

Sugar Surfing™ Basics for Diabetes Educators (unabridged version)

Sugar Surfing is the skill of making in-the-moment self-care decisions using real-time blood sugar readings displayed on a continuous glucose monitor (CGM). It involves identifying shapes and patterns in CGM trend lines that serve as a heuristic or mental shortcut to quickly process and interpret the data. Users can then decide whether to take action – proactive or reactive – to reshape the pattern.

A growing number of people with diabetes are using CGMs and practicing this type of dynamic diabetes self-management. They are analyzing data in real time, as opposed to retrospectively, which requires some changes in what and how diabetes educators teach them. Improved blood sugar numbers and a sense of personal empowerment for people with diabetes are obvious benefits.

What is Sugar Surfing?

Sugar Surfing is about managing a situation and not just a blood glucose value. It breaks down diabetes management decisions into segments of time. Blood sugar trend lines are viewed and quickly analyzed for action or continued observation. This is followed by ongoing visual blood sugar trend line checks.

Sugar Surfing is summarized by the acronym “SURF” (Figure 1):

- *See the patterns:* Visually recognize a pattern in the CGM trend line.
- *Understand the significance:* Assign relevance or meaning to the recognized pattern(s).
- *Respond appropriately:* Choose to take an action with the intent of altering the trend line or choose to wait (continue to observe).
- *Follow up carefully:* Scan the trend line periodically for continued or emerging glycemic trends, hence repeating the SURF cycle.

Sugar Surfing is based on the idea that there is no way to completely anticipate or prevent all shifts in blood sugar patterns. Rather, changes need to be recognized and addressed as they happen in order to improve outcomes. So, blood sugar levels need to be seen and understood in real time.

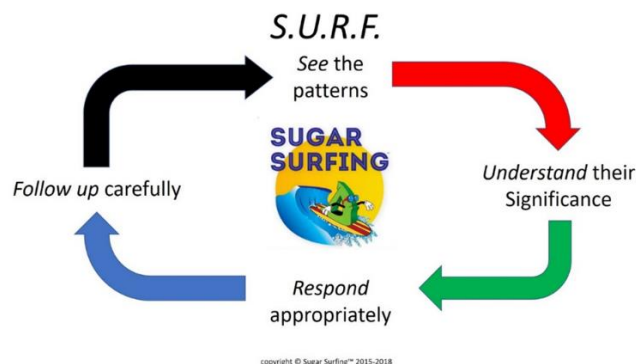


Figure `1

Blood Sugar Trend Line Patterns

Sugar Surfers learn to see the blood sugar trend line as a series of shapes. In this way, a large amount of data is condensed into a more useable format. Once visualized, analysis is quick, and action can be taken in the moment.

There are 6 basic patterns or shapes that may occur in a blood glucose trend line (Figure 2):

- *Shelf*: A period of relative blood sugar stability when a trend line does not drift further than a width of 30 mg/dL (~2 mmol/L) over 1 hour.
- *Delta*: A period of rising blood sugar levels with an increase of at least 30 mg/dL (~2 mmol/L) over 1 hour.
- *Drop*: A period of falling blood sugar levels with a reduction of at least 30 mg/dL (~2 mmol/L) over 1 hour.
- *Pivot*: A full reversal in blood sugar trending in response to an action or stimulus including insulin, exercise, carbohydrate, or stress (Figure 3).
- *Inflection*: Any measurable change in the direction of a blood sugar trend line (up or down). Inflections can reveal useful information about insulin and food action, fading of insulin effect, and effective duration of insulin effect (Figure 4).
- *Lag*: The time that passes between an action or stimulus (insulin, exercise, carbohydrate, stress) and a measurable change in the direction of the trend line.

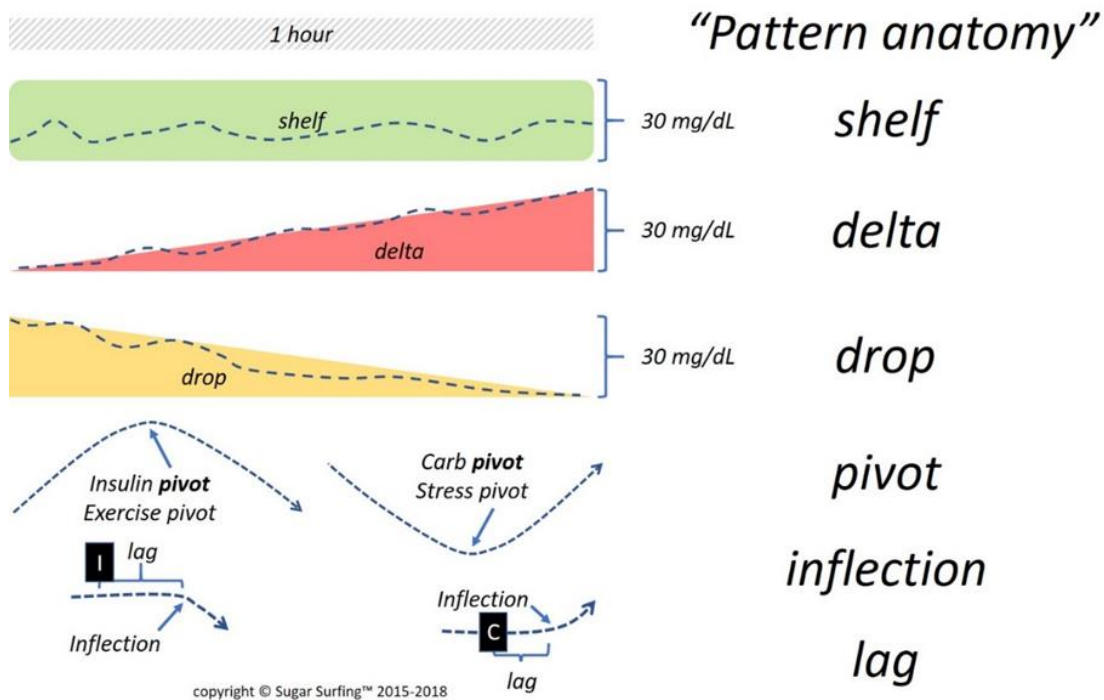


Figure 2.

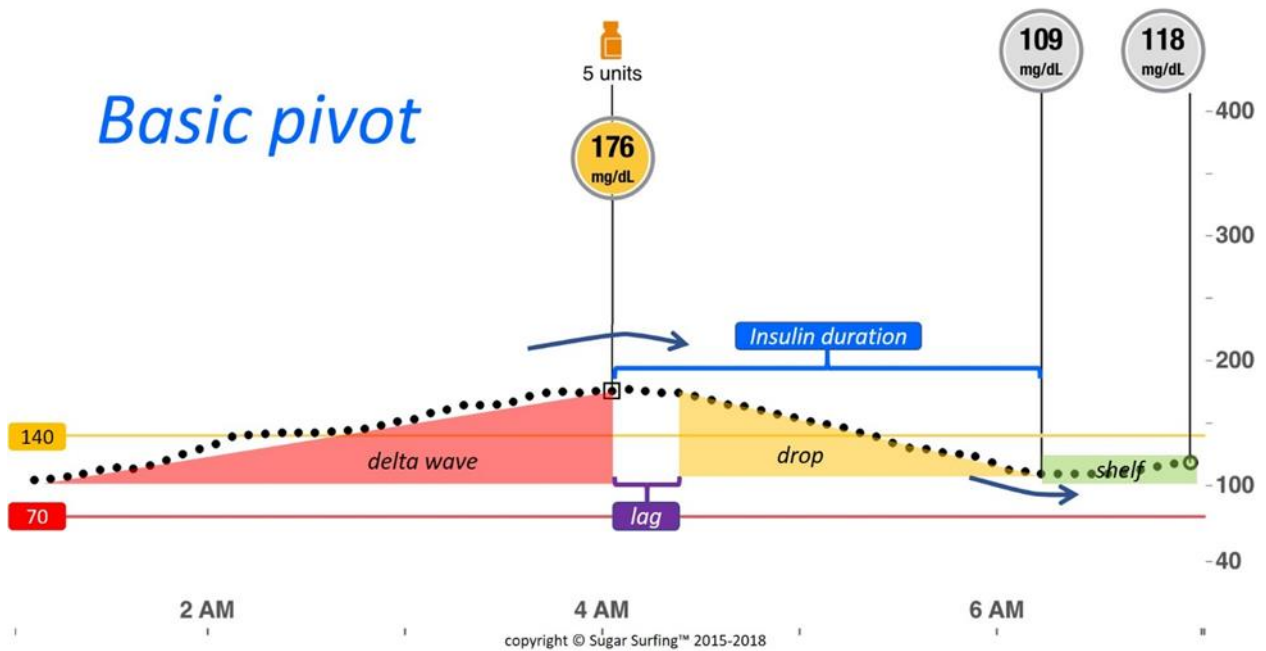


Figure 3.

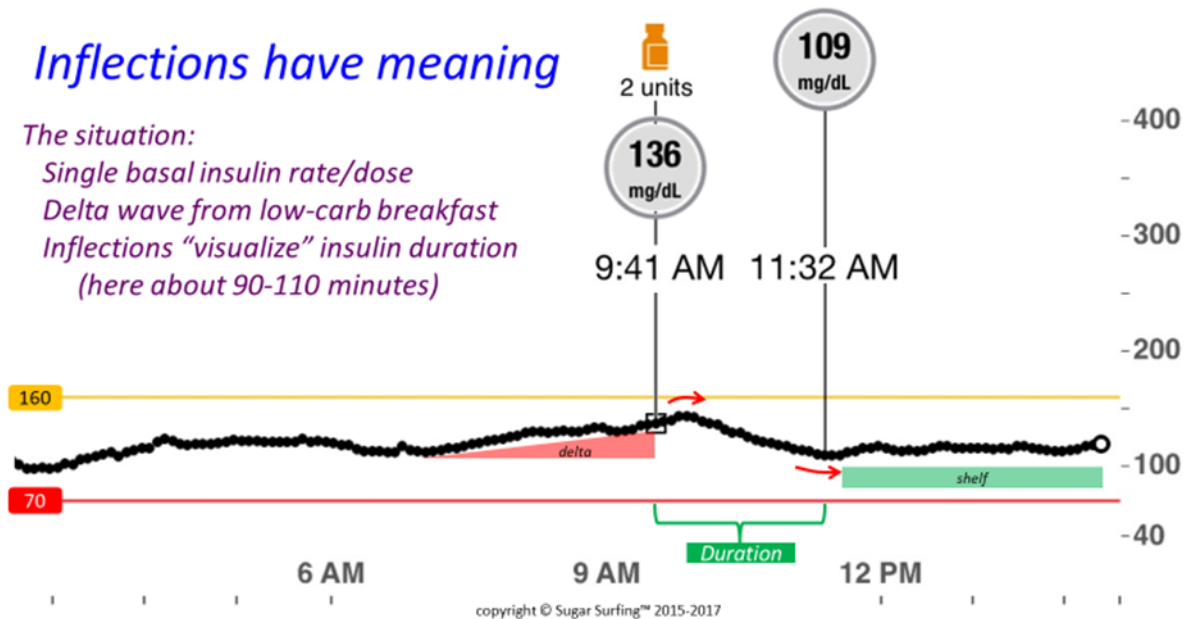


Figure 4.

By simply looking or glancing at the CGM display screen, the Sugar Surfer gets a heads-up on the general direction that blood sugar levels are moving. The blood sugar is viewed as trending steady (shelf), declining (drop), or accumulating (delta). Also, the blood sugar level itself (height

on the display graph) combined with how rapidly the level is changing upward or downward (or at what level its trending steady) becomes valuable for determining what action(s) are needed.

Magnitude and duration of the above shapes may extend below or beyond the stated ranges. The 30 mg/dL width (~2 mmol/L) for the core definitions are adjustable based on the preferences of the individual. For example, some deltas or drops may evolve gradually over several hours. Likewise, a shelf may be less than 60 minutes in length.

Acting on Trend Lines

Once a pattern is seen, the Surfer decides how significant it is. Significance often becomes intuitive for experienced Sugar Surfers, but another acronym, CARE, helps when learning to judge the significance of an observed trend line (Figure 5). CARE stands for:

- *Current*: What is happening right now? What are you doing?
- *Anticipated*: What are you considering doing soon? What are you NOT going to do?
- *Recent*: What did you do in the last several hours? What did you NOT do?
- *Experience*: What is your experience with similar situations like the one happening now?

With the significance of a trend line decided, the next step is choosing whether to act or not to act. Action can be as powerful (or disruptive) as no action. The choices available to the typical Surfer are usually wide ranging. Besides deciding what to do, there are other factors to consider, including when, how, and how often to do it. Sugar Surfing students may have predetermined actions for certain blood sugar trending situations.

Significance is subjective. The same glycemic pattern could carry a different significance to another individual based on situational variables. Acts of omission (i.e., self-restraint) are considered 'actions' in the truest sense and can be powerful self-management tools.

The final step is following up. Following up is glancing at the trend line as frequently as desired to see what happens next.

Determining significance: take **C.A.R.E.**

Current (what are you doing now)

Anticipated (actions/omissions)

Recent (actions/omissions)

Experience (your own)

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Figure 5.

An entire SURF cycle can happen in a matter of minutes or may take hours. New trending patterns are always emerging, and the user decides on the significance of each based on the current situation. The aim is to steer the trend line to best meet the current and anticipated needs of the individual in the moment.

Sugar Surfing in Practice

Sugar Surfing is not an “all or none” thing. Static management techniques (rigid insulin dosing formulas or algorithms) might still work most of the day, and dynamic methods may be used only when needed.

Static self-care methods such as insulin dosing ratios and formulas, sliding scales, and pre-programmed insulin delivery settings on an insulin pump do not change based on circumstances. The same can be said about rigid meal plans. While a static approach to diabetes can work reasonably well sometimes, it lacks the flexibility needed to optimally self-manage constantly changing blood sugar levels.

The benefit of Sugar Surfing is improved blood sugar control and less rollercoasting in blood sugar levels. Improved blood sugar levels after meals will ultimately lower the hemoglobin A1C level. Lower hemoglobin A1C levels are associated with a reduced risk of developing long-term diabetes complications. The intangible benefit of Sugar Surfing is a greater sense of control and empowerment of the Sugar Surfer over his/her diabetes. The greater sense of self confidence felt by the Sugar Surfer (and their family) is significant.

Common Techniques Used by Sugar Surfers

Glancing: Looking quickly at the CGM trend line on a mobile device or receiver. More frequent glancing is associated with improved glycemic control.

Basal trending assessment: Glancing to validate the effectiveness of basal insulin dosing by injection or by insulin pump (steady blood sugar trending – a shelf – in the absence of food, exercise, stress, or additional insulin).

Pivoting (carb or insulin): An intentional action to redirect the trend line after a blood sugar change of 30 mg/dL (~2 mmol/L) or more.

Microbolusing and microcarbving: Using relatively small doses of insulin or carbohydrate to create a small change in the direction of the trend line that results in blood sugar changes of less than 30 mg/dL (~2 mmol/L).

Waiting for the bend: Injecting mealtime (rapid-acting) insulin and waiting for a trend line inflection that indicates the insulin effect is occurring.

Taking the drop: Taking a dose of rapid-acting “correction” insulin when blood sugar is trending on a shelf to lower the trend line to a new steady level (assumes basal insulin is properly balanced).

Conclusion

Nothing about type 1 diabetes is fully predictable. Vigilance is the key. The availability of CGM devices now provides an opportunity for vigilance to be maintained while not taking away valuable time to attend to the normal duties of a full and productive life.

Practicing dynamic diabetes management like Sugar Surfing is a choice. The skills can be taught and, with time and practice competency, proficiency, and even expertise can be attained.

The diabetes educator is a partner in the Sugar Surfing process. The goal is to create a safe environment conducive to optimal emotional satisfaction and intellectual growth in self-care for the person with diabetes.

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