Sugar Surfing™ for School Nurses

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www.sugarsurfing.com

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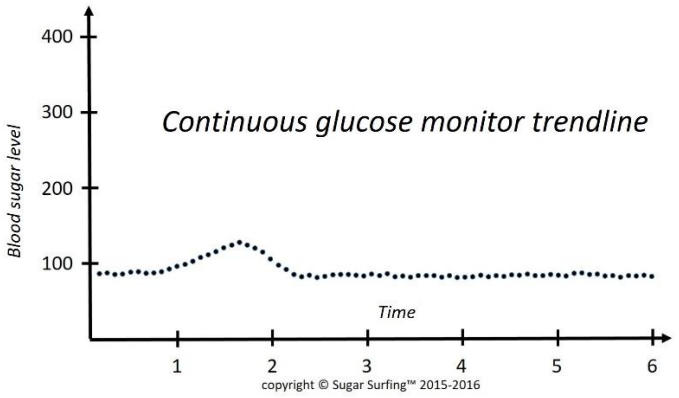
Introduction

Diabetes is managed by self-care decisions which result in specific outcomes. For example, a low range blood sugar is a reason for the person to eat a small of amount of fast acting carbohydrates which will raise the sugar level quickly, but not too much. On the other hand, a high range blood sugar might prompt the person to inject more insulin by shot or a pump to lower the sugar level. A planned meal will require a certain amount of insulin to be injected or infused by a pump to allow the body to properly absorb the sugar from the meal. In this case, the insulin dose would be calculated by the person or an adult caregiver.

A fingerstick blood sugar measurement is a single value. It represents a 'snapshot' of what the blood sugar was at a specific point in time. While this information is very useful, it does not tell which direction the blood sugar level is moving. There are now small wearable devices which can report the blood sugar level of the user every few minutes. These are called continuous glucose monitors (CGM for short).

Using a CGM, blood sugars are plotted along a time grid called a trendline. Since the trendline has direction, it becomes a powerful tool for the user to make decisions about diabetes self-care. This is called "managing the moment". Dynamic diabetes management is the discipline of harnessing trendline data to make more effective diabetes care choices in the moment. A metaphor used to describe this principle is called Sugar Surfing™, named after the book of the same name. Sugar Surfing is attempting to mimic how a working pancreas works. It's a method to steer rising and falling blood sugar trends as they are happening.



More parents have been using Sugar Surfing methods to manage their children with diabetes. Benefits of this style of care include improved blood sugar control and a greater sense of personal empowerment. School nurses, teachers and others will naturally have questions about what dynamic diabetes management means and what role they can play to help the student and their family succeed in this progressive and empowering method. The information presented here is intended to explain basic concepts about Sugar Surfing. Specifically, this is aimed at helping school nurses. It is intended to provide insight about how some parents and students with diabetes apply the concepts of dynamic diabetes management.

In the school setting, parents may use CGMs to help manage their child's diabetes via remote monitoring capability. CGMs can improve the quality of diabetes care for students. It is a beneficial tool to prevent missed class time especially when a school nurse understands the value of using this new technology.

School personnel can better serve their students who wear a CGM by

1) Understanding what a CGM does

2) Learning how they operate

3) Interpreting the data for diabetes management

Static versus Dynamic thinking

Now that blood sugars can be viewed in real time, ***old methods for diabetes self-care require updating***. No longer is a blood sugar level seen as a static value, but rather part of a *continuum* of readings. Blood sugar levels rise and fall over time in everyone, it's only a matter of how much.

The point of Sugar Surfing is to develop tactics and methods to "steer" a glucose trend line. This contrasts with responding only to a single blood sugar measurement and nothing else.

More school teachers, nurses and teaching assistants are encountering children and teens practicing Sugar Surfing techniques. At first, these methods may seem foreign or even counterintuitive to those unfamiliar with them.

The following is an overview of Sugar Surfing with an emphasis on supporting the school nurse or other personnel who have students with type 1 diabetes. It is intended to be a guide and not a comprehensive review.

Basics of Sugar Surfing

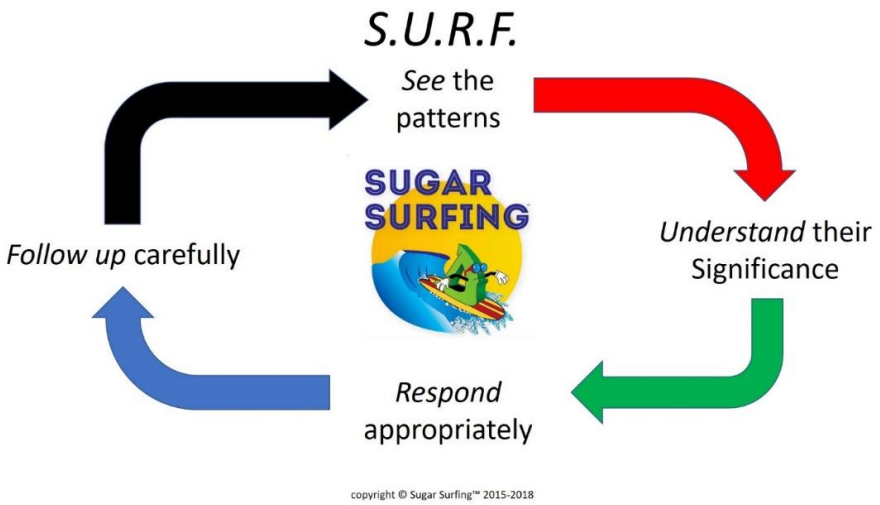
Sugar Surfing is the skill of making 'in the moment' self-care decisions using real time blood sugar readings displayed on a continuous glucose monitoring system, or CGMS).Sugar Surfing is summarized by the acronym: S.U.R.F.

See the patterns *– visually recognize one of six basic shapes displayed on the CGM trend line*

Understand their significance *– assign relevance or meaning to the recognized pattern(s)*

Respond appropriately *– choose to apply an action with the intent of altering the glycemic trending OR choose to wait (continue to observe).*

Follow up carefully *– following any action or non-action, continue to scan the trendline periodically (glance) for continued or emerging glycemic trends, hence repeating the SURF cycle.*

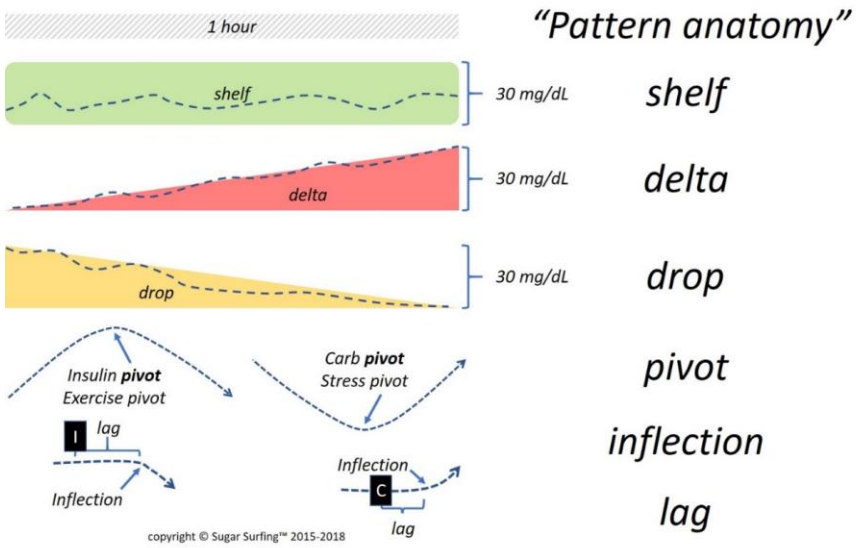


Sugar Surfing breaks down diabetes management decisions into segments of time. Blood sugars are viewed (glanced at) and quickly analyzed for immediate action or absence of action. This is followed with ongoing glancing (visual blood sugar checks). Sugar Surfing is about managing a situation more than just a blood sugar number.

Sugar Surfing is based on the idea that there is no way to completely anticipate or prevent all shifts in blood sugar patterns. To recognize change as it happens, there must be a way to see blood sugar levels in real time. CGM does just that. The first step in learning Sugar Surfing is to be able to recognize and identify SIX basic shapes or patterns on the glycemic trend line. These are described next.

<u>Pattern anatomy</u>

Sugar Surfing is founded on recognizing visual patterns in the CGM trendline. As shown in this image, there are 6 basic patterns or shapes on any CGM trend line display.



Shelf – a period of relative blood sugar stability. A 'shelf' is defined as a trend line which does not drift further than 30 mg/dL (~ 2 mmol/L) over 1 hour.

Delta wave – a period of rising blood sugar levels which increases at least 30 mg/dL (~2 mmol/L) over 1 hour

Drop – a period of falling blood sugar levels which reduces 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 (insulin, exercise, carbohydrates, stress)

Inflection – any measurable change in the direction of flow by a blood sugar trend line (up or down). Inflections can reveal useful information about insulin and food action, fading of insulin effect and duration of injected insulin effect.

Lag – the time which passes between an action (insulin, exercise, carbohydrates, stress) and a measurable change in the direction of the trend line.

By reducing the blood sugar trendline into shapes, a large amount of data can be more easily visualized, analyzed and acted upon while it is happening.

Through the act of *glancing* (simply looking at the display screen), the Sugar Surfer gets a "heads up" display of the general direction of flow of blood sugar levels. Through glancing, the blood sugar is estimated as either trending steady (i.e., a shelf), declining (i.e., a drop) or accumulating (i.e., a delta wave). Also, the amount (height on the graph) of the blood sugar level combined with how rapidly the blood sugar is changing upward or downward (or trending steady) becomes valuable for determining what action(s) are needed.

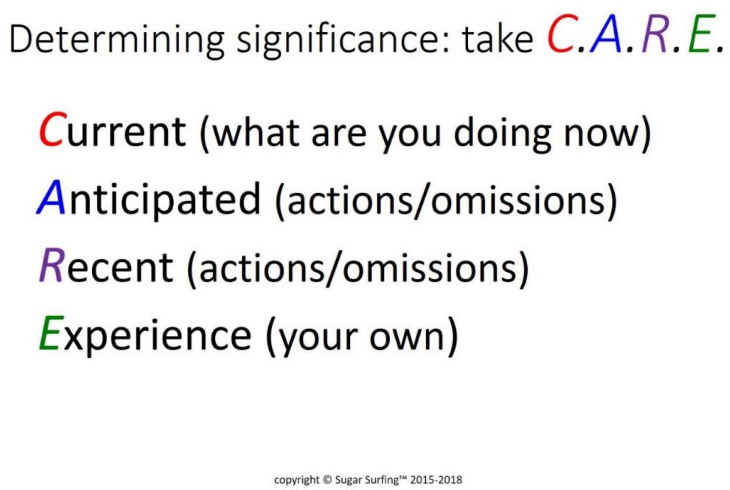
Once a pattern is seen, the Surfer decides how significant it is. Significance is often intuitive for experienced Sugar Surfers. When deciding significance of an observed trendline, a second acronym has been created.

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 now?*



Assigning significance to a trendline might seem hard to do. However, the *CARE* process is very easy to do. Another name for this action might be 'situational awareness'.

Once the significance of a trendline observation is 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. Once an action (or series of actions) are done, the process shifts to the final step: following up (as frequently or infrequently as desired). Following up is glancing at the trendline.

Dosing insulin falls under the 'action' category, just as choosing what to eat and when or when not to exercise. But besides the "what" to do, there are other options regarding "when", "how" and "how often" to consider too. Sugar Surfing students may have well-rehearsed actions which have been discussed in advance with family to deal with certain blood sugar trending situations.

Once action (or nonaction) is taken, the SURF cycle starts over. Surfing decision 'loops' can happen in a matter of minutes or take hours. New trending patterns are always happening. One aim of Sugar Surfing is to steer the blood sugar trend line to best meet the needs of the individual student in the moment.

Sugar Surfing is made up of many different methods and tactics. It's 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. Sugar Surfing works at the intersection of static and dynamic thinking.

Static self-care methods do not change based on the circumstances. Insulin dosing ratios and formulas, sliding scales and pre-programmed insulin delivery settings on an insulin pump are examples of static diabetes management thinking. The same can be said about rigid meal plans. While a static approach to diabetes can work reasonably well sometimes, it often lacks the flexibility needed when blood sugar levels that constantly change .

Potential benefits of Sugar Surfing

The immediate benefit of Sugar Surfing is improved blood sugar control and less 'rollercoasting' in blood sugar levels. Improved meal 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 student and their family is impossible to measure.

Common Sugar Surfing methods used in the school setting

There are several common Sugar Surfing methods which may be employed in the school with proper adult supervision or awareness, depending on the age and experience of the student and permissions granted by the student's doctor and family.

Glancing *– the act of looking at the CGM trend line on a mobile device or receiver. Glancing is a quick action.*

Basal trending assessments *– when glancing shows relatively steady blood sugar trending (a shelf) in the absence of food, exercise, stress or insulin; then the Surfer is attempting to validate the effectiveness of basal insulin dosing by injection or by insulin pump.*

Pivoting (carb or insulin pivoting) *– a complete reversal in the direction of the glycemic trendline caused by insulin, exercise, stress or food (carbohydrates). Pivots are usually an intentional action after a blood sugar change of 30 mg/dL (~2 mmol/L) or more.*

Microbolusing and microcarbing *– creating a small change in the direction of glycemic trendline using relatively small doses of insulin or carbohydrates. Microdosing is intentional and results in blood sugar changes of less than 30 mg/dL (~2 mmol/L) or less.*

Waiting for the bend *– injecting meal time (rapid-acting) insulin and waiting for a trendline inflection to happen. This indicates that the insulin effect is occurring. The goal is to better synchronize blood sugar lowering action of insulin with the blood sugar raising effect of a carbohydrate containing meal or large snack.*

Taking the drop *– When trending on a "shelf" (period of relative blood sugar stability), injecting/bolusing a dose of rapid-acting "correction" insulin to lower the trending blood sugar to a new, lower steady level. This assumes basal insulin is properly balanced .*

Role of the school nurse in Sugar Surfing

School nurses are licensed professionals with clearly defined codes of conduct. These principles will always take precedent in any healthcare interactions with students and their families or other caregivers.

Health care policies and practices vary from school district to school district. Licensed school health professionals will follow specific orders written and signed off on by the student's diabetes doctor. Doctor's orders must be legible, understandable, and not ambiguous. It is the school nurse's right to question any orders which, in the nurse's professional opinion might jeopardize the health and well-being of the student or which are not clearly defined.

Some physician practices provide detailed written orders to facilitate Sugar Surfing principles in the school. Such orders are not intended to make the school nurse an expert in these methods. In most cases they allow the parents greater flexibility in working with the school nurse to make care adjustments based on situational awareness. The student, family, school nurse and other school professionals should be partners in this effort.

Sugar Surfing is a decision-making process which school nurses can choose to learn and participate in. The nurse attains greater proficiency over time. The parent is usually the active partner in this effort. The parents partner with the school nurse to allow the student to best manage diabetes dynamically during the school day. Parents and nurses should have effective lines of communication and clearly defined roles to minimize any risks to the Sugar Surfing student.

Finally, it is important to understand and appreciate that Sugar Surfing methods can be performed differently between providers, yet still attain similar outcomes. There is no one, "right way" to Sugar Surf. **Remember, Sugar Surfing is a process, not a recipe.**

Keys to effective Surfing at school

It is best that parents, nurses and student meet at the start of the school year and discuss roles and expectations. One essential element is to ensure effective methods of communication between student, family and school personnel. Parents may possess cloud-based BG data collection technology (mentioned above) and view the student's BG trends from home or work on a mobile device. Audio and/or vibratory alarms on CGM devices can be frequently adjusted (or sometimes turned off) based on the situation. Most providers will not adjust or modify alert limits on data receiving devices unless specifically asked to do so.

School nurses can be granted blood sugar data sharing access if needed or requested. It is important that parents have a realistic expectation about how often the school nurse can oversee remotely collected CGM data in real time. School nurses often have numerous ongoing duties and oversight responsibilities. As part of pre-semester planning, the family might choose to provide basic instruction in one or more Sugar Surfing methods in writing.

Sugar Surfing parents are accustomed to making independent self-care adjustments and modifications to meals, snacks, stress and insulin therapy. The school nurse is obliged to adhere to the pre-written physician's orders (school care plan) since they originate from the student's licensed health care provider. Orders in a diabetes medical management plan are prewritten to honor the proficiency and independence demonstrated by the student and their family.

Unless specifically stated in the school orders, the nurse may be unable (or unwilling) to adjust the written care plan based on verbal or written input from the parent. Before Sugar Surfing at school, discuss and create agreed upon roles and redundant methods to effectively communicate during school hours. The student's diabetes doctor or team may choose to state in writing that parents can advise and direct the nurse on the student's diabetes care actions in the school.

The choice of Sugar Surfing methods to be performed in the school should be discussed in advance. Some methods are more time intensive than others. For example, the nurse may not have the protected time to oversee a 'waiting for the bend' move. As the nurse becomes more comfortable with dynamic management, newer methods might be added. The family should update the school medical management plan with these new methods and obtain co-signature by the student's doctor as indicated.

Caveats to remember

CGM technology is still imperfect, just as hand held blood sugar meters. Don't accept every BG reading at face value if it conflicts with other observations made in the moment. Repeated BG measurements might be needed if the CGM seems at odds with the situation at hand.

The trendline arrows on CGM's are created from the last several data points. A cresting BG level may show an upward trend arrow even when the person's glucose level has stopped rising or may be starting to drop. This is an artifact of CGM technology. **There is no substitute for good judgment**.

Some students may have used their CGM long enough to have developed the ability to internally sense falling, rising, or steady blood sugar trends. This is attributed to the "biofeedback" effect the sensor provides to users who glance often at their readouts and make mental notations of their internal sensations. This can be a powerful advantage for helping the student to detect shifting sugar levels and allow for pre-emptive action to be taken before a low or excessively high blood sugar reading happens.

Conclusion

Sugar Surfing is always a choice. It uses blood sugar information from a CGM device in proactive and reactive ways. It is also a skill. Skills require time and practice to develop full competency. With time, proficiency and even expertise can be attained. Nothing about type 1 diabetes is fully predictable. Vigilance is 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. The school nurse can be a partner in the Sugar Surfing process. With a clear definition of roles and expectations, the nurse, family and student can create a safe environment conducive to optimal emotional and intellectual growth.

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