott Diabetes Care.
- The Diabetes Monitoring Forum explores ways to optimise the role of blood glucose and ketone monitoring in the management of diabetes.
- The Forum achieve this by creating and evaluating advice and practical materials for people with diabetes and for healthcare professionals.

What do you want from this workshop?

As healthcare professionals in the area of diabetes we encounter patients with Type 1 or Type 2 diabetes who are seeking our help about self blood glucose monitoring (SBGM). We do not always have all the answers. We shall take a moment to explore what information we are seeking to day to help us in our provision of healthcare advice.

List here you own/ the group's reasons for attending today:

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What was SBGM developed for?

- ◆ vascular complications were thought to be linked with glycaemic control
- ◆ concern that tightening of control could increase risk of hypoglycaemia
- ◆ limitations of urinalysis

Walford et al. Lancet 1978 (April 8th)

- ◆ increasing long term complications
- ◆ artificial pancreas seen as a few years away!
- ◆ negative experience with urine testing

Sonksen et al. Lancet 1978

What guidelines exist about SBGM?

- ◆ HTA (Health Technology Assessment) Report 2000
- ◆ NICE (National Institute for Clinical Excellence) Guidance
- ◆ DoH NDST 2003 Guidance
- ◆ Bandolier 2005 report
- ◆ Cochrane Review 2005
- ◆ "Consensus Guidance"
- ◆ Diabetes UK 2005

HTA Report 2000 (Type 2 Diabetes)

- ◆ No evidence to show that SGM (blood or urine) improves BG control using GHb or FBG.
- ◆ No evidence that BGM more effective than urine testing
- ◆ **Studies reviewed had low statistical power and were poorly conducted and reported. Small but clinically relevant effects might not have been noticed**
- ◆ Patients perceptions of monitoring were neither completely nor rigorously studied and further work is needed in this area
- ◆ Urine testing is less costly than blood testing
- ◆ Urine testing is preferred by some patients

HTS Report (Type 1 Diabetes)

- ◆ Results of DCCT demonstrated the efficacy of a package that included frequent SBGM
- ◆ Combining studies was difficult because of the different approaches to design, subject selection and comparison of testing modalities

- ◆ Only one study showed a benefit from using SBGM as compared to urine glucose self monitoring
- ◆ Most studies showed that patients preferred blood monitoring to urine monitoring
- ◆ One study showed that blood testing was more costly than urine monitoring

NICE Guidance for people with Type 2 Diabetes

- ◆ Self monitoring should not be considered as a stand-alone intervention.
- ◆ Self-monitoring should be taught if the need/purpose is clear and agreed with the patient.
- ◆ Self-monitoring can be used in conjunction with appropriate therapy as part of integrated self-care.
- ◆ People with type 2 diabetes should expect to have their long-term glucose control checked every 2-6 months. Laboratory measurement of the amount of HbA1c will give an indication of the overall blood glucose level over previous months.

DoH NDST 2003 Guidance

- ◆ Self-monitoring can provide considerable benefits to people with diabetes.
- ◆ Allowing patients to see the immediate impact of particular behaviours, such as dietary habits or physical activity, on their blood glucose levels.
- ◆ Allowing people with other conditions to identify when they are feeling unwell due to blood glucose levels or another cause.
- ◆ Giving people confidence about their blood glucose at critical times, such as prior to driving or in work contexts.
- ◆ Providing re-assurance, improving motivation and reducing fear of hypoglycaemia, which cannot be detected by urine testing.
- ◆ Supporting psychological well-being by increasing feelings of control
- ◆ Supporting people with jobs where blood glucose monitoring might be a condition of employment.
- ◆ Enabling temporary insulin use during pregnancy

Bandolier 2005 Report

- ◆ Is testing worthwhile for type 2 diabetics on oral medication?
- ◆ Systematic review in 2000 – inconclusive
- ◆ However, despite a small sample there was a trend for lower HbA1c with self monitoring

- ◆ In 2000 no convincing RCT evidence that SBGM was beneficial in type 2, but there was no evidence of no benefit
- ◆ **Absence of evidence of benefit is not evidence of absence of benefit**
- ◆ **New RCTs confirm that there is significant benefit of SBGM in type 2 diabetes**
- ◆ Is the size of benefit an issue?
- ◆ For some it is small but for others it is significant
- ◆ **This is an example of where average results are of less interest than knowing that an intervention benefits some people very much**

Cochrane Review 2005

From this review we concluded that self-monitoring of blood glucose might be effective in improving glycaemic control in patients with type 2 diabetes who are not using insulin. To assess the potential beneficial effects of SMBG in these patients a large and well-designed randomised controlled trial is required. This long-term trial should also investigate patient-related outcomes like quality of life, well-being and patient satisfaction, and **provide adequate education to the patient to allow SMBG to be effective.**

Consensus Guidelines

The healthcare professionals agreed that SMBG should be regarded as an integral part of treating all people with diabetes:

- ◆ All people with type 1 diabetes should have access to home blood glucose monitoring at least four times per day as required.
- ◆ Pregnant women with type 1 diabetes should monitor their blood glucose at least four times per day to include both fasting and 1h postprandial blood glucose measurements.
- ◆ People with type 2 diabetes who are using a conventional insulin regimen and who have stable control should monitor their blood glucose two or three times a week.
- ◆ Drivers with diabetes should test their blood glucose before commencing any journey and at regular intervals on long journeys.

Owens et al. Diabetes and Primary Care 2005

Diabetes UK

Diabetes UK's position is that people with diabetes should have access to home blood glucose monitoring based on individual clinical need, informed consent and not on ability to pay. **Home monitoring is essential in the context of diabetes education for self-management** in order to enable the person to make appropriate treatment or lifestyle choices

Restrictions on the type and numbers of testing strips is unacceptable as this does not meet individual needs and circumstances. Such a policy is against Standard 3 of the National Service Framework (NSF) for diabetes relating to patient empowerment

So what are the barriers to effective use of SBGM?

List your thoughts on why people do not use SBGM effectively. Add other suggestions made by the group.



What options for change are there to overcome these barriers?

List your ideas and those that arise in the group discussion that might help overcome these barriers.



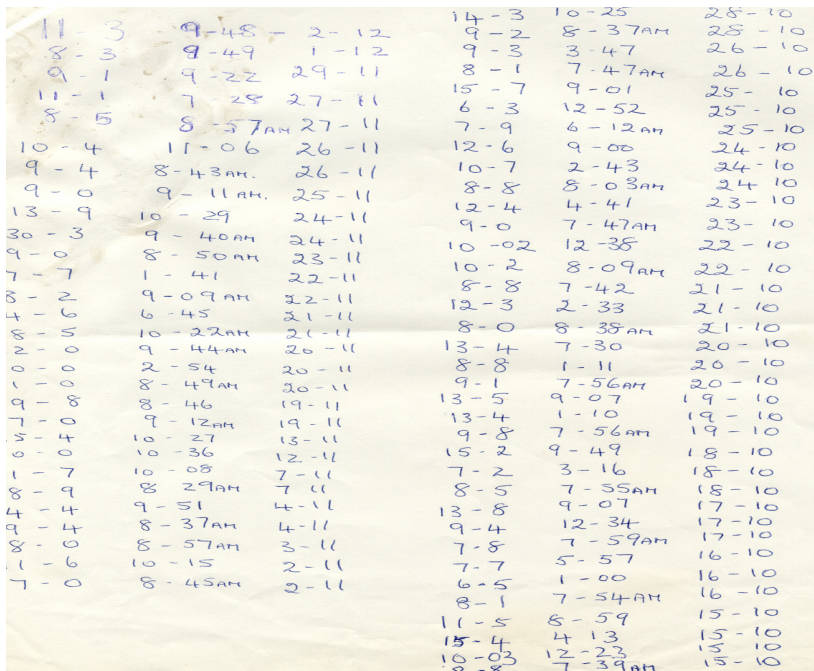
“10 Reasons to hate BGM” (Personal barriers to effective use of SBGM)

1. Your meter makes you feel bad about yourself
2. Monitoring seems pointless (because you believe there is nothing you can do about your blood glucose results anyway)
3. Checking your blood glucose reminds you that you have diabetes, which is something you'd probably rather not think about too much.
4. Your meter seems to control your life, telling you what you can and can't do.
5. Monitoring serves as an opportunity for your friends and family to bother you
6. None of your health care providers ever do anything with the results anyway

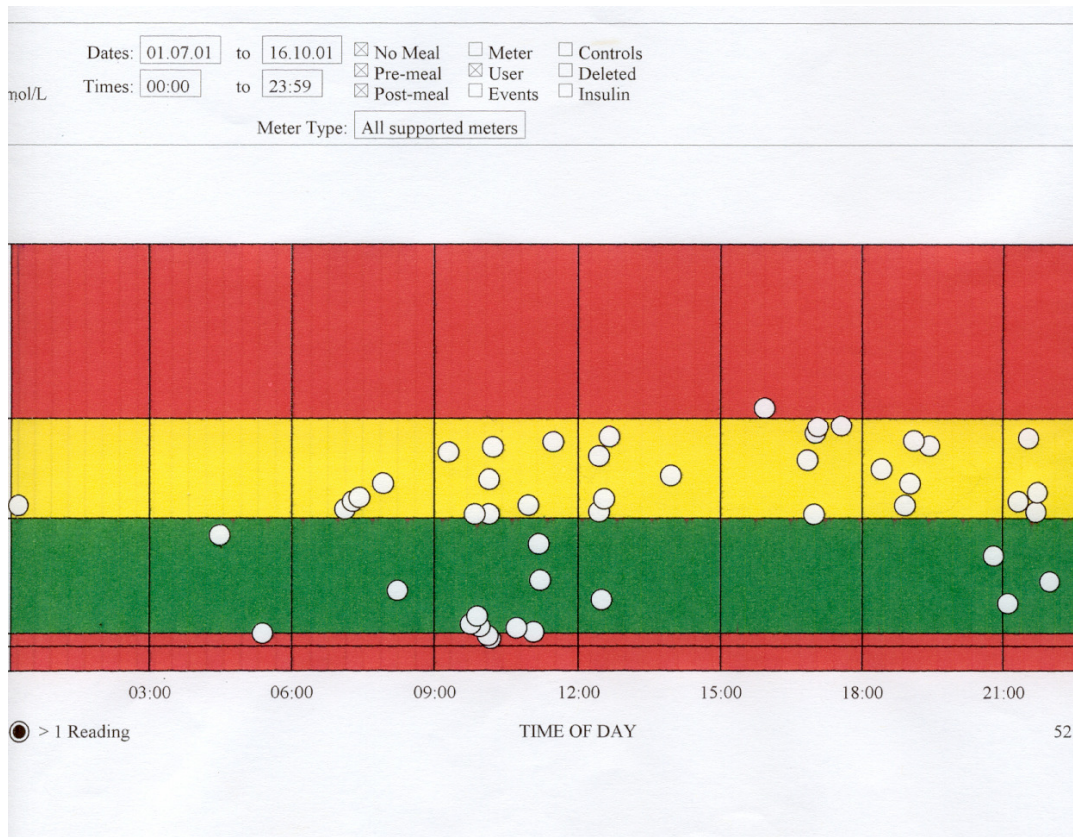
7. Checking blood glucose sometimes hurts
8. Monitoring can be inconvenient
9. Monitoring can be expensive
10. Life is too busy and demanding to take the time for regular monitoring

Polonsky 1999

How can we help people make sense of the data from SBGM?



11-3	9-48	2-12	14-3	10-25	28-10
8-3	9-49	1-12	9-2	8-37AM	28-10
9-1	9-22	29-11	9-3	3-47	26-10
11-1	7-28	27-11	8-1	7-47AM	26-10
8-5	8-57AM	27-11	15-7	9-01	25-10
10-4	11-06	26-11	6-3	12-52	25-10
9-4	8-43AM	26-11	7-9	6-12AM	25-10
9-0	9-11AM	25-11	12-6	9-00	24-10
13-9	10-29	24-11	10-7	2-43	24-10
30-3	9-40AM	24-11	8-8	8-03AM	24-10
9-0	8-50AM	23-11	12-4	4-41	23-10
7-7	1-41	22-11	9-0	7-47AM	23-10
8-2	9-09AM	22-11	10-02	12-35	22-10
4-6	6-45	21-11	10-2	8-09AM	22-10
8-5	10-22AM	21-11	8-8	7-42	21-10
2-0	9-44AM	20-11	12-3	2-33	21-10
0-0	2-54	20-11	8-0	8-38AM	21-10
1-0	8-49AM	20-11	13-4	7-30	20-10
9-8	8-46	19-11	8-8	1-11	20-10
7-7	9-12AM	19-11	9-1	7-56AM	20-10
5-4	10-27	13-11	13-4	9-07	19-10
0-0	10-36	12-11	9-8	1-10	19-10
1-7	10-08	7-11	15-2	7-56AM	19-10
8-9	8-29AM	7-11	7-2	9-49	18-10
4-4	9-51	4-11	8-5	3-16	18-10
9-4	8-37AM	4-11	8-5	7-35AM	18-10
8-0	8-57AM	3-11	13-8	9-07	17-10
1-6	10-15	2-11	9-4	12-34	17-10
7-0	8-45AM	0-11	7-8	7-59AM	17-10
			7-7	5-57	16-10
			6-5	1-00	16-10
			8-1	7-54AM	16-10
			11-5	8-59	15-10
			15-4	4-13	15-10
			10-03	12-23	15-10
			8-X	7-39AM	15-10



M T W T F S S

Dates: 01.07.01 to 16.10.01
 Times: 00:00 to 23:59
 Meter Type: All supported meters

No Meal Meter Controls
 Pre-meal User Deleted
 Post-meal Events Insulin

Summary - mmol/L

Average	12.2 mmol/L
Highest Blood Glucose	20.6 mmol/L
Lowest Blood Glucose	2.6 mmol/L
Standard Deviation	5.3 mmol/L
Number of Glucose Readings	52
Days Covered	107
Number of Days Without Tests	65
Average Readings Per Day	0.5
Deleted Glucose Readings	0
Control Readings	0
Deleted Control Readings	0
Number of Events	0
Number of Insulin Entries	0

Readings/Range - mmol/L

Glucose Ranges	Number	Percent
Very High (19.8 - 33.4)	2	4%
High (12.1 - 19.7)	32	62%
Target (3.0 - 12.0)	16	31%
Low (2.1 - 2.9)	2	4%
Very Low (0.0 - 2.0)	0	0%

() - Values in parentheses include at least one HI or LO value.

Tools to help effective use of SBGM

- ◆ Discovery Sheet
- ◆ DMF Leaflets

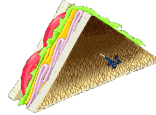

- ◆ YOU

Discovery Learning

- ◆ Discovery learning is an experience and inquiry-based method of instruction.
- ◆ Discovery learning takes place when the learner gains insight, 'discovers' concepts or devises strategies through experience, inquiry, and reflection

Name _____

Discovery Sheet

Day	Pre Breakfast Blood Sugar (insulin)	 Breakfast Foods Eaten	2 hr blood sugar	Before lunch blood sugar (insulin)	Lunch foods eaten 	2 hr blood sugar	Before Evening meal blood sugar (ins)	Evening Meal 	2 hour blood sugar	Bed time blood sugar (ins)	Exercise Today 	Special Comments	3 Am Blood sugar

Using the DISCOVERY SHEET

The DISCOVERY Sheet is a tool that has been developed to help people with diabetes be more active in understanding what is happening to their blood sugar control. It is a myth that health care professionals are able to 'sort out' diabetes control; only the person with diabetes can do that. Health care professionals can help make sense of information about diabetes and make suggestions about different treatments but the main effects on blood sugar control are often related to the effects of food and exercise – which are under the control of the person himself or herself!

The aim of the DISCOVERY Sheet is to help you gain some insights into what is happening to your blood sugar control in relation to your daily activities. It is intended as a tool to use occasionally NOT on a regular basis. Once you have completed the sheet for the first time, it is best that you discuss the results further with a diabetes specialist nurse or dietitian who will help you make some sense of what is happening and help you make some changes that will assist you with your diabetes control.

1. Collect the information on blood sugar levels, food types and amounts, insulin dose (if applicable) and exercise for the 7 days
2. Try not to make any judgements about the results you are seeing until you have the whole picture.
3. Before seeing the diabetes nurse/dietitian, consider the following:

What information about your diabetes has this given you?

What surprised you about the results?

What concerns you most about the results?

What questions do you have about the information you have collected?

Role of Health Care Professional in “Discovery Learning”

To ask questions to enable reflection and learning

- ◆ Do you have any questions about what you observed this week?
- ◆ Did anything surprise you?
- ◆ What foods/meals seem to work well for you?
- ◆ What foods/meals concern you?
- ◆ Have you come to any conclusions?
- ◆ What do you think might help that?
- ◆ How did that (insulin) dose work for you?
- ◆ Have you made any changes because of what you saw? Tell me about it

Brackenridge and Swenson 2004

SGBM: What should we do to make it worthwhile?

- ☞ View it as a **TOOL** Needs a skilled user/teacher and a proper purpose
- ☞ Consider the **purpose** for the checking blood glucose levels – this will guide the when to test, how often.
- ☞ Help people discover for themselves how SBGM can help them self manage their diabetes
- ☞ Don't immediately judge who will/who will not use SBGM effectively.
- ☞ Regularly review the use of the tool – assist people with their **personal** barriers

Reflections: How to approach self-blood glucose monitoring in your patients.

- ◆ Ask yourself does this patient understand the concept of the balance between insulin and blood glucose or do they need more education?
- ◆ Try to explore how much the patient understands that their blood glucose levels are a direct result of their food intake and lifestyle.
- ◆ Ask them why they monitor their blood glucose.
- ◆ Look through some of their results and ask questions to see if they understand why a particular reading was high or low

Examples:

- Why do you think your blood glucose after lunch on Thursday was so high?
- Can you think back to what you ate?
- What does this tell you?
- Does this happen often?
- Were you unhappy with this reading?
- What will you do in the future to change this high reading after lunch?

- Why do you think your blood glucose when you woke up was so low?
- What did you do when you saw this low reading?
- What do you think you can do to avoid low readings first thing in the morning in the future?

- ◆ Ask them what they do in response to a blood glucose reading
- ◆ If they do not react to their reading, other than just writing it down, try to explore whether this because they do not understand or because they lack confidence to change their own lifestyle.

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Discovering diabetes: achieving target blood glucose control through a behavioural approach to insulin and food self-management
British Journal of Diabetes and Vascular Disease, 2004;4:117-20
If you register at the journal website: <http://www.bjdvd.co.uk/>
You may download this article free of charge.

Case Histories

- Review the information you have about the patient
- How is the patient currently using HBGM?
- What may be the current/future benefit for this patient for HBGM?
- What questions do you need to ask the patient?
- What would be your advice or guidance?

Case Study Anne

- ◆ 55 years
- ◆ Type 2 DM for 2 years
- ◆ Diet advice
- ◆ Metformin 850mg BD
- ◆ BMI 30
- ◆ BP 155/90
- ◆ Recent A1c 9%

0730	12.6
1130	5.2
0800	11.5
1700	20.3
1500	11.4
0630	10.4
0830	14.2

Case Study William

- ◆ Aged 72
- ◆ Type 2 diabetes for 5 years
- ◆ Metformin 850mg BD
- ◆ Gliclazide 80mg BD
- ◆ BMI 27
- ◆ Recent A1c 8%

	Before breakfast	Before Lunch	Before Evening Meal	Before Bed	Other
Monday	8.2	12.1	6.3		
Tuesday	10.7			12.2	
Wednesday	9.3	7.3			
Thursday			15.2		
Friday					2.4
Saturday	5.4	18			

Case Study David

- ◆ Type 1 diabetes for 20 years
- ◆ On multiple injection regimen (Glargine 20; NovoRapid 4/4/6)
- ◆ Recent A1c 9.2%

	Pre BF	Post BF	Pre Lunch	Post Lunch	Pre Dinner	Post Dinner	Pre Bed	0300
Tues	8.0	6.0	14.4	19.8	2.7	2.8	8.1	11.3
Wed	4.5	6.7	2.8	4.1	3.1	3.2	3.9	4.1
Thurs	2.6	5.0	3.2	11.7	7.8	2.1	3.6	12.4
Fri	6.3	2.5	5.4	8.9	10.8	3.8	5.3	12.2
Sat	9.7	4.1	6.8	10.2	9.9	6.9	13.1	19.0
Sun	12.9	4.1	3.4	5.8	7.2	3.9	10.2	9.6
Mon	5.8	2.8	22.1	16.5	10.2	2.3		14.3

Case study Sue

- ◆ Type 2 diabetes for 6 years
- ◆ Recent A1c 10.2%
- ◆ BMI 25
- ◆ Losing weight
- ◆ Metformin 500mg BD
- ◆ Gliclazide 160mg BD

Case Study Sophie

- ◆ Aged 43
- ◆ Type 2 diabetes 4 years
- ◆ BMI 28
- ◆ Very symptomatic
- ◆ A1c 7.2%
- ◆ Metformin and gliclazide (maximum doses)

BB	AB	BL	AL	BD	AD	Bed
9.3	11.6	8.9	10.4	8.7	10.4	14.2
10.4	11.4	16.3	14.1	13.7	16.3	17.2
13.3	13.7	12.7	15.1	13.4	14.9	16.4
15.2	14.1	17.2	14.3	12.3	13.2	16.2
13.7	15.3	10.3	13.2	9.3	11.2	15.6
11.4	17.3	14.2	13.7	10.4	11.2	9.6
10.8						

Case Study Laura

- ◆ Aged 61
- ◆ BMI 34
- ◆ Type 2 diabetes for 3 months
- ◆ On metformin 500 mg bd
- ◆ Last A1c 7%
- ◆ Bp 170/100
- ◆ Cholesterol 7
- ◆ Possible depressed

4.2	13.9		
	18	6.2	8
5			15
	17		