



MiniMed™ Academia

Initiate Phase Training
CareLink Interpretation
Methodology

Medtronic Diabetes Integrated Therapy Management



INSULIN DELIVERY



CONTINUOUS GLUCOSE MONITORING



BG TESTING WITH REMOTE BOLUSING



THERAPY MANAGEMENT TOOLS



MiniMed™ 640G
with SmartGuard™

CareLink[®] Benefits

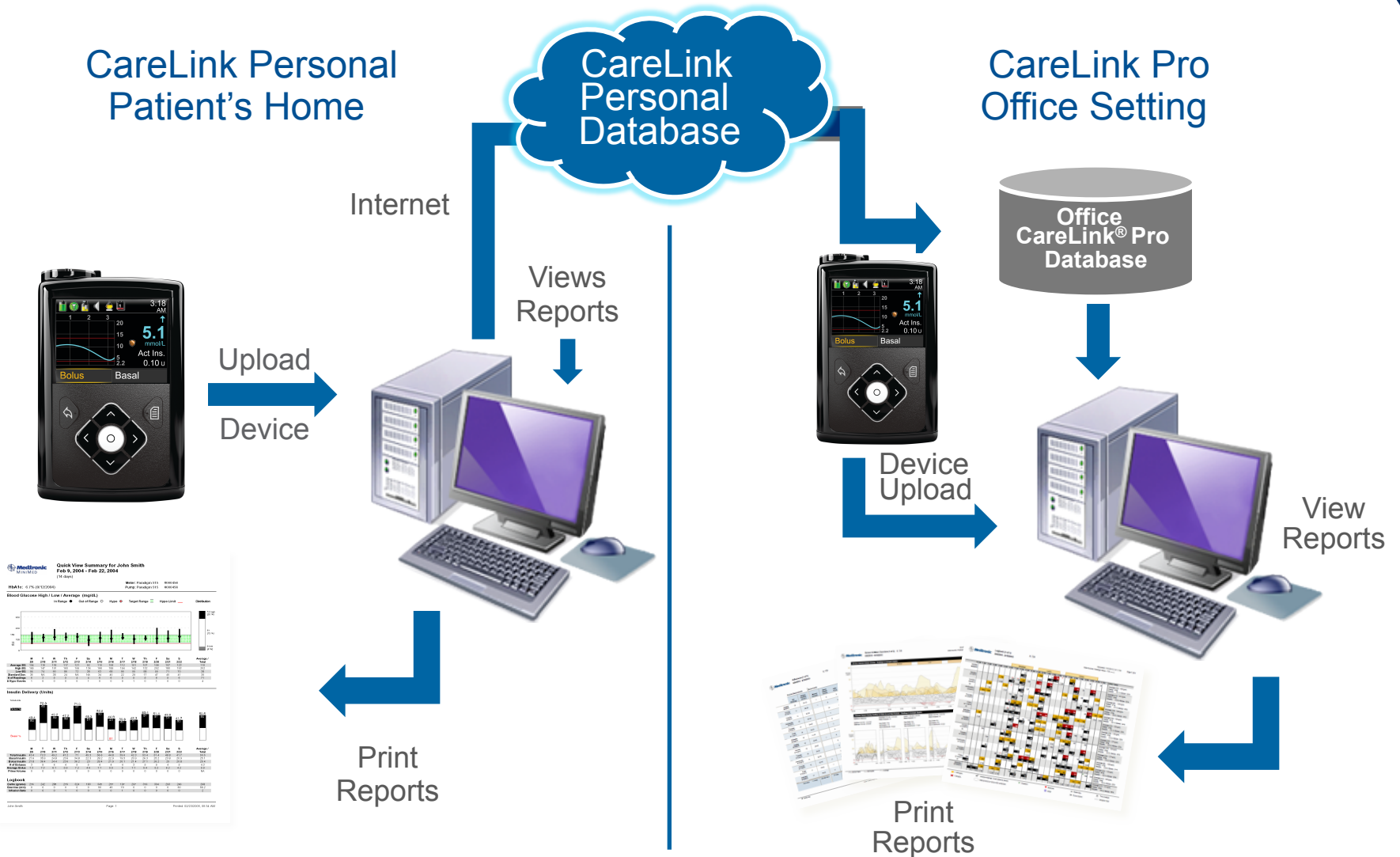
Efficiencies that save you time

- Review insulin pump, continuous glucose monitoring (CGM), and blood glucose meter data in one convenient place
- Link to your patient's CareLink[®] Personal account for simple data transfer and remote monitoring

More insights for better treatment decisions

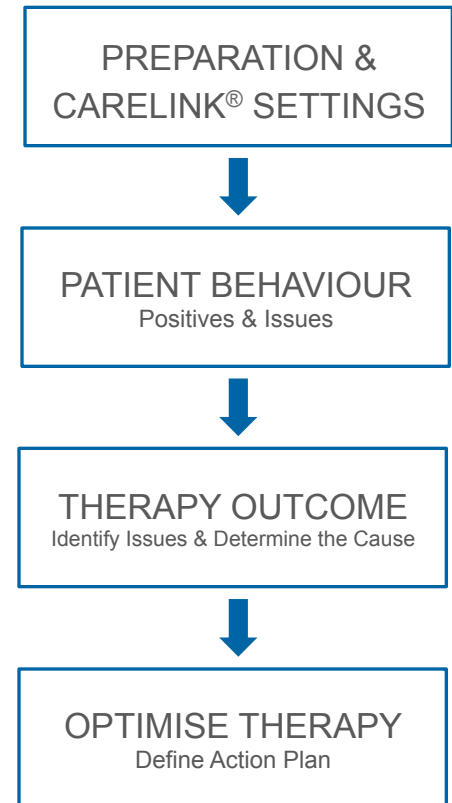
- Generates easy-to-read reports that you can use to educate and motivate patients
- Highlights specific patient events and behaviors

The CareLink Software Platform



Overview of the Interpretation Methodology

- Developed by the CareLink Advisory Board which consists of 5 experienced HCPs who integrated CareLink in their daily practice.
- 4 Step methodology describing how you could use CareLink to optimise your patient's diabetes therapy
- For both patients on
 - CGM
 - SMBG



Preparation

- Make sure your patient has registered themselves in CareLink® Personal
 - Involve patient in treatment
 - Enables Tele-consultations
- Let the patient do the upload at home
 - Saves you time at the clinic
 - Ask patient to identify an issue



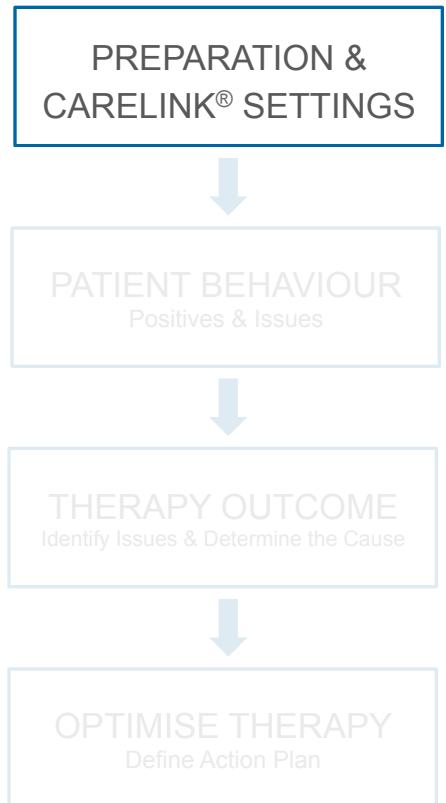
* [Corriveau E.A., Durso P.J., Kaufman E.D., et al. Effect of Carelink, an internet-based insulin pump monitoring system, on glycemic control in rural and urban children with type 1 diabetes mellitus. *Pediatr Diabetes*. 2008; 9(Part II): 360-366.]

Linking to a CareLink® Personal account

The screenshot displays the Medtronic CareLink Pro software interface. The window title is "Medtronic CareLink® Pro". The menu bar includes "File", "View", "Tools", "Language", and "Help". The main content area is titled "PATIENT, SAMPLE" and contains a "Patient Profile" section with the following fields:

- * First Name: SAMPLE (marked as * required)
- * Last Name: PATIENT (marked as * required)
- Date of Birth: 12/10/1975
- Patient ID: 0

Below the profile fields, there is a section for "Synchronization with Medtronic CareLink® Personal" with the status "Not linked". Two buttons are visible: "LINK TO EXISTING ACCOUNT" and "SEND E-MAIL INVITATION TO PATIENT".



CareLink® Pro Settings

- Data Selection
 - The patient won't remember more than two weeks
 - Select the two most recent weeks WITH DATA

Specify Reporting Period and Data Sources (step 1 of 3) >> learn more

Duration:
most recent 2 weeks

From: 6/14/2010 Through: 6/27/2010 (Days selected: 14)

Use link meter data as stored:
 in the pump in the link meter(s) >> learn more

>> export selected data

	April 2010				May 2010				June 2010				
	4	11	18	25	2	9	16	23	30	6	13	20	27
Include in reports													
<input checked="" type="checkbox"/> Paradigm Revel - 523 (-----)													
<input checked="" type="checkbox"/> - Linked Meter Data													
<input checked="" type="checkbox"/> - Sensor Data													
<input checked="" type="checkbox"/> - Manual BG Entries													
<input type="checkbox"/> Inactive Devices													

data from device exists | selected reporting period | device read (Settings captured)

READ DEVICE



CareLink® Pro Settings

- Settings
 - Glucose Targets
 - Meal Times

Important as a number of graphs in the report will use these settings.

Verify Report Settings (step 2 of 3) >> learn more

Glucose Target (mmol/L): Low High

Analysis Periods: Bedtime and wake-up timeframes should group the first and last fingersticks of the day (| |)
>> learn more
Meal timeframes should group corresponding meal markers (|)
Set timeframes by dragging their edges

Wake-up Bedtime

Breakfast

Meal Name:

Meal Time Period: -

Meal Analysis Parameters

Pre-Meal BG Target (mmol/L): -

Pre-Meal Analysis Period:

Post-Meal BG Target (mmol/L): -

Post-Meal Analysis Period: -

Use these parameters for all of this patient's meals

DELETED MEAL Preview

12 3 8
10.1 12.2 8.7

-100 0 +100 +300 +500

PREPARATION &
CARELINK® SETTINGS

PATIENT BEHAVIOUR
Positives & Issues

THERAPY OUTCOME
Identify Issues & Determine the Cause

OPTIMISE THERAPY
Define Action Plan

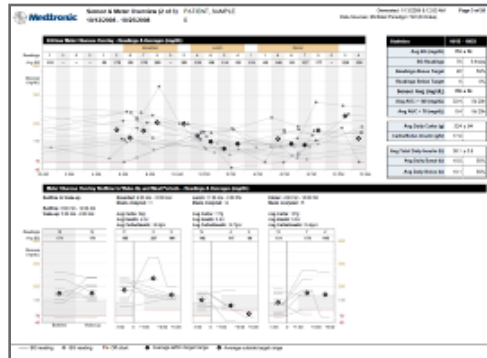
CareLink® Professional Reports

Adherence

Medtronic Adherence Report (1 of 1) Date: 01/20/15

Sensor	Device	Serial Number	Start Date	End Date	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
...

Sensor & Meter Overview

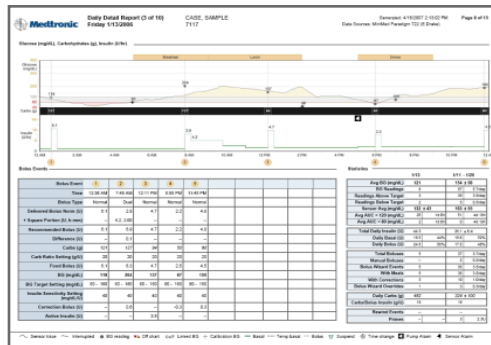


Logbook

Medtronic Logbook (1 of 1) Practice Exercise 1, Practice Exercise 1

Date	Time	Value	Unit	Category
1/20/15	08:00	100	mg/dL	BG
1/20/15	09:00	110	mg/dL	BG
1/20/15	10:00	120	mg/dL	BG

Daily Detail



Device Settings

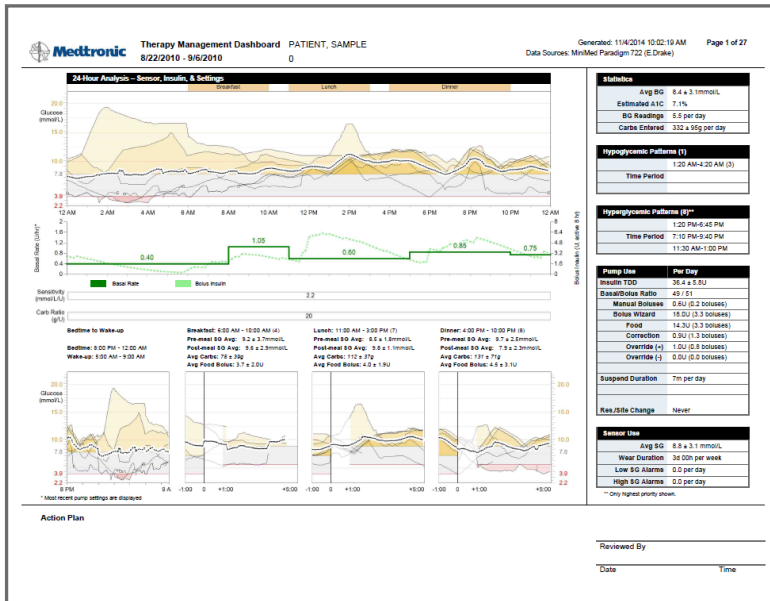
Medtronic Device Settings

Summary Statistics:

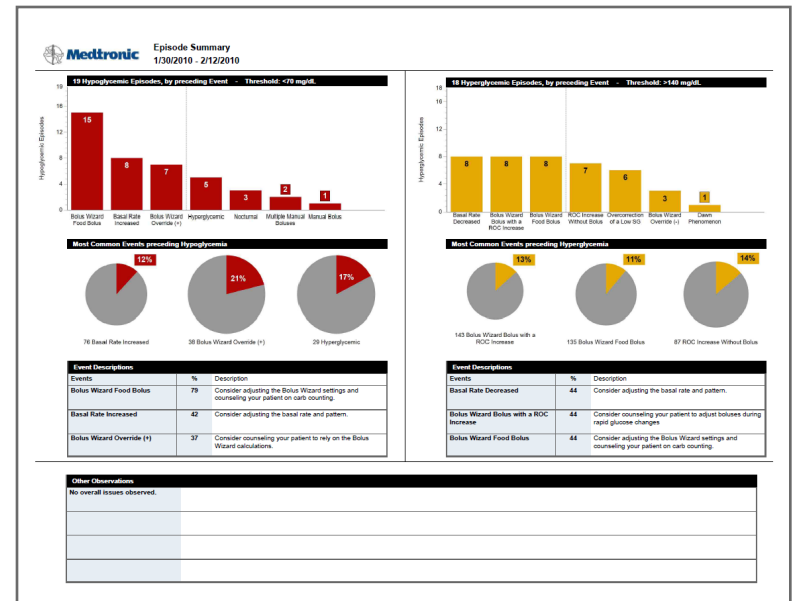
- Avg BG (mg/dL): 100.0
- Min BG (mg/dL): 70.0
- Max BG (mg/dL): 130.0
- Avg Rate of Change (mg/dL/hr): 0.0
- Min Rate of Change (mg/dL/hr): -0.5
- Max Rate of Change (mg/dL/hr): 0.5

CareLink® Pro Sensor Reports

Therapy Management Dashboard



Episode Summary



Adherence Report

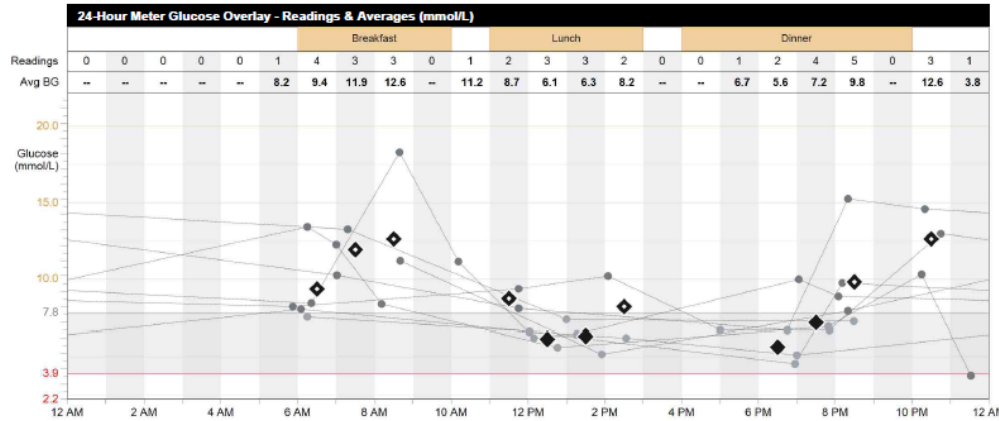
Monitoring Information	Bolus Information	Rewind / Set Information	Suspend Information
		Suspend Duration (h:mm)	Tubing Amount (U)
Monday 11/18/2013	Monday 11/18/2013	1:17	
Tuesday 11/19/2013	Tuesday 11/19/2013	0:01	10.3
Wednesday 11/20/2013	Wednesday 11/20/2013	0:01	
Summary 6.9/day			4h 36m

Sensor & Meter Overview Report



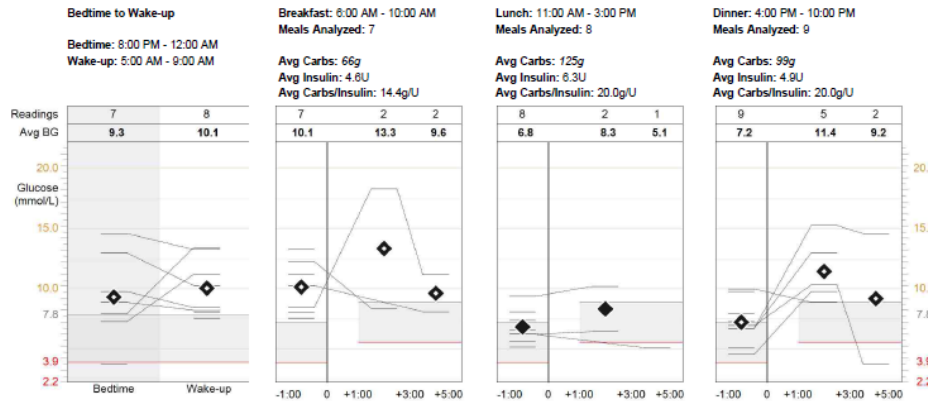
Sensor & Meter Overview (1 of 2) PATIENT, SAMPLE
8/28/2010 - 9/4/2010 0

Generated: 11/4/2014 10:08:57 AM Page 2 of 13
Data Sources: MiniMed Paradigm 722 (E.Drake)



Statistics	8/28 - 9/4	
Avg BG (mmol/L)	8.9	± 3.2
BG Readings	38	4.8/day
Readings Above Target	22	58%
Readings Below Target	1	3%
Sensor Avg (mmol/L)	--	--
Avg AUC > 7.8 (mmol/L)	--	--
Avg AUC < 3.9 (mmol/L)	--	--
Avg Daily Carbs (g)	298	± 62
Carbs/Bolus Insulin (g/U)	17.3	
Avg Total Daily Insulin (U)	35.1	± 5.2
Avg Daily Basal (U)	17.9	51%
Avg Daily Bolus (U)	17.2	49%

Meter Glucose Overlay Bedtime to Wake-Up and Meal Periods - Readings & Averages (mmol/L)



— BG reading ● BG reading ▼▲ Off chart ◆ Average within target range ◆ Average outside target range

The Logbook Report

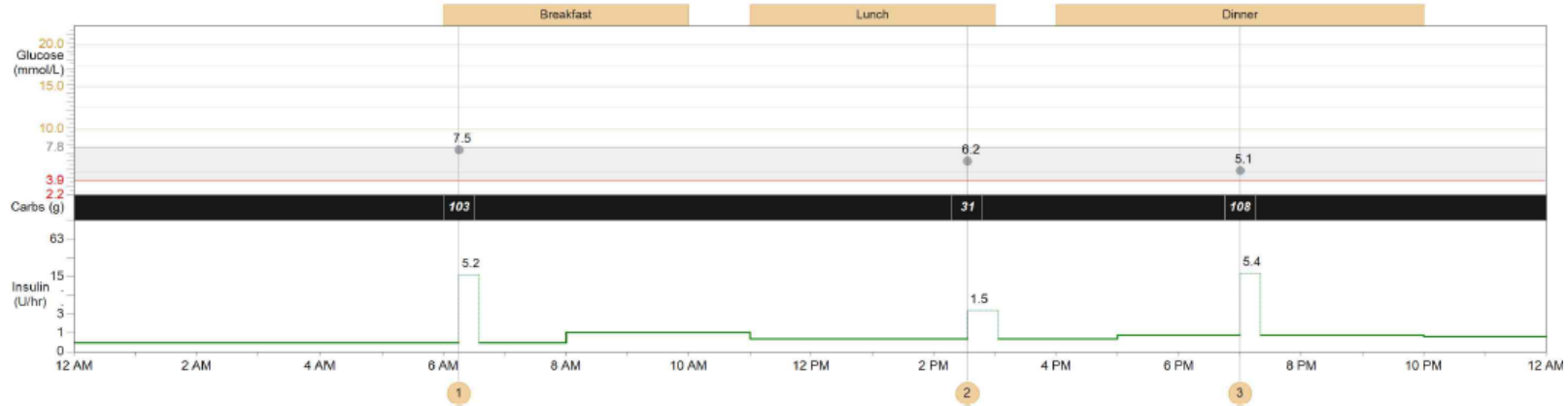
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM
Thursday 8/26/2010							8.8		6.2		
									75		
									2.00		
Friday 8/27/2010							13.3	11.9	12.8		
									32	65	
									4.00	5.00	
Saturday 8/28/2010							7.5				
									103		
									5.20		
Sunday 8/29/2010							8.0				
									86		
									4.30		
Monday 8/30/2010							8.4		18.3		1
									69		
									3.50	6.00	
Tuesday 8/31/2010							8.2				
									37		
									1.90		
Wednesday 9/1/2010									10.3		
									15		
									0.90		
Thursday 9/2/2010									13.3		
									45		
									5.00		
Friday 9/3/2010										11.2	
										114	
										8.00	
Saturday 9/4/2010							13.4	12.3	8.4		
									28		
									5.00		

Daily Totals	
Average (5):	9.2mmol/L
Carbs:	215g
Insulin:	28.6U Bolus: 33%
Average (7):	9.1mmol/L
Carbs:	377g
Insulin:	39.9U Bolus: 58%
Average (3):	6.3mmol/L
Carbs:	242g
Insulin:	30.7U Bolus: 39%
Average (4):	7.2mmol/L
Carbs:	283g
Insulin:	32.1U Bolus: 44%
Average (7):	9.9mmol/L
Carbs:	418g
Insulin:	46.1U Bolus: 59%
Average (6):	9.0mmol/L
Carbs:	259g
Insulin:	33.1U Bolus: 47%
Average (5):	11.0mmol/L
Carbs:	322g
Insulin:	36.5U Bolus: 45%
Average (3):	9.3mmol/L
Carbs:	354g
Insulin:	38.5U Bolus: 53%
Average (3):	8.1mmol/L
Carbs:	249g
Insulin:	31.1U Bolus: 48%
Average (7):	8.7mmol/L
Carbs:	258g
Insulin:	32.5U Bolus: 54%

Daily Totals Statistical Info

Dinner		Daily Totals				
	7 PM	8 PM	9 PM	10 PM	11 PM	
		10.6				Average (5): 9.2mmol/L
		45				Carbs: 215g
		2.50				Insulin: 28.6U Bolus: 33%
	5.0	4.3				Average (7): 9.1mmol/L
		150				Carbs: 377g
		7.40				Insulin: 39.9U Bolus: 58%
		5.1				Average (3): 6.3mmol/L
		108				Carbs: 242g
		5.40				Insulin: 30.7U Bolus: 39%
	4.6		9.8			Average (4): 7.2mmol/L
	74		15			Carbs: 283g
	3.70		0.80			Insulin: 32.1U Bolus: 44%
		10.0	8.9			Average (7): 9.9mmol/L
		114				Carbs: 418g
		5.70				Insulin: 46.1U Bolus: 59%
		6.7		13.0		Average (6): 9.0mmol/L
		74				Carbs: 259g
		3.70			2.50	Insulin: 33.1U Bolus: 47%
	6.7		15.3	14.6		Average (5): 11.0mmol/L
	105					Carbs: 322g
	5.30					Insulin: 36.5U Bolus: 45%
			7.3			Average (3): 9.3mmol/L
			235			Carbs: 354g
			11.70			Insulin: 38.5U Bolus: 53%
			7.9			Average (3): 8.1mmol/L
			41			Carbs: 249g
			2.10			Insulin: 31.1U Bolus: 48%
		6.9		10.3	3.8	Average (7): 8.7mmol/L
		122				Carbs: 258g
		6.10			1.00	Insulin: 32.5U Bolus: 54%

Daily Detail Report



Bolus Events									
Bolus Event	1	2	3						
Time	6:15 AM	2:33 PM	7:00 PM						
Bolus Type	Normal	Square	Normal						
Delivered Bolus Norm (U)	5.2	--	5.4						
+ Square Portion (U, h:mm)	--	1.5, 0:30	--						
Recommended Bolus (U)	5.2	1.5	5.4						
Difference (U)	--	--	--						
Carbs (g)	103	31	108						
Carb Ratio Setting (g/U)	20.0	20.0	20.0						
Food Bolus (U)	5.2	1.5	5.4						
BG (mmol/L)	7.5	6.2	5.1						
BG Target Setting (mmol/L)	4.4 - 10.0	4.4 - 10.0	4.4 - 10.0						
Insulin Sensitivity Setting (mmol/L per U)	2.2	2.2	2.2						
Correction Bolus (U)	--	--	--						
Active Insulin (U)	--	--	0.1						

Statistics	8/28		8/28 - 9/4	
Avg BG (mmol/L)	6.3		8.9 ± 3.2	
BG Readings	3		38	4.8/day
Readings Above Target	--	0%	22	58%
Readings Below Target	--	0%	1	3%
Sensor Avg (mmol/L)	--		--	
Avg AUC > 7.8 (mmol/L)	--	--	--	--
Avg AUC < 3.9 (mmol/L)	--	--	--	--
Daily Carbs (g)	242		298 ± 62	
Carbs/Bolus Insulin (g/U)	20.0		17.3	
Total Daily Insulin (U)	30.7		35.1 ± 5.2	
Daily Basal (U)	18.6	61%	17.9	51%
Daily Bolus (U)	12.1	39%	17.2	49%
Primes	1	0.9U	2	1.8U

Patient Behaviour

- Encourage the good (or positive) behaviour
 - Use the ‘adherence report’ to find some positives in the patient behaviour
 - Prevent focusing too much on therapy outcomes.
- Determine Data Quality and Behaviour Issues
 - Check for issues in the ‘adherence report’ and find out more on the behaviour by asking questions like:
 - “Does the patient eat without giving a bolus?”
 - “Does the patient use the SG-value or the BG-value as input for the bolus wizard?”



Patient Behavior

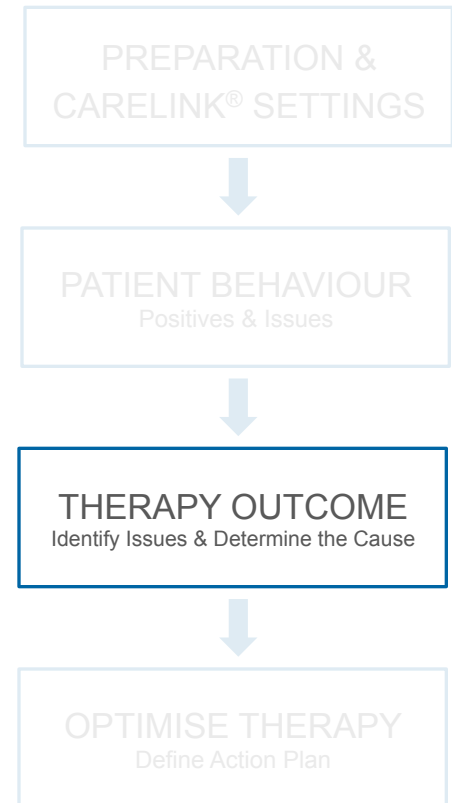
Parameters	Impact on Data Quality
Infusion set change frequency [Fill Events]	If the infusion set is not changed regularly (as described in the instructions) proper insulin infusion cannot be guaranteed.
BG Reading frequency [BG Readings]	Sensor accuracy strongly depends on good and frequent calibration. If the patient does not use a sensor, the number of blood glucose readings are also very important for proper data analysis.
Sensor Use [Sensor Duration]	If sensor duration is low, the average, pre- and post-prandial glucose values cannot be determined accurately.
Bolus Frequency [Bolus Events]	If there are too few bolus events, the pump is probably not used appropriately. The patient might use the priming function to deliver boluses.
Bolus Type	Manual or Bolus Wizard® Overrides: Assessment of the Carbohydrate Ratio and/or the sensitivity settings should be done carefully taking into account the manual boluses and the overrides.

Patient Behavior – Adherence Report

	Glucose Measurements		Bolus Events					Fill Events					Suspend Duration (h:mm)	
	BG Readings	Sensor Duration (h:mm)	Manual Boluses	Bolus Wizard Events	With Food	With Correction	Overridden	Rewind	Cannula Fills	Cannula Amount (U)	Tubing Fills	Tubing Amount (U)		
Monday 11/18/2013	6		1	4	4	4								1:17
Tuesday 11/19/2013	7		1	6	3	6	1	1	1	0.5	1	10.3		0:01
Wednesday 11/20/2013	8			6	4	6								0:01
Thursday 11/21/2013	8		3	5	4	5	2							
Friday 11/22/2013	9			6	3	6	1	1	1	0.5	1	12.1		0:01
Saturday 11/23/2013	5			4	4	4	1							2:57
Sunday 11/24/2013	6			4	4	3	1							0:05
Monday 11/25/2013	7		1	5	4	4	1	1	1	0.5	1	11.5		0:12
Tuesday 11/26/2013	7		1	4	4	4	1							0:01
Wednesday 11/27/2013	8			7	4	7	1							0:02
Thursday 11/28/2013	5		1	4	4	4	2	1	1	0.5	1	13.7		0:01
Friday 11/29/2013	6		1	6	4	6	1							
Summary	6.9/day	0m	0.9/day	5.0/day	78.3%	95.0%	23.3%	3	4	0.5U /fill	4	11.9U/fill		4h 36m

Therapy Outcome

- Identify the therapy related issues
- Determine a cause for each of these issues
 - Form a hypothesis
 - Test the hypothesis



Therapy Outcome: Identify the Issues

WHEN IDENTIFYING THE ISSUES LOOK FOR:

- Nocturnal Hypoglycaemic episodes
- Pre-prandial Hypoglycaemic episodes
- Post-prandial Hypoglycaemic episodes

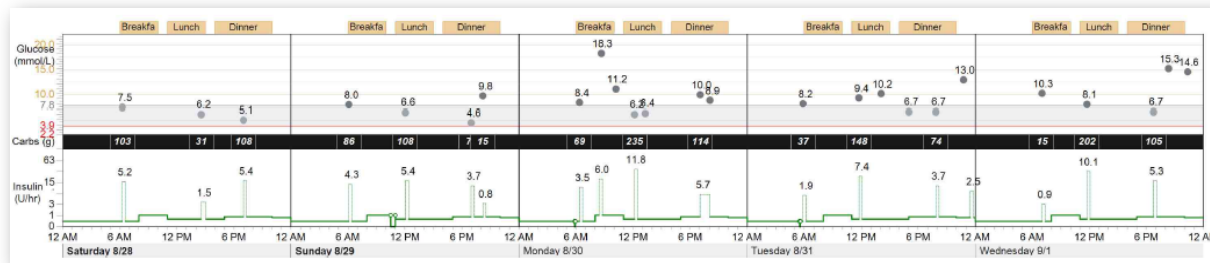
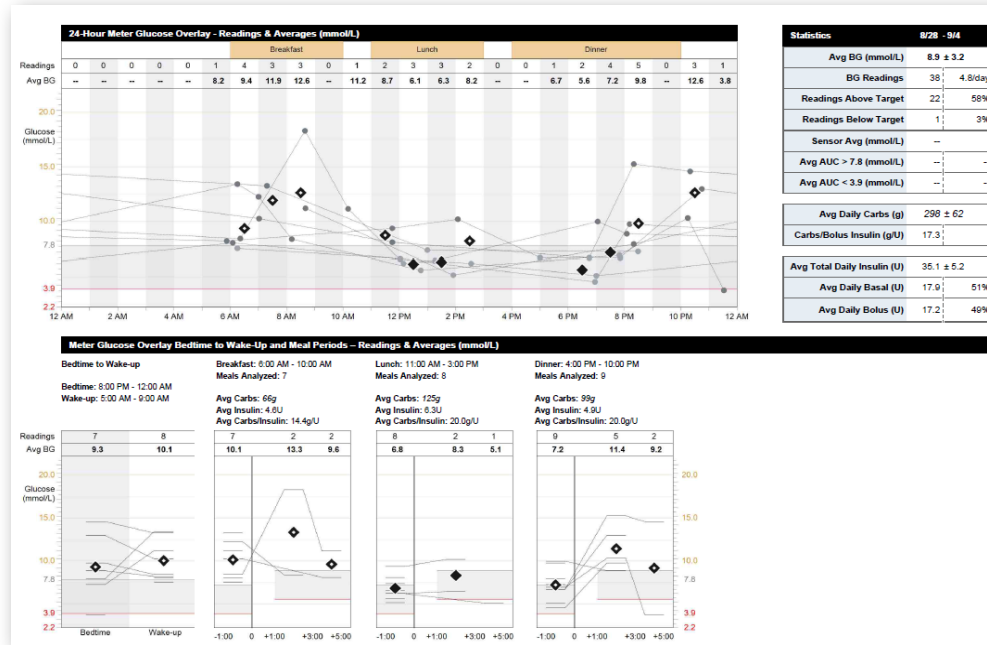
- Nocturnal Hyperglycaemic episodes
- Pre-prandial Hyperglycaemic episodes
- Post-prandial Hyperglycaemic episodes

- Hyperglycaemia followed by Hypoglycaemia
- Hypoglycaemia followed by Hyperglycaemia

- Mean daily blood glucose and glucose variability (SD).
- Check for ingested carbohydrates; Is the amount appropriate?
- Check for insulin doses and distribution of % of basal or bolus.
- How many times did the patient change the temporary basal rate.



Therapy Outcome: Identify the Issues - SMBG



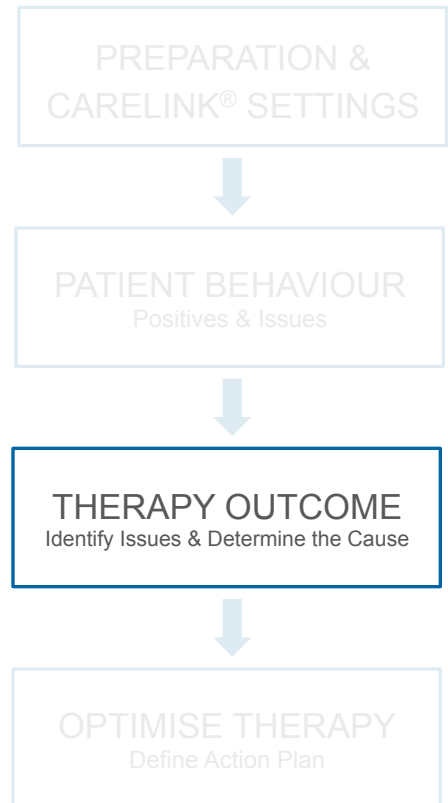
Therapy Outcome: Determine the Cause

- What happened?.....
- What could be the reason?



Note

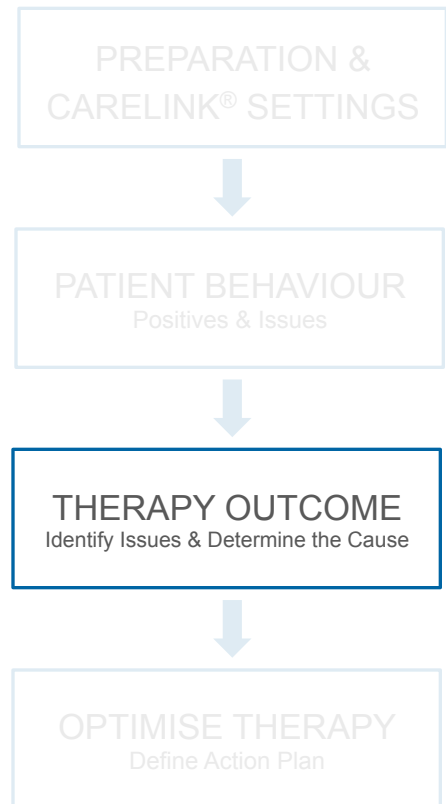
- CareLink® only shows data from the device(s)
- Displayed pump settings are settings at the moment of upload



Therapy Outcome: Determine the Cause

HYPO'S

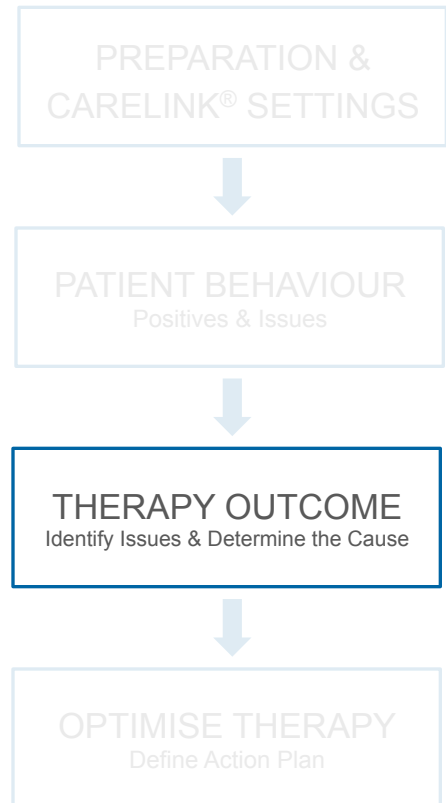
Patterns	Common contributing factors
Nocturnal Hypoglycaemia	<ul style="list-style-type: none"> • Too high overnight Basal Rate • Evening Boluses • Exercise without adapted insulin delivery • Alcohol consumption without adapted insulin delivery
Post-Prandial Hypoglycaemia	<ul style="list-style-type: none"> • Incorrect carbohydrate counting • Too low carbohydrate ratio • Manual boluses instead of Bolus Wizard® • Unawareness on active insulin and insulin stacking • Too high Basal Rate • Bolus during falling sensor values only for patients on CGM • Incorrect Bolus Type (dual wave / normal / square wave)
Hypoglycaemia preceded by Hyperglycaemia	<ul style="list-style-type: none"> • Too low insulin sensitivity • Manual bolus used to correct for hyperglycaemic episodes • Unawareness on active insulin and insulin stacking • Multiple boluses to correct hypoglycaemia • Bolus during falling rate of change alert? Only for patients on CGM
Pre-Prandial/Other Hypoglycaemia	<ul style="list-style-type: none"> • Too high Basal Rate • Exercise without adapted insulin delivery • Alcohol consumption without adapted insulin delivery



Therapy Outcome: Determine the Cause

HYPERS

Patterns	Common contributing factors
Nocturnal Hyperglycaemia	<ul style="list-style-type: none"> • Too high overnight Basal Rate • Evening snack without a Bolus • Manual or Bolus Wizard® overrides for late night snacks • Incorrect carbohydrate counting for late night snacks • Patient is afraid of hypoglycaemia through the night • Infrequent infusion set changes • Incorrect Bolus type
Post-Prandial Hyperglycaemia	<ul style="list-style-type: none"> • Incorrect carbohydrate counting • Too low carbohydrate ratio • Manual boluses instead of Bolus Wizard® • Too low Basal Rate • Patient is afraid of hypoglycaemia • Infrequent infusion set changes • Bolus with rising rate of change alert? (only for patients on CGM)
Hyperglycaemia preceded by Hypoglycaemia	<ul style="list-style-type: none"> • Overcorrection of a hypoglycaemic episode with glucose • Overcorrection of a hypoglycaemic episode with pump suspension
Pre-Prandial/Other Hyperglycaemia	<ul style="list-style-type: none"> • Too low Basal Rate • Illness • Stressful episodes • Patient is afraid of hypoglycaemia • Infrequent infusion set changes • Rising sensor rate of changes • Patient suffers from the dawn phenomenon or the Somogyi effect • Patient was in the pre-menstrual period • Patient was taking medication that could influence glucose levels and/or insulin sensitivity?
Intermittent high readings	<ul style="list-style-type: none"> • Patient missed boluses • Infrequent infusion set changes



Therapy Outcome: Verify the Cause



Bolus Events					
Bolus Event	1	2	3	4	
Time	8:21 AM	8:25 AM	12:09 PM	7:03 PM	
Bolus Type	Normal	Normal	Normal	Square	
Delivered Bolus Norm (U)	3.5	6.0	11.8	--	
+ Square Portion (U, h:mm)	--	--	--	5.7, 1:00	
Recommended Bolus (U)	3.5	--	11.8	5.7	
Difference (U)	--	--	--	--	
Carbs (g)	69	--	235	114	
Carb Ratio Setting (g/U)	20.0	--	20.0	20.0	
Food Bolus (U)	3.5	--	11.8	5.7	
BG (mmol/L)	8.4	--	6.2	10.0	
BG Target Setting (mmol/L)	4.4 - 10.0	--	4.4 - 10.0	4.4 - 10.0	
Insulin Sensitivity Setting (mmol/L per U)	2.2	--	2.2	2.2	
Correction Bolus (U)	--	--	--	--	
Active Insulin (U)	--	--	--	--	

Statistics	8/30	8/28 - 9/4
Avg BG (mmol/L)	9.9	8.9 ± 3.2
BG Readings	7	38 4.8/day
Readings Above Target	5	71% 22 58%
Readings Below Target	--	0% 1 3%
Sensor Avg (mmol/L)	--	--
Avg AUC > 7.8 (mmol/L)	--	--
Avg AUC < 3.9 (mmol/L)	--	--

Daily Carbs (g)	418	298 ± 62
Carbs/Bolus Insulin (g/U)	15.5	17.3

Total Daily Insulin (U)	46.1	35.1 ± 5.2
Daily Basal (U)	19.1	41% 17.9 51%
Daily Bolus (U)	27.0	59% 17.2 49%
Primes	--	-- 2 1.8U

⤵ Sensor trace
 ● BG reading
 ⬆ Linked BG
 — Basal
 ⬆ Bolus
 ⏸ Suspend
 🕒 Time change
 ❤ Exercise
 📢 Glucose alert
⤵ Interrupted
⚠ Off chart
⊕ Calibration BG
⋯ Temp basal
⏮ Pump rewind
🟢 Injected insulin (U)
🟦 Other
📢 Alarm

Optimise Therapy

- Discuss the identified issues with the patient and define together an action.
- Document all the identified issues and agree with the patient on a treatment strategy.
- Make sure to also discuss how to follow-up.



PATIENT BEHAVIOUR
Positives & Issues

Positives	Issues
_____	_____
_____	_____

THERAPY OUTCOME
Identify Issues & Determine the Cause

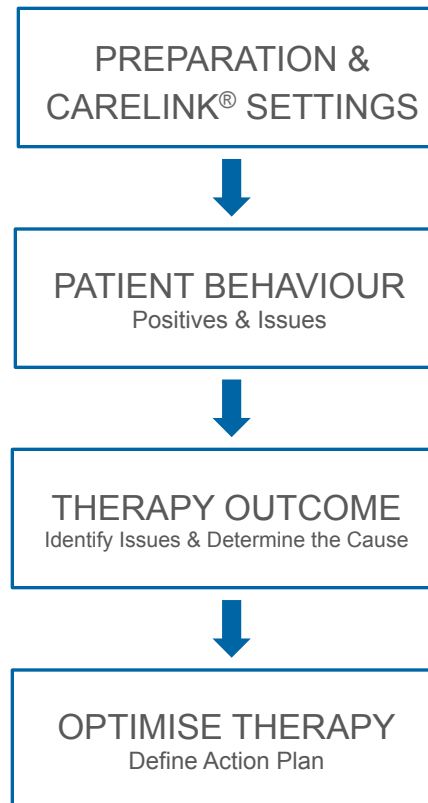
I	C	A	A
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

OPTIMISE THERAPY
Define Action Plan

A	A	A	A
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Comments

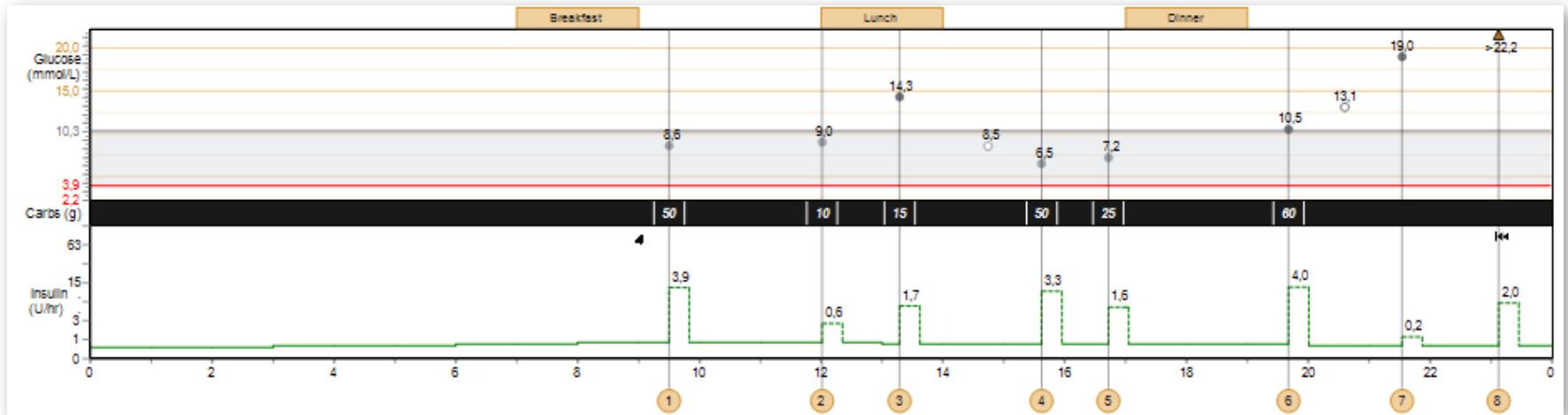
Summary



Short Examples: 2 - Adherence

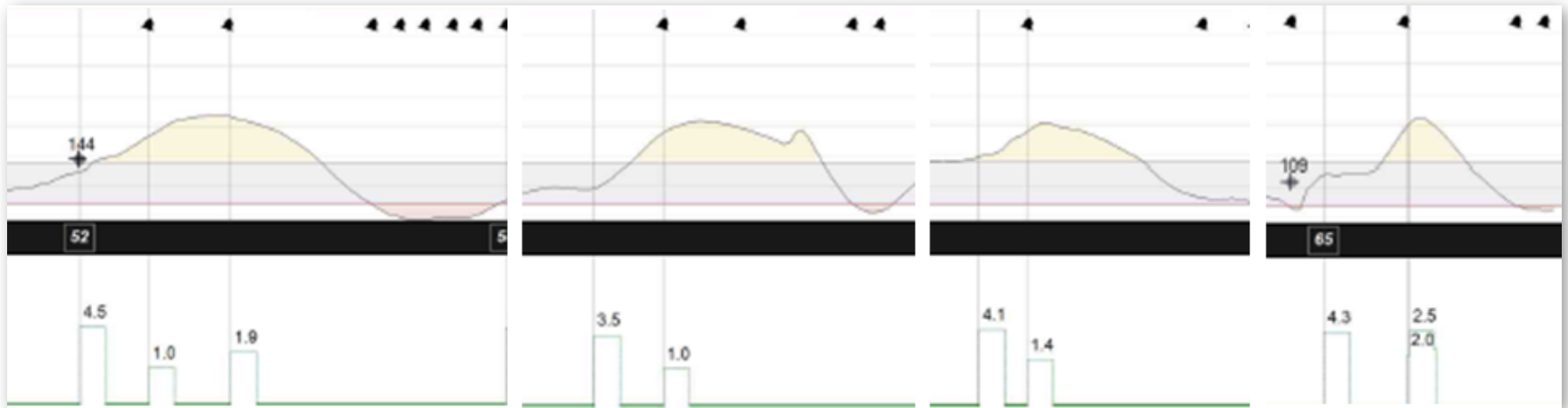
	Glucose Measurements		Bolus Events				Priming Events			Suspend Duration (h:mm)	
	BG Readings	Sensor Duration (h:mm)	Manual Boluses	Bolus Wizard Events	With Food	With Correction	Bolus Wizard Overrides	Rewind	Primes		Prime Volume (U)
Wednesday 5/2/2007	2		2	3	3						
Thursday 5/3/2007	5	20:05	3	3	2	1	1				0:01
Friday 5/4/2007	4	15:40	2	3	2	1	3	1	1	14.7	
Saturday 5/5/2007	5	17:30	2	2	2						
Sunday 5/6/2007	1		4	1	1	1					
Monday 5/7/2007	6	21:40	2	2	2	1	1				
Tuesday 5/8/2007	2	22:15	2	3	3		1				
Wednesday 5/9/2007	4	18:20	3	2	1	1					
Thursday 5/10/2007	1		6	1	1			1	2	16.2	
Friday 5/11/2007	3		2	2	2	1	1				
Saturday 5/12/2007	6	2:05	2	7	5	4	3				0:01
Sunday 5/13/2007	8	15:45	1	3	2	3	2				
Monday 5/14/2007	6	21:55	4	2	1	2					
Tuesday 5/15/2007	3	24:00	4	3	3	1	3				
Summary	4.0/day	179:15	2.8/day	2.6/day	2.1/day	1.1/day	1.1/day	2	0.2/day	2.2U/day	0:02

Short Examples: 3 – Infusion set



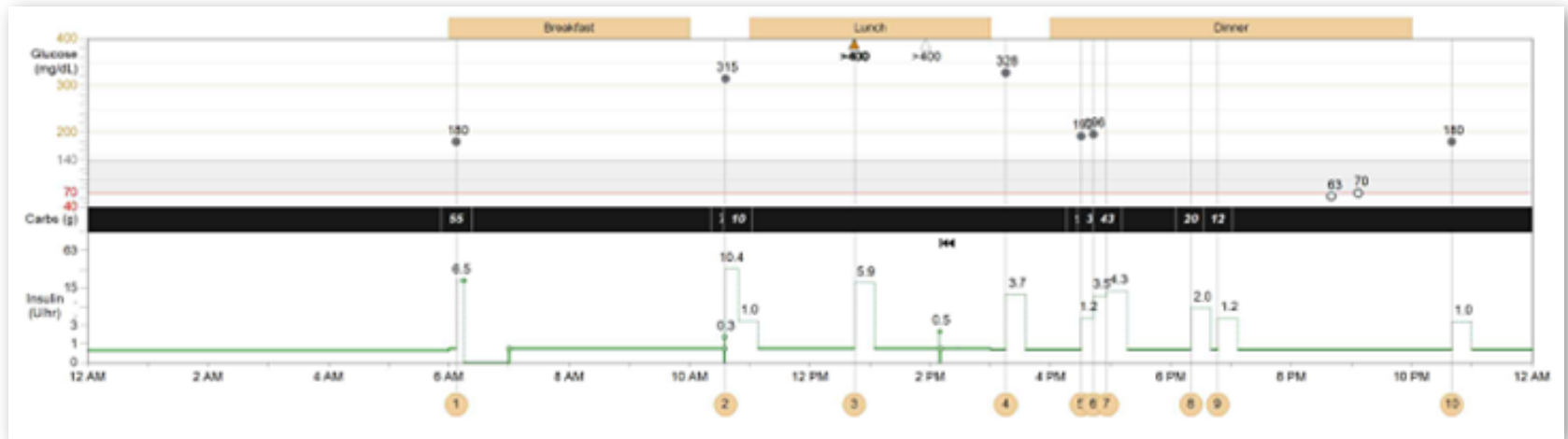
- Untreated Hyperglycaemia

Short Examples: 4 – BW and Active Insulin



- Patient did not structurally use the Bolus Wizard®
- When Bolus Wizard® is used, several correction boluses are needed to treat the post-prandial hyperglycaemia.
 - Low confidence in the Bolus Wizard® and therefore not using it.
- Patient might have some problems with carbohydrate counting or,
- The carbohydrate ratio is programmed too high.
- Giving the manual correction boluses without taking into account the active insulin results in hypoglycaemia.

Short Examples: 8 - Sensitivity Factor



- Example of a patient who, despite the large number of correction boluses, suffers from hyperglycaemia during the day, which in this case was caused by an incorrect sensitivity factor (too high) and a too low basal rate (between 6AM and 6PM).