

# Home Blood Glucose Monitoring(HBGM) Data Management System For Patients With Type 2 Diabetes



National Healthcare Group  
**POLYCLINICS**

Ng Soh Mui  
Care Manager  
&  
HBGM Workgroup  
Nursing Services

# ESI (Empowerment Self-Management Initiative)

## Purpose

To **leverage on technology and a structured programme** to engage and empower patients to take control of their conditions



# HBGM and Patients with Type 2 Diabetes on Insulin

- **Adherence to self-monitoring of blood glucose has been found to be associated with improvement in HbA1c even when patients were not self-titrating their insulin doses**
- **Patients may implement beneficial lifestyle changes as a result of the feedback provided by regular monitoring**

## References

Karter, A. J., Ackerson, L. M., Darbinian, J. A., et al. Self-monitoring of blood glucose levels and glycaemic control: the Northern California Kaiser Permanente Diabetes registry. *Am J Med.* 2001; 111: 1-9.

Murata, G. H., Shah, J. H., Hoffman, R. M., et al. Intensified blood glucose monitoring improves glycemic control in stable, insulin-treated veterans with type 2 diabetes: the Diabetes Outcomes in Veterans Study(DOVES). *Diabetes Care.* 2003; 26: 1759-1763.

# Blood Glucose Control and Diabetic Complications

## Improved control of blood glucose reduces the risk of diabetic complications

### References

The Diabetes Control and Complications Trial Research Group. Effect of intensive diabetes management on macrovascular events and risk factors in the Diabetes Control and Complications Trial. *Am J Cardio*. 1995;75: 894-903.

The Writing Team for the Diabetes Control and Complications Trial/ Epidemiology of Diabetes Interventions and Complications Research Group. Effect of intensive therapy on the microvascular complications of type 1 diabetes mellitus. *JAMA*. 2002; 287: 2563-2569.

UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes:UKPDS 38. *BMJ*. 1998; 317: 703-713.


Ohkubo, Y., Kishikawa, H., Araki E., et al. Intensive insulin therapy prevents the progression of diabetic microvascular complications in Japanese patients with non-insulin dependent diabetes mellitus: a randomized prospective 6-year study. *Diabetes Res Clin Pract*. 1995;28:103-117.

# Problem

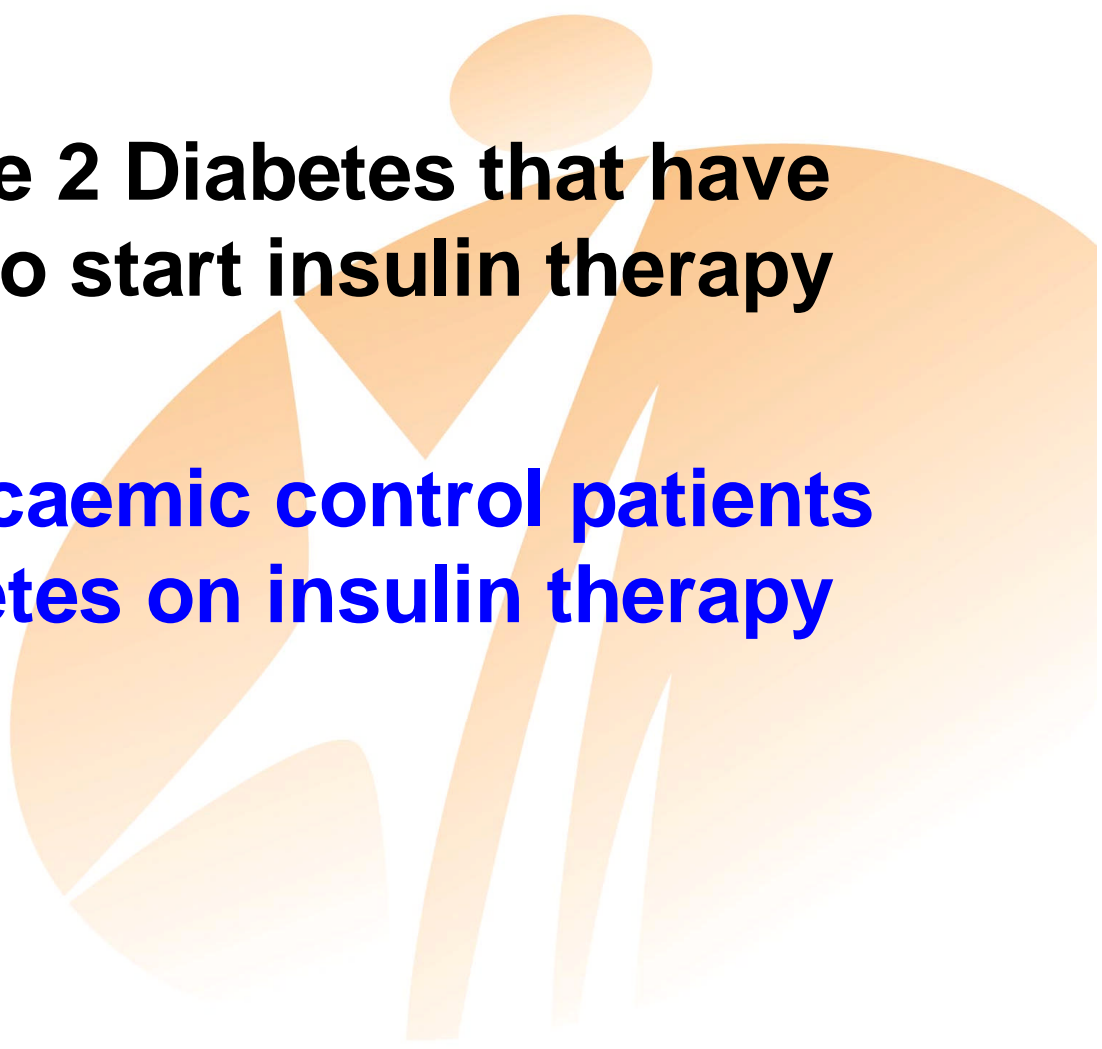
**Self-monitoring of blood glucose is an underutilised but integral part of disease management for patients with both Type 1 and Type 2 Diabetes**

Global Consensus Conference on Glucose Monitoring Panel 2005

# Successful Implementation of HBGM

- **Form a task force**
  - **Represented by a Care Manager from each polyclinic**
  - **Develop a Patient Empowerment framework to support active self-management**
  - **Develop HBGM protocol**
  - **Training for Care Manager in the use of HBGM Data Management System**
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- A large, stylized orange graphic of a human figure is positioned on the right side of the slide. The figure is composed of simple, rounded shapes and is oriented towards the left, appearing to be in a walking or standing posture. It is semi-transparent, allowing the text of the list to be seen through it.

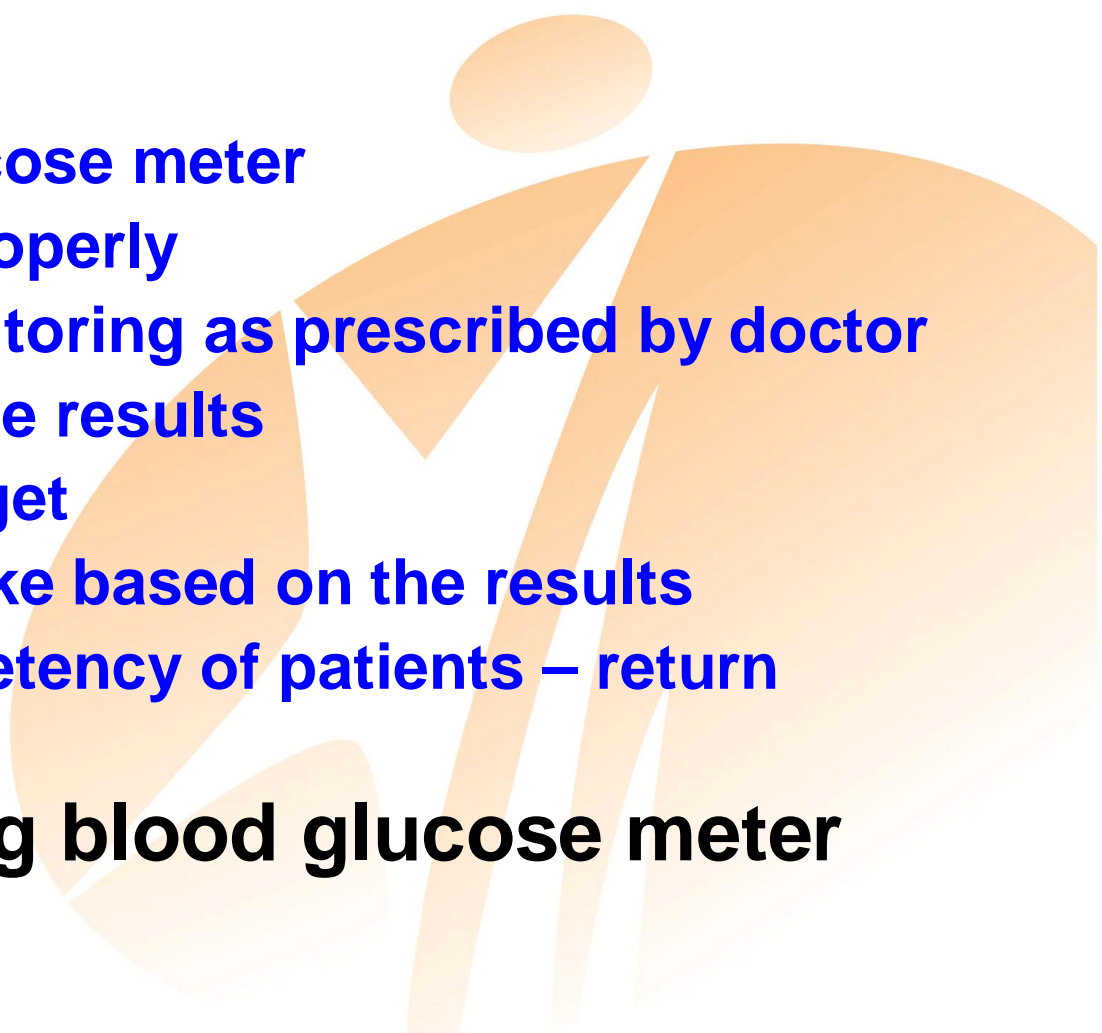
# Target Patients

- **Patients with Type 2 Diabetes that have been prescribed to start insulin therapy**
  - **Existing poor glycaemic control patients with Type 2 Diabetes on insulin therapy**
- 



# ESI - Structured Programme

Key Educational Areas	Clinic Visit	Telephone Consult	Follow-Up Interval
Teach / Review insulin injection technique / Others	1	—	1 <sup>st</sup> visit
Teach / Review HBGM / Review insulin injection technique/ Others	1	—	The next day
Telephone consult	—	1	The next day after 2 <sup>nd</sup> visit
Review insulin injection technique / HBGM / Others	1	—	A month after 1 <sup>st</sup> visit

# HBGM Education

- **Teach HBGM**
    - **Loan of blood glucose meter**
    - **How to perform properly**
    - **Frequency of monitoring as prescribed by doctor**
    - **How to interpret the results**
    - **Blood glucose target**
    - **What actions to take based on the results**
    - **Ensure skill competency of patients – return demonstration**
  - **Reminder to bring blood glucose meter**
- 

# Blood Glucose Meter Sticker

APPOINTMENTS						
Date	Time	Time Slot	Rm	TCU/Wks	Fasting	Remarks
		Am/>10/pm	CM		<input type="checkbox"/> Yes <input type="checkbox"/> No	<b>To bring</b>
						
						
NHGP/MF33-00						NHG Logo

# Lifestyle Changes Education

## Food Intake

Consume more or less CHO  
Change of eating habits  
Struggle with how to follow meal plan

## Physical Activity

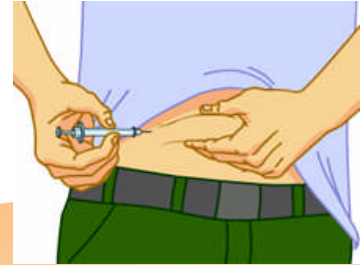
Change of usual activity

Use the measured  
**blood glucose values** to  
discuss

**Glycaemic Control**

# Self-Administration of Insulin

- Teach self-administration of insulin
- Return demonstration
- Issue 'Take Home Kit'
- Explain insulin action profile

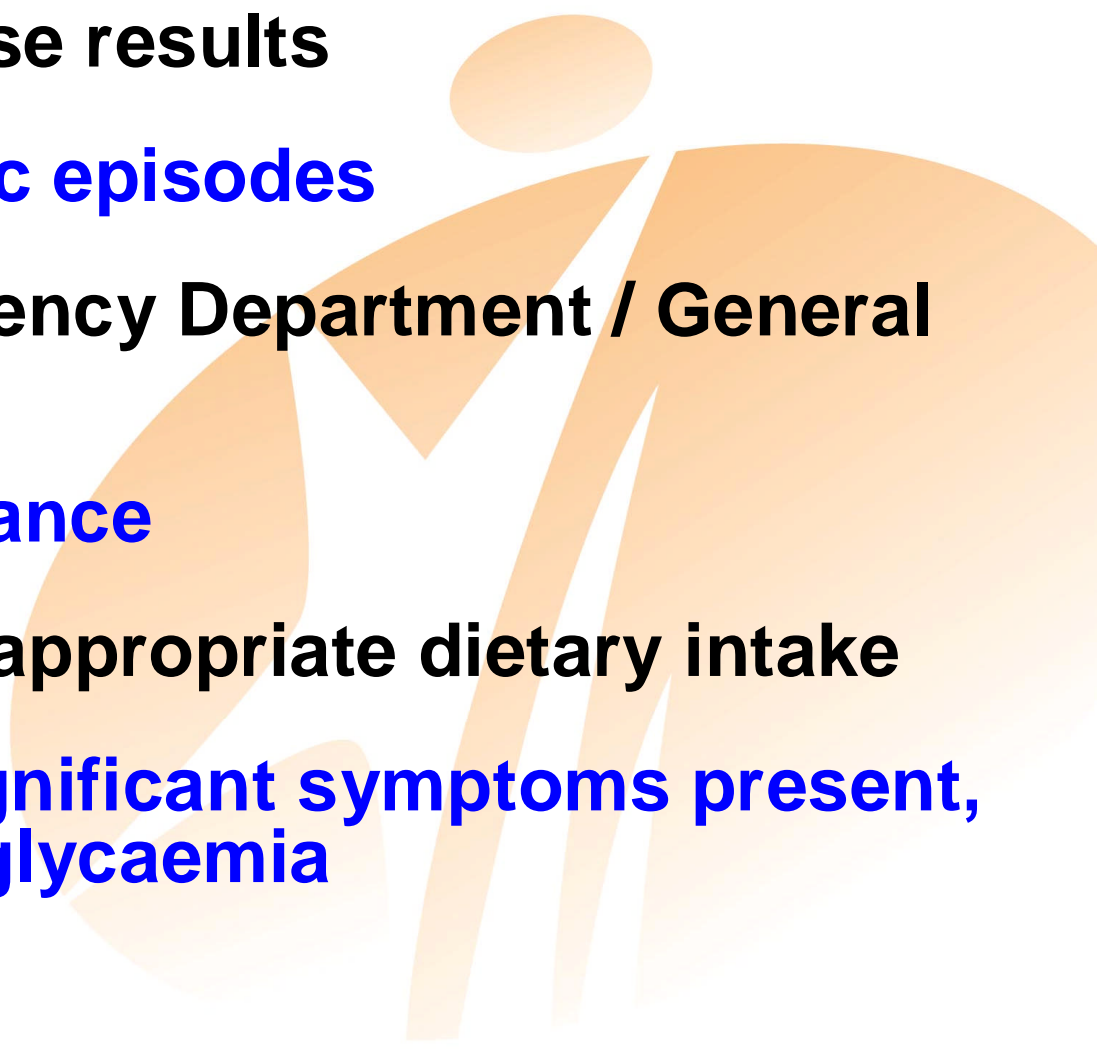


# Prevention and Treatment of Hypoglycaemia

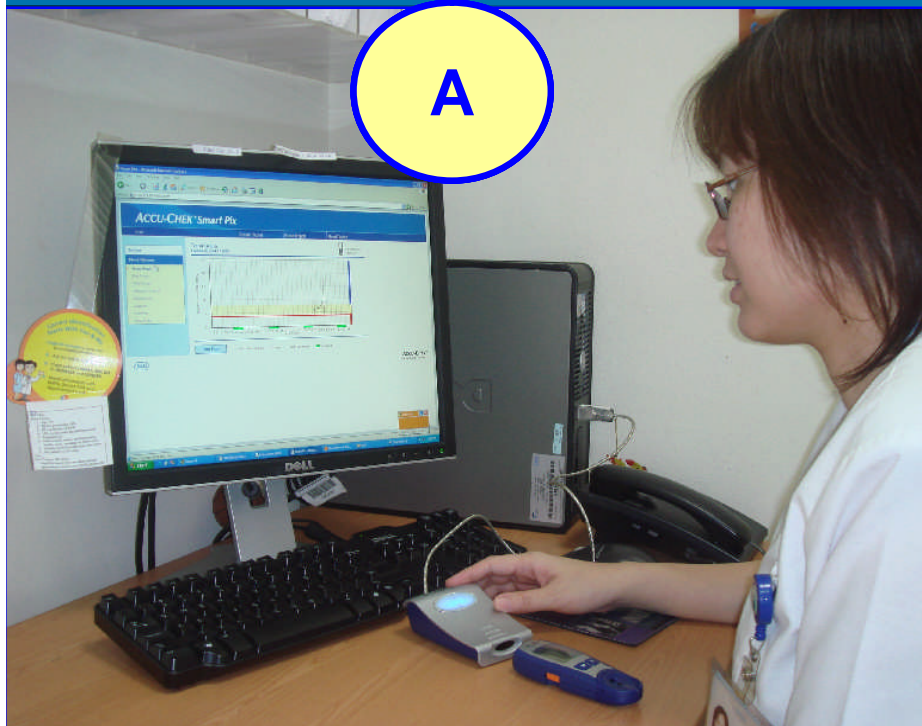
- What is hypoglycaemia?
- Causes
- Signs and symptoms
- How to prevent?
- How to treat?
- Sick day management plan



# Telephone Follow-Up

- Home blood glucose results
  - Any hypoglycaemic episodes
  - Any visit to Emergency Department / General Practitioner
  - Medication compliance
  - Reinforcement on appropriate dietary intake
  - Inform doctor if significant symptoms present, for example, hypoglycaemia
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- A large, stylized orange silhouette of a person is positioned on the right side of the slide. The figure is composed of simple geometric shapes: a circle for the head, a large rounded shape for the torso, and two vertical lines for legs. The silhouette is semi-transparent, allowing the text of the list to be seen through it.

# HBGM Data Management System

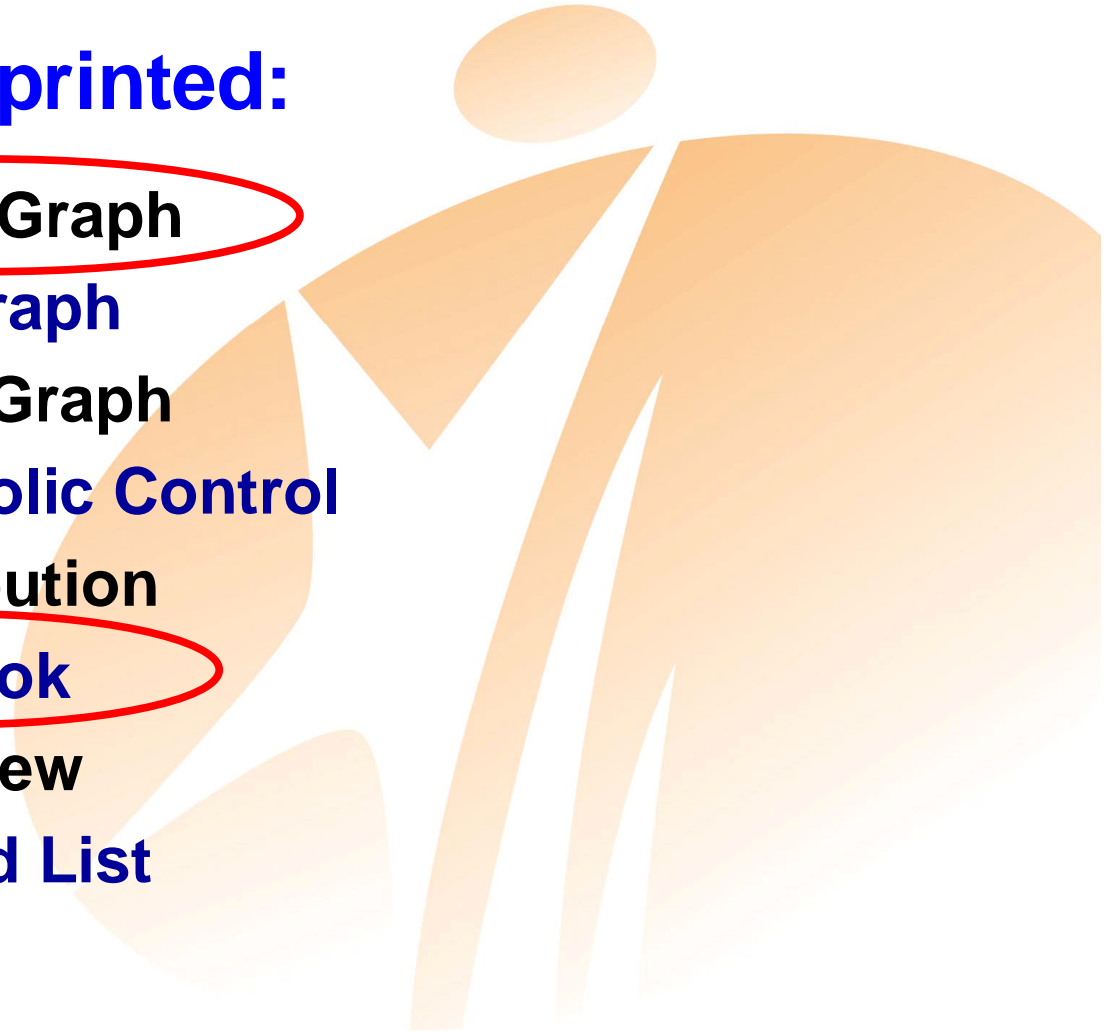


- Plug the device into the USB port of the computer
- Data in blood glucose meter is read by computer via infrared

- Software is downloaded into the computer
- A serial cable connection is used to transfer data from blood glucose meter to computer

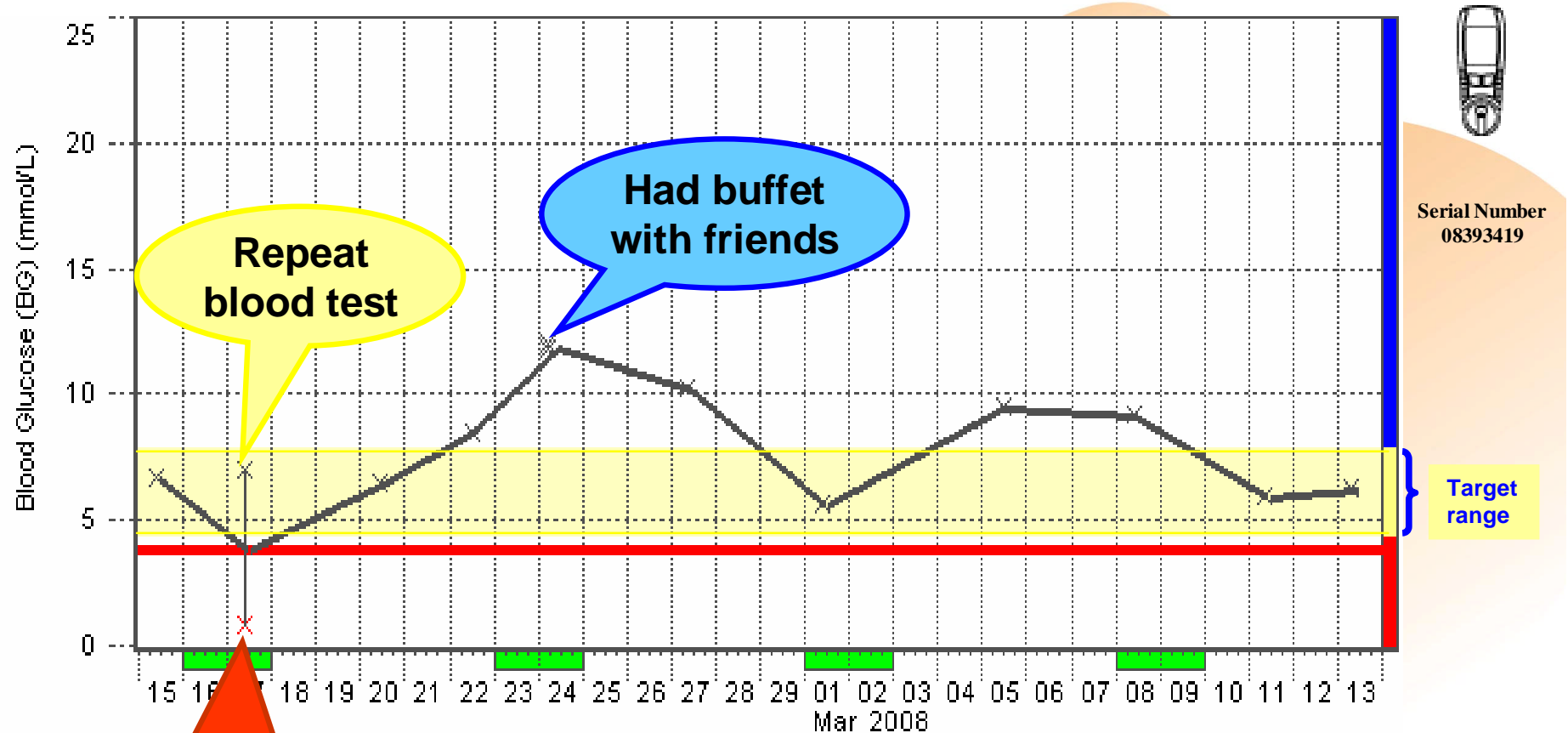
# How do Care Managers Use the HBGM System?

- **Print the report for the patients**
- **Reports can be printed:**
  - **Trend Graph**
  - **Day Graph**
  - **Week Graph**
  - **Metabolic Control**
  - **Distribution**
  - **Logbook**
  - **Overview**
  - **Record List**



# Engage Patient with Trend Graph

Captures all the consecutive blood glucose values within the time period selected



Insufficient blood sample

x Blood Glucose (BG) x Hypo ■ Weekend

# Engage Patient with Logbook

## Logbook

4 weeks up to 03.13.2008



Serial Number  
08383419

Date	05:30 - 07:59	08:00 - 10:59	11:00 - 12:29	12:30 - 16:59	17:00 - 18:29	18:30 - 21:29	21:30 - 23:59	00:00 - 05:29
Thursday	-	-	-	-	-	-	-	-
Tuesday	-	6.0	-	-	-	-	-	-
Saturday	-	9.2	■	-	-	-	-	-
Wednesday	-	-	9.5	■	-	-	-	-
Saturday	-	5.6	-	-	-	-	-	-
Wednesday	-	10.2	■	-	-	-	-	-
Sunday	02.24.2008	12.0	■	-	-	-	-	-
Sunday	02.24.2008	11.8	■	-	-	-	-	-
Friday	02.22.2008	-	-	-	8.5	■	-	-
Wednesday	02.20.2008	-	6.5	-	-	-	-	-
Sunday	02.17.2008	-	7.0	-	-	-	-	-
Sunday	02.17.2008	-	0.8	H	-	-	-	-
Friday	02.15.2008	-	6.7	-	-	-	-	-
n	3	8	1	1	0	0	0	0
MBC	10.0	6.5	9.5	8.5	-	-	-	-
SD	3.2	2.8	-	-	-	-	-	-

I want to  
have less  
blue

Evaluated results

13

Maximum

12.0 mmol/L

MBC

7.7 mmol/L

Minimum

0.8 mmol/L

Standard Deviation (SD)

3.0 mmol/L

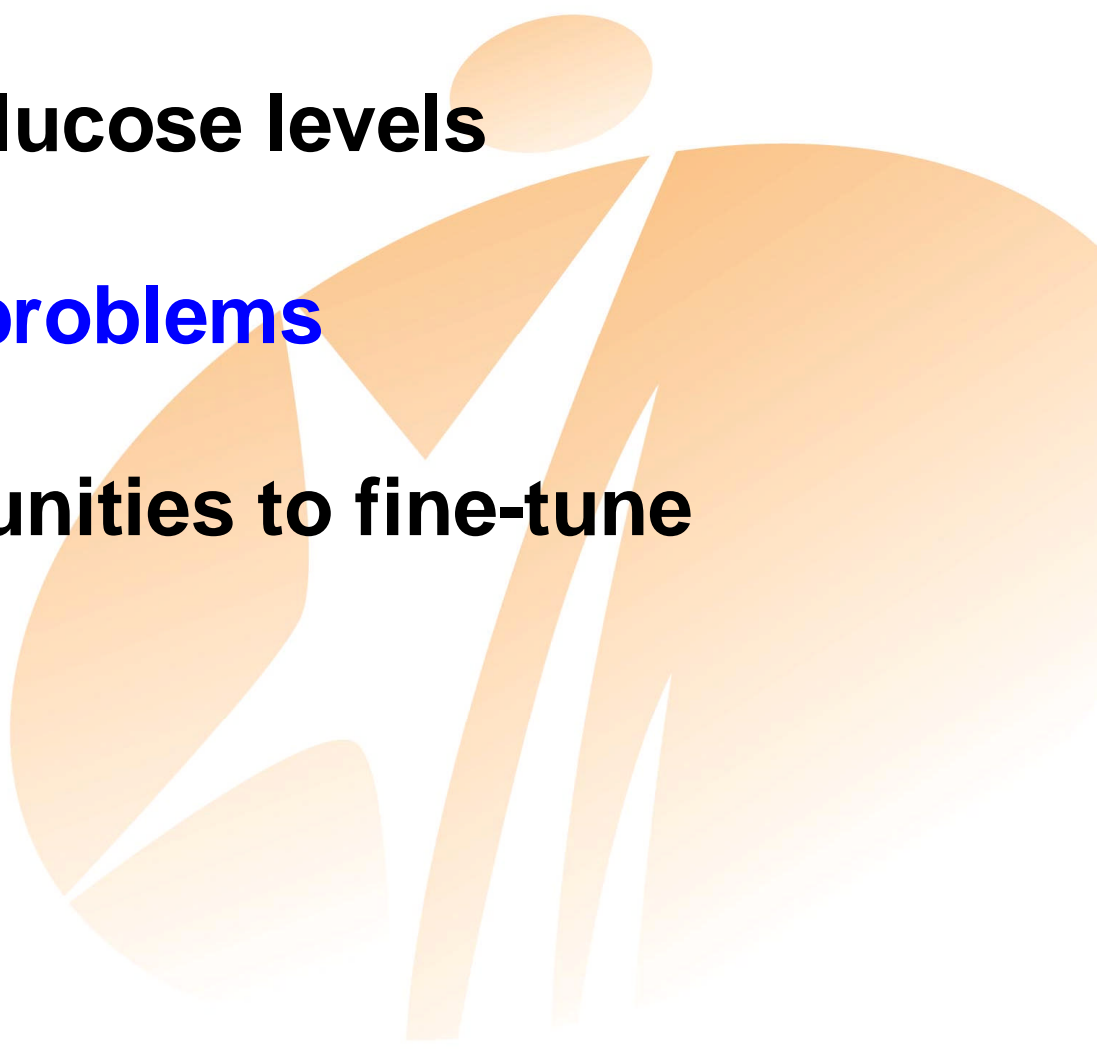
Print Page

■ Above Target  
■ Below Target

H Hypo

■ Weekend

# Benefits of the HBGM Data Management System

- **See trends in glucose levels**
  - **Spot possible problems**
  - **Identify opportunities to fine-tune management**
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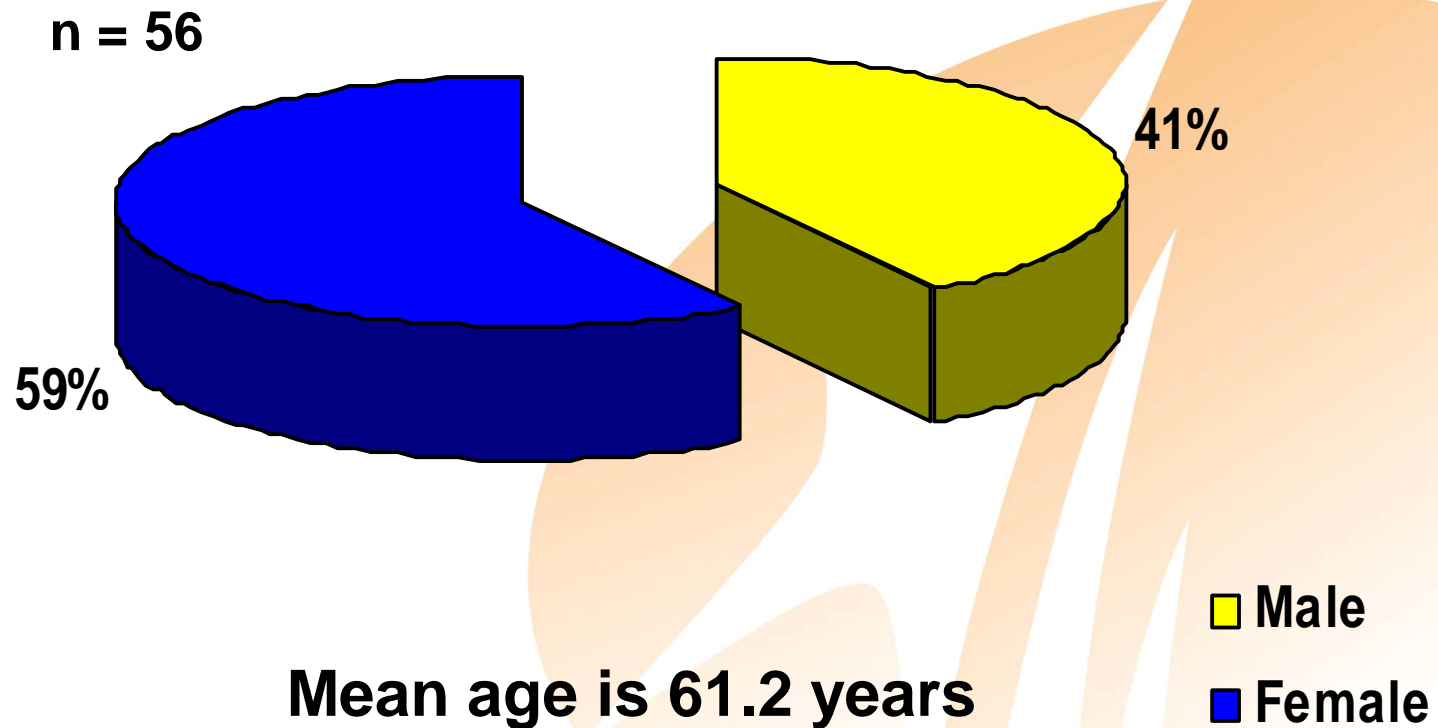
# Preliminary Results

**56 patients were enrolled into the programme from Oct 2007 to Jan 2008**



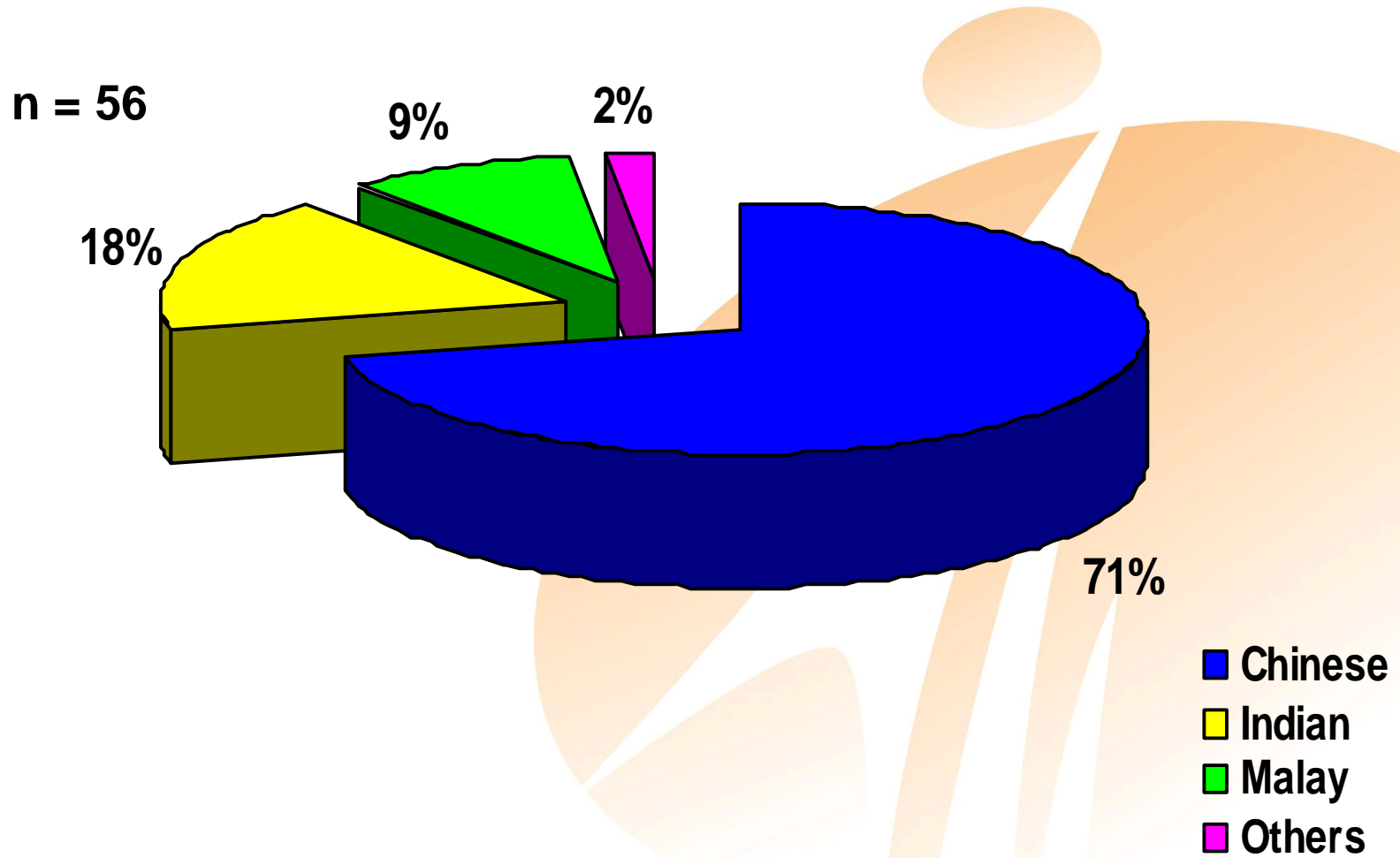
# Preliminary Results

## Gender



# Preliminary Results

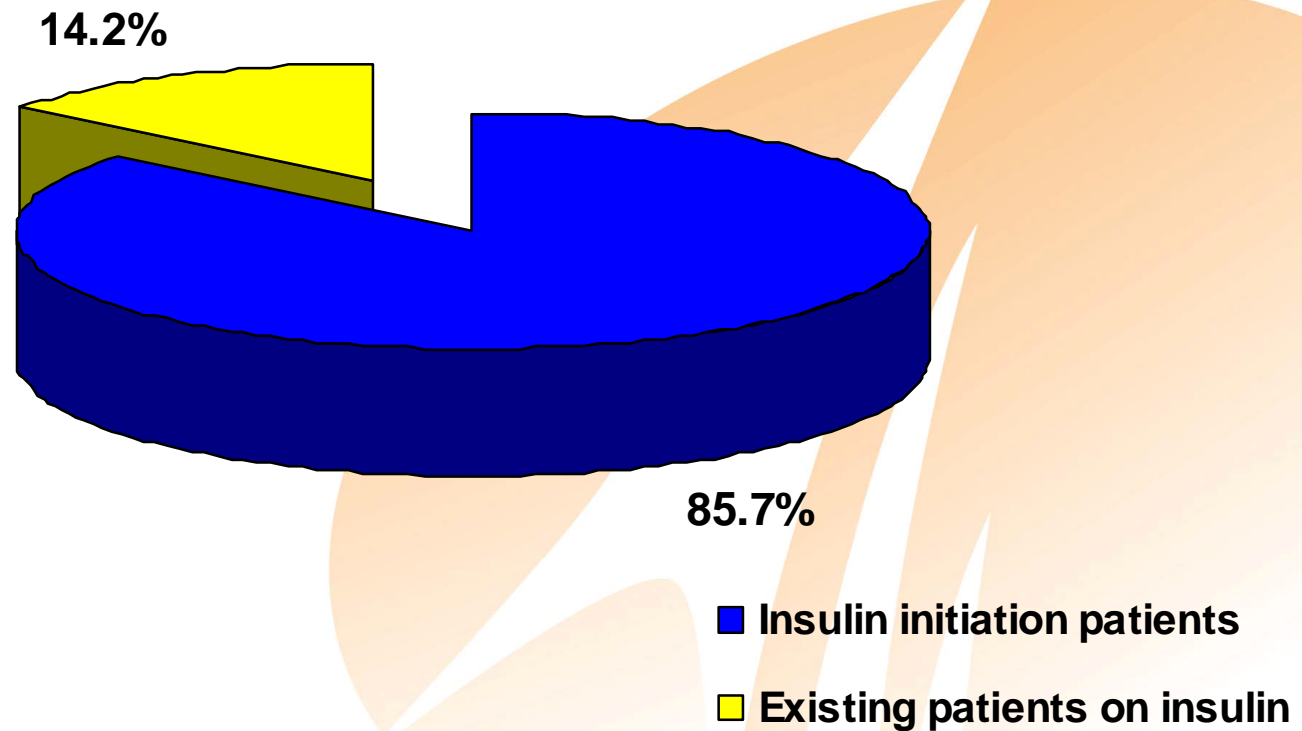
## Ethnic Group



# Preliminary Results

## Type of patients

n = 56



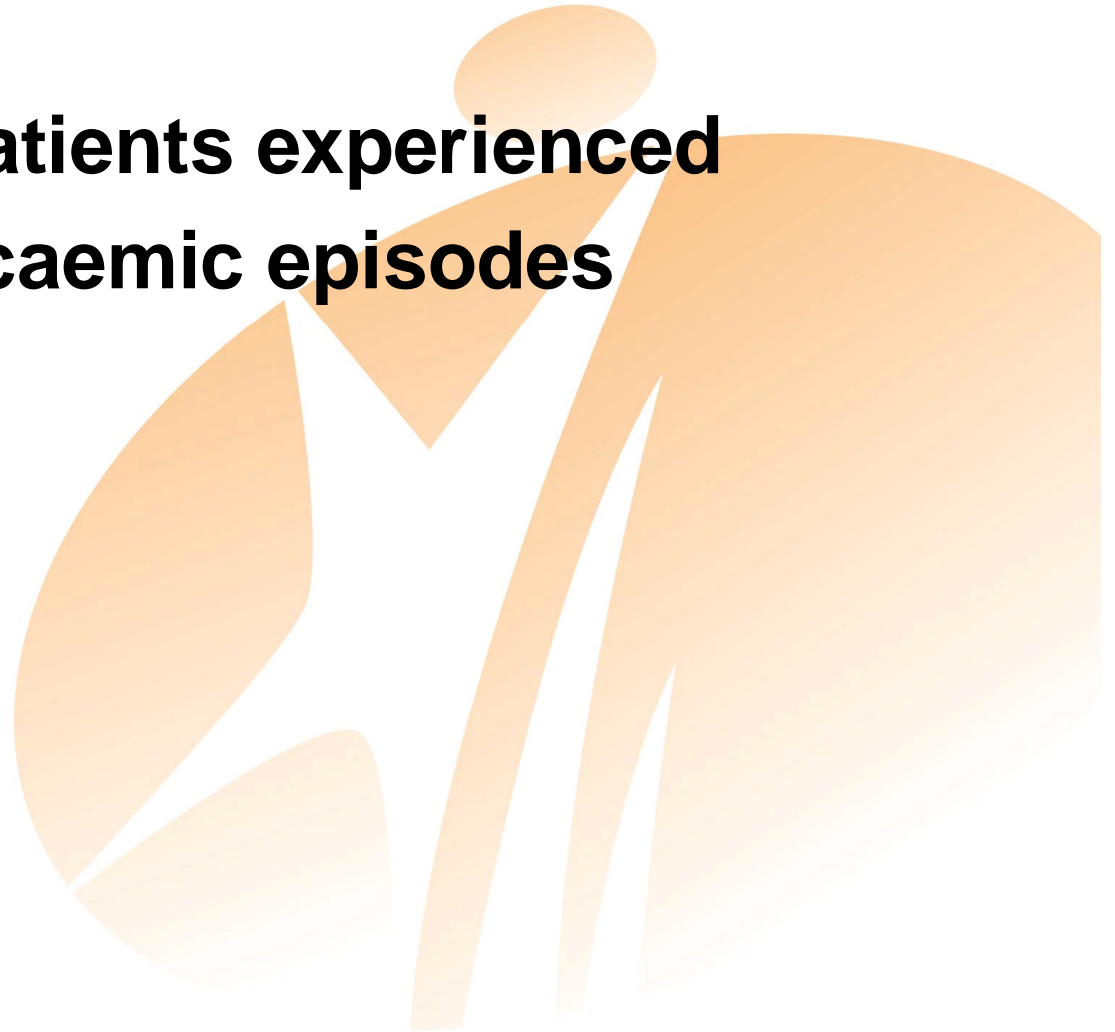
# Preliminary Results

## Drop Out

<b>Hospitalised</b>	1
<b>Refused to continue insulin</b>	2
<b>Others</b>	2
<b>Total</b>	<b>5 (8.9%)</b>

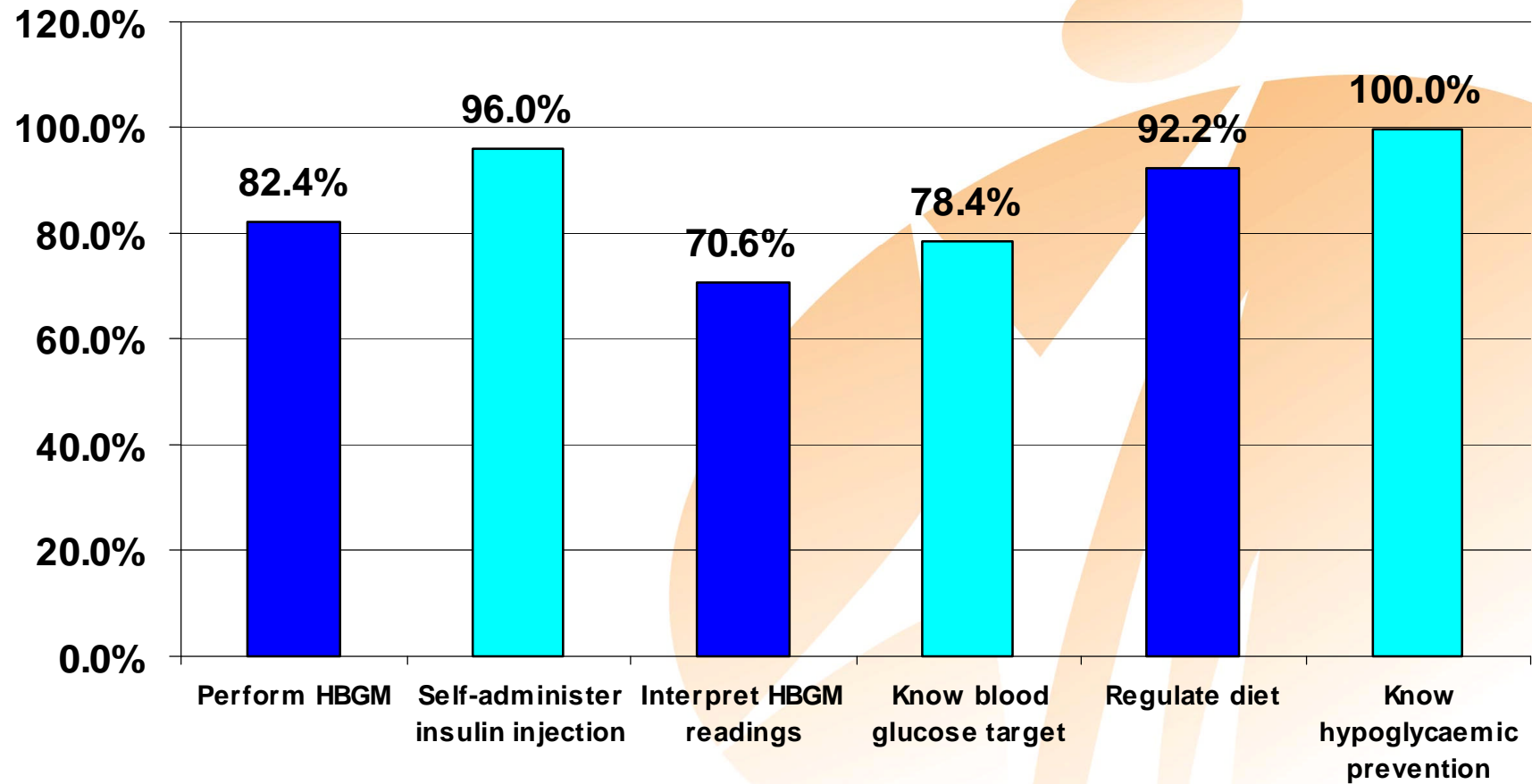
# Hypoglycaemic Episodes

**6 (11.8%) patients experienced hypoglycaemic episodes**



# Preliminary Results

## Self-management skills



# Mean HbA1c (%)

<b>Baseline</b>	<b>9.4</b>
<b>3 months</b>	<b>8.3</b>
<b>Reduction</b>	<b>1.1</b>

# Conclusion

**HBGM Data Management System and a Structured Programme** have facilitated the uptake of HBGM and engaged patients in self-managing their conditions





**THANK YOU**

