

## Patient Education: Assisting Individuals in Understanding Diabetes Complications Through the Metaphor of “Sticky Sugar Syndrome” (SSS)

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### Abstract

*This manuscript introduces the “Sticky Sugar (SS)” metaphor as a novel approach to patient education, aimed at improving understanding of the complications associated with hyperglycemia in diabetes. The SS metaphor/analogy simplifies the explanation of complex medical concepts, helping patients- particularly those with low health literacy to comprehend the importance of managing blood sugar levels. Elevated HbA1c levels are compared to SS, which causes damage to blood vessels, nerves, and vital organs. This accessible framework encourages patients to visualize the risks of uncontrolled diabetes (also with the aid of a visual poster), facilitating greater engagement in disease management. The metaphor has been successfully employed in clinical practice over the past decade to encourage adherence to the medication regime and self-care behaviors. This work offers a practical and impactful strategy for healthcare providers to communicate complex information more effectively, contributing to better patient outcomes.*

### 1. Introduction

Diabetes is a chronic condition arising from insufficient insulin production by the pancreas or the body's inability to efficiently utilize the produced insulin. Insulin, a crucial hormone, is responsible for regulating blood glucose levels [1]. Uncontrolled diabetes often results in hyperglycaemia, characterized by elevated blood glucose or sugar levels. This prolonged condition contributes to significant harm to various bodily systems, particularly the nerves and blood vessels. Vascular complications of both the macrovascular systems cardiovascular disease (CVD) and microvascular systems (kidney diseases, retinopathy, and neuropathy) are the leading cause of mortality in individuals with diabetes [2].

Diabetes remains a formidable global public health challenge, marked by its escalating prevalence, substantial morbidity, and profound effects on individuals, healthcare systems, and national economies. Recent global assessments reveal that 537 million adults grapple with diabetes, 80% of which reside in low and middle-income countries [3]. Studies have highlighted a lack of diabetes knowledge in developing and underdeveloped countries [4,5]. Meta-analyses have demonstrated the effectiveness of patient education across various contexts, including diabetes management, which can lead to improved health outcomes [6]. With the shift from a paternalistic to a patient-centered approach in healthcare, it is essential to tailor patient education to individual needs. This includes aspects like

medication adherence [7,] improved self-care behaviours, and HbA1c control [8].

Various professional bodies advocate for universal health literacy precautions, ensuring information is accessible to all patients regardless of literacy levels. These precautions include avoiding medical jargon, breaking down information into manageable steps, focusing on a few key points during visits, and assessing comprehension by encouraging patients to repeat information [9]. Many patients have low health literacy skills alongside difficulty with reading, writing, numeracy, and communication. The growing reliance on electronic technology hampers both access to and understanding of healthcare information. Individuals with limited health literacy often include those with lower levels of education, older adults, migrants, and those relying on various forms of public assistance [10]. Discussing the consequences of microvascular and macrovascular damage from hyperglycemia may prove challenging for some patients due to their limited understanding or inability to grasp abstract ideas. In such cases, employing metaphors can serve as an alternative strategy to overcome this barrier in patient education.

### 2. The use of metaphor

This article explores the utility of metaphors in educating patients about the impacts of hyperglycemia on both macrovascular and microvascular systems in diabetes mana

gement. Metaphors are an effective tool for communicating with patients about illness and its treatment [11, 12]. They play a crucial role in communication by making abstract medical concepts more tangible. By relating complex ideas to familiar experiences or objects, metaphors enhance understanding and accessibility of information. This connection increases patient engagement and improves treatment compliance [13, 14]

The *Cambridge Dictionary* [15] defines a metaphor as an “expression that describes a person or object by referring to something that is considered to have similar characteristics to that person or object”, as exemplified by phrases like ‘the mind is an ocean’ and ‘the city is a jungle’. Metaphors and simile are common figures of speech in everyday language.

### 2.1. Assessing and improving patient knowledge of diabetes complications

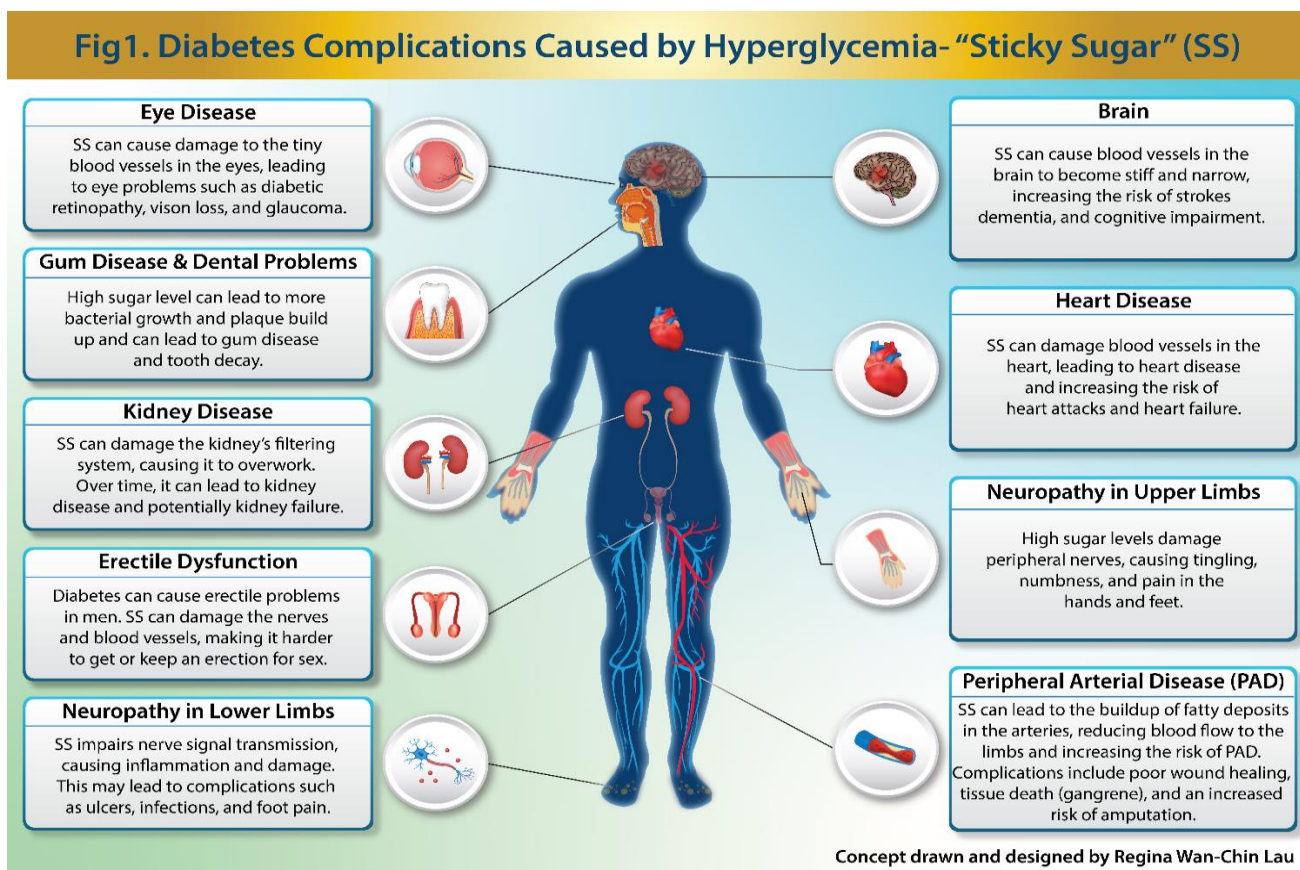
When assessing patient comprehension of diabetes, it is common for them to refer to it simply as a ‘sugar problem’. To enhance understanding during education sessions, introducing the metaphor of ‘sticky sugar’ proves invaluable. Imagine your blood sugar behaving like sticky syrup in your body and sticking to the blood vessels like “pipes”. The higher the sugar content (blood sugar level), the stickier it gets- therefore likely to “clog up”. While the description may not align perfectly with medical accuracy, the goal is to create relatable analogies that aid in conveying the effects of elevated sugar levels on the body’s blood vessels.

As the discussion delves into the microvascular and macrovascular effects of elevated sugar levels, the metaphor aids in explaining the process. In general, this stickiness can lead to:

1. The ‘sticky’ build-up of blockages in blood vessels, similar to how pipes become clogged. These blockages narrow the vessel (pipe), reducing blood flow to organs and ultimately depriving them of oxygen and essential nutrients. Over time, this deprivation can cause damage and dysfunction in these organs.
2. Inflammation in the walls of blood vessels (pipes), weakening them and causing them to become ‘leaky’. Imagine tiny holes forming in the vessel walls (pipes), allowing substances to seep out where they shouldn’t be. When blood vessels are clogged and leaky, it can cause tissue damage and impair the proper functioning of organs.

Using the concepts discussed above, patients are prompted (as appropriate) to describe their understanding of how sticky sugar could impact various body parts, beginning from the top and moving downwards. Begin by asking them to explain what they believe sticky sugar could do to their brain, eyes, heart, kidneys, hands, feet, and lower limbs. Allow for clarification or additional information where needed. This method fosters better understanding by prompting patients to actively engage in thinking, internalising, and visualising how sticky sugar affects their blood vessels.

A comprehensive literature view conducted by Elafros [16] demonstrates the wide variation in patient and provider knowledge of microvascular sequels across studies. Incorporating a diagram into patient education sessions could serve as a visual aid throughout the session to reinforce key concepts and facilitate understanding. Point out each part of the diagram that represents a different complication and briefly explain how diabetes affects that particular area of the body. Please refer to Fig.1.



### 3. Discussing consequences of Sticky Sugar Syndrome (SSS) and its impacts on various body systems

#### 3.1. Brain

Sticky sugar (SS) can affect brain function in two major ways. Firstly, it damages blood vessels in the brain and slows down the flow of blood to the brain. This makes it harder for oxygen and nutrients to reach brain cells which can cause memory issues, trouble thinking clearly, and increase the chances of developing dementia. Secondly, blood vessels may become stiff due to the build-up of fatty deposits (atherosclerosis). This change can lead to a blood clot. If a clot travels to the brain it can result in a stroke- which is where a blood vessel in the brain becomes blocked or bursts, leading to brain damage [17].

#### 3.2. Eye Diseases

Sticky sugar syndrome damages small blood vessels by causing them to weaken and leak, leading to conditions like diabetic retinopathy. If left untreated it can cause vision problems and even blindness. Additionally, it can lead to increased pressure in the eyes, resulting in glaucoma and further vision impairment [18].

#### 3.3. Heart Diseases

The heart is like a pump that keeps blood flowing throughout the body. It delivers oxygen and nutrients to organs and tissues. SS can cause ‘sticky build-up’ or plaques (atherosclerosis) to build up inside the blood vessels that supply oxygen to your heart, narrowing them and reducing blood flow. This can lead to chest pain, heart attacks, and other heart problems. Additionally, SS makes it harder for the heart muscle to work properly which can lead to a condition called diabetic cardiomyopathy. This can eventually cause heart failure [17].

#### 3.4. Kidney Diseases

Sticky sugar harms the kidneys by damaging their small blood vessels and filtering units, leading to kidney disease and potential kidney failure. It leads to inflammation and scarring in the kidneys, impairing their ability to effectively filter waste from the blood. Over time, this damage can progress to kidney disease and even kidney failure [19].

#### 3.5. Neuropathy

Sticky sugar syndrome causes neuropathy by damaging the nerves throughout the body, impairing their ability to transmit signals properly. This occurs as SS triggers inflammation, which damages the protective covering (myelin) around the nerves and disrupts their normal function [20] This phenomenon also reduces blood flow to the nerves, depriving them of oxygen and nutrients and further damaging them. As a result, individuals may experience symptoms like pain, tingling, and numbness in affected areas.

#### 3.6. Peripheral Arterial Diseases (PADs)

Sticky sugar affects peripheral arterial disease by causing damage to the blood vessels that supply oxygen and nutrients to the arms and legs. This damage leads to narrowing and hardening of the arteries, reducing blood flow to the extremities [21]. Poor blood flow circulation can

lead to pain and other foot wounds that are slow to heal. In severe cases, foot or leg amputation may be necessary.

### 4. Improved compliance through a better understanding of the disease process

Understanding the complications of diabetes through the ‘sticky sugar’ metaphor can motivate patients to keep their sugar levels (HbA1c) within a healthy range and make necessary changes to their lifestyle. It also encourages patients to take accountability for their self-management [12]. It is important to reinforce that the stickier it gets (due to high sugar levels), the more damage it causes to the body’s organs. Through diligent management of their condition, patients can significantly diminish the likelihood of organ damage and mitigate associated health risks. Some ways to achieve this include: [22]

1. Adopting a balanced and nutritious diet that focuses on whole foods, fruits, vegetables, lean proteins, and healthy fats.
2. Engaging in regular physical activity or exercise.
3. Regularly monitoring blood sugar levels and following the prescribed medication regimen, including insulin or oral medications.
4. Maintaining a healthy weight through portion control and portion management.
5. Avoiding tobacco and limiting alcohol consumption.
6. Managing stress through relaxation techniques such as meditation, deep breathing exercises, or yoga.
7. Getting regular check-ups and screenings to monitor overall health and detect any potential complications early.

### 5. Conclusion

In summary, diabetes poses a global health challenge with increasing prevalence and substantial morbidity, particularly in developing countries. Lack of diabetes knowledge, especially in developing countries, emphasizes the need for continuous training for healthcare providers and tailored patient education. Metaphors such as ‘sticky sugar’ serve as effective communication tools, enhancing health literacy by improving patient understanding of diabetes complications. Sticky sugar syndrome, a consequence of uncontrolled diabetes, can have profound negative effects on various organs throughout the body. This can result in serious complications such as heart disease, stroke, vision impairment, kidney failure, nerve damage, and peripheral arterial disease.

Using metaphors like SS in patient education helps to bridge the gap between complex medical concepts and everyday understanding. These metaphors create relatable analogies that resonate with patients. By encouraging patients to actively discuss how sticky sugar affects various body parts, we foster better understanding and patient involvement. They are encouraged to maintain an acceptable HbA1c level to reduce ‘stickiness’ in their blood sugar. It is important to note that hyperglycemia, a key feature of diabetes, harms various bodily systems including nerves and blood vessels.

By acquiring new knowledge and collaborating with healthcare professionals, individuals can consciously embrace a comprehensive healthcare approach. This

involves actively managing blood sugar levels, implementing lifestyle adjustments, and ensuring regular monitoring to safeguard their health and well-being.

### Adjunct comment

Over the years my approach to patient education using the ‘Sticky Sugar Syndrome’ (SSS) metaphor has been beneficial, enabling me to customize information according to each patient’s specific needs and convey it at the level that matches their understanding. A trial run with the SSS concept could provide further insights into its effectiveness. By incorporating patient feedback and closely monitoring their reactions, we can assess its impact on patient comprehension and motivation to manage diabetes effectively. This trial represents an opportunity to refine patient education strategies for better health outcomes.

### Author’s Contribution

#### Regina Lau:

- Decades of primary care experience, in chronic disease management plans and utilising the Sticky Sugar (SS) metaphor and framework/tool (as described in the manuscript).
- I have implemented opportunistic health education in the emergency department, targeting patients with diabetes and presenting the above framework with great outcomes.
- Researched articles related to diabetes complications, focusing on both macrovascular and microvascular damage.
- Conducted extensive literature searches to gather data on diabetes complications to help draft teaching points.
- The author agrees to be accountable for all aspects of the work and approves the final version of the manuscript.

### Conflict of interest

Not applicable.

### Ethical statement

Not applicable.

### Clinical trials registry and registration

Not applicable.

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### References

1. Cole JB. Genetics of diabetes mellitus and diabetes complications. *Nature Reviews Nephrology*. 2020;16(7):377.
2. Morrish NJ, Wang SL, Stevens LK, Fuller JH, Keen H, and the WHOMSG. Mortality and causes of death in the WHO multinational study of vascular disease in diabetes. *Diabetologia*. 2001;44(2):S14.
3. Chan JCN, Lim L-L, Wareham NJ, Shaw JE, Orchard TJ, Zhang P, et al. The Lancet Commission on diabetes: using data to transform diabetes care and patient lives. *The Lancet*. 2020;396(10267):2019-82.
4. Abouammoh Noura AN. Knowledge about Diabetes and Glycemic Control among Diabetic Patients in Saudi Arabia. *Journal of Diabetes Research*. 2020;2020:1.
5. Pourkazemi A. Diabetic foot care: knowledge and practice. *BMC Endocrine Disorders*. 2020;20:1.
6. Simonsmeier BA, Flaig M, Simacek T, Schneider M. What sixty years of research says about the effectiveness of patient education on health: a second order meta-analysis. *Health Psychology Review*. 2022;16(3):450-74.
7. Atolagbe ET. Effectiveness of educational intervention in improving medication adherence among patients with diabetes in Klang Valley, Malaysia. *Frontiers in Clinical Diabetes and Healthcare*. 2023;4:1132489.
8. Maleki Chollou K, Gaffari-Fam S, Babazadeh T, Daemi A, Bahadori A, Heidari S. The association of health literacy level with self-care behaviors and glycemic control in a low education population with type 2 diabetes mellitus: a cross-sectional study in Iran. *Diabetes, Metabolic Syndrome and Obesity*. 2020:1685-93.
9. Wittink H, Oosterhaven J. Patient education and health literacy. *Musculoskeletal Science and Practice*. 2018;38:120-7.
10. Nutbeam D. The evolving concept of health literacy. *Social Science & Medicine*. 2008;67(12):2072-8.
11. Sopory P. The persuasive effects of metaphor: A metaanalysis. *Human Communication Research*. 2002;28(3):382.
12. Solberg H, Nysether GE, Steinsbekk A. Patients’ experiences with metaphors in a solution-focused approach to improve self-management skills: A qualitative study. *Scandinavian Journal of Public Health*. 2012;40(4):398-401.
13. Rossi MG. Metaphors for patient education. A pragmatic-argumentative approach applying to the case of diabetes care. *Rivista Italiana di Filosofia del Linguaggio*. 2016;10(2).
14. Kanthan R, Mills S. Using metaphors, analogies and similes as aids in teaching pathology to medical students. *The Journal of the International Association of Medical Science Educators*. 2006;16(1):19-26.
15. Cambridge Dictionary [Internet]. Cambridge University Press. 2024. Available from: <https://dictionary.cambridge.org/>.
16. Elafros MA. Patient and health care provider knowledge of diabetes and diabetic microvascular complications: a comprehensive literature review. *Reviews in Endocrine and Metabolic Disorders*. 2023;24(2):221.
17. Viigimaa M, Sachinidis A, Toumpourleka M, Koutsampasopoulos K, Alliksoo S, Titma T. Macrovascular complications of type 2 diabetes mellitus. *Current vascular pharmacology*. 2020;18(2):110-6.
18. Stehouwer CD. Microvascular dysfunction and hyperglycemia: a vicious cycle with widespread consequences. *Diabetes*. 2018;67(9):1729-41.
19. Chen Y, Lee K, Ni Z, He JC. Diabetic kidney disease: challenges, advances, and opportunities. *Kidney diseases*. 2020;6(4):215-25.
20. Singh R, Rao HK, Singh TG. Neuropathic pain in diabetes mellitus: challenges and future trends. *Obesity Medicine*. 2020;18:100215.

21. Soyoye DO, Abiodun OO, Ikem RT, Kolawole BA, Akintomide AO. Diabetes and peripheral artery disease: A review. World J Diabetes. 2021;12(6):827-38.
22. Support for people living with diabetes [Internet]. Diabetes Australia. 2024. Available from: <https://www.diabetesaustralia.com.au/>.

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