Power to Empower

Designing for Type 2 Diabetes

Sylvia MacSpadyen & Umar Shaikh
Submitted to OCAD University in partial fulfillment of the requirements for the degree of
Master of Design in Strategic Foresight and Innovation
Toronto, Ontario May 2024

Copyright Notice

Author's Declaration

We hereby declare that we are the sole authors of this MRP. This is a true copy of the MRP, including any required final revisions, as accepted by my examiners.

We authorize OCAD University to lend this MRP to other institutions or individuals for the purpose of scholarly research.

We understand that our MRP may be made electronically available to the public.

We understand that my MRP may be made electronically available to the public.
We further authorize OCAD University to reproduce this MRP by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research

Abstract

The growing prevalence of people living with Type 2 Diabetes (PLWT2D) and the increase in the magnitude of associated comorbidities continue to impact people across Canada leading to severe health problems with no signs of slowing down. Despite significant investments in research, public health interventions, clinical care and new treatments and technologies, Canada ranks 10th among the 17 peer countries. (OECD Health, 2023) in Diabetes prevalence.

Canada has a low physician-to-patient ratio and many Canadians do not have access to a family doctor. Canada has 2.7 physicians per 1,000 people compared to the OECD average of 3.5 physicians per 1,000 people (OECD Health, 2023). Most People living with Type 2 Diabetes are under the care of primary care practitioners, who are experiencing unprecedented burnout, an increase in unpaid administrative work, and limited time to see the overflowing numbers of patients in their practice.

The implications of the increase in prevalence of Type 2 Diabetes and less access to primary care practitioners to provide care, creates concern about the future of population health and the capabilities of health care systems to meet the demands.

To better understand why the problem persists, our research focused on what creates delays in recommendations for care from healthcare providers, and what creates delays in the adoption of recommendations for care by people living with Type 2 Diabetes.

Bold intervention strategies are required to change the trajectory of Type 2 diabetes prevalence and in this paper, we make a case for how design offers new perspectives on problem solving within the scope of providers of care and people living with Type 2 Diabetes.

Glossary of Terms:

For the purposes of this research, the following definitions will be used.

Adherence and Compliance:
Adherence is defined as the extent to which the patient's behavior matches AGREED recommendations from the health care provider. This term refers to a process after inclusion of a patient's perspective.

Compliance is defined as 'the extent the patient's behavior matches health care provider recommendations. Although still used, current recommendations are to stop using it because it implies the clinician only decides on suitable treatment and the patient is passive. Neither of these terms will be used in this paper as they are considered old terminology from an acute care model and the terms contribute to blaming and shaming of PLWD.

Biomedical Model:
Assumes disease to be fully accounted for by deviations from the norn of measurement of biological variables and leaves no room within its framework for social, psychological, and behavioral dimensions of illness.

COM-B:
A framework that considers behavior change in a 'behavioral system' involving three essential conditions: capability, opportunity, and motivation.

Biopsychosocial model:
A trans disciplinary model which looks at the interconnection between biology, psychology, and social-environmental factors.

Causal Layered Analysis (CLA):
Research method to understand the underlying systemic structure of a situation. Consists of four levels: the litany, social causes, discourse/worldview, and myth/metaphor. This method can also be used to construct future scenarios.

Clinical Inertia:
The lack of timely adjustment to therapy when a patient's treatment goals are not at recommended range. It means delays adding or change the care plan if the A1C blood glucose measurement is too high, leading to increased health risk.

Comorbidities:
When two disorders or illnesses are concurrent in the same person and implies interactions between conditions that affect the course and prognosis of both.

Continuing Professional Development (CPD):

Involves educational activities to enhance medical competence in medical knowledge and skills, as well as in management, team building, professionalism, interpersonal communications, technology, and accountability.

Flash Glucose Monitoring (Freestyle Libre 2) and
Continuous Glucose Monitors (CGM) (Freestyle Libre 3 and Dexcom)
These are wearable devices that track a person's blood glucose every few minutes throughout the day and night. It is a small disposable sensor that is worn on the body. It shows patterns of how glucose is affected by specific actions or lifestyle in real time.
In this paper we will refer to all using the term CGM.

Glucose Variability:
Refers to the swings in blood glucose levels above and below target ranges. Variability and glucose patterns can be observed through Flash Glucose Monitoring/CGM.

Design Thinking:
A human centered design process that consists of 5 stages: empathize, define, ideate, prototype and test.

Foresight
In design, this refers to methodologies such as trends analysis, horizon scanning, scenarios development and wind tunneling for testing robustness of the future.

Health Equity:
A state in which everyone has a fair and just opportunity to attain the highest level of health.

Health Literacy:
A person's ability to find, understand and use written information to promote, maintain and improve their health

Jobs to be done (JTBD):
A framework that enables taking the perspective of the people or systems by looking at what people are trying to accomplish (Jobs) and by doing so gaining a deeper understanding to make innovation far more predictable and optimal.

Lifestyle Medicine:
A branch of evidence-based healthcare emphasizing disease prevention using behavioral intervention strategies. Examples are self-care, diet, physical activity , coping, adopting recommendations, sleep, and socializing.

Macrovascular Complications:
Refers to coronary arteries, peripheral arteries and cerebrovasculature (heart attacks, stroke, circulation)

Microvascular Complications:
Refer to long term complications that affect small blood vessels. This includes retinopathy, nephropathy, and neuropathy. (eyes, kidneys, nerves)

Pre-diabetes:
A serious health condition where blood sugars are higher than recommended range but not high enough for a diagnosis of Type 2 Diabetes. Prevention or delays are possible.
Scope: the boundaries that the research will explore. The important role social determinants play will not be fully explored.

Stigma:
negative attitudes, judgement, discrimination, or prejudice against someone because of their diabetes. Comes from a false idea that people with diabetes make unhealthy food and lifestyle choices, which resulted in their diagnosis.

Internal Stigma:
type of stigma experienced internally and externally. It is a belief that a person has about themselves that includes self-blame, shame, and guilt.

External stigma:
blame and judgement that comes from other people and society

Self-Determination Theory:
An empirically based theory of human behavior and personality development. Focus on social-contextual factors support or thwart peoples thriving through the satisfaction of their basic psychological needs for competence. relatedness and autonomy.

Self-Management:
Activities and behaviors an individual undertakes to manage and treat their condition

Social Determinants of Health:
Non-medical factors that influence health outcomes. They are the conditions in which people are born, grow, work, live and age and the wider set of forces and systems that impact daily living. (income, education, job security, food security, housing, social inclusion, access to affordable health, discrimination, systemic racism)

Signals:
In foresight practice, references short term indications of a change in direction

Systems Thinking:
A holistic way to investigate factors and intersectionality or connected holes rather than separate parts that could contribute to possible outcomes.

Trends:
Longer term pattern or movement in a particular direction

Acknowledgement

We would like to thank our family, friends and colleagues that supported us throughout our learning journey. A special thank you goes out to our families who put in a lot of extra time and effort to hold down the fort while we devoted so much of our free time to the SFI course work and final MRP.

Dedication

THANK YOU to the people living with Type 2 Diabetes who shared with us their stories and experiences to help guide our understanding. You took us into your world with all its ups and downs and we appreciate that.

THANK YOU to all the health care providers that were so generous with their time and sharing perspectives. Your care for people living with Type 2 Diabetes is so inspiring. We know time is your premium and feel grateful that you made space for us.

And finally, an extra special thank you to our MRP advisor, Helen Kerr, for making such an impact in our lives with her teaching in our course work by inspiring us to lean in to the messiness and use rigour to gain a deeper understanding of problems. For always provoking us to think about equity and being accountable to prevent potential harms in our innovation. And mostly by reducing our feelings of stress with her calm demeanor and thought provoking questions. Her support for us was felt through the entire process.

A personal dedication from Sylvia:
Thank you to my husband Mike, who encouraged me and believed in me when I frequently doubted myself. You made this possible for me with all your love and support. To my children Kyle and Courtney who inspire me every day, and never missed a moment to check in and offer words of encouragement. Love you so much.

To my brother Ron, was always so interested in the SFI coursework over the past 3 years and never missed an opportunity to tell me how proud he is of me. I love you so much. To my mom, who has taught me through her actions, the value of being a lifelong learner. And to my late dad, my biggest fan, he would have been so proud.

To my friends and colleagues, thank you for your love and support. Finally, to my MRP partner, Umar, thank you for always bringing the laughs and the logic. So happy to cross this finish line with you!

A personal dedication from Umar:
In the Name of the Most Merciful, The All Knowing: I want to thank all my family, my wife and my friends for their support and patience over the past three plus years. It wasn't easy

7

giving up Fridays and Sundays, but we did it. I also want to thank my colleagues and the amazing leaders at work that supported me as I completed the program, and allowed me to put what I learned into action.

Finally, thank you to my amazing MRP partner Sylvia who's positivity and curiosity drove this project and kept us humming through the busy winter months!

Table of Contents

Figures & Tables

Chapter 1: Introduction

The Case for design thinking in Type 2 Diabetes

Design Thinking can play a crucial role in the field of Type 2 diabetes as it allows for a patient-centred approach that helps identify gaps in the clinical experience. By understanding the needs and challenges faced by individuals with Type 2 diabetes, design thinking can contribute to creating more effective and patient valued solutions that seek a deeper understanding which could lead to a preventative strategy.

One of the key benefits of using design thinking in Type 2 diabetes is the ability to take an end-to-end approach. This involves mapping out the various systems and steps involved in the journey of Type 2 diabetes, both from the perspective of patients and healthcare providers. By visually representing these processes, design thinking can help identify key leverage points that can be influenced for improvement and innovation.

Together, design and futures thinking methodologies such as "jobs to be done," causal layered analysis, and foresight can be leveraged to gain a deeper understanding of the current and future needs of individuals living with Type 2 diabetes from the context of their lived experiences. These tools enable designers to explore different layers of the problem and anticipate potential challenges and opportunities.

Our Questions to Explore

Primary Research Question:
What factors impact delays in recommendations for care by clinicians or delays in adoption of recommendations by people living with Type 2 Diabetes (PLWT2D)?

Secondary Questions:
With evidence to support lifestyle medicine, access to new medications and innovative technology, why are 50% of diagnosed PLWT2D living outside of target blood glucose range that would contribute to an increase in comorbidities and decline in health?

What will the future of Type 2 Diabetes management look like if trends of decline in access to primary care practitioners and increase in prevalence continue?

If people's daily self-management is essential in preventing disease progression and improving outcomes, why is lifestyle medicine not prioritized?

With flash glucose monitoring/CGM available to enable people to see how their glucose is directly impacted by lifestyle choices in real time, why is it covered for only a small portion of the population? Why don't all people have equal access to see their glucose in relation to their lifestyle?

Who/what might be the most effective support for PLWT2D?

11

What would have to be true for self determination (autonomy, and empowerment) of PLWT2D to take a more active role?

Our Approach & Methodology

The research focused primarily on the relationship between healthcare providers and people living with type 2 diabetes (PLWT2D). We aimed to understand the lived experiences of both to inform a new care model that empowers PLWT2D as the decision-makers in their care. We examined clinical factors such as clinical inertia and medical school training, continuing professional development, and factors impacting PLWT2D like care experiences and access to lifestyle medicine.

Our research involved secondary methods to understand the problem from various perspectives and identify systemic issues creating delays in care recommendation and adoption. We also conducted primary research, including semi-structured interviews with PLWT2D, their family members, primary care practitioners, endocrinologists, and certified nurse diabetes educators. Collectively in this paper, they will be referred to as health care practitioners.

Healthcare practitioners were asked to share their experiences, and perspectives regarding the dynamics that result in delays in care and the adoption of recommendations. Patients and family members discussed what was most valuable or helpful in managing their diabetes and what frustrations or challenges they encountered in their care journey. Questions around what would have to be true to actualize change for improved care experiences triangulated perspectives.

We also conducted additional expert interviews to better understand undergraduate medical training curriculum and continuing professional development, with a focus on lifestyle and nutrition training.

Based on our findings, we proposed a new clinical journey that centers on an empowered patient model, health literacy, and preventative care. This comprehensive investigation forms the basis for our new human-centered care model which we describe in detail in Chapter 3.

Study limitation:

In this paper, we examine the relationships between health care practitioners and people with type 2 Diabetes and their families in health care settings. We investigate how people can self-manage and empower themselves, and how use of behavioral science can support them. We aim to provide a human centered approach that can benefit health care practitioners, patient advocates and industry partners who seek to enhance care experiences.

We do not address social determinants of health, which are factors such as education, job, family, food, environment, discrimination, systemic racism, health care and social context influence health (Canadian Public Health Association, 2023). These factors can produce health disparities, especially for some groups, but they require more research. We also do not cover other health professionals who may work with people with Type 2 diabetes, such as pharmacists, social workers, dietitians, and others. And we do not account for all the different ways medical schools teach across Canada.

There are two study authors for this current research paper. Both acknowledge that their positionality may have influenced the work to some extent. Both have lived experiences through working in diabetes and with continuous glucose monitoring.

Chapter 2: Current State: What is & Why it is

Context & Background: What is diabetes?

Diabetes is a chronic health condition that occurs when (1) the pancreas is unable to produce enough insulin or when it cannot use the insulin it produces effectively (World Health Organization, 2024). The two predominant types of Diabetes are: **Type 1 Diabetes** which constitutes 5-10% of the diabetes population and is considered a non-preventable autoimmune condition treated with insulin and **Type 2 Diabetes** which constitutes 90-95% of cases and is considered preventable (or at least delayable) when treated with any combination of lifestyle interventions, oral medication, and insulin (Public Health Agency Canada, 2023).

According to the World Health Organization, 1-10 adults have Diabetes of all types worldwide with diabetes being ranked as the 2nd most important condition in need of attention in North America. Since 2000, the number of Canadians living with Type 2 Diabetes has doubled and the International Diabetes Federation lists Canada among the worst of Organization for Economic Co-Operation and Development (OECD) countries for diabetes prevalence (Diabetes 360 Framework Diabetes Canada, 2018).

The aim for people living with Type 2 diabetes (PLWT2D) is to keep their blood sugar in a desired range as advised by clinicians, which if in target range, can help lower the risk of health problems. To get blood sugar into a desired range, clinical guidelines recommend the importance of modifying lifestyle factors to minimize progression of diabetes and prevent co-morbidities. For every 1% reduction in A1C the associated reduction in microvascular risk was 37% and a 21% decrease in death related to diabetes (Stratton et al, 2000).

Prediabetes, a condition that refers to a person who has higher blood glucose levels but not high enough to be diagnosed as Type 2 Diabetes, has grown in prevalence as well. In Canada, 11.7 million people are living with Diabetes or pre-diabetes, which is nearly 1 in 4 Canadians (Diabetes 360 Framework Diabetes Canada, 2018), and is expected to rise by 12% by 2025 (Diabetes 360 Framework Diabetes Canada, 2018). Thirty percent of people do not know they have prediabetes (Diabetes Canada, 2023) and if left without intervention may progress to Type 2 Diabetes. Of six million people who live with prediabetes in Canada, half will develop Type 2 Diabetes. (Diabetes 360 Framework Diabetes Canada, 2018). For context, someone is newly diagnosed with Type 2 Diabetes every 3 minutes (Diabetes 360 Framework Diabetes Canada, 2018). These numbers are disproportionately higher in indigenous communities and areas where there are low socioeconomic factors (Centers of Disease Control, 2023). According to Canada's public health agency, each year, more than 3000 individuals aged 1-19 are newly diagnosed with Type 1 or Type 2 (Framework for Diabetes, 2022). The rate of type 2 Diabetes is increasing in kids (under 12) and teens (under 20) with projections of a 700% increase by 2060. (Centers for Disease Control, 2023)

The Wicked Problem

Diabetes is a serious population health problem. It is the leading cause of blindness in people aged 20-65, contributing to 50% of kidney failure requiring dialysis and 40% of heart attacks, stroke, nerve damage and 70% of limb amputations not caused by accidents are diabetes related (House of Commons, 2019) . Cardiovascular disease (CVD) remains the leading cause of death in people living with diabetes and occurs nearly two to four times more often in people with Type 2 diabetes versus people without diabetes (Diabetes Canada, 2024). Diabetes also accounts for 70% of lower limb amputation and is the seventh leading cause of death in Canada (Diabetes Canada, 2024). If increased prevalence continues to grow by 40% by 2028 as projected, populations will not only be less healthy but health care costs for treating Diabetes will soar to approximately 40 million dollars CAD (Diabetes Canada, 2023).

The impact of Diabetes on people goes beyond medical conditions and can impact an individual's resiliency and quality of life. In a survey with 6934 patients and caregivers, fifty percent of people living with Type 2 diabetes responded that the condition negatively impacted their ability to take on life's challenges and 48% mentioned it negatively impacted overall self-confidence (Gopisetty et al 2018). A third indicated it negatively impacted their family relationships and one in ten people living with Type 2 Diabetes (PLWT2D) indicated that diabetes had a serious negative impact on their ability to plan. (Gopisetty et al, 2018).

The personal financial burden of living with diabetes is also growing, with costs being an important factor for 'adherence' to treatment (Diabetes Canada, 2024). Seventy percent of those living with diabetes mention that it is difficult to pay health care bills due to out of pocket payments (Diabetes Canada, 2024). Further to the financial burden for people, these same factors affect businesses. Absenteeism (missed work) and presenteeism (reduced productivity at work due to illness) of those living with or caring for someone with diabetes also impacts Canada's overall economy (Diabetes Canada, 2024).

Health system impact of Diabetes

Diabetes is one of the costliest health conditions to manage (Rosella et al 2016), and an increasing cost burden on Canada's health system due to an increased need for health services, loss of productivity and long-term support to manage diabetes-related complications (Diabetes Canada, 2024). People living with Type 2 diabetes are two to three times more likely to see a specialist and three times more likely to require hospital admission, with longer lengths of stay (Diabetes Canada, 2024).

These costs are expected to grow, not only because the number of PLWT2D is expected to grow but also because medications are becoming more expensive. New medications are expected to cost between $65 to $388 USD more per month, depending on the dosage (Newman et al, 2021).

Why does the problem persist?

Diabetes in Canada continues to grow due to a myriad of different but linked causes.

Social inequities and lifestyle: Social inequalities and food insecurity are significant factors contributing to the development of diabetes. In Canada, the inequities in diabetes risk are driven by various social determinants, including income, education level, employment and working conditions, food security, early childhood development, social support, the built environment, and access to prevention and care services   (Diabetes Canada, 2022). It is evident that Canadians with lower incomes face higher prevalence of diabetes and encounter greater challenges in accessing necessary supports, often due to limited availability of healthy food choices (Diabetes Canada, 2022). It is estimated that 1 in 8 Canadian households are food insecure. (Diabetes Canada, Food Security and Diabetes: A Positioning Statement, 2020)

The current situation highlights the barriers that many Canadians face in accessing healthy food and the lack of sufficient education on healthy living practices (Diabetes Canada, 2022). Moreover, sedentary lifestyles have become increasingly prevalent, further increasing the risk of developing chronic conditions such as diabetes (Diabetes Canada, 2022). Addressing these issues is crucial to reducing the burden of Diabetes and improving population health. By addressing social inequalities, promoting food security, and enhancing education of healthy living, there is hope to create an environment that supports individuals in making healthier choices to reduce their risk of developing diabetes and other chronic diseases.

Lack of access to testing & proactive diagnosis: Diabetes often goes unnoticed and many Canadians live with undiagnosed diabetes (Diabetes Canada, 2022). In Canada, 1.5 million people are unaware they have diabetes, and 5.6 million have prediabetes (Diabetes Canada, 2022). Diagnosis for diabetes occurs during acute health events or routine blood work, which requires lab requisitions and access to healthcare practitioners. With a primary care provider shortage, this routine blood work and lack of access to physicians in general creates additional delays in diagnosis. Limited access to proactive diabetes screening leads to delayed diagnoses, impacting patient care (Diabetes Canada, 2022). Early detection is crucial for timely intervention and effective management. Improving access to screening and raising awareness is crucial for timely diagnoses and better healthcare outcomes.

Delays in Care: Delays in care result in the progression of Type 2 Diabetes and the development of Type 2 diabetes in patients with pre-diabetes. A lack of adoption of guidelines further accentuates the need for timely interventions, as a 2015 study of diabetes patients in Canada demonstrated that 49% did not receive annual foot exams, 26% did not receive urine protein tests, 17% did not receive an HBA1C test in the past 12 months and 25% have never received a dilated eye exam (Diabetes Canada, 2022). Less than a third of primary care physicians in Canada discuss nutrition with their patients with type 2 diabetes and less than 20% of them raise the issue of physical activity (Diabetes Canada, 2022). In our interviews, many people discussed being shocked when they

temporarily lost their sight or had to have toes amputated, not making the link between being in target range.

In 2021, Canada responded to the growing diabetes epidemic by passing BILL C-237, which is an act to establish a national diabetes framework. The framework of the BILL sets out to do some of the following (Private Member's BILL C-237, 2021);

1. Improve access to diabetes prevention and treatment to ensure better outcomes
2. Explain what diabetes and prediabetes are (health literacy)
3. Identify training, education for health care providers in relation to prevention and treatment including guidelines
4. Promote research and knowledge sharing for prevention and treatment

The BILL was inspired by the Diabetes 360 initiative which outlines the following goals:
1. 90% of Canadians will live in an environment that preserves wellness and prevents the development of diabetes.
2. 90% of Canadians will be aware of their diabetes status (access to care for testing).
3. 90% of Canadians with diabetes will engage in preventing complications
4. 90% of all Canadians will achieve improvement in health outcomes

It will take a collaboration with multiple stakeholders to accomplish these goals, recognizing that a health system-led only approach to achieve these ambitious goals will be woefully short without a high level of engagement from people living with Type 2 Diabetes. Finding solutions to fully empower people for prevention and improved outcomes will be essential to successfully mitigate this population health epidemic and lessen the serious personal and health care economic impact.

The scope of this paper will zoom in specifically to challenges related to delays in care, as it impacts the prevention of further complications and the improvement of overall health outcomes (Goals #3 and #4 as set out by the Diabetes 360 framework).

What creates delays in Care?

Despite the increase in the availability of antihyperglycemic medications and evidence-based treatment guidelines, the proportion of people with PLWT2D who do not achieve glycemic goals continues to rise.

The term clinical inertia is defined as 'failure to initiate or intensify therapy according to guidelines". In Canada rates of clinical inertia are reported at 65% (Almigbal et al, 2023). Causes for this inertia are complex and multifactorial and can be seen from three causal factors: physician related accounting for 50%, health care systems (30%) and patient relation factors (20%) (Okemah & Quinones, 2018).

Patient Factors	Physician Factors	System Factors
• Denial of disease • Lack of awareness of progressive nature of disease • Feelings of failure • Lack of awareness of implications of poor glycemic control • Fear of side effects • Concerns over ability to manage more complicated treatment regimens • Too many medicines • Treatment costs • Poor communication with physician • Lack of support • Lack of trust in physician	• Time constraints • Lack of support from staff • Concerns over costs of treatment /testing • Reactive rather than proactive care • Underestimation of patient needs • Difficulties navigating guidelines and algorithms • Lack of informaiton or understanding of new treatment options and potential benefits • Lack of information on side effects • Lack of clear guidance on individualizing treatment • Concerns over patients ability to manage more complicated treatment regimens • Concerns over patient adherance	• No clinical guideliens available • No disease registry • No visit planning • No active outreach to patients • No Decision support • No team approach to care • Poor communication between physician and staff

Figure 1: Factors for Inertia; adapted from Gembillo et al, 2021

Clinical inertia prolongs the duration of patients' hyperglycemia which then puts them at increased risk of diabetes-associated complications and reduced life expectancy. (Okemah & Quinones, 2018)

Diagram A shows a breakdown of factors that are attributed to clinical inertia which include; physicians, health care systems and patients. **Physician factors** include time constraints and because of this physicians are often in a reactive mode of care rather than proactive care. Lack of support from other allied health professionals like nurses and diabetes educators, concerns over costs or testing and lack of understanding of guidelines and new options for treatment are also factors. In addition, clinicians lack understanding of patient needs from the patient perspective, lack of guidance on personalizing treatment plans and have concerns over a patient's perceived level of 'adherence', or perceptions that a patient won't be able to manage more complicated regimes. (Okemah & Quinones, 2018)

System related factors are attributed to not having clinical guidelines as a standard of practice, not having a disease registry, not standardized visit planning and no active recall system. Some of these are evidence-informed system level recommendations of the chronic care model. (Clement et al, 2018). There is also a lack of team based care as well as decision support. Decision support refers to integration of evidence based guidelines into the clinical workflow and includes audits, feedback and reminders so that physicians can have insights on how they are doing. And finally poor communication between clinicians and staff can lead to gaps in care.

Patient related factors include people's denial of having diabetes, lack of awareness that diabetes can progress in severity making people feel like failures. Lack of awareness of the implications of having their A1C in the recommended target range can lead to disease progression. Fear of side effects of medications, concerns over managing more complex treatments or when there are too many treatments, it is a deterrent. Poor communication

with physicians, lack of necessary support and lack of trust in physician recommendations are also contributing factors.

To stop the progression of disease, the clinician must support early initiation and intensification of therapy to reduce the risk of worsening microvascular and macrovascular complications. "Recent work suggests that clinical inertia related to diabetes management, hypertension and lipid disorders may contribute to up to 80% of heart attacks and strokes. (O'connor et al, 2005).

These delays can result in a substantial increase in the incidence of diabetes related complications and mortality. A one-year delay in treatment intensification for a patient whose A1C was above 7.0%, significantly increased the risk of heart attacks, heart failure, and stroke. (Okemah & Quinones, 2018)

The possible root causes for these factors will be explored through systemic analysis.

Exploring the systemic causes for Delays in Care

Causal Layered Analysis (CLA)

Causal layered analysis (CLA) is a method used to create transformative spaces for the creation of alternative futures (Inayatullah, 2004). At its root, the CLA is a tool used to understand the deeper *why* of a problem. The model consists of four levels: **the litany, the system, worldviews, and metaphors.**

The litany refers to the official description of the problem as we experience it and see it written about in news media or in journals. It is what appears on the surface to the external world.

The **structures and systemic causes** are the enabling causes that result in the symptoms evident in the litany.

The **worldviews** and values help explain the paradigms that sustain the systems and structures.

Finally, the deep **myths and metaphor** include the unconscious beliefs that underlie the current worldviews. These are hidden.

Our mapping of a contextual CLA included research from secondary and primary sources and was used to better understand the complexity of the diabetes experience. Our aim was to peel back the layers of the onion, identifying and understanding the system and mindsets that result in delays in care. Later in this report, we also used the CLA method to rebuild the Type 2 diabetes experience for the future.

Litany
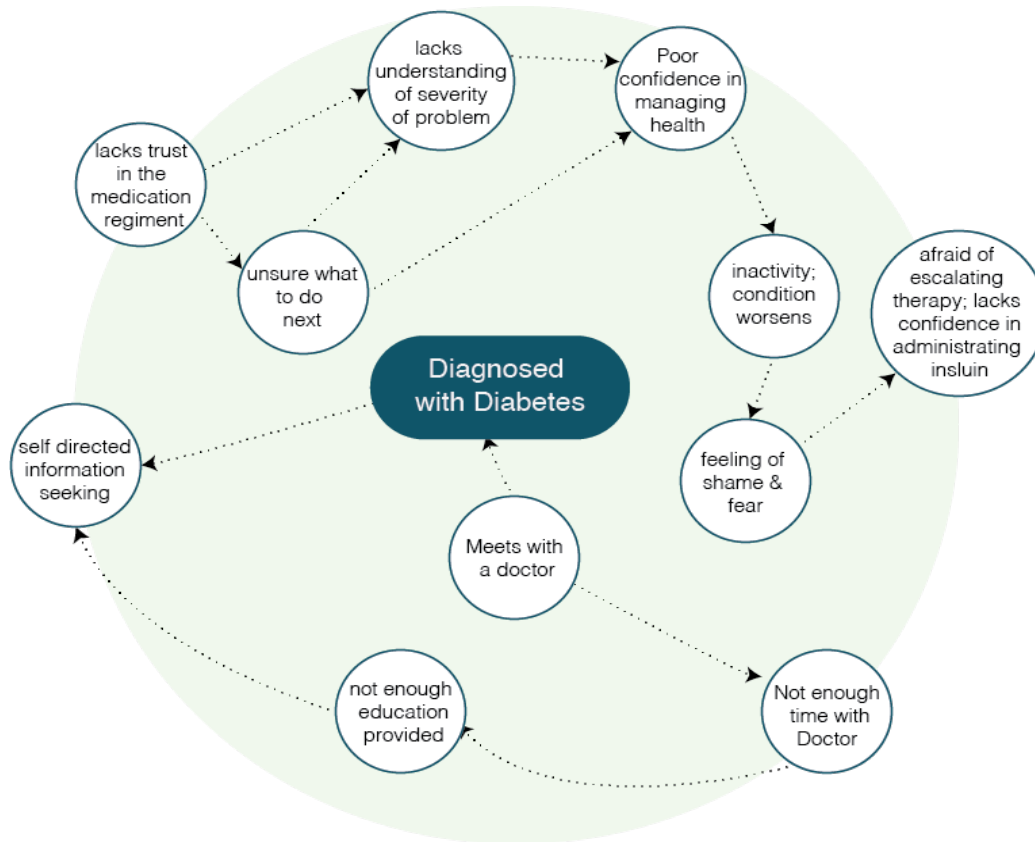
Figure 2: Litany & Diagnosis

The Diagnosis Experience

To better understand the litany, we built a causal map diagram that illustrates the clinician & patient encounter based on information gathered through our interviews with patients. This is what we describe as the micro-layer, or the visible experience.

In the center, we start with a person who is newly diagnosed with Type 2 Diabetes. This person may have received their diagnosis due to an acute event outside of their practitioner's office which in turn provokes contact with a practitioner, or they may become aware of their Diabetes diagnosis through lab testing.

Most people we spoke with described the moment of diagnosis as feeling 'overwhelmed', 'shocked' and 'frightened'. Many used language of self-blame, citing their lifestyle choices as the reason they had Type 2 diabetes. Some made direct links to being the cause of their Type 2 Diabetes status. A few felt it was expected as they had witnessed other family members also being diagnosed with type 2 diabetes.

In our interviews, most people mentioned not having enough time to absorb the information and recall that starting medication was the priority of their discussion. Many people expressed a need to understand ways that they could affect change in lifestyle and reduce their medication intake and while practitioners shared in the patients' overall

20

priorities, their 'jobs to be done' were in stark contrast. Specifically, in our interviews some practitioners mentioned a myriad of adverse health outcomes and co-morbidities that could arise from continued elevated blood glucose levels but this did not seem to be known by the PLWT2D). As a result, they would proactively prescribe additional medications to the patient to reduce risk of stroke, kidney failure but the patient sees it as failing to make progress. Although altruistic in intention, the clash in 'jobs to be done' between patient and provider was a central and recurring theme in our interviews with both segments. Many people we interviewed focused on the target number and discussed the focus of the clinical consultation was around achieving the target number. Few patients mentioned the focus on prevention and what the implications might be if the target number was out of range.

For those people we interviewed who were part of a family health team (FHT), which includes additional allied health team support, like a certified diabetes educator, there was a more descriptive plan for follow up consultation within approximately 1-3 months. Time restrictions in the clinical consultation can be a barrier to addressing some of the emotional jobs for people and time delays in between visits ignite a search for information from external sources. For some interviewed, wait times varied in follow up visits and the goal of the follow-up more often revolved around checking A1C test results.

Many people we interviewed reported difficulty in finding the information that they needed to better understand what was happening to them. Patients mentioned that they felt they had many questions that were unanswered and felt they did not have the information they needed to take actions on their own behalf to improve their blood glucose levels. Many reported using the internet as a source of information about what diabetes was and how to treat it, including YouTube, Instagram and TikTok. Not understanding the differences between types of Diabetes was reported including references to thinking that one type of diabetes advanced to another type of diabetes. Overall health literacy was low for many people as information was not easy to access and seemed generalized and they were seeking information in the context of their own life experience.

Targeting shame is ranked as a priority in the Diabetes 360 initiative, the viewpoint of the 'inevitability' of the disease can inhibit engagement in lifestyle medicine for many people who share a genetic predisposition. Clinicians reported that people's feelings of shame and self-blame come from the images people see in media, and TV and from family, friends as well as health care. Internalizing blame for 'causing diabetes' created a feeling of failure for many people. This sentiment was shared by some people we interviewed. Some health care providers that we interviewed discussed the importance of changing this narrative in and out of health care and not using history to decide if people will make changes.

As one physician told us; "I've had patients frequently break into tears because everybody has been telling them, including their spouse and children that it is their fault. They carry

this guilt in the back of their heads, and this is just not true. "People living with Type 2 Diabetes should all be told that it is not their fault" (MD participant).

Other clinicians we interviewed acknowledge that genetics, microbiome, ancestry, parents, and socioeconomic status cause Type 2 Diabetes, recognizing non-pharmaceutical and pharmaceutical solutions help to prevent other comorbidities, but this is not always communicated. Daily self-management is essential for successful control of glucose and most people who are newly diagnosed do not have the opportunity to see how glucose affects their body or how glucose is affected by lifestyle even though it is now possible through sensing technology. Uncertainty of what actions to take leads to poor confidence in being able to feel in control of managing glucose.

Systems

Trying to address the micro-layer, or the patient-physician interaction we describe in the Litany, requires us to delve deeper into their structural causes. Through our interviews and secondary research we identified four distinct but interrelated systemic causes for delays in care:

1. Coordination of Care
2. The Information Environment
3. Academia and the Know-Do Gap for Clinicians
4. Access to Care

Exploring each one of these deeper structural forces help us understand why delays in care occur. At the end of the section, we will attempt to link together all four systems to the patient-physician interaction.
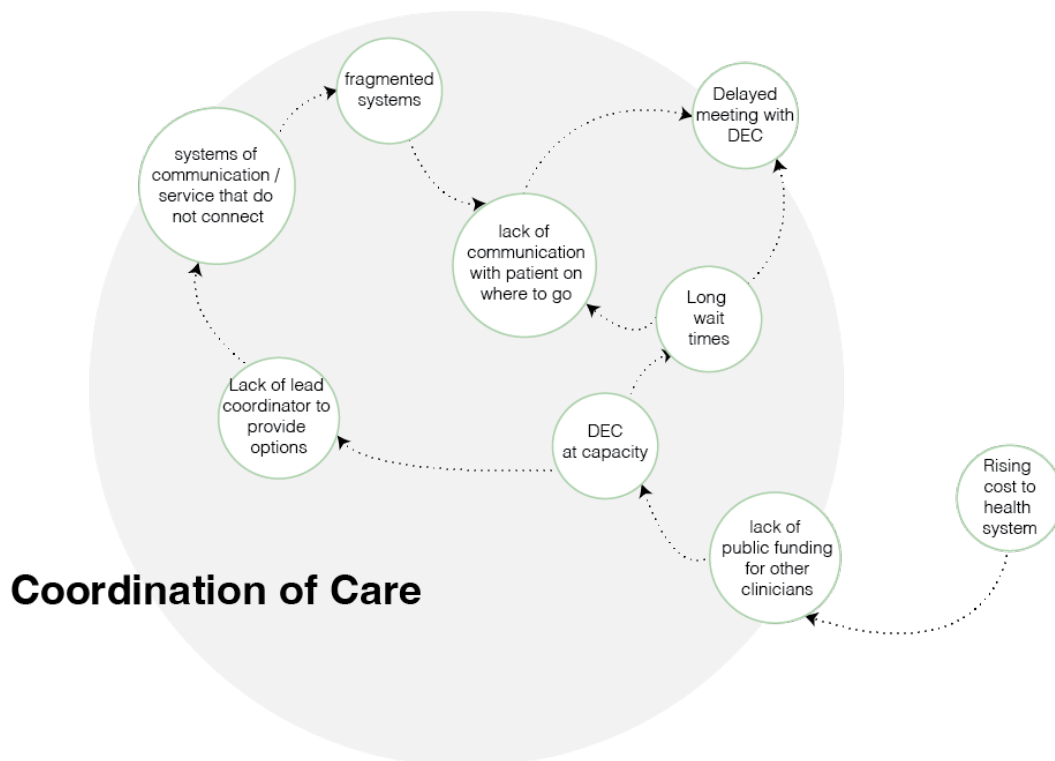
Figure 3: Coordination of Care Systems Map

Coordination of Care

"We cannot simply recruit our way out of this problem. We need to modernize how primary care is delivered to reflect the evolving needs of our population and those providing the care" (Dr. Kathleen Ross, President, Canadian Medical Association)

The coordination of care, which refers to a deliberate organization of care activities between two or more participants, including the patient (Agency for Health Care Research and Quality (AHRQ), Coordination of Care), is often a challenge. Optimal organization of care should include shared decision-making, an interprofessional team, self management support and systems that include patient registries, reminders, feedback, and benchmarking. (Clement, et al 2013). This recommended process is not being optimized in Canada for many reasons, which include a lack of available funding and capacity, suboptimal incentive models, different technical systems which do not communicate with one another, a lack of trained personnel and lack of team based care.

In surveys conducted by Diabetes Canada, 22% of newly diagnosed people were not directed to a diabetes education center at diagnosis. Twenty six percent reported receiving no education and 25% had to wait 3 months or longer to see a diabetes educator. In Canada, 24-35% of people attend diabetes education classes. (Grohmann et al, 2017). In a practice audit of 1173 primary care physicians, 50-70% of them who had access to Diabetes specialists, diabetes nurses, and dietitians but only 39% of the patients were co-managed with a diabetes educator or other specialty. (Lieter & Cheng, 2019). In the same

23

survey, only one third of patients had planned organized visits designated for regular assessments, prevention interventions and attention to self-management support. (Lieter & Cheng, 2019).

A need for collaborative, personalized care

During our interviews, we learned about different care experiences.   Those who were members of a family health team, who had a Diabetes nurse educator and dietitian as part of their care experiences commented on experiencing high value learning. They reported that they felt each team member including their physician had different roles in their care, but they all seemed to be aware of each other's part. These respondents, who received team based care, as part of the medical model, felt there was a more coordinated communication among care providers which may have lessened delays in recommendations. Some mentioned how cared for they felt when the physician proactively reached out to suggest check ins or make new recommendations.

Others we spoke to had a referral for a diabetes center outside of their primary care provider and reported the lack of personalized counseling as a deterrent of value. Their were significantly longer wait times for these referrals. Most people spoke about having specific questions or needs in the context of their own life and found themselves struggling for information.

Delays in Referrals and Capacity

In a study with patients whose A1C was not in recommended range, only one third of primary care clinicians reported that their patients had planned visits that included regular assessments, prevention interventions and self-management support (Lieter & Cheng, 2019).

When we spoke to health care practitioners at diabetes education centers, the delay between referral and initial session was both frustrating and a barrier to appropriate care. Alternatively, the primary care physicians we spoke to that worked in collaboration with diabetes educators mentioned a lack of availability and capacity concerns that resulted in 3-4 week delays between diagnosis and subsequent follow ups with the educator.

Clinicians we interviewed recognized that people are more motivated to make changes at diagnosis and when delays occur, as it created time and space for increased online searches and possibilities of misinformation. They also indicated that battling misinformation or competing recommendations by online influencers, as making subsequent consultation difficult and believe that there was an increased risk that a patient will ignore recommendations.

For PLWT2D, one study showed that when they have access to attend Diabetes education classes, only 24-35% were estimated to attend. (Grohmann & Espin, 2017). Given that many people are seeking health information, the delay of recommendation may be a contributing factor. As a result, most people receive care for diabetes solely from their primary care physicians. (Grohmann & Espin, 2017).

24

For those who started to use insulin, they were referred to an endocrinologist who often had a diabetes educator. The patients we interviewed mentioned the endocrinologists prescribed a CGM so they could see the cause and effect of their lifestyle in relation to their glucose and helped them in their daily self-management. The people interviewed who had access to seeing their own glucose in relation to their lifestyle were better able to make decisions in between clinical visits. Some mention it was a 'game changer' in helping them manage their diabetes. These same people felt that time in range (TIR) was a more achievable target and helped to contribute to being more successful.
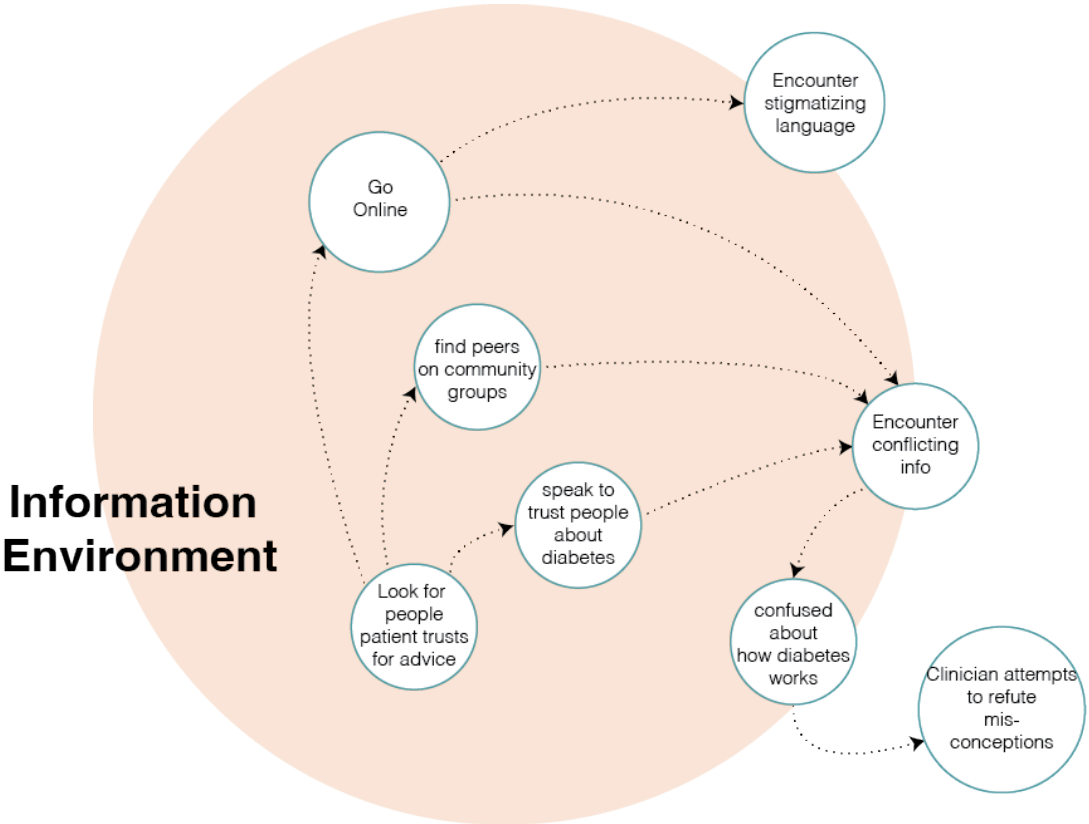
Figure 4: Information Environment Systems Map

The Information Environment
As mentioned in the previous section, delays in coordination and counselling on how to manage diabetes results in patients seeking information for themselves. The mix of shock and confusion as an output of the diagnosis results in heightened motivation to learn more about the condition, why it occurs and how to best manage the condition. Further to this feeling, through our interviews, we discovered a connection to guilt and self-blame that occurs, especially if the person was also dealing with other linked risk factors such as being overweight or a sedentary lifestyle.

Lack of Time and Patient Adherence in Primary Care

Primary care often struggles with patient adherence, partly due to the limited time available to explain diseases or treatments thoroughly (Fernandez-Lazaro et al, 2019). Many individuals interviewed expressed a lack of deep understanding about diabetes, making it challenging for them to describe the condition or take necessary actions for change.

To compensate for this knowledge gap, many patients turned to the internet to seek information about diabetes, lifestyle improvements, and dietary changes. However, they often found it difficult to determine which information was most suitable for their needs. In addition, the rising challenge of misinformation was prevalent throughout our interviews with both PLWT2D and clinicians. For PLWT2D, the search was for someone they could trust, whether in their own support circle or online. For clinicians, as mentioned in the previous section, it was to dispel misinformation their patients had learned.

Information Seeking Behavior and Online Resources

Between 2019 and 2020, there was a significant increase in Google searches related to diabetes, with Type 2 diabetes being the most searched term, followed by "symptoms of diabetes" and "what is diabetes" (Tantengco, 2021). This growing online interest spotlights the importance for healthcare providers and public health officials to provide evidence-based information on prevention and control of diabetes through online platforms.

A recent study further highlights the challenges with misinformation citing 1 in 5 Google searches for terms related to diabetes revealing inaccurate information about the condition and how to manage complications (International Diabetes Federation, 2022). A related report from the University of Chicago found that 44% of TikTok videos related to health information contained non-factual information, mostly from nonmedical influencers and content creators (Health Information on TikTok: The Good, the Bad and the Ugly, 2024).

Given the substantial online interest in diabetes, healthcare providers and public health officials should focus on delivering evidence-based information regarding diabetes prevention and control on the internet (Tantengo 2024).

Limited Understanding of A1C and Implications

Many people interviewed indicated a lack of in-depth knowledge about the implications of not having their A1C levels within the target range. They were often only aware that the A1C number represented a goal but did not fully comprehend its significance. Some individuals also struggled to explain Type 2 Diabetes to others and found it challenging to find simple explanations online. Others mentioned that their understanding of the importance of A1C

levels came through negative experiences with complications, wishing they had better understood the connection between A1C and overall health (PLWT2D).
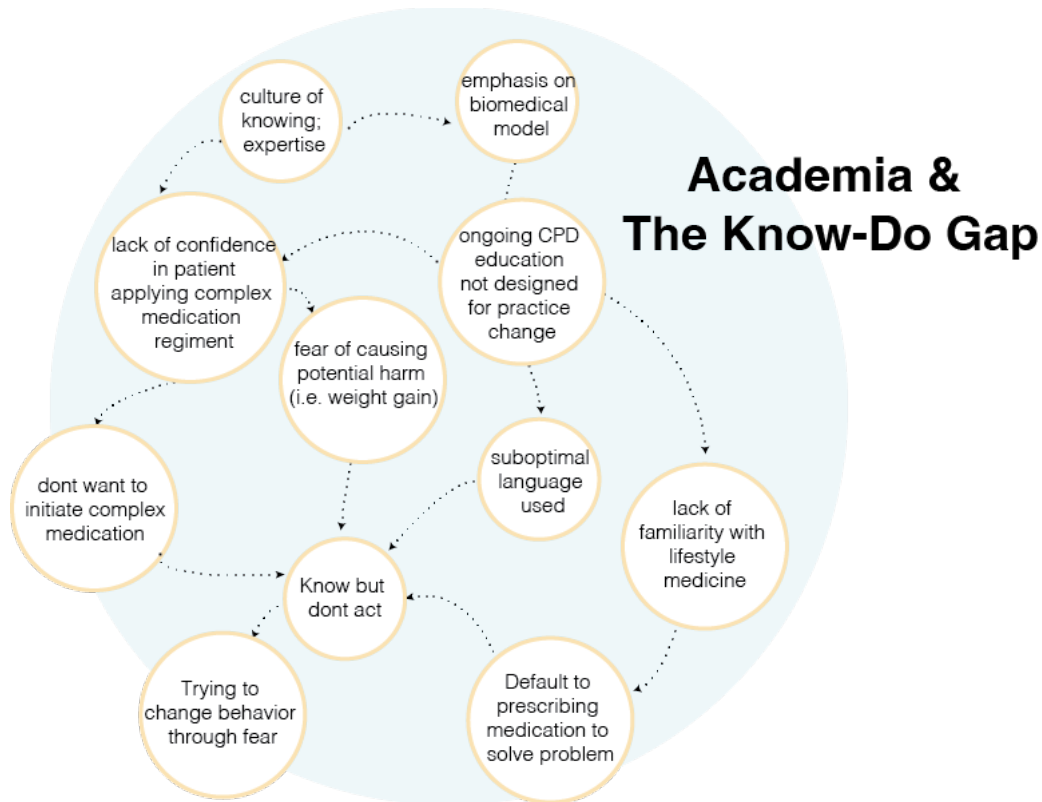
Figure 5: Academia & the Know-Do Gap System Map

Academia and the Know-Do Gap

Clinical practice guidelines are medical recommendations created by experts and are systematically developed based on the latest available science and evidence to aim at facilitating improved clinical decision making for better patient outcomes. The lack of adoption of clinical guidelines by primary care has been well documented with some research showing 'non adherence' up to 60%. (Wang et al, 2021).

Continuing professional development (CPD) does not result in behavior change

For clinicians to continue to update their knowledge on clinical practice guidelines they are required to participate in ongoing continuing professional development (CPD). The goal of the education is to promote clinical practice change where there are methods in educational design that help to ensure that clinicians can make the necessary changes. However, Canadian researchers looked at the quality of the CPD, they documented that 96% of the education was designed for cognitive learning (knowledge acquisition) through didactic methods.(Hart, 2023). However, to promote practice change, a physician needs to be educated in an educational model that helps to show how to make the changes and enables time to practice so that they can increase skills and increase confidence for change (Hart, 2023). These would be behavioral models.

Implementation science offers some valuable methods to accelerate the adoption of evidence-based practices in clinical settings, providing clinicians with current guideline recommendations and strategies to support change in patient populations, particularly in chronic diseases like diabetes.

The design of CPD programs often prioritizes credit-based incentives for participation, rather than emphasizing intended behavioral outcomes such as practice change and improvements in population health. Simply passing testing or completing CPD events does not guarantee behavior change among clinicians.

Challenges actioning Clinical Practice Guidelines

Lack of knowledge and beliefs in clinical practice guidelines can also play a role in delays in recommendations. Lack of knowledge of guidelines may be attributed to the constant changes and updates that occur requiring clinicians to constantly be learning and adopting practice change. Some evidence shows that health care providers may deviate from practicing guidelines and recommendations due to disagreement or distrust of the evidence regarding the goals for care (Aujoulat et al, 2014).

Health care provider's personal and patient preferences can play a role in recommendations and delays and there is some evidence that the higher the health literacy of a patient, the less delays in recommendations. Fear of making recommendations for treatment that may cause weight gain or hypoglycemia is a documented impact of clinician recommendations, 75.5% of physicians would be more aggressive treating hyperglycemia in their patients, if not for concerns about hypoglycemia (Rebicki et al, 2022).

Lack of Lifestyle Counselling in Medicine

Among those we interviewed, both clinicians and PLWT2D, everyone agreed that lifestyle and nutrition counseling were very important and all agreed that personalized approaches and expertise were missing. In medical school students and practicing physicians believe that lifestyle medicine is highly relevant to care outcomes in chronic disease, however they add that consultation time for such is limited and they have lack of expertise and comfort in these discussions that become barriers to adoption. (Freedhoff, 2016). When lifestyle management is initiated early, the effects of healthy behavioral interventions can be long lasting, more than 20 years (Canadian Diabetes Guidelines, 2023), but few have an opportunity to access lifestyle learning.

Gap between Medical School and Practice

In an American Medical Association meeting, a survey was conducted on knowledge regarding pre-diabetes and diabetes, with 258 medical students, 61 of which were residents and attending physicians, less than half answered questions correctly. (Khan, 2019). The Study acknowledged that overall knowledge of prevention and management was poor and changes needed to be made in medical school training (Khan, 2019).

Health care providers are not prescribing lifestyle changes for managing or preventing chronic diseases because of lack of knowledge, skills, education, time, confidence, or support system. Medical schools offer less than 20 hours of nutrition (Lessans & Pasarica, 2022).

Medical school training and the model of primary care is designed for relationship building across the spectrum of a person's life. Family physicians principles value whole-person, patient-centered care. "The principles of lifestyle medicine are aligned with the values of family medicine and being well versed in the use of lifestyle modification as the first-line treatment not only expands the family physician repertoire but also meets patients' expectation" (Bharati & Kovach, 2024). However, lifestyle medicine is almost non-existent in medical school training but only recently it is being offered as an elective in some innovative programs as an elective course.

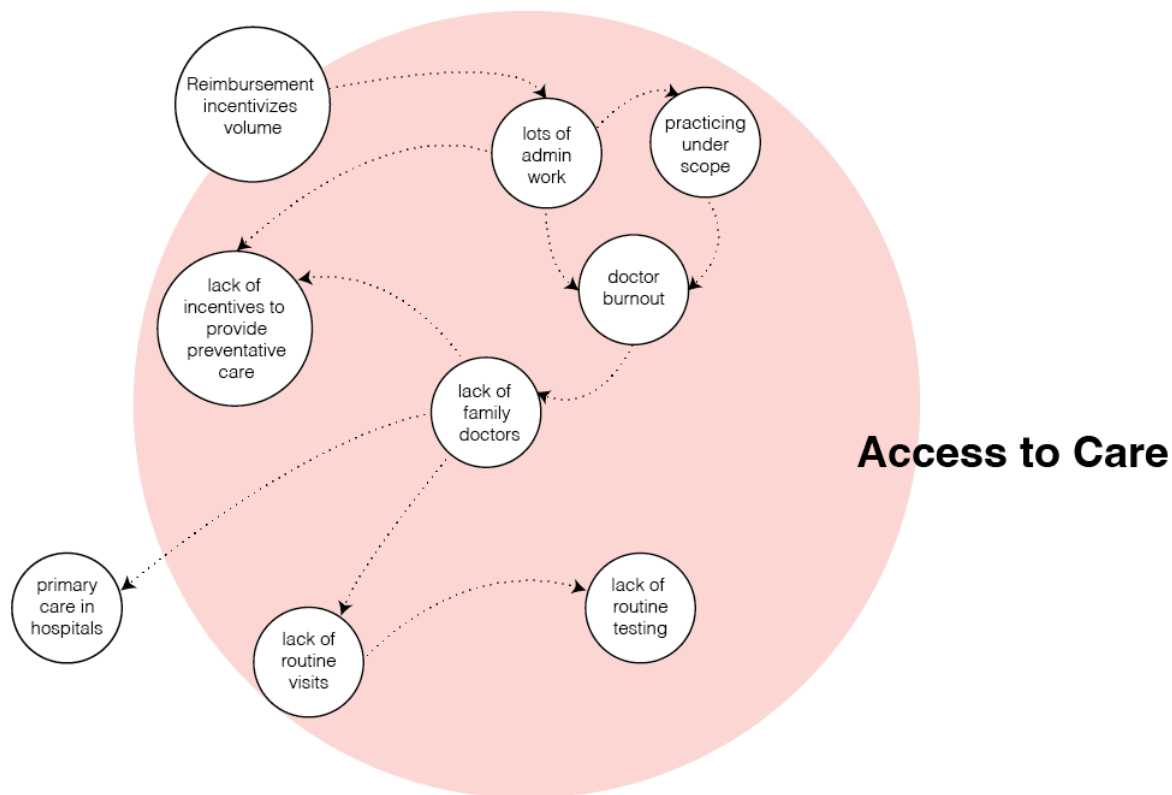*Figure 6: Access to Care Systems Map*

Access to Care
More than one in five Canadians do not have a family physician or nurse practitioner. (Duong, 2023). For these people, the Emergency Room, pharmacy and paid virtual models are options. For these Canadians, standard screening would not be coordinated and therefore they would not be a registered part of a system.

Physician Shortage

Currently, more than 1 in 5 people do not have access to a primary care practitioner. By 2026, it is estimated that 4 million Ontarians will not have a family doctor. Many primary care practitioners are in the retirement age which will increase that decline (National Post 2024). Although anecdotal, some evidence exists that newer doctors are taking on less patients to maintain work-life balance and mental health (Grant, 2024).

Fragmented Care

Most healthcare in Canada is publicly financed but privately delivered with a low physician-to-population average in primary care. The care is delivered through a variety of practice models ranging from solo practitioner to team based care models. Variations exist in these models across Canada. The models depend on coordination of care with other health care professionals to ensure optimal care experiences, particularly for PLWT2D, who visit their provider an average of 8.2 times per year (Szafran et al, 2019).

The solo practitioners, who are compensated by fee for service, refer to other health care providers for services required to support PLWT2D. In addition many team based models do not have a full spectrum of support within their organization but instead refer to community services. Approximately 15% of care is considered a solo, 46 % group practice and only 19% interprofessional (International Health Care Systems, 2020)

The ratio is above average compared to member countries for the Organization for Economic Cooperation and Development (OECD) but below that of several other high income countries. Canada is experiencing fragmentation in care and an increasing shortage of Primary care physicians. There are different structures for care with different incentive models that may impact care for people living with Type 2 Diabetes.

Administrative Burden reduces available time

Administrative work for physicians include charting, third-party forms, generating sick notes, managing the office, tracking lab results and following up from patient appointments (Administrative Burden, n.d.). A study showed 24% of a physician's working hours were spent on administrative duties and two-thirds of respondents reported that administrative work negatively affected their ability to deliver high quality care (Rao, et al, 2020). Physicians who spent more time on administrative work reported lower levels of career satisfaction, higher rates of burnout and fewer patients seen (Rao et al, 2020).

The administrative burden, and its acute impact on general practitioners, resulting in fewer medical students choosing to go into family medicine - is further increasing the physician shortage. Interest in family medicine peaked in 2015, with 38% of medical graduates naming it their first choice of residency. In 2022, that number declined to 30%, and in some parts of the country, it sits even lower with 28% (Pauls, 2023).

Lack of routine testing

For PLWD the stabilization of blood sugars in a recommended target range is based on clinical practice guidelines and recommendations made by health care providers to

prevent additional serious health conditions. The lab test that has been traditionally used to assess how close people are to this goal has been the HBA1C (A1C) test. Guidelines suggest that PLWT2D test be done every 3 - 6 months. And if the glucose is not in target, then additional lifestyle or medical management are what is recommended in the guidelines.

However, approximately 50% of people living with Type 2 Diabetes do not have their A1C in the target ranges (Health Canada, 2023). So half of this population's risk of comorbidities is increasing and a decline in overall health is expected. Tight glycemic control is associated with a reduction in comorbidities. (Lieter & Cheng, 2018)

In an audit, only 35% of primary care physicians reported that all their patients had regular planned visits with regular assessments as per recommendation of guidelines (Lieter & Cheng, 2018), which means regular testing is not always being done. People that were interviewed for this paper reported feeling stress about going for the A1C test and some delayed it because of how it made them feel like a failure and how they never really knew if what they were doing by changing lifestyle was impacting the number.

The Complete System

Information Environment

Go Online

Encounter stigmatizing language

find peers on community groups

speak to trust people about diabetes

Look for people patient trusts for advice

Encounter conflicting info

confused about how diabetes works

Clinician attempts to refute mis-conceptions

Academia & The Know-Do Gap

culture of knowing; expertise

emphasis on biomedical model

lack of confidence in patient applying complex medication regiment

ongoing CPD education not designed for practice change

fear of causing potential harm (i.e. weight gain)

dont want to initiate complex medication

suboptimal language used

lack of familiarity with lifestyle medicine

Know but dont act

Trying to change behavior through fear

Default to prescribing medication to solve problem

lacks understanding of severity of problem

Poor confidence in managing health

lacks trust in the medication regiment

unsure what to do next

inactivity; condition worsens

afraid of escalating therapy; lacks confidence in administrating insluin

Diagnosed with Diabetes

self directed information seeking

Meets with a doctor

feeling of shame & fear

not enough education provided

Not enough time with Doctor

Reimbursement incentivizes volume

lots of admin work

practicing under scope

doctor burnout

Coordination of Care

fragmented systems

Delayed meeting with DEC

systems of communication / service that do not connect

lack of communication with patient on where to go

Long wait times

Lack of lead coordinator to provide options

DEC at capacity

lack of public funding for other clinicians

Rising cost to health system

lack of incentives to provide preventative care

lack of family doctors

Access to Care

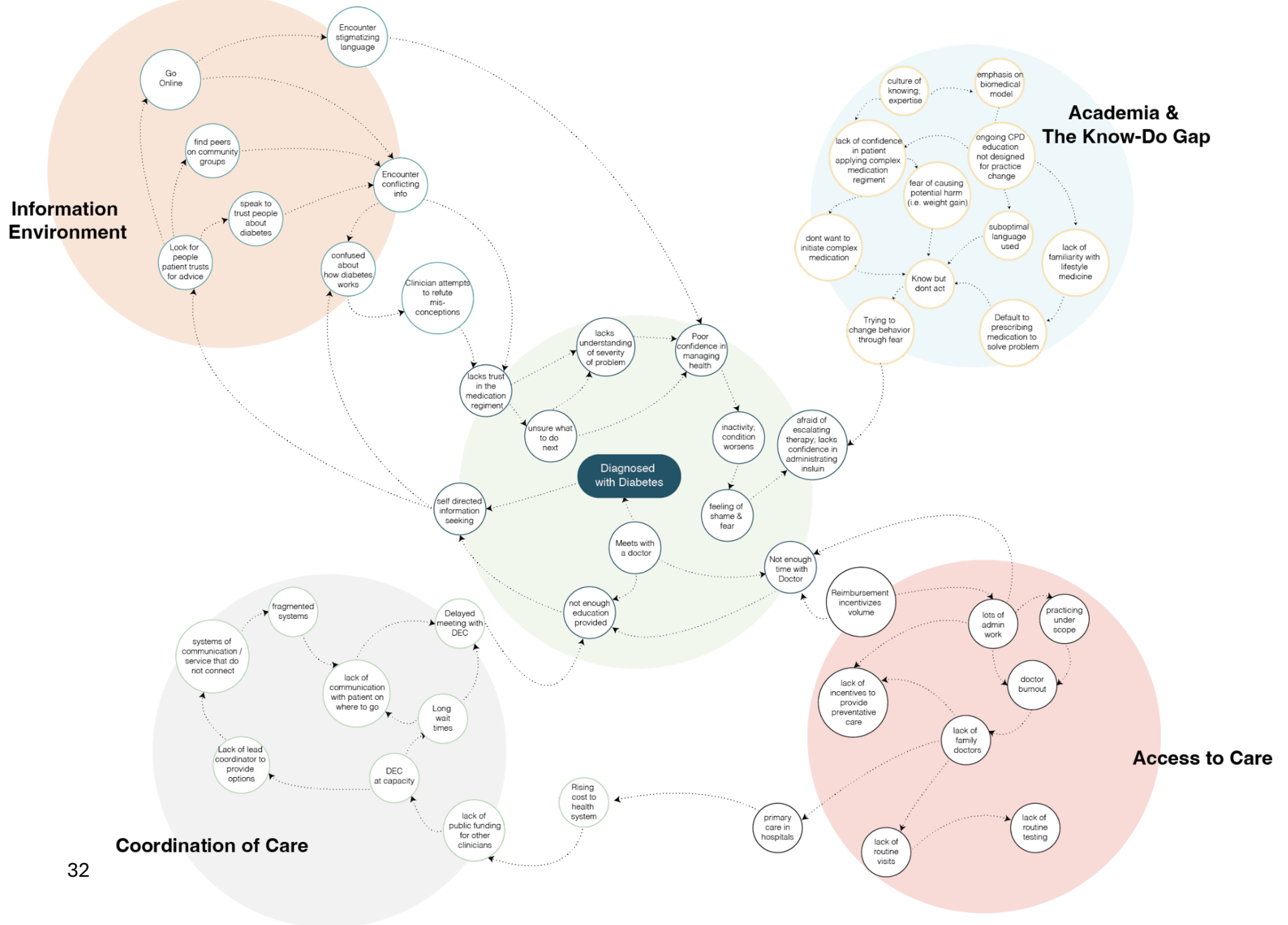primary care in hospitals

lack of routine visits

lack of routine testing

32

Figure 7: Systems surrounding the Diagnosis of Diabetes

Patient causes: health literacy, stigma, shame, blame

The impact of stigma and how it influences the management of Diabetes

"Shame is considered the most distressing of all human emotional experiences" (Inagaki 2022)

Stigma surrounding diabetes, often referred to as "blame and shame," manifests through negative feelings such as exclusion, rejection, or blame due to the perceived stigmatization of having the condition. Stigma is defined as a characteristic of a person that differs negatively from culturally defined norms and stigmatization occurs when there is a perception of a stigma that results in a punitive response. (Inagaki, 2022)

Studies indicate that up to 50% of individuals with diabetes feel stigmatized, leading to reluctance in disclosing their diagnosis (Centered for Disease Control, 2022). The experience of stigma can negatively affect quality of life and contribute to feelings of fear, embarrassment, guilt, anxiety, and low self-esteem. Stigma may also contribute to how people view their condition, and in turn, how the disease is treated. As many as 33% of PLWD are hesitant to disclose their diabetes to others, according to Diabetes Canada (Diabetes 360, 2018).

Stigma is experienced slightly more by people using insulin (55%) versus oral medication (49%) (Lui, 2017). Some factors that influence stigma include higher BMI and self-reported uncontrolled blood glucose (Lui, 2017). Some research shows that people who experience shame and stigma, often

 hopelessness and increased unhealthy behaviors (Inagaki, 2022). This makes it more of a challenge to adopt recommendations from health care providers.

Language & the Patient-Clinician Experience

Language also plays a significant role in diabetes care and the feeling of stigma by patients. The language around diabetes has been studied by behavioral scientists who document its profound negative effect on adopting healthy self management practices. Terms like "compliance" and "adherence" can undermine patient empowerment and fail to acknowledge the active engagement required for effective self-management. Language that emphasizes the condition over the person, such as using "diabetics" instead of "people living with diabetes," further contributes to the stigmatization.

Assessment of medical students shows feelings of stigma toward people living with Type 2 diabetes. In a study looking at attitudes of medical students toward people living with Type 2 diabetes, one third of them harbored stigma. (Beverly et al, 2019). Students' beliefs, reflected much of societal bias, that diabetes was a result of unhealthy eating and sedentary lifestyle and felt less empathy for them because they thought they could have prevented the disease or controlled it better. (Beverly et al, 2019).

Contributing to language surrounding Diabetes is the term 'failure'. Examples used in literature or spoken includes describing someone as 'failing to meet target' or 'failed on

orals so now start on insulin'. We note that people do not fail medications, medications fail people. In the interviews, some clinicians mentioned that the loop of shame continues for people as they start at diagnosis and if they can not improve their target A1C, they feel like they have failed and if they progress to need more medication, they feel like they are failing and 'no one wants to feel like a failure'. (Health care provider).

Clinicians and individuals with diabetes sometimes have divergent views on the role of diet and lifestyle as treatment modalities, highlighting a communication gap. Clinicians often mention the priority of focus on long-term prevention, while prioritizing A1C in discussion, and individuals with diabetes may prioritize short-term glycemic control.

Health Literacy

Health literacy, defined as individuals' ability to obtain, process, understand, and communicate health-related information, is closely tied to diabetes knowledge, self-efficacy, self-care behaviors, and glycemic control (Cavanaugh et al, 2011). Higher health literacy levels improve patients' understanding of guidelines and increase their likelihood of integrating treatment recommendations (Fernandez-Lazaro et al, 2019). However, low health literacy can hinder motivation and make target numbers feel meaningless (Fernandez-Lazaro et al, 2019).

The process of achieving higher health literacy varies between PLWT2D. Overall, the process to learn more about their condition was described by our interviewees as excruciating, difficult and littered with misinformation. As a result, patients struggle to find credible sources of information, and in some cases, their sources conflict with clinician recommendations. Through our interviews, we had PLWT2D mention that their "dietitian didn't know any more" than a YouTube influencer, and in isolated cases, patients asked us what they should be doing.

Overcoming poor health literacy and understanding how their body is reacting to their lifestyle is a critical 'job to be done', and one that is seldomly accomplished without support from care teams.

Psychosocial Factors

Societal stigma arises from media portrayals, societal beliefs, and interactions with family, friends, and coworkers. People with diabetes often face inaccurate comments or jokes attributing their condition to poor choices or a lack of willpower. The association of poor food and lifestyle choices in connection with having caused their Diabetes is highly prevalent. The resulting emotional burden and stress can lead to more severe mental health issues, such as depression. The impact of psychosocial factors on the adoption of recommendations and lifestyle changes is not fully understood but can significantly impact motivation.(Kalra et al, 2018)

Provider causes: academic mental models

Medical school curriculum prioritizes biomedical model

34

Although there is considerable evidence of the importance of lifestyle medicine in chronic disease management, it is only offered in some programs as an elective course. Medical school training is based on a biomedical model, and generally subjects like lifestyle medicine, human centered care and self management strategies are de-emphasized or non-existent. This reductionist approach and lack of emphasis on the whole patient within their life context limit patient-centric care.

Understanding the models of medical teaching and traditional thinking in the development of primary care physicians as well as the impact of medical school training can help explain some of the dynamics seen that are less conducive to empowerment of patients in shared care.

Medical school training is dominated by the biomedical model for teaching and grading of progress. Basic biomedical sciences, including anatomy, physiology and molecular biology are essential for student learning, however they neglect to include the psychological and social elements of disease. (Fuller, 2017)

This biomedical model supports clinicians' framing of disease as 'scientific or mechanist reasoning'. The biomedical model has changed over time to include an evidence based model which recognizes cure, prevention and management (Fuller, 2017). In diabetes, this model would maintain the focus of care as biological elements of disease like glucose management and prevention of other comorbidities. People with diabetes are more than their lab numbers. An example would be focusing on A1C at appointments can make people feel like they have failed at properly managing their diabetes (Diabetes Canada, 2022).

Limited time to improve behavior and incorporate lifestyle

Primary care physicians face barriers in incorporating lifestyle medicine into their practice, including time constraints and difficulties in changing patient behavior. Medical students on entrance to medical school place a high priority on lifestyle factors but feel unprepared to have meaningful discussions with patients after graduation (Lessans et al, 2022). The challenge lies not in motivation or beliefs, but rather in the capabilities and opportunities available within the constraints of limited time. The question then arises: where can lifestyle counseling be effectively integrated if it is not feasible within the confines of a typical clinical encounter?

Lifestyle medicine is the use of evidence-based lifestyle therapeutic intervention including whole food, physical activity, stress management, avoidance of risky substances and positive social connections (Rea et al, 2020). "yet physicians do not consistently address lifestyle during clinical visits despite believing that it is their responsibility to do so" (Rea et al, 2020). A 2023 survey of primary care physicians only, having difficulty with changing patient behavior (89%) and having limited time (81%) were major barriers to incorporate Lifestyle medicine into their practice (Bharati, 2022).

A decline in empathy

Medical students experience a decline in empathy throughout their training, which raises concerns about the doctor-patient relationship. (Akgun et al, 2020). If the doctor-patient relationship is the cornerstone of optimal patient centric care, cognitive empathy and compassionate empathy are essential skills. Why empathy is of particular importance is that being able to take the perspective of the patient will aid in that relational aspect of care which is shown to improve patient outcomes. This decline is a trend among medical students and physicians and is a growing concern for medical education specialists around the world (Igde et al, 2017). Might delays in care be improved if the deliberate practice of empathy was employed by thinking about the long term effects on inaction? Understanding the person as not just the patient with a condition but a person that needs tools and support is critical to drive human-centred care.

There has been much published surrounding the language of caring for people with diabetes and how practices in acute care have carried over into the management of chronic disease. The use of the term 'complaint or adherent' which is grounded in an acute model where the health care practitioner feels responsible for the person's actions or inactions. Many people interviewed described experiences at diagnosis as missing discussion about diabetes or including vague instructions of lifestyle 'lose weight' or 'less desserts'. Some felt judged.

In an online questionnaire with physicians specializing in internal medicine and endocrinology assessing attitudes towards patients with type 2 diabetes and obesity and their attributions of controllability and blame, 85% of physicians felt professionally prepared and confident to treat patients with Type 2 Diabetes yet a third reported being repulsed by patients and viewed them as lazy (39%), lacking motivation (44%) and noncompliant with treatment (44%) (Bennett & Puhl, 2023). Many witnessed professionals in their field making negative comments about PLWT2D (44%) (Bennett & Puhl, 2023)

A study by Speight (2021) shows research on the attitudes that can be revealed when HCPs call people 'non compliant'. People feel like passive submissive recipients of care who should follow prescriptions of health services, they feel weak-willed or 'difficult' and feel like challenges and complex emotions and experiences are disregarded. (Speight et al, 2021)

Metaphor

Doctor knows best

Medical hierarchies of power start in medical school. The nature of doctors' training results in a deep rooted sense of being special and the institutionalisation of their professional identity (Wessely & Gerada, 2013). In our interviews we heard many people express gratitude for their physicians' empathetic guidance and care, and we also listened to many who felt not seen or listened to in the context of their own individual needs.

As most well intentioned clinicians aim to offer quality of care, the mindset of knowing all the answers can override care experiences. In a study looking at communication in the

36

clinical encounter physician interrupted patients within 11 seconds and those patients who were not interrupted only spoke for a median of six seconds. For those patients who did speak about a problem, they were interrupted within a few seconds. Although time limitations are a challenge, the authors opinions that these interruptions were more about impatience and giving solutions. (Phillips et al, 2019). The culture of knowing, of expertise, and of being in control is necessary to execute on the biomedical model. "The medical system makes well intended clinicians feel ineffective or poor at time management for taking time to listen and care for their patients" (Phillips et al, 2019).

Respect for patients' autonomy is now entrenched in medical ethics but some people's described experience and research both show that 'paternalism' overrides the clinical discussion. Autonomy as an ethical principle 'obliges doctors to disclose information, to probe for and ensure understanding and voluntariness, and to foster adequate decision making" (Walton, 2002). Not providing people with information, helping them understand it without undue influence or coercion allowing them to make informed decisions, including helping people understand different options and treatment refusal. (Walton, 2002)

There is a large discrepancy in the research between family physicians' values and behaviors regarding advocacy and community health partnerships. More than 80% of the participants indicated that it was important to partner with public health and community-based organizations, and to advocate for policies that would improve community conditions but only half of those in the study indicated they were involved in any of these initiatives. In surveys conducted by Diabetes Canada, 22% of newly diagnosed people were not directed to a diabetes education center at diagnosis, 26% percent reported receiving no education and 25% had to wait 3 months or longer to see a diabetes educator (Diabetes Canada, 2018)

In a practice audit of 1173 primary care physicians, 50-70% of them had access to Diabetes specialists, diabetes nurses, and dietitians but only 39% of the patients were co-managed with a diabetes educator. (Lieter & Cheng, 2020). In the same survey, only one third of patients had planned organized visits designed for regular assessments, prevention interventions and attention to self management support. (Lieter & Cheng, 2020).
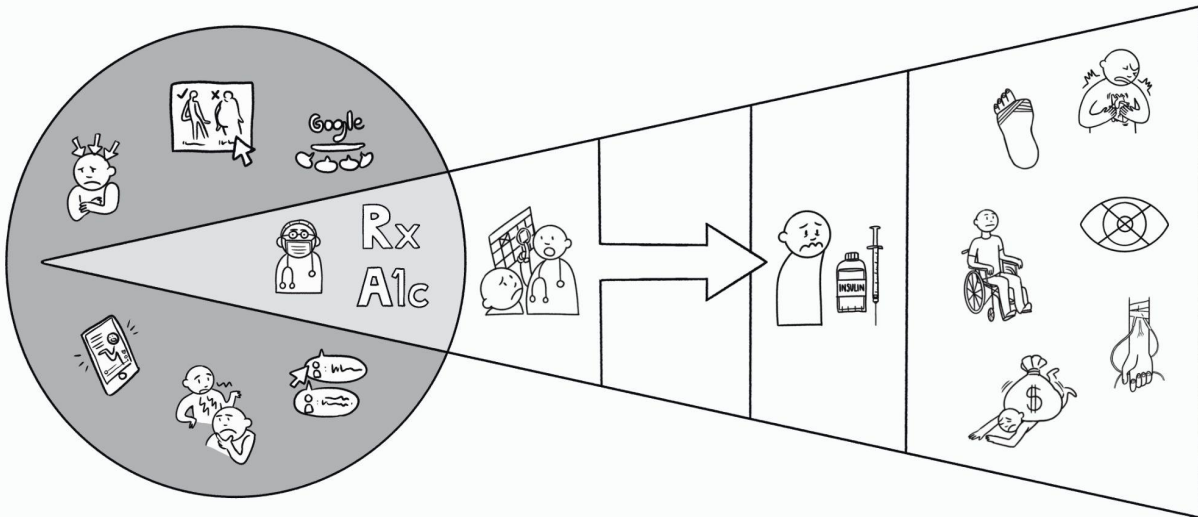
Current State Journey

Figure 8: Current Experience of Diabetes Care

Figure 8 is a journey that is health care provider dominant. The first image shows a patient at diagnosis with a limited exchange with a busy primary care provider. In this model the provider is the holder of knowledge and the options for care are focused in a biomedical treatment plan. The instructions are to take the medication with the goal to lower the A1c. Lab tests to check progress are scheduled every 3 months at a lab. Wearing a flash glucose monitor or CMG is not recommended at the beginning of this journey. A1c cannot reveal the relationships between certain foods, timing and combination of foods, stress or other lifestyle factors that cause fluctuations in glucose. The amount of time a person is in optimal ranges and how long they remain out of optimal range is referred to as time in range (TIR) and is connected to increase or decrease risk of health outcomes. International consensus on Use of CGM recommended that 70% time in range is optimal (Saboo et al, 2021) . Studies suggest that (TIR) can effectively predict long-term diabetes complications (Diabetes Care, 2019). In addition, a landmark study (DCCT), found a relationship between different levels of time in range and diabetes complications or comorbidities. (Beck et al, 2019). Yet starting with a CGM is not the standard of care. Patient instructions in this model may include weight loss and references to resources. In a team based model, after 1-3 months there is a connection with an allied health team with options to participate in learning classes. These are provider 'jobs to be done'.

While the instructions provided might be clear from the provider perspective and supported by clinical evidence – the delivery does not allow time for comprehension checks or deep understanding about the disease, lifestyle options or deep feelings like shame that emerge with new 'social reality of stigma'. Unaddressed and unknown, this may impact levels of empowerment, confidence, motivation to adopt recommendations and generate additional health seeking behavior to find answers. The most successful outcomes are when PLWT2D follows daily self-management. In the scope of the role of a

time strapped primary care provider, lifestyle as medicine takes little priority. And even if time permits, our research shows that medical school and ongoing CDP does not prioritize the patient's role in care. Understanding PLWT2D's emotional, functional, and social motivators (Jobs to be done) are integral to personalizing a plan that is patient centered and meets PLWT2D where they are in their journey to improve health outcomes.

In the figure 8 journey the patient internalizes blame and feels shame for the current diagnosis as the belief is that they have caused this due to their own 'unhealthy' choices.

Their knowledge about diabetes is uncertain and they start on a health-seeking journey to understand it better and to think about how to share it with family. In our interviews with certified diabetes educators, most indicated that people are at the highest level of motivation to take personal action at diagnosis. The three-month period opens the window for misinformation and more intense feelings of shame from views of others and images in society and media. The person feels stigmatized and alone in the journey of learning. Uncertain which resources are helpful, some patients find comfort in influencers on YouTube and TikTok who have lived experiences and some diet advice.

Now in their second meeting, the patient may be influenced by misinformation, and may be more risk averse to taking additional medication. In addition, without a clear plan at diagnosis, their condition may not have improved significantly resulting in additional pressure on the busy primary care provider.

Throughout the journey, PLWT2D feel that they are failing to make progress but request more time to make progress as they do not want to go on more medication. During this period the clinician may also be hesitant to recommend additional medication as they deem the side effect of weight gain or the risk of causing hypoglycemia may increase health problems. The primary care provider may have recommended a Diabetes Education Centre in their first meeting, but a lack of available seats and capacity means the patient may or may not get access to additional resources.

As time progresses, additional symptoms or lab values show disease progression and the need for additional health care provider consultations for eyes, kidneys or cardiovascular health become part of the person's life. The activity surrounding the management of diabetes increases which increases the person's understanding about the impact of A1C on overall health. The financial burden on the patient and health care system increases.

A day in the life: Sarah at diagnosis

Figure 9: Sarah's current day in the life

A day in a life of Sarah at Diagnosis of Type 2 Diabetes

Sarah's primary care practitioner has met with her to discuss the results of her lab work and in that consultation, Sarah learns that she has Type 2 Diabetes. Sarah instantly feels frightened and shocked. She wonders how this is going to impact her life. Her physician explained that a good strategy will be for her to lose weight and lower her carbohydrate intake. She instantly thinks about how 'bad' her food choices are and that she doesn't exercise enough and blames herself for now getting diabetes. She knows her physician is

trying to help, but when the first thing she hears about changing her diet, she feels judged. Her doctor explains that the goal is to keep her blood sugars in better 'control' and that she should do a test to check it every three months. Her first thought is what if she can not reach that target? What if she fails? She asks about a specific plan because she really wants to know what to do so her A1C is better next time and her doctor explains that there is a diabetes center at the hospital and they teach people about lifestyle but she mentions that it will be at least a 3-6 month wait as they have many referrals.

Sarah leaves the office with a prescription, and a referral and feels overwhelmed. In the car on the way home, she goes over in her mind all the ways she has caused her diabetes and thinks about what her family and friends will think of her. She feels ashamed. She decides that she will not tell anyone about the diagnosis and just try hard to get rid of diabetes. As she arrives home she makes a plan to do a lot of exercise and eat more salads. But then she wonders if that will be enough so she goes onto the computer and starts to search for answers. She sees the Diabetes Canada site which has a lot of information and learns there are so many types of diabetes.

She wants to make sure which kind she has. In the patient information section she reads 'microvascular or macrovascular' complications and thinks that the site is too medical for her, so she keeps searching. She finds some influencers talking about keto diets, then intermittent fasting and hears that cardio is beneficial but weight lifting is better. She can't afford a gym or all those vegetables that are being recommended. She gets home late from her work and there are no streetlights where she lives, so she doesn't feel safe walking. She is so confused. She wants the information now as she is ready to make changes. She wants that next A1C test to be low. She wishes she had someone she could talk to that would give her a specific plan based on her own life.

Chapter 3: Future State: What could be & How

"The Future State," envisions a transformative experience for diabetes patients. It aims to empower individuals living with diabetes by providing them with the knowledge to understand their bodies, access to supportive care providers, and tools that offer valuable insights into their performance. This chapter is divided into two sections.

Section 1: Defining a Future State Strategy

In this section, we utilized the Causal Layered Analysis from Chapter 1 to imagine a new future, starting with the metaphors and world views that would need to change. This is found in our Future State Layered Rebuild. By challenging the existing metaphors and exploring alternative perspectives, we identified the key seeds for change and reorganization within the system. These insights led us to categorize the proposed changes as "Provocations" – radical re-imaginations of the prevailing positions. The Provocations played a vital role in defining and refining our overall strategy, which we summarized as one conceptual journey.

Section 2: Futures and Scenarios

While we had a preferred strategy, we recognized that there are multiple potential futures that could unfold, based on emerging signals and trends. To explore these possibilities, we conducted an in-depth horizon scan to identify nascent signals of change and trends. From this analysis, we extracted the drivers of change that are causing significant shifts in the healthcare system. We categorized these drivers into static, unchanging factors, and those with more variability, which we labeled as critical uncertainties.

To assess the resilience of our strategy outlined in Section 1, we created a 2x2 scenario map using two critical uncertainties from our research. This map allowed us to design four distinct scenarios that represent different possible future conditions. We thoroughly examined our strategy within each scenario to ensure its effectiveness and adaptability.

Recognizing the preferred scenario for our strategy, we developed a detailed "day in the life" journey that showcases the benefits for patients, providers, and the broader healthcare system. This exercise blended the insights from the Causal Layered Analysis, provocations, and scenarios, providing a holistic view of the envisioned future state.

By delving into the future state and exploring various scenarios, this chapter sets the stage for the subsequent sections, where we will delve deeper into the strategies and initiatives required to bring this vision to fruition.

Defining a Future State Strategy

People are powerful and have valuable insights about themselves that inform health decisions. People's lived experience is considered expert opinion and an equal part of decision making in health compared to only clinician expertise. The myth or metaphor underlying the CLA is 'people are experts of their bodies'.

Governments and citizens realize that to have healthy populations people need to have their voices heard.

In this alternative scenario, the world views have shifted to embrace the person at the center of informed decision making and empowerment in health. A collective mental model that considers that everyone is unique and can make changes to improve and promote healthy living is possible. People do not feel shame about their condition, but embrace care plans that are co-designed with others. Community members, family members and peers are considered valuable in people's health care journeys. Clinicians are seen as medical strategists that rely on the data from peoples devices and insights from other health professionals.

The culture of medical school training no longer enables a system of over working with conditions that bring exhaustion and compromised mental well being. Medical students have access to a private channel where they can safely share poor treatment. Mental health conditions are no longer stigmatized with medical students and they have equal access to mental health support.

Relationships between patients and primary care practitioners are still highly valued, but the scope of work of the provider is more in their biomedical training. Primary care shares an understanding of the important value in behavioral models for improved care and recognizes that it is out of their scope of work. Physicians shift in valuing supportive providers that do not 'compete' with their medical competencies but instead enhance the care for people's day to day needs. They realize there are others more suitable to help people with behavior change.

A prediabetes diagnosis will be framed as being as important as a cancer diagnosis. It will be seen as important to not delay treatment. Use of medications alone is viewed as an unfavorable first line approach where lifestyle medicine can make an impact. For cultures that experience higher than average levels of diabetes due to genetic factors, efforts are made early to change the 'eventuality thinking' and foster the same vision of inspiration and empowerment for improvements.

Personalized plans for chronic disease management are valued as a patient centered model of care rather than an external one. Health care depends on the insights for shared decision making.

Educating people about their own body, different diseases, and conditions and how lifestyle is medicine and understanding health prevention is a prioritized part of the curriculum starting at elementary school and throughout each stage of learning.

Systems

A combination of macro, meso and micro systems actors will make the future of Diabetes prevention possible.

The systems and structures have changed to refocus health in the person's medical home and tools that further empower informed decision making. From a macro level perspective, the Government prioritizes prevention and deceleration strategies.

Political:
Governments support lifestyle literacy through awareness campaigns and incentive programs to participate in healthy living. Campaigns to ensure Canadians put an end to stigma toward people living with Type 2 Diabetes by teaching others how metabolic health is a priority for everyone and that people's behavior did not cause their Type 2 diabetes. The government upholds that everyone in Canada has the right to health care in the same way everyone in Canada has a right to access to school.

Incentives have been put in place for people who participate in health prevention initiatives and for companies to be able to innovate in these areas, using government funding. Health systems continue to decentralize care, increasing scope for alternative practitioners, but are making efforts to defragment the system and improve collaboration with a focus on prevention.

Social and values
From a medical system perspective, medical schools and associations will provide medical education that is designed to promote change in attitudes, increase skills and improve performance. Medical students and practicing physicians will prioritize de-stigmatizing diabetes and also increase their knowledge regarding pre diabetes and diabetes as it relates to lifestyle as medicine. Evidence based medicine is informed by people's lived experiences, and biobehavioral models (mind, heart, body) are valued as an equal system of care.

Trust will be restored with physicians due to an increased partnership in shared decision making in care. People feel more powerful when they participate in the clinical consultation. Their voice is included in the discussion and what they say impacts the course of actions taken.

44

Clinicians value other services and the coordination of these services help to relieve the burden and they appreciate a patient who brings personal insights. Social prescribing is the norm. Clinicians are viewed as 'regular' people with the same emotional and mental health needs as others. They no longer have to hide any mental health challenges they may experience and they have a strong association that does not stigmatize them or penalize them for having mental health challenges.

Social, values and environment:
The Alice Walton School of Medicine (AWSOM), has proven to produce clinicians who are more empathetic at graduation, who prioritize listening to people and facilitating learning. Medical students graduate with self perceptions equal to others in society and not privileged as holders of knowledge. Students graduate valuing the mental wellbeing of themselves and others. Students graduate on a competency based model over high marks for biomedical classes. Cognitive empathy skills and people centered counseling is practiced and evaluated. Students will have an opportunity to graduate earlier based on competencies evaluations or are provided the grace of more time to be more prepared. These different graduation times will not be based on competition but on including all the students' needs. The school's treatment of students models the type of treatment they will provide.

Technology
With respect to people living with diabetes, they will require the tools and infrastructure to capture their own personal insights in their home. Assessments and testing that were commonly provided through lab visits are now available directly to people using their own technology.

In Type 2 diabetes, all people have equal access to see how their own glucose is affected by stress, food, activity etc. and have a support that helps them make decisions to empower different choices by using a CGM.

Social media platforms are validated through evidence based guidelines and through behavioral models for lifestyle and awareness. Health literacy is supported through use of colour codes, pictures and infographics across both food and medicine so everyone can understand the same information. People can see the change they can make.

Business and open spaces include gamified movement so people are promoted to do exercise wherever they go. Airports have clearly defined walking paths and electronics are powered by cycling. Businesses prioritize well being programs and food choices are improved for onsite cafeterias, staff meetings and available snacks without labeling them for people living with diabetes. Parks and open spaces promote movement by using visual prompts.

Values

A strength based approach is valued in discussion with people working on lifestyle change. People are given space to discuss what they do well and positive changes they made as an equal part of addressing problems. Language used by society and the medical profession will not include blaming or cultivating feelings of failure.

Litany

In the future, Type 2 Diabetes is recognized as a condition that is multifactorial and is not the fault of the person. People in general are much more aware of their metabolic health and the role that glucose variability plays which has contributed to the stigmatization of the condition in the past. People are more aware of the progressive nature of diabetes and are motivated by preventative prescriptions. Peer support is valued in health care.

New diagnosis of Type 2 Diabetes is slowing down and there is a significant reduction in comorbidities and severity. Primary care practitioners have more time to spend with more informed PLWT2D and listening to experiences helps guide decision making for care. These physicians are valued for their strategy in care as they provoke important discussion and timelines around prevention.   A1C has now been replaced with Time in Range as the standard of care.

People have equal affordable access to technology like CGM to help them see how their own glucose is impacted by various lifestyle choices, empowering them to make more informed decisions based on their own context of life.

Provocations

Investing at the wrong end of the spectrum

Patients have identified several barriers to successful self-management of diabetes, both in our primary research and secondary desk research. During our interviews, they mentioned a lack of a plan, insufficient time with healthcare professionals, low health literacy, and psychosocial factors such as stigma as key obstacles to achieving glycemic control. Previous studies have echoed these comments, highlighting the lack of understanding of their management plan, uncoordinated care, and limited access to specialized services, such as dietitians (Nagelkerk et al, 2006).

The emerging pattern illustrates the need for quality care earlier in the diabetes journey. Motivation to understand the disease, its impact on the patient's body, and long-term risks is highest after diagnosis. Patients are seeking structured plans to improve their health, establish rapport, and access digital tools that provide insight into their bodies. Unfortunately, this support is often not available until the later stages of diabetes, when complications arise or when insulin becomes necessary. At that point, patients receive more time from nurses, specialists, and access to tools like continuous glucose monitors.

This structure not only negatively impacts patients, limiting their ability to proactively self-manage their condition but also imposes significant costs on the healthcare system.

46

Studies have shown that a one-year delay in achieving glycemic control due to this inertia results in nearly $1 billion USD in costs to the US healthcare system (Ali et al., 2020). These costs arise from additional medications, consultations, and potentially expensive interventions that result from the failure to achieve glycemic control (Ali et al, 2020).

Recognizing the needs of patients and the impact on health systems, why don't we flip the investment equation? We are not suggesting that surgical interventions or specialty medications are unnecessary or should not be funded. However, there is an underinvestment and lack of access to high-touch care early in the diabetes or prediabetes journey, which is a critical need for patients. Studies indicate that over a ten-year period, early intervention to improve lifestyle modifications can result in a reduction of per capita direct medical costs by $4,810 USD (Herman et al, 2014). A more recent study focusing on preventing the progression to diabetes in prediabetes patients using lifestyle modifications showed a one-year cost saving of $1,169 in direct medical costs, primarily by avoiding inpatient admissions (Sweet et al, 2020).

If lifestyle plays an essential role in preventing the progression of pre-diabetes to diabetes, the acceleration of diabetes complications, and the mitigation of comorbidities, why is it not prioritized? Why is the system so resistant to empowering patients with health literacy and insight into their own glucose performance to make informed decisions within the context of their own world and life?

Doctors cannot be our superheroes

The burden of care for people living with diabetes rests unequally on the shoulders of our primary care physicians and specialists. Driven by the immense pressure of an underfunded healthcare system that is being driven into further cost burden due to the pandemic and resulting inflation, our healthcare heroes are overwhelmed.

Legacy infrastructure and business models, rising immigration and population numbers and an increasingly aging population, the dam is being asked to do too much. This results in not enough time being spent with people living with diabetes, poor coordination of care and a gap between education and action as it relates to clinical guidelines and best practices.

Tasked with also combating medical misinformation, maintaining adherence and the rising administrative burden of healthcare, primary care providers are struggling to provide quality counselling. In addition, the traditional model of teaching physicians how to support self-management of people living with diabetes has lingering roots of acute care practices that do not work in chronic disease management. The acute care model emphasizes control of the clinician to be responsible for the decisions of people and use of the term 'non compliant or non adherent' is still prevalent. Discussing management in terms of 'failure on orals' 'failure to target' is language that has a negative impact on empowerment of people. The context of people's lives are essential for people to manage their Diabetes. If the ultimate decision maker is the person living with the condition, then an empowering model of care that includes psychosocial and behavioral approaches, may

47

prove to increase the shared role in care. Appreciative inquiry (strengths based approach) is an approach that considers the whole person and their families or communities and focuses on what is working and functioning well which is in contrast to a deficit narrative in medicine. (Kennedy et al, 2022). It is more common in nursing education.

A radical re-think is necessary. We are seeing in the US new models of care emerging and direct to consumer models, but pockets of sporadic decentralized innovation lack the ability to create systemic change. What we need is a recognition that there is a bucket of support separate from biomedical interventions. What we need to ask ourselves is, does it need to be the doctor who shoulders all this weight?

Is a doctor equipped to provide us with lifestyle medicine …or can it be someone else who can be empowered to provide support to patients using human centered methodologies?

Does a doctor have enough capacity to be our cheerleader? To tell us if we're improving, how to improve, and to provide us with positive reinforcement? Or is someone adept at behavioral models and language the right person to foster self-determination?

Does it need to be our doctor that helps us find the right tools, apps, and educational resources to manage the complexities of good health?

…or can it be a new role?

One focused with expertise in behavioral sciences, language sensitivity for health promotion and psychosocial issues that impact care. Instead of being a person who feels responsible for our outcomes, it could be a facilitator of lifestyle medicine. It might be a health coach, mentor, and guide to navigate living with Diabetes. Someone who can help us find confidence in our positive high points (strength based), work on improving our lifestyle, educate us on the impact of blood sugar on our organs and reinforce the right behaviours.(health literacy that makes sense from the context of our individual lives)

There is an important physician role in Diabetes care to help guide the biomedical piece of the puzzle. To ask clinicians to actively support self-management strategy deviates them from their designed role in medicine. The current system, of making the physician the biomedical leader, lifestyle leader, adherence leader and bi-annual coach is one that is neither working for the patient or the system at large.

Through our interviews we've stumbled on success stories and there is a central thread evident in sustainable change: the physician is the patient's care advisor and strategist. Patients who can manage their diabetes within target, meet with their physician bi-annually, to create a six-month strategy that is then handed off to a coach. The coach then works with the patient so set up the right behaviors, nutritional plans, targets, and check-ins. Through this high-touch approach, patients build confidence, habits and familiarity with foods and routines that support them through their diabetes journey.

48

A case for a new model of support

Medical care models, as previously discussed, are based on biomedical frameworks and prioritization of lifestyle interventions is low. However, much of the problem of increasing prevalence of Type 2 Diabetes and progression of the condition, requires prioritization of behavioral change for both PLWT2D, and those who provide support and care. Behavioral models can help better define the problem that we are trying to solve by providing a deeper understanding of the people who are the ultimate decision makers in the adoption of recommendations for improved health outcomes. Behavioral models can also help to reframe the deeper problems that need to be solved, to enable increased engagement in care. If increased engagement of people is essential to change the dynamics of the problem it will require behavior to change in context peoples diverse and unique lived experiences.

A behavioral change has the most success when applying a solution designed with the competencies required. Evidence based research in behavioral sciences are not a part of biomedical training**. COM-B** is a behavioral change framework that looks at a person's capabilities (C), opportunities (O) and Motivation (M) to change behavior (B). Successful interventions using COM-B and self-determination theory may be the catalyst of a system that truly puts people at the center of care and honors lived experience equally to expert opinion.

Fundamental to the model is that people will only perform a behavior when they have the capability, opportunity, and motivation and from this (COM-B) as a model conceptualize behavior as part of a system of interacting elements. Researchers of COM-B reviewed over 1,200 published studies that identified precursors to behavior change and found the majority were classified into these three categories. (Michie, 2014).

"Changing the incidence of any behavior of an individual , group or population involves changing one or more of the following; capability, opportunity or motivation relating either to the behavior itself or behaviors that compete with or support it" (Michie, 2014).

People first must have the **capabilities** to perform a change in their behavior. These capabilities would include both physical and psychological capabilities. Physical capabilities in Diabetes might include skills like mobility or strength. Psychosocial skills may include having knowledge and health literacy or the mental stamina to perform the behavior. Second, **opportunity factors** are considered. Opportunity includes the external factors that impact a person's ability to perform the behavior. This might include a person's physical environment, triggers, transportation, food insecurity and other social determinants. Opportunities can also be considered 'social', which considers ways people might influence a behavior through facilitating or inhibiting the behavior. This might include community, interpersonal influences like family, social cues like stigma and cultural norms.

49

Finally, the third pillar, Motivation, refers to both people's level of desire and reasons to change their behavior. People's motivation can be connected to the number of 'jobs' that the new behavior will help people accomplish or help them avoid. 'Jobs' might be functional, social, or emotional accomplishments which would be considered impulse or reflex motivators. Alternatively, motivation can also be reflective which involves self-conscious planning and evaluation, examining beliefs about what is 'good or bad'.

Identification of some of the deep causes of what is driving people's behaviors will inspire how to use those insights to re-design intervention strategies that meet the specific and unique needs of people in the context of their environment. COM-B can be a successful tool to help assess social determinants of health or other important factors that could provide insights regarding 'blockers' that would require workarounds to meet their individual needs.

Those trained in COM-B will also be better able to provide more expansive insights to those practitioners who care for PLWT2D.

CGM for Health Equity

Continuous Blood Glucose (CGM) meters provide real-time data into how a person's body is reacting and impacted by lifestyle. The device provides a visualization of the relationship between blood glucose and food, exercise, sleep, and stress, by capturing every minute, which shows a person's patterns in their glucose. Interviewing people who have access to seeing how their glucose is reacting in real time over the course of the day, mentioned the insights from CGM to be powerful motivators for positive change. If increasing person centered care, health literacy and informed decision making is the goal, it would start by providing self-management tools that can instantly foster motivation.

Recognizing the enormous benefit of this information to people is key to improving outcomes, preventing disease progression, and ultimately reducing the cost to the health system. In addition, the data from CGM can provide confidence to providers to delay intensification of medication due to fear of causing hypoglycemia. For the first time, they will have data that can provide real time insights regarding the direction their glucose is heading and how quickly it is moving, which can empower people to make proactive decisions to mitigate harm. The predictive information aided short term and long term lifestyle planning and enabled individuals to take action and prevent hypo and hyperglycemia (Lawton et al, 2018).

CGMs can demonstrate that people can have the same A1C (i.e. three-month average blood glucose), but have different variability (extreme peaks and dips and for longer duration of time) patterns in their blood glucose during their day. This variability is what clinicians are most concerned about, as it is directly connected to progression of disease (Team, 2024). For this reason, an international consensus has recommended the standard of care should be Time in Range (TIR). People living with Diabetes find TIR a simple and intuitive percentage more motivating as a target as they can instantly see factors that

impact these percentages. The standardized visual reports help PLWT2D and health care providers in the evaluation and identify practical insights, which help guide the right behaviors (Dreesen, 2022).

During our interviews, some PLWT2D who had access to a CGM felt an increase in confidence and control over decisions they were making day to day. Further, they felt that they were learning each day about what worked well for them and what didn't, empowering them in their choices. In the literature use of CGM is shown to impact psychosocial factors such as a lessening the burden of day-to-day management and increasing quality of life, gaining increased awareness of specific actions to take and factors that impact glucose variability and having glucose more consistently in control (Johnston et al, 2022). Several people interviewed also mentioned some of these factors and added a decrease in stress and worry as well as an increase in confidence that they did not have to avoid certain activities as simple as eating dessert with their families.

With the health system buckling under the weight of an aging population, doctor shortages, growing pharmaceutical and infrastructure costs, investment in proactive, not reactive care will be paramount. Engaging and preparing people to share in care dynamics can improve efficiencies in consultations and enable personalized medicine required to meet people where they are.

Despite this encouraging data, access to CGMs remain low, some monitors like the Freestyle Libre are covered for people on insulin. However, most diabetes patients are not using insulin, and have not advanced to this stage. One reason is the lack of use of Flash glucose monitoring or CGM in primary care clinics among PLWT2D. (Healio, 2022). For many, CGMs are fenced behind insurance co-pays. This fundamentally creates a health equity issue and clear haves and have nots. Patients without family providers, without access to continuous care and without the funds to purchase CGM devices are unable to receive the same level of support as people with insurance and the ability to afford CGM devices. This creates an unintended doubling down on the burden of the disease for the least fortunate and most vulnerable...until they advance to the point of needing insulin.

With a wealth of real-world evidence to support empowerment of people in shared care and improved quality of clinical encounters, why are people not given the opportunity to learn about how their body is reacting to glucose? To have access to time in range, PLWT2D should have the opportunity to wear a CGM.

 If using self-management tools like CGM can help people engage more in their own care and help improve lifestyle choices with the goal of prevention, why do people have to progress to insulin before they can see how their own glucose is impacted by lifestyle? This technology is seen as a more powerful tool as it can help people identify patterns and fluctuations to better understand factors that impact people's Diabetes in real time. (Dreesen, 2022). These devices are associated with improved health behaviors and outcomes and empower people.

51

Instead, if we provide CGMs at pre-diabetes, or to people who are predisposed to diabetes due to genetics and co-morbidities we can inject insight, reflection, and self-management much earlier in the care journey. The downstream impact of early intervention would provide multi-fold savings as these patients would be able to avoid expensive medications, more expensive counselling from specialists, potential acute hospital events, and the secondary costs amplified for their families.

A first step for patient-centric care which honors personalization would start with enabling ALL people to have the right to see how their own glucose is impacted by lifestyle factors like stress, type of food, sequence of foods, medications, fatigue, mood etc. This is an important step toward health literacy and the importance of long term management to avoid progression.

However, CGMs as just tools are not enough in isolation. People need to understand what the devices are telling them and build their own strategies to manage high and low blood sugar. For example, in speaking PLWT2D, we recognized that regardless of when a patient received the device, they were left on their own to make sense on how to react and adjust to the metrics they were seeing. This resulted in a trial and error method which could be streamlined had they had a coach to guide them.

Ultimately the question we need to ask ourselves is, are we serious about managing diabetes and reducing our costs or will we continue to invest in the same frameworks and methods that have not demonstrated an ability to slow the prevalence of this condition?
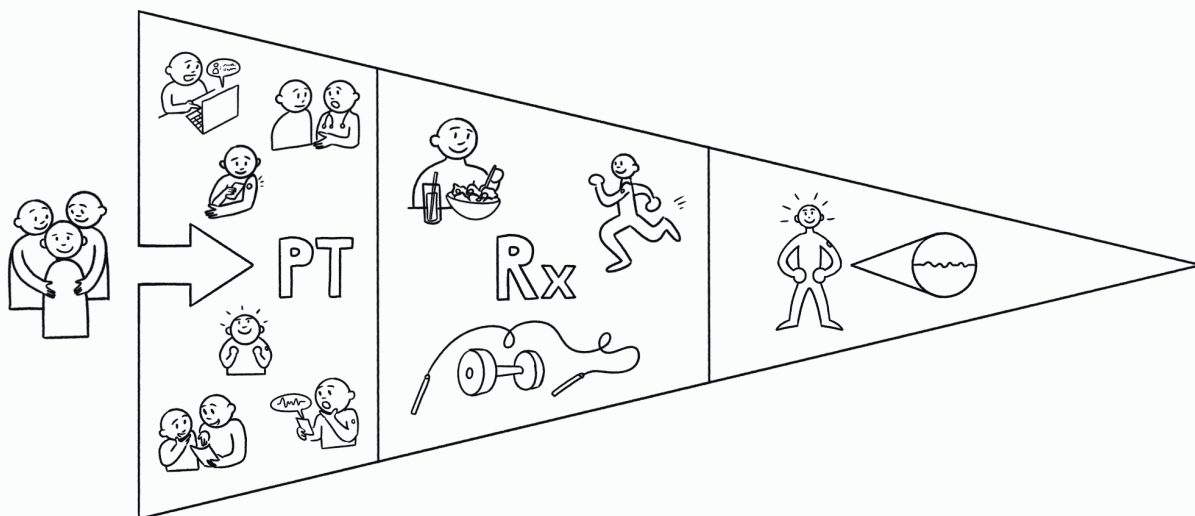
Putting it all together: Power to Empower

Figure 10: Future State Concept for Care

52

Combining our provocations, we built a strategy for the future of diabetes.

In our strategy, the experience is centered around recognizing people are highly motivated to know their bodies, learn how to manage their condition and are empowered to make decisions that improve their quality of life. The primary focus is on the context of the person's life and understanding Type 2 Diabetes is prioritized.

Figure 10 shows what the new journey of empowerment would look like. At diagnosis, the health care provider clarifies that it is not a person's fault and explains the combinations of factors that can lead to diabetes and provides optimism that there are many options including lifestyle.

Following the initial diagnosis, the PLWT2D has no delays in their learning journey. The diagnosis triggers two separate but distinct events: an introductory meeting with their coach within the next 48 hours, and onboarding onto a CGM. Patient centric model starts by valuing the unique nature of people's lifestyle in relation to their glucose.   The family members are encouraged to join the learning so they can support in meaningful ways. The CGM is the first step in personalized insights that will guide shared decision making. The person works with the coach to develop a clear short term and long-term plan which maximizes the patients' health literacy and knowledge of their own unique body. Through achieving a sequence of short-term goals, the patient is aligned to achieving a long term vision for their health.

Using a health coach to increase health literacy, empowerment and engagement in the health journey can encourage preventive actions to mitigate disease progression. The competency of the coach to use a strength-based model, by facilitating observation of positive examples of changes will reinforce healthy behavior and using motivational interviewing techniques for people to make choices that work within the context of their lives.   Reflecting on these behaviors can activate more positive behaviors for ongoing improvements. Health coaches understand the COM-B model and listen for barriers and opportunities as it relates to a person's capabilities, opportunities and motivations and creates plans to help in these areas.

The primary care practitioner in this journey supports the biomedical needs of the person and provides expert recommendations based on clinical guidelines and pharmaceutical management. They still meet with the patient, to review their progress and adjust their medications accordingly. The coach takes notes throughout their meetings with the patient, which live in the patient's chart for the primary care practitioner to review.

Throughout the journey, the person stays at the center, taking preventative actions and the need for additional provider support and hospitalization is lessened due to the high level of involvement. Through this collaborative framework, patients can meet with coaches trained to help improve their behavior, equipped with tools to provide them with insight and supported with both biomedical and lifestyle expertise.

The model shows that there is much more activity around patient learning and taking actions using tools to support them. Along with their families, they adopt new lifestyle patterns that reduce their risk of progression and therefore less requirement on the healthcare system.

Futures and Scenarios

To effectively design for the future, we have adopted a comprehensive approach that involves analyzing signals in the changing healthcare environment, turning the signals into trends, extracting drivers, and building a robust strategy.

1. **Found Signals in Changing Health Care Environment:** We start by closely monitoring the healthcare landscape and identifying signals of change. These signals can come from various sources such as technological advancements, policy changes, and shifts in patient preferences. By actively seeking out these signals, we can stay ahead of the curve and understand the evolving needs and challenges within the healthcare system.

2. **Identifying the Drivers of Change:** Through our trends, we identified the drivers of change. We looked at drivers through the STEEP-LV prism, our drivers include social shifts, technological advancements, environmental and economic transitions, political and regulatory changes, or cultural pivots. By understanding the underlying drivers, we can anticipate how these trends may evolve and impact the healthcare landscape.

3. **Developing Four New Scenario Worlds**: Based on key uncertainties that we have identified from our drivers, we develop four new scenario worlds. These scenario worlds serve as alternative futures that are influenced by different combinations of uncertainties. By exploring and imagining these different scenarios, we were to identify potential risks and opportunities as uncertainties ebb and flow.

4. **Using Wind Tunneling as a Futures Framework:** To further validate and refine our strategy, and identify barriers and enablers, we use a futures framework known as wind tunneling. This framework allows us to simulate the implementation of our strategy in each scenario world and assess its effectiveness. By testing our strategy in these simulated environments, we can identify any gaps or areas of improvement and make necessary adjustments.

By adopting this approach, we can design for the future with a deep understanding of the changing healthcare landscape and the potential impact of emerging trends. This ensures that our solutions are not only innovative but also well-aligned with the evolving needs of patients and healthcare providers.

Documenting Trends and Drivers

Digital Therapeutics continue to grow and evolve

Abbott & Weight Watchers partner to support Diabetes patients.

Description: As part of the Weight Watchers diabetes program, customers can use the Weight Watchers app, integrated with their blood glucose data to see how food impacts their body. In addition, through their plan and subscription they can see how healthy eating can impact their diabetes.

Implication: Coaching and technology help people better understand their bodies and what to do when their blood glucose spikes or crashes.

Link: https://abbott.mediaroom.com/2023-09-19-Abbott-and-WeightWatchers-Connected-App-Experience-is-Now-Available-for-People-Living-with-Diabetes

Abbott builds and releases the Lingo

Description: The Abbott Lingo takes the traditional CGM and attempts to bring it to the masses. Using a mix of technology, gamification and coaching, the device and accompanying subscription plan helps every day users learn about the impact of sleep, stress, food, and exercise on blood glucose - and how they can better manage their condition for *points/recognition*

Implication: Managing and learning about blood glucose does not need to be fenced off for people living with diabetes only. Understanding how our body works, reacts, and is impacted by our lifestyle helps normal people *biohack*.

Link: https://endurance.biz/2024/industry-news/abbott-hits-the-ground-running-with-new-lingo-consumer-biowearable-app/#:~:text=Originally%20unveiled%20by%20Abbott%20in,personalised%20insights%20and%20customised%20coaching.

Klick Health announces new AI tool that uses 10 seconds of voice to screen for diabetes

Description: Klick Labs has created an AI model that uses 10 seconds of voice audio to screen for type 2 diabetes. The study found that the AI had a test accuracy of 89% in women, and 86% in men.

Implication: The ability to remotely screen patients using an AI tool increases accessibility and potential for early diabetes diagnosis. This tool can be used in rural areas or across countries to easily diagnose patients with Diabetes.

Link: https://www.klick.com/news/ai-and-10-seconds-of-voice-can-screen-for-diabetes-new-study-in-mayo-clinic

56

Information Flows are Evolving

Lower trust in science and providers due to misinformation, reflecting politicization of healthcare

Description: The pandemic resulted in conflicting mandates and legislations rolled out in political parties. Health care misinformation and lack of trust in science increasing in social media is a global threat. The WHO acknowledges that misinformation has become a serious threat to public health. Misinformation and disinformation result in the erosion of trust in healthcare providers. Voices of authority and experience are outweighed by activities of social 'influencers' with highly engaged followers. 15% of the most habitual news sharers are responsible for 30- 40% of fake news.

Implication: At a macro level, distortion of science can impact healthy populations and interfere with population health initiatives. Measles, covid and other infectious diseases are greater health risks because of misinformation about health and healthcare professionals. At a micro level interaction, practitioners must spend more time correcting misinformation, and patients are at risk of reduced agreement to take medication. Potential increase in progression of disease and severity of health related issues may increase the burden of costs on the health system.

Link: https://www.weforum.org/agenda/2023/12/trust-in-science-and-healthcare-drops-to-new-lows-wef24/

Rise of Tik Tok for Ozempic and Healthcare.

Description: Survey from CharityRx shows 1/3 of GenZ consult TikTok for health advice and another 44% turn to YouTube before turning to their doctor. Overall 1 in 5 Americans reportedly consult TikTok before their doctor. They say they trust health influencers more than medical professionals in their community. Top reasons include accessibility, affordability, and approachability. The company 'WellTheory' just introduced a platform for people with autoimmune conditions which just announced it raised 7.2 million in seed funding. High level of influence comes from influencers who share personal experiences with disease, followed by having triumphed (remission).

Study of the first 100 videos with hashtag #ozempic on TikTok viewed 70 million times. Less than 5% of videos mentioned off label use. Many videos were uploaded by non professionals and advocated for by celebrities. This caused shortages for people with diabetes. The potential of TikTok to reach masses without evidence based medicine is exponential.

Implication: Health care providers and regulatory bodies face the impact of social media's power to drive patient behavior and build demand.

Decrease in access to care and approachability of patient centric care, may drive more people to social media for health advice. Chronic conditions may go untreated and people may risk an increase in disease progression or lack of evidence based care leading to lower population health.

Misinformation and off label use can be amplified significantly across the population. Credibility and trust in influencers in other domains (i.e. beauty, fashion) bleeds into healthcare.

Link: https://www.forbes.com/sites/debgordon/2022/12/20/33-of-gen-zers-trust-tiktok-more-than-doctors-new-survey-shows/?sh=21c821196c7b

https://www.news-medical.net/news/20231005/How-is-TikToks-Ozempic-trend-impacting-diabetes-patients.aspx#:~:text=Overall%2C%20the%20first%20100%20search,21%2C207%20likes%2C%20and%20544%20comments.

AI grows risk of deepfakes and misinformation.

Description: Medical deepfakes use AI to manipulate medical data, images, or videos. They introduce new risk for the malicious use of health misinformation, and with limited regulation, are growing. Researchers at Flinders University were able to produce 100 misleading and deceptive blogs, images, and videos to promote health disinformation using Generative AI.

Without regulation, social media sites have attempted to moderate deepfakes and GenAI misinformation. However, the same social media sites have also notably downsized their content monitoring staff, risking their total effectiveness. On TikTok Shop, merchants are defrauding consumers, publishing videos featuring deepfake doctors to deceive buyers into believing their health products are being promoted by professionals. These videos have garnered more than 10 million views.

Implications: Some social media sites like YouTube have taken to validating health care professionals before allowing them to create and share content on their platform. This extra step introduces strict criteria and requirements and creates tension against the ethos of a free internet society creates, viewers and users have become accustomed to. These policies, while needed, also run the risk of reinforcing distrust in authority.

Link: https://news.flinders.edu.au/blog/2023/11/14/medical-researchers-find-ai-fails-pub-test/

https://www.mediamatters.org/tiktok/deepfake-doctors-are-selling-sketchy-health-products-tiktok

Decentralized Models of Care are being explored

Providence Health launches remote care for Diabetes

Description: Through a partnership with health technology company Cadence, the health system will add an Remote Patient Monitoring solution and a responsive virtual care program to enhance chronic disease management. Through these tools, the two organizations plan to combine technology and a nurse practitioner-led clinical care team to review patient vital signs outside of clinical locations, the press release notes.

Implication: Of the 300 patients participating in the program, 89 percent take vitals daily, and only 0.2 percent of remote encounters escalated to engagement with Providence clinicians, according to the press release.

Link: https://mhealthintelligence.com/news/providence-launches-remote-patient-monitoring-program-for-chronic-care#:~:text=In%20June%202022%2C%20the%20two,and%20guideline%2Dbased%20medication%20management.

SuperWIN1 trial at Kroger

Description: Kroger, a US supermarket utilized in-store registered dieticians to provide community based counselling to patients with hypertension. The primary endpoint was change in dietary approaches to stop hypertension (DASH) score from baseline to 3 months. The trial used dieticians to provide in person counseling and data guided interventions. Another smaller cohort also included online tools for meal planning, recipes, and healthy purchases.

Implication: At 3 months, the DASH score increased by 4.7 vs a control group with no dietitian consultations. In a prespecified hierarchical test, at 3 months, DASH score increased by 3.8 more for the group that received additional meal planning, recipes and purchasing tools.

Link: https://www.nature.com/articles/s41591-022-02077-7

Pharmacist-Led Interventions Can Improve HbA1c in Underserved Communities

Description: The findings of the study suggest physician and pharmacist collaboration may lead to better health outcomes for some patients, compared to receiving care from just a primary care physician.

Implication: "They demonstrate the potential of collaborative care such as this to improve diabetes outcomes, relative to care received from a physician alone, irrespective of ethnicity," Narain added. "The magnitude of the difference is consistent with what might be achieved by adding another medication for diabetes. The benefits were observable even after a single visit with a pharmacist."

Link: https://www.hcplive.com/view/pharmacist-led-interventions-can-improve-hba1c-in-underserved-communities

Pharmacist scope of practice grows

Description: Ontario expands scope of practice for Pharmacists to include acute care and prescribing for 19 minor ailments . In Alberta, pharmacists enjoy additional prescribing authorization that grants them greater autonomy to independently select, initiate, modify, and monitor all prescription drugs, excluding narcotics and controlled substances. Struggling with doctor shortages, Nova Scotia has leaned on Pharmacists by growing pharmacist-led clinics that support primary care

Implication: Health systems are looking to innovative and resource efficient alternatives to the traditional primary care model. Provinces across Canada have explored new models of care centered on pharmacists as the primary care clinician. This includes increasing their scope and providing them the appropriate space and tools to provide care, in high-need communities. The new model attempts to meet Canadians where they are, improve accessibility and create new care pathways to support both acute and chronic conditions.

Link: https://www.hrreporter.com/focus-areas/compensation-and-benefits/ontario-expands-pharmacists-scope-of-work/380155

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7603659/)

https://atlantic.ctvnews.ca/pharmacists-in-n-s-say-they-want-to-do-more-to-support-the-strained-primary-health-care-system-1.6512236)

System continues to invest in the biomedical model

Anti-obesity medication market grows exponentially

Description: Over 85 different anti-obesity medications in the pipeline. Seven different medications besides Ozempic are up for FDA approval. There are many different types of anti-obesity medications including injections and oral tablets

Implications: Demand for anti-obesity medication continues to remain high. However, the medication is not a catch-all as two thirds of patients who stop taking the medication re-gain their weight. Other side effects like loss in muscle health are resulting in adjacent biomedical innovation as new anti-obesity medication can be paired around muscle atrophy prevention therapies.

Link: https://www.nature.com/articles/s41366-024-01473-y

Time in Range Replaces A1C as higher value glucose metric

Description: Time in range (TIR) is an outcome metric that measures the percentage of time a person stays within a healthy range. The International consensus committee on TIR recommended a standard of 70% as a new goal for PLWD. TIR is a metric for long-term health outcomes in the Type 2 Diabetes population. It provides more actionable data in real time, showing how lifestyle affects glucose variability. A1C, the traditional measure of blood sugar control, does not reflect glycemic control accurately and can be influenced by many factors. Glucose variability is linked to the risk of low and high blood sugar, which can cause micro and macro vascular complications. Studies show that A1C control does not lower the chances of macrovascular events or death. For every 10% decrease in time in range, there was a .8% change in A1C.

Implications: As time in range becomes better understood as a valuable biomarker to show glucose variability, clinicians and patients will desire access to see how their own glucose is affected by factors that may have agency to improve. The standardization of TIR

60

being an intuitive and more 'patient centric biomarker, may increase the dependency on CGM for improved self management in the patient's medical home. Clinicians may be more empowered to provide personalized/individualized advice for management including lifestyle as medicine.

Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7814148/

New 1 hour procedure to allow insulin patients to get off medication earlier

Description: A new endoscopic procedure called re-cellularization via electroporation therapy (ReCET) showed promise in a small, early-stage study, allowing Type 2 diabetes patients to come off insulin for a year. They believe ReCET rejuvenates the tissue in the small intestine, allowing the body to respond to its own insulin again.

Implications: Money continues to be invested in point-in-time acute remedies like GLP-1s and intensive procedures. The broader opportunity around sustainable, self-led, lifestyle improvements remain under-indexed.

Link: https://www.advisory.com/daily-briefing/2023/05/02/diabetes-procedure

Physicians ill prepared for the demands of chronic disease

Untrained Clinicians struggle to manage obesity

Description: A third of medical school deans and curriculum staff surveyed indicated that they lack obesity education. Two thirds of primary care providers indicate that having more time with patients would improve their ability to provide obesity treatment.

Implication: Lifestyle education is underinvested and as a result, providers over index on biomedical therapies (i.e. prescriptions and medication) to support patients living with chronic conditions. Beyond that, lifestyle counselling requires more time from clinicians. With GLP-1s flooding the market, a sustainable model is required that focuses on lifestyle improvements.

Link:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6988262/#:~:text=Forty%20of%20141%20 0medical%20schools,no%20plans%20to%20develop%20one.

Stigma and PLT2D Impact

Description: Recognition of the impact that stigma may play on people performing important day to day functions to manage their diabetes has received increased discussion by advocacy groups, ADA, CDA and medical education initiatives. Stigma, defined as judgement, discrimination and prejudice comes from the false idea that people with diabetes made unhealthy food and lifestyle choices which caused their diabetes. Internal stigma is the belief people have of themselves and external stigma is society, health care and people. Stigma is shown to be a barrier for people to a successful journey in management.

Implication: Without an intervention strategy to dismantle stigma, populations are at risk of avoiding care and changing behaviour that would impact better health outcomes.

PLWT2D will be less motivated to adopt evidence-based practices and this dynamic may not be known by practitioners as the root cause.

Link: https://www.cdc.gov/diabetes/library/features/diabetes_stigma.html

Medical Students lose Empathy throughout Medical School

Description: Although empathy in healthcare can benefit patients and practitioners (reducing pain, improving satisfaction and, for practitioners, reducing burnout), there is a decline in empathy over each consecutive year of medical school. The decline may be cultural as the US shows the greatest level of decline vs Far East Schools that demonstrate an increase in empathy. Four major themes that identify why include stressful work environment, time pressure, focus on biomedical models, tick-box empathy training. Root causes include hidden curriculum, stressful workloads, lack of peer support, prioritization of biomedical knowledge.

Implications: Medical schools producing MDs who are less prepared to meet people where they are at and consider a holistic care model. Students are less prepared to embrace a shared decision-making model required in chronic disease management. Increased cynicism, distancing, and desensitization. Patients may turn to additional sources for medical care if they do not feel seen and heard. As an example: studies show that doctor of osteopathy (DO) graduates' empathy does not decline to the same degrees of standard medical schools because of emphasis on curriculum focusing on holistic, patient centered, collaborative and compassionate care.

Link: https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-023-04165-9

Alice Walton School of Medicine

Description: MD program enhances conventional medical education with a whole person approach to care. Innovative teaching methods including mental, physical, social, and emotional well-being. classes in 'whole person coaching and self-care training for students. Evidence based program with inclusive and collaborative approaches to care designed to promote resilience, prevent disease, and restore health. The education will use active learning methods such as simulations, case based learning and small group activities. The program is called ARCHES- and includes 6 core elements: A-art of healing R-research, entrepreneurship, and innovation C- clinical care H-health system sciences E-embracing the whole health S-science of medicine.

Implications: Physicians will be better equipped to provide care in the context of a person's life, respecting that each person is unique. Graduating students will be more willing to share decision making. Physicians will have increased competencies that can meet the emotional and functional needs of people.

Link: https://www.axios.com/local/nw-arkansas/2023/09/05/bentonville-medical-school-health-nonprofit-alice-walton

Patients seek to reduce medication through lifestyle therapy

Virta Health posts triple digit growth

Description: Virta Health, a diabetes remission company, has grown exponentially, reaching triple digit customer growth in 2021 and partners with 350 large employers. Their virtual-first platform adds new peer reviewed research demonstrating efficacy in managing and enabling diabetes remission through diet. They have launched a Road to Reversal initiative with patients across the US sharing their experience reducing their weight, improving their lifestyle and most importantly, the medications they are taking.

Implications: Patients continue to seek alternatives for medication therapy. Many Virta Health customers are beginning with multiple diabetes related medications prescribed and use Virta health, a mix of coaching and lifestyle adjustments, to lose weight and reduce dependence on medication. A recent survey commissioned by Virta health shows that 50% of patients would switch providers if it included diabetes reversal therapy. The reduction of medications and reversal of diabetes is a key job to be done in recently diagnosed diabetes patients.

Link: https://www.virtahealth.com/press/new-executives-2023-growth

https://www.virtahealth.com/road-to-reversal

LifestyleRx seeks to reduce dependence on medications

Description: Lifestyle Rx seeks to reverse diabetes through a twelve-week program. They were recently admitted into the Y Combinator 2023 cohort, a prestigious incubator for high-potential start-ups. The company uses virtual physician visits, virtual group sessions, weekly lessons, and recipes, as well as self-assessment and personal health reports (from labs) to provide comprehensive care. Their program uses the 4+2 diabetes reversal strategies which include: eating healthier food to manage insulin, exercising, managing alcohol and liver health, focusing on fat burning, improving sleep and stress management.

Implications: Lifestyle Rx hits multiple key jobs to be done: virtual physicians with routine visits, lessons to learn more about diabetes, peer support and a keen focus on self management. Surprisingly, Lifestyle RX does not include a CGM to help enable these goals.

Link: https://www.ycombinator.com/companies/lifestylerx

https://lifestylerx.io/diabetes-reversal

Continuous Blood Glucose Meter usage grows among people without Diabetes

Description: People without diabetes are looking to use CGM meters like Abbott's Freestyle Libre and Dexcomm's G7 to manage their health. CGM manufacturers are beginning to encourage growth in the meter for broader populations by pivoting to messaging like "optimizing blood sugar for peak mental and physical performance". Members of the public gravitate to CGM use due to fear of gaining diabetes, optimizing their nutrition with a focus on glycemic responses and improving athletic performances.

Implication: Biohacking or optimizing the way our body performs by managing lifestyle factors is growing. In the study, members of the public are using CGMs to change their food order, better manage their caloric intake or avoid health complications in the future. The growth of a health-conscious public shows in other avenues as well, including nutrition (AG1), wearables (Apple Watch) and exercises (peloton, apple fitness).

Link: https://wchh.onlinelibrary.wiley.com/doi/full/10.1002/pdi.2475

The frontline is crumbling

Nursing Shortage

Description: There will be a nursing shortage of 117,600 by 2030 which is partly due to the impact that Covid 19 contributed to burn out. Seventy percent of nurses reported mental health worsening during the pandemic and 96% said workplace demands caused them to leave the profession.

Implications: Lack of access to primary care places increase demands on hospitals and other allied health professionals particularly nurses. Without the appropriate number of nurses to work in hospitals, people will be unable to seek timely care leading to worsening of health conditions.

Link: https://hospitalnews.com/how-global-nursing-talent-is-driving-healthcare-system-transformation/#:~:text=In%202022%2C%20two%20years%20into,of%2033%2C000%20nurses%20by%202028.

Admin and unmanageable case loads impact provider

Description: Providers are shedding patients as case loads become unmanageable. Some patients are being sent letters from the primary care provider advising them that they no longer have a space for them in their practice citing an inability to keep up with the workload or size of the patient roster. Some simply mention 'for personal reasons'.

Implication: People feel that health care is no longer a right of Canadian citizens as it stipulated in our constitution. They may feel more fearful and vulnerable in the face of health care problems with no one to care for them. Awareness of these actions may fuel empathy from some or lack of trust from others.

Link: https://toronto.citynews.ca/2022/12/07/ontario-family-doctors-caseloads-unmanageable/

Canada is growing and becoming more diverse

Description: By 2041 half of the Canadian population will be made up of immigrants and their Canadian born children. 1 in 4 Canadians will be born in Asia or Africa. 2 in 5 Canadians will be part of a racialized group. Black population will surpass the Chinese population. Canada will have the highest percentage of first-born citizens than any other G8 country with more than 200 ethnic origins.

Implications: Health care will need to be available to respect people's language and cultural considerations for receiving care. Patient centered models of assessing and

aligning on needs will be even more crucial. Advanced support services as well as providers who have training in cultural sensitivities around health care will be important.

Link: https://www.thestar.com/news/canada/canadas-population-hits-41-million-growing-by-a-million-in-just-nine-months/article_021a0bd0-ed20-11ee-9e9a-bfd1e944d4f5.html?utm_source=Twitter&utm_medium=SocialMedia&utm_campaign=National&utm_content=canadapopulation

New medical students do not want to go into primary care.
https://universityaffairs.ca/features/feature-article/can-new-approaches-to-medical-curriculum-solve-the-family-doctor-shortage/

Description: With the number of family physicians not being able to meet the needs of Canadians, less than 50% of medical students are choosing to go into family medicine and Canadian medical schools only graduate approximately 3000 per year. This is only 700 new graduates per year. And given that nearly 20% of the 47,000 family doctors in Canada are planning to retire there is a need for more graduates. The rates of medical school students choosing family medicine is down 40.2 % from 2008.

Implications: Additional health care providers or other supports will need to be available to care for people to prevent increased decline in population health.
The potential for more minor illness to be referred into specialty or emergency rooms is possible. Primary care will start to be seen as a place that may not provide the best care. Also increase burnout on those primary care providers due to increased wait times

Link: https://www.cbc.ca/news/canada/toronto/oma-declining-number-medical-school-students-family-medicine-1.7182901

Scenario Mapping

How scenario mapping works

To envision and prepare for the future, we employ a foresight methodology known as scenario mapping. Drawing from the emerging trends and signals in our environment, scenario mapping enables us to imagine multiple alternative futures and gain valuable insights into the potential impact of these futures on our organization.

Scenarios are not predictions, but rather tools that transport us to the future and enhance our ability to imagine different possibilities. According to the Futures Platform (2023), Scenario analysis allows us to

(1) Think about future changes in a systematic and structured manner

(2) helps us understand how potential future changes may impact our plans and strategies, and

(3) provides a fresh perspective on the current situation, uncovering new possibilities and opportunities (Veltheim, 2023).

Our scenario mapping process involves several key steps:

1. **Looping Signals into Trends:** We start by identifying signals of change in our environment. These signals could be technological advancements, social shifts, economic factors, or policy changes. We then analyze these signals to identify emerging trends that have the potential to shape the future.

2. **Bucketing Trends into Drivers of Change:** Next, we categorize the identified trends into drivers of change. These drivers represent the underlying forces or factors that are influencing the trends. By understanding these drivers, we can gain deeper insights into the dynamics and potential trajectories of the trends.

3. **Identifying Critical Uncertainties:** From the drivers of change, we recognize that some may continue their current trajectory, while others have the potential to evolve along multiple trajectories. We carefully select two critical uncertainties that we believe have the most variability and uncertainty associated with them.

4. **Creating a Scenario Map:** The two critical uncertainties form the axes of our 2x2 scenario map. Each uncertainty represents a different pole along the axis, creating four distinct quadrants. These quadrants serve as the outer boundaries for scenario definition.

Through this exercise, we uncovered four separate scenarios that could emerge based on different combinations of the critical uncertainties. Each scenario represents a unique future, and our strategy would be impacted differently depending on which scenario comes to fruition.

By employing the scenario mapping methodology, we can explore a range of possible futures and gain a deeper understanding of the uncertainties and risks that lie ahead. This allows us to develop a more robust and adaptive strategy that can thrive in a variety of future scenarios.

How we chose the critical uncertainties

Critical uncertainties refer to the drivers that have the potential to trend in different directions, significantly impacting the innovation of new business models and the way organizations operate. By recognizing and understanding these critical uncertainties, we can effectively navigate uncertainty, build resiliency, and explore new possibilities.

To identify our critical uncertainties, we first bucketed the identified trends into drivers. This process allowed us to categorize the trends based on their underlying factors or forces across STEEP-V.

Next, we mapped the direction of these drivers. Some drivers are relatively static and expected to continue in their current direction. For example, physician burnout has been a persistent concern in the healthcare industry for the past decade, and with more doctors retiring will continue to escalate. There isn't a scenario, in which the retirement of doctors can be delayed. Similarly, the investment in the biomedical model has been ongoing and is expected to continue through new surgeries and pharmaceuticals. These drivers are considered more certain and have a relatively predictable trajectory.

However, as we mapped the direction of the drivers, we also identified those that are less certain. These are the drivers where the future direction is more uncertain, and multiple possibilities exist. For instance, new models of care are constantly being explored, but there is no consensus on a dominant alternative. This uncertainty opens the possibility for different scenarios to emerge. It could mean that care continues to be centralized in hospitals and primary care centers, or it could lead to a proliferation of alternative care models within communities. These uncertain drivers are the ones that we were the most unsure about and became the focus of our analysis.

By identifying these critical uncertainties, we can explore the potential impact of different scenarios and adapt our strategies accordingly. This exercise helps us consider a range of possibilities and make informed decisions that can withstand future changes and uncertainties.

Table 1: Critical Uncertainties

Driver	Direction	Critical?
Digital Therapeutics continue to grow and evolve	**Uncertain:** digital therapeutics are growing but a dominant model does not exist, and efficacy has not proven out	N

Information Flows are Evolving	**Uncertain:** the rise of misinformation, coupled with the breadth of different information sources creates the opportunity for multiple futures	N
Decentralized Models of Care are being explored	**Uncertain:** governments and health systems continue to explore innovative models of care to meet the needs of patients.	**Y:** System response to physician gaps will impact quality of care
System continues to invest in the biomedical model	**Static:** investments into biomedical interventions will continue	**N/A**
Physician ill prepared for the demands of chronic disease	**Static:** a critical mass of physicians will remain untrained in managing chronic diseases	**N/A**
Patients seek to reduce medication through lifestyle therapy	**Uncertain:** as new medications (i.e. GLP-1s) come into the market, patients may oscillate between traditional biomedical interventions and lifestyle therapies. There are multiple futures possible.	**Y:** The transition of unmet to met needs will be critical in determining futures
The frontline is crumbling	**Static:** A critical mass of doctors will still be retiring over the next decade. Caseloads and replenishment of physicians in family health will continue to be challenges for systems.	**N/A**

Creating the Scenarios

After analyzing drivers our change, we landed on two critical uncertainties:

1. Whether decentralized models of care are supported and proliferate as a function of health system funding or whether traditional modes of care continue to retain dominance in funding and support from the system

2. Whether patients choose to pursue pharmaceuticals,surgeries and the biomedical model to manage their diabetes or if they emphasize lifestyle changes to manage diabetes

These two critical uncertainties helped us create the two-by-two scenario map
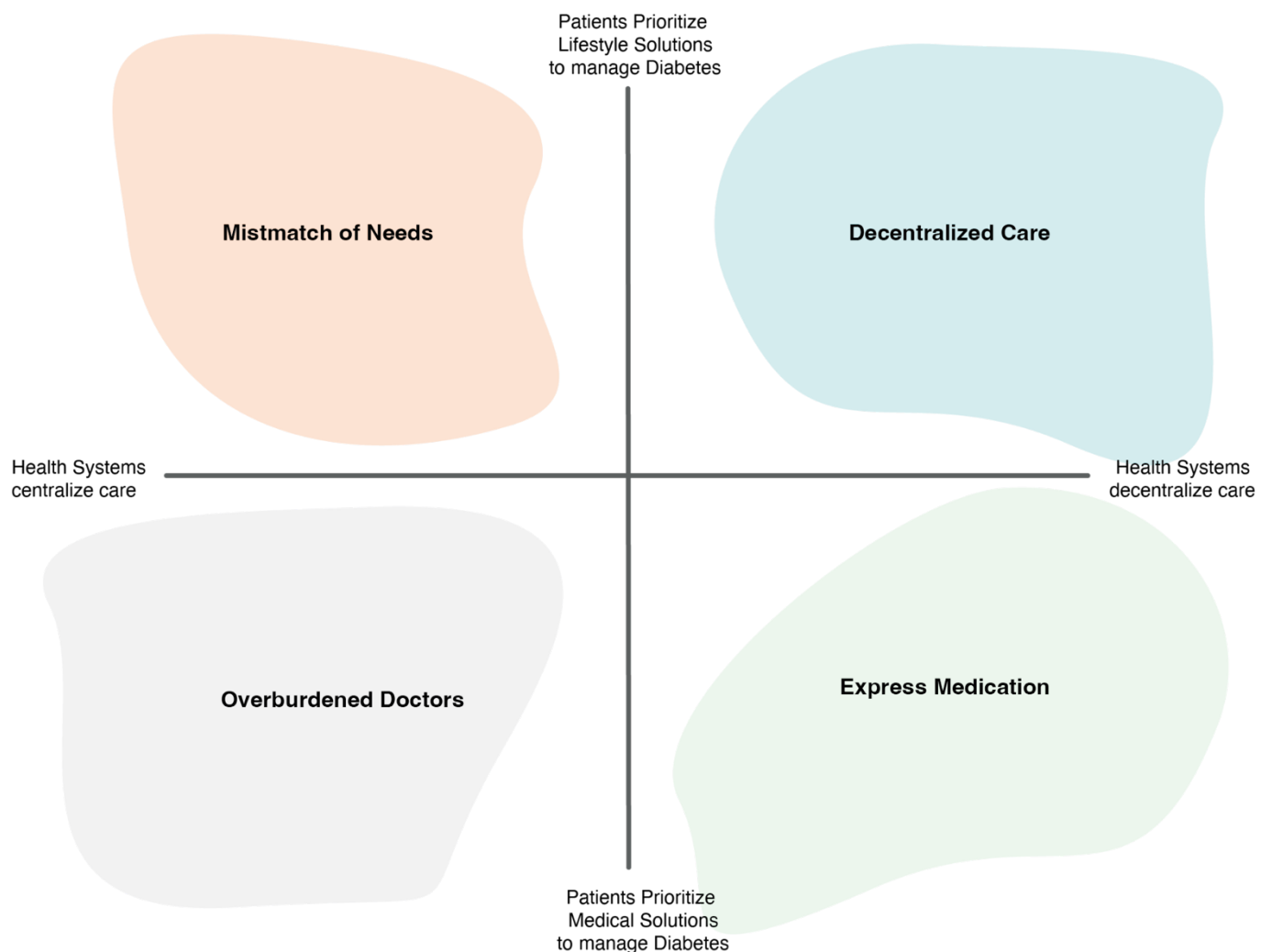

Figure 11: Scenarios for Design

In the Mismatch of Needs scenario, several key concepts shape the healthcare landscape and the experiences of people living with diabetes. These concepts highlight the transformative shift occurring within the healthcare system and the efforts made to address the challenges and opportunities associated with diabetes management.

1. **Inconsistent care from primary care providers:** Time and availability from primary care providers continues to be a burden. Meetings with patients are sporadic and far apart. Caught between providing patient care and administrative chores, physician efficacy for lifestyle remains hit or miss. Beyond appropriate coaching, language continues to be a challenge. Some doctors have bought into the impact of stigma; however, others are finding it challenging to adjust the way they think and behave around a condition linked to lifestyle choices.

2. **Online Communities for Support and Inspiration:** Since PLWD are still unable to receive adequate care due to an overburdened primary care system, they seek additional support through online communities and social media platforms. These spaces provide a platform for sharing experiences, coping strategies, and emotional support among individuals managing their conditions. However, contradictory advice and information overload can create challenges in decision-making. As a result, politicians, advocates, and health systems invest in misinformation detection tools and are routinely creating awareness campaigns to mitigate population health harm.

3. **Inequality in Care and Access:** Recognizing the need for coordinated care, systems invest more into family health teams and syncing medical systems. However, communities without a critical mass of physicians still need to resort to solo practitioners. As a result, those with access to comprehensive care and community support have better outcomes compared to those solely relying on overburdened doctors. Efforts to address this inequality through virtual care gain momentum, emphasizing personalized approaches and leveraging patient feedback and data.

4. **Personalized Approaches and Decision-Making:** The healthcare system increasingly prioritizes personalized approaches, incorporating patient feedback and personalized data in decision-making. Doctors rely on tools and resources to provide tailored direction and support to patients via precision medicine. The pivot to technology to overcome doctor shortages, increased demand and evolving conditions help reduce some of the decision-making pressure on healthcare providers.

5. **Patients still feel they need support:** while doctors are more available and investment into coordination has helped make healthcare accessible to many more, patients still feel they lack the appropriate support to overcome diabetes. They are searching for the right tools to help them make their own decisions and this frustration leads them to test different methods outside of the purview of their care providers.

Scenario 2: Overburdened Doctors

The system is grappling with an overwhelming number of patients and a severe shortage of doctors. This imbalance creates immense pressure on healthcare providers, leading to strained resources.

1. **Doctors are overburdened:** Doctors find themselves facing an ever-increasing workload, with too many patients and not enough time to adequately address their needs. Compounding the problem is a lack of focus on preventative medicine, which further strains the healthcare system. Doctors are unable to provide the adequate counselling required to support preventative medicine, they meet patients too infrequently and the number of Canadians without a family doctor has increased significantly. As a result, patients are unsure what needs to be done to prevent chronic diseases.

2. **System reacts by growing and innovating via technology:** To cope with the overwhelming demand, hospitals and healthcare facilities continue to expand, with tall buildings becoming even taller. Recognizing the need for innovative solutions, AI tools are implemented to reduce the administrative burden on doctors. These technologies aim to streamline processes, improve efficiency, and free up valuable time for doctors to focus on patient care. While these advancements hold promise, they also present challenges in terms of standardization across clinicians, data privacy, and maintaining the human touch in healthcare. Despite these efforts, the strain on the system remains, and patients experience long waits to meet physicians.

3. **Auditing as a service:** As AI technology penetrates healthcare it creates a confounding problem - accuracy. The risk tolerance for healthcare professionals remains low, and fear of mistranslation through scribe-like tools creates an additional burden for healthcare providers. As a result, auditing charts, reviewing prescriptions and therapies from physicians becomes a natural new cost to the system.

4. **Reactive, not preventative:** The emphasis on reactive rather than proactive approaches means that doctors are often caught in a cycle of addressing

immediate needs rather than preventing health issues before they escalate. This reactive mindset widens the know-do gap, leaving doctors unable to practically apply the knowledge they acquire through continuous learning.

5. **Biomedicine continues to evolve:** Biomedicine continues to innovate with new GLP-1s and related medications launching routinely. The pipeline is flush with new therapies to manage diabetes and other chronic conditions. While these medications are clearly helping to prevent diabetes advancement, the cost of medicine continues to skyrocket.

6. **New limitations from payors:** Payors react by seeking to limit who can access specialty treatments and medications like GLP-1s. As a result, patients face financial barriers to receiving necessary medical care, this phenomenon is further exacerbated by increasing difficulty of them getting in front of doctors unless their needs are acute or urgent.

7. **Impact of medications to health literacy:** Virtual direct to consumer avenues erupt so patients can access GLP-1s and other new innovative medications, turning doctors into vehicles for prescribing rather than counselling. For patients, health literacy remains low, as they seek information from various sources, often lacking credibility. Additionally, for some patients, a lack of trust in their providers has led to the emergence of alternative support models outside of traditional healthcare settings. This lack of trust is a result of multiple factors, first the amount of misinformation in the knowledge ecosystem, but also a lack of familiarity with their physician. As many do not have a stable healthcare provider, new faces mean less trust.

Scenario 3: Express Medication

In Express Medication, the healthcare landscape has undergone significant changes. To manage the demand for care, health systems have increased scope for community providers like pharmacists and have attempted to decentralize the way care is provided through virtual care.

1. **Localized prescribing experiences:** Pharmacy-based prescribing has been implemented as an alternative method for patients to access medications used to manage diabetes. Due to the lack of accessibility in meeting with physicians, pharmacists have stepped into actively screen and flag patients who are eligible for diabetes medications. The decentralized approach has created new avenues for care in remote communities and has helped mitigate some of the burden for physicians. However, coordination of care remains challenging as disconnects between professions, systems and communication create gaps in handoffs.

2. **Patient demand for medicine:** The influence of social media and platforms like TikTok have created a flood of people seeking trending medications, including GLP-1s. In response, pharmaceutical companies have doubled their efforts by developing new therapies. However, patients using GLP-1s often face challenges in maintaining their weight when they go off the medication. This creates on-cycles where patients are using the medication and then off-cycles in which they regain much of their weight.

3. **Evolution of medication:** While new specialty medications like GLP-1's have shown immense improvement in A1C levels for patients, they did come with their own side effects. Some patients experience muscle atrophy among other unintended health outcomes. Providers began medication stacking, adding other prescriptions to prevent muscle atrophy and other side effects.

4. **Payor funded support:** To minimize their costs and reduce the number of patients see-sawing between cycles, payors invest in diabetes educators, dieticians, and other specialists to coach individuals taking glp-1s so that their improvement can be sustained. As a result, patient-primary care physician relationship has been deprioritized, with primary care physicians having less involvement in the management of chronic conditions like Type 2 diabetes. These changes have contributed to an increase in inequality in healthcare access and outcomes, people with insurance receive access to cutting edge medications bookended by care from allied health professionals and educators.

5. **Digital Therapeutics continue to grow**: lack of access and an overburdened system leads patients to leverage digital therapeutics to learn about their body and get counseling. Some therapeutics are paid for by payors, however, most utilize a freemium model. Alexa, amazon's voice-initiated personal assistant, can now detect whether you have diabetes through voice analysis. While the diagnosis is free, the plan and subsequent clinician support requires you to pay an additional subscription cost.

Between the overburdened physicians and the demand for expensive therapies, the most at-risk and least well-off fall through the cracks. Unable to get timely care, their condition is likely to accelerate in severity.

Scenario 4: Decentralized Care

This scenario recognizes a future in which lifestyle changes are on-demand with patients and decentralized community models support primary care physicians in managing PLWD. The community models provide early detection, testing, educational support and connect back into a patient's care ecosystem.

1. **Self-Management to support lifestyle changes:** Health systems push to support lifestyle improvements by investing in upskilling and filling roles like diabetes educators and dietitians. This push and funding from the system allows new lifestyle focused companies to flourish, using publicly available funds to recruit and provide care for patients living with diabetes and other chronic diseases. The push for lifestyle changes and prevention, or de-acceleration of diabetes progression alleviates some of the burden on primary care providers.

2. **Value Based Care...plus:** Health systems, focused on managing costs and improving outcomes for patients with chronic conditions like diabetes, introduce reimbursement and incentives for clinicians. To achieve optimal health outcomes, the focus has shifted from traditional point-in-time metrics like A1C to dynamic performance metrics such as Time in Range. This allows for a more comprehensive evaluation of patients' day-to-day blood glucose management. The new model emphasizes the importance of helping patients effectively manage blood glucose fluctuations and develop personalized healthy habits. By aligning reimbursement and incentives with improved patient outcomes, healthcare systems are laser focused on optimizing care delivery.

3. **Unlocking patient health:** People are driven to push the boundaries of human potential through innovative and cutting-edge technologies. They are driven by a desire for self-improvement and optimization, and actively engage in biohacking to improve their health. Biohackers embrace a personalized approach to health, stacking different personalized devices to tailor interventions to their unique individual goals. Genetic modifications, precision medicine, and personalized nutrition plans allow them to optimize their physical and mental performance.

4. **Doctors as health strategists:** The role of doctor's shift, rather than solely focusing on treatment, doctors are now positioned as health strategists who work collaboratively with patients to develop comprehensive plans for managing diabetes. This shift emphasizes the importance of a holistic approach to healthcare. Once a plan is created, doctors provide a clean hand off to other health professionals who work with patients to build their confidence and actualize their lifestyle goals.

5. **Screening in the community:** diabetes screening is conducted in the community and reviewed by care teams. This decentralized approach to diabetes care supports routine screenings and medication support all conducted via community providers like nurses and pharmacists.
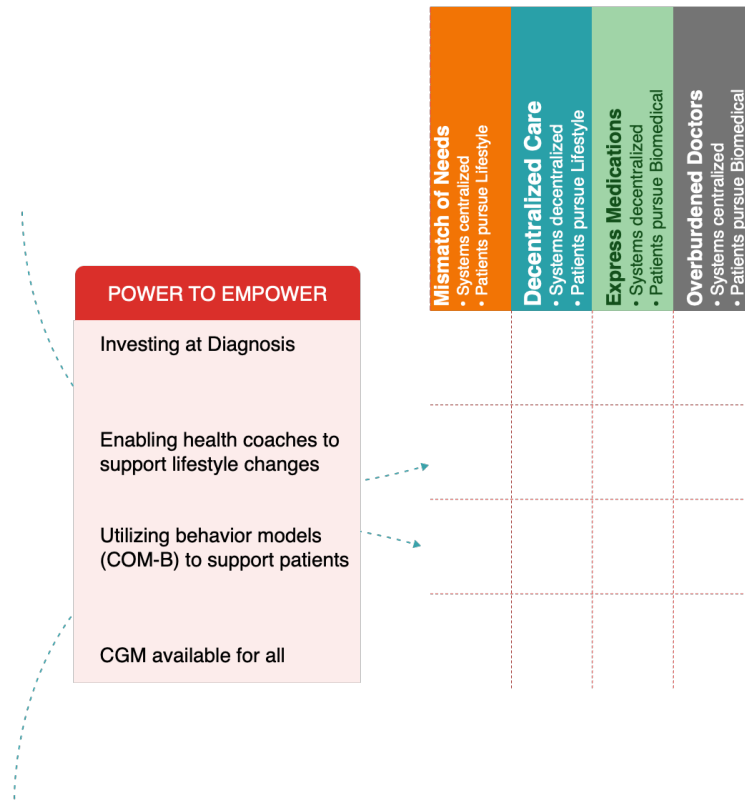
Wind tunneling for resilience

Figure 12: Wind tunneling the Power to Empower Strategy

In Mismatch of Needs

In Mismatch of Needs, our strategy would improve outcomes by engaging private payors such as insurance companies, or employers who have a vested interest in achieving better health outcomes. However, challenges and potential inequities arise within this experience.

While private payors or employers would support Power to Empower, individuals without insurance coverage or the means to afford co-pays may face difficulties accessing the coach and CGM device, leading to potential gaps in care, like what we see today.

Furthermore, raising awareness among the public about the benefits of Power to Empower presents a challenge. The program would primarily exist within payor and employer portals, requiring individuals to buy into its advantages and potentially hindering widespread adoption.

The implementation of Power to Empower may create tension between the biomedical model and the behavioral coach. Patients would have the autonomy to initiate their participation in the program, resulting in potential discontinuity of care. The doctor and the coach would work independently instead of collaborating as a unified team.

Additionally, the program's reach may be limited to individuals formally diagnosed with diabetes or pre-diabetes due to cost containment measures imposed by payors and

providers. This artificial fencing may cause delays for individuals without access to doctors, potentially limiting the program's impact.

Implementing Power to Empower raises significant challenges in Overburdened Doctors due to the prevailing reliance on biomedical solutions by patients for diabetes management. This reliance makes it difficult to achieve widespread adoption of the new approach.

To build momentum for Power to Empower, a sales force is hired to educate primary care physicians about the program's efficacy and the value of behavioral coaches. However, the limited continuity of care within the program poses a challenge, making it challenging to gain the support of doctors.

Limited payor uptake further hinders the adoption of Power to Empower. The lack of patient desirability for lifestyle solutions restricts the program's appeal, as only individuals who can afford individual plans or pay out-of-pocket expenses show interest in trying the program.

To overcome these challenges, Power to Empower establishes its own team of healthcare professionals who work virtually with interested patients to create a funnel of participants. The doctors collaborate with patients to review medication and then transition them to the behavioral coach for further support and guidance.

Overcoming the barriers to adoption requires addressing the limitations of the biomedical model, enhancing doctor engagement, increasing patient desirability for lifestyle solutions, and establishing effective collaboration between healthcare professionals within Power to Empower.

In this context, Power to Empower recognizes the need to develop strategies that bridge the gap between biomedical and behavioral interventions, promote the value of lifestyle solutions, and foster seamless collaboration between doctors and coaches. By addressing these challenges, Power to Empower can enhance adoption rates and improve patient outcomes in diabetes management.

In Express Medication

In Express Medication, patients, influenced by social media and updated guidelines, are increasingly turning to specialty medications like GLP-1s for diabetes management. This shift in patient preferences has led to the emergence of new channels, such as community pharmacies, independent nurse practitioner offices, and virtual care, where patients can receive prescriptions. Recognizing the increased demand, payors are motivated to reduce costs and support long-term improvements, leading them to fund Power to Empower.

Working through payors presents limitations to the uptake of Power to Empower, as it becomes accessible only to individuals who have insurance coverage, can afford specialty medications, and have the financial means to cover the remaining out-of-pocket costs associated with the program.

To address this, Power to Empower would focus on raising awareness specifically among these patient types and work closely with payors to maximize enrollment in the program. Additionally, partnerships with community pharmacies and other clinicians would be established to ensure that patients' medication regimens are adjusted as their performance improves.

Coordination and continuity of care are considered paramount in Power to Empower. To mitigate fragmentation and maintain visibility, Strategy 1 would employ methods such as sending faxes and emails to community pharmacies and primary care providers, facilitating communication and information sharing.

By capitalizing on patient preferences for specialty medications, leveraging partnerships with community pharmacies and clinicians, and prioritizing coordination of care, Power to Empower aims to overcome adoption challenges. These efforts would enhance awareness, accessibility, and continuity of care, ultimately improving patient outcomes in diabetes management.

In Decentralized Care

In Decentralized Care, Power to Empower collaborates with various healthcare providers including pharmacies, independent nurse practitioners, primary care physicians, and hospitals is key. Patients are enrolled into Strategy 1 through this multidisciplinary care team, ensuring a comprehensive approach to their diabetes management.

Government funding supports the creation of a unified patient view, linking fragmented patient records across multiple providers. This integration allows Power to Empower to establish continuity of care for patients, enabling seamless communication and coordination among their care team.

Proactive screening and testing of patients play a crucial role in supporting Power to Empower. By identifying individuals who were previously unaware of their diabetes or pre-diabetes status at an earlier stage of disease progression, they can be enrolled into the program. This early intervention helps mitigate the progression of diabetes, leading to better health outcomes.

Recognizing the value of the behavioral model, efforts are made to incorporate it into educational curricula as an adjunct to the biomedical model. Clinicians are educated on the efficacy of the behavioral model and understand its benefits in supporting their own practice. This buy-in from clinicians facilitates the enrollment of patients into Power to Empower, as they recognize the importance of this innovative approach in improving patient care.

Through collaboration, government support, proactive screening, and education, Power to Empower addresses adoption challenges by creating a cohesive care team, integrating patient records, identifying patients early, and fostering clinician engagement. These efforts ultimately enhance the effectiveness of Strategy 1 in improving patient outcomes and transforming diabetes management.

Barriers and Enablers

Through wind tunneling we looked across the four worlds and assessed our strategy, Power to Empower, to understand what needed to be true for our strategy to flourish. As a result of the activity, we broke down both enablers - that will help the new transformative future come into fruition, and barriers, which will optimize business as usual but will likely not transform the underlying worldviews and myths.

Barriers

1. Fragmentation as a function of different systems and siloed care. Doctors and other clinicians need to be incorporated and plugged into the Power to Empower strategy so that continuity of care is established. Increasing scope for other professions like nurses and pharmacists, and the methodology that is being employed, does not fulfil its complete promise. While these roles are increasing access to the patient, the related faxes and reports sent back to family physicians are increasing the administrative burden for the role, and thus reducing the number of patients physicians can see.

2. Leaning on the private-payor model. Fencing the strategy behind private payor strategy limits efficacy, as only the people who can afford it, who have the insurance will be able access the Power to Empower strategy. And even then, limited awareness of the strategy will mitigate total efficacy of the solution.

3. It is proposed to create a new role of a coach who specializes in behavior modification. This role cannot be an extension of clinicians, i.e. working to do additional clinical work, but will need to sit alongside traditional clinicians to provide additional support and guidance to patients in managing their diabetes.

4. Funneling Power to Empower through providers. The work to build awareness, demonstrate efficacy, educate primary care physicians, is limiting and will require further buy-in from medical academia to demonstrate value. True innovation will come when lifestyle programs/coaches and CGMs are widely available.

Enablers:

5. Investment early. Funds and channels to receive funds need to be available at the health system level to promote lifestyle and behavioral modification

6. One record for one patient. Fragmented systems that limit communication between providers and in our situation, coaches, will create tension between biomedical and behavioral models. they need to work in tandem with one another, not in opposition.

7. Awareness of the public to the value of lifestyle and behavioral modification. From our interviews, people are searching for this information. Access to Power to Empower needs to be available to anyone who is searching for it.

8. Proactive screening in the community to identify people with asymptomatic diabetes or pre-diabetes. Connected to early investment but government funded A1C testing in the community can enhance and improve early identification.

9. Reduction of stigma and the acceptance of lifestyle medication and behavioral modification in academia. The treatment of diabetes like cancer or other conditions in which it is *no one's fault*.
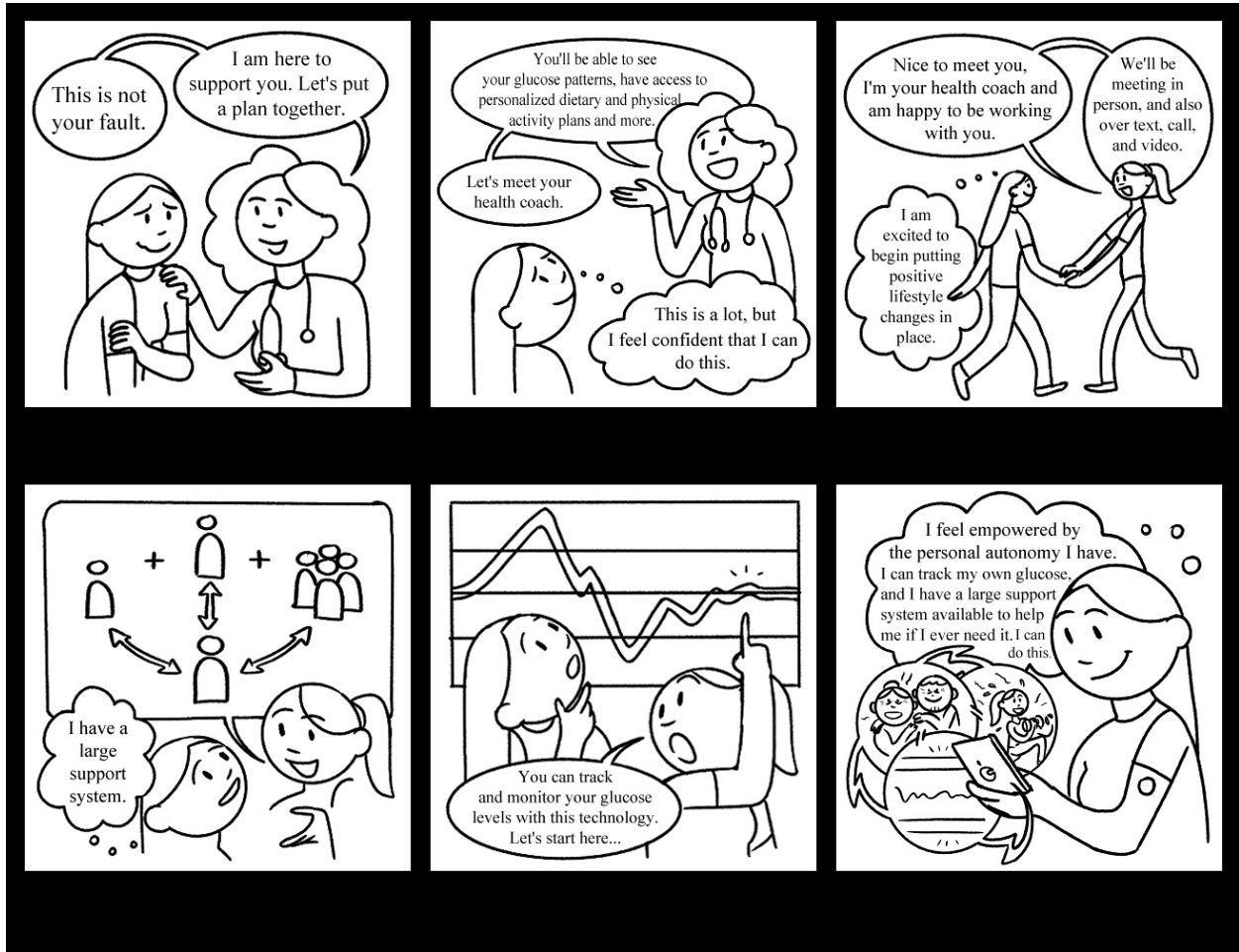
A day in the life journey: Sarah in the future

Figure 13: Sarah's Future Day in the Life

In Figure 13, Sarah learns she has type 2 diabetes from her doctor in the office. The first thing the doctor tells her it is 'not your fault' and explains to her all the factors that contribute to having type 2 diabetes and that there are lots of options for her both pharmacologic and lifestyle. She feels comforted by these comments. The doctor provides her with a prescription for a CGM so she can start right away being able to see how her glucose is impacted by different things in her life. Her doctor mentions that everyone's glucose has peaks and dips in the day, and everyone reacts differently so the first step is to learn about her own glucose. The doctor uses visual examples to help her see how glucose is variable. She feels comforted to know that everyone's glucose fluctuates, and everyone is trying to stabilize it. She thinks her family will be eager to learn about this also. She feels very motivated that she has options. The doctor provides her with access to the health coach who she can connect with right away. Her doctor explains that a health coach will spend time with her to help her with learning and ways that she can take actions if she chooses to make an impact on her health. Share feels less afraid of the future and feels confident she will have a plan and looks forward to including her family.

Conclusion:

Despite various initiatives by government, healthcare, and industry, the prevalence of Type 2 Diabetes continues to increase without signs of slowing down. In this exploratory research, our goal was to understand the factors that cause delays in recommendations from practitioners and the adoption of recommendations by people with Type 2 Diabetes.

We wondered if approaching the problem from a design perspective and reframing it from the perspective of people could lead to the creation of an innovation strategy.

To address the wicked problem, a bold innovation is needed. We realized that to develop intervention strategies that made a material impact, existing mindsets needed to be challenged and new worldviews adopted. Instead of optimizing broken systems, we must strive to empower individuals as the ultimate decision-makers in their own lives. Shifting belief systems from those in positions of power to those receiving care is the first step toward bold innovation.

Who we think would find value in our work:
Organizations and institutions invested in improving diabetes care, but whose current system does not prioritize patient-driven change, may find value in our work. This includes designers of medical school curricula, developers of continuing professional development programs, and education boards responsible for incorporating new learning models for health literacy and disease knowledge at an early age.

Government organizations recognizing the need for bold innovation should focus on campaigns that empower people to change, aligning with their goal of improving population health. Provincial bodies should prioritize health equity by ensuring access to Continuous Glucose Monitoring (CGM) as a crucial step in a human-centred equity model for health literacy. The Ministry of Health, drug funding agencies, and Health Technology Assessment agencies (i.e. CADTH & ICER) should go beyond current incentive models and advocate for health equity in access to personalized insights.

In the United States, the Advanced Research Project Agency for Health (ARPA-H) was established in 2023 to drive breakthroughs in diabetes prevention, among other diet-related diseases. While the focus is on medication innovation and access, there is currently limited emphasis on empowering individuals to make a change - and how to get individuals to have their own personalized health 'aha' moments. Our research may contribute to formulating a new strategy to improve the patient response to diet-related diseases.

Both Medicaid and Medicare should consider our research in their evaluation of disease prevention and mitigation with a keen focus on providing personalized care starting from the time of diagnosis, rather than waiting until a person begins insulin. Value-based care models should prioritize preventative services to keep people healthier and personalize

care, as involving patients from the beginning of diagnosis is crucial for mitigating disease progression.

Our Next Steps:
Our next steps involve prototyping and testing various intervention strategies for implementation in Canada and the United States. To raise awareness of our work, our ambition is to speak at medical conferences such as the American Diabetes Association and Diabetes Canada and present our research and innovation ideas to government agencies and healthcare associations. Having the opportunity to speak at medical schools and influence their curriculum would be a valuable first step in shifting the belief that individuals have more power than we believe.

Bibliography

Adkison, J. D. (2021). Implementing Continuous Glucose Monitoring in Clinical Practice. *Family Practice Management*, *28*(2), Article 2.

Administrative burden. (n.d.). Canadian Medical Association. https://www.cma.ca/our-focus/administrative-burden

Advani, A. (2020). Positioning time in range in diabetes management. *Diabetologia*, *63*(2), Article 2. https://doi.org/10.1007/s00125-019-05027-0

Advani, A. (2020). Positioning time in range in diabetes management. *Diabetologia*, *63*(2), Article 2. https://doi.org/10.1007/s00125-019-05027-0

Agency for Healthcare Research and Quality (AHRQ). (n.d.). Retrieved April 29, 2024, from https://www.ahrq.gov/

Ali, S. N., Dang-Tan, T., Valentine, W. J., & Hansen, B. B. (2020). Evaluation of the Clinical and Economic Burden of Poor Glycemic Control Associated with Therapeutic Inertia in Patients with Type 2 Diabetes in the United States. *Advances in Therapy*, *37*(2), 869–882. https://doi.org/10.1007/s12325-019-01199-8

Almigbal, T. H., Alzarah, S. A., Aljanoubi, F. A., Alhafez, N. A., Aldawsari, M. R., Alghadeer, Z. Y., & Alrasheed, A. A. (2023). Clinical Inertia in the Management of Type 2 Diabetes Mellitus: A Systematic Review. *Medicina (Kaunas, Lithuania)*, *59*(1), 182. https://doi.org/10.3390/medicina59010182

Armstrong, A. J., Holmes, C. M., & Henning, D. (2020). A changing world, again. How

    Appreciative Inquiry can guide our growth. *Social Sciences & Humanities Open*, *2*(1),

    100038. https://doi.org/10.1016/j.ssaho.2020.100038

Aronson, R., Bajaj, H. et al, 2022, Impact of flash glucose Monitoring pEople with type 2

    Diabetes Inadequately controlled with non-insulin Antihyperglycemic TheErapy

    (IMMEDIATE): A randomized controlled trial

Atkins, L., Francis, J., Islam, R., O'Connor, D., Patey, A., Ivers, N., Foy, R., Duncan, E. M.,

    Colquhoun, H., Grimshaw, J. M., Lawton, R., & Michie, S. (2017). A guide to using the

    Theoretical Domains Framework of behaviour change to investigate implementation

    problems. *Implementation Science*, *12*(1), 77. https://doi.org/10.1186/s13012-017-

    0605-9

Aujla, N., Yates, T., Dallosso, H., & Kai, J. (2019). Users' experiences of a pragmatic

    diabetes prevention intervention implemented in primary care: Qualitative study. *BMJ*

    Open, *9*(8), Article 8. https://doi.org/10.1136/bmjopen-2018-028491

Aujoulat, I., Jacquemin, P., Rietzschel, E., Scheen, A., Tréfois, P., Wens, J., Darras, E., &

    Hermans, M. P. (2014). Factors associated with clinical inertia: An integrative review.

    Advances in Medical Education and Practice, *5*, 141–147.

    https://doi.org/10.2147/AMEP.S59022

Bansal, N. (2015). Prediabetes diagnosis and treatment: A review. *World Journal of*

    Diabetes, *6*(2), 296–303. https://doi.org/10.4239/wjd.v6.i2.296

Battelino, T., Danne, T., Bergenstal, R. M., Amiel, S. A., Beck, R., Biester, T., Bosi, E.,

    Buckingham, B. A., Cefalu, W. T., Close, K. L., Cobelli, C., Dassau, E., DeVries, J. H.,

Donaghue, K. C., Dovc, K., Doyle, F. J., III, Garg, S., Grunberger, G., Heller, S., … Phillip, M. (2019). Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations from the International Consensus on Time in Range. *Diabetes Care*, *42*(8), Article 8. https://doi.org/10.2337/dci19-0028

Beck, R. W., Bergenstal, R. M., Cheng, P., Kollman, C., Carlson, A. L., Johnson, M. L., & Rodbard, D. (2019). The Relationships Between Time in Range, Hyperglycemia Metrics, and HbA1c. *Journal of Diabetes Science and Technology*, *13*(4), Article 4. https://doi.org/10.1177/1932296818822496

Beck, R. W., Bergenstal, R. M., Riddlesworth, T. D., Kollman, C., Li, Z., Brown, A. S., & Close, K. L. (2018). Validation of Time in Range as an Outcome Measure for Diabetes Clinical Trials. *Diabetes Care*, *42*(3), Article 3. https://doi.org/10.2337/dc18-1444

Beck, R. W., Bergenstal, R. M., Riddlesworth, T. D., Kollman, C., Li, Z., Brown, A. S., & Close, K. L. (2019). Validation of Time in Range as an Outcome Measure for Diabetes Clinical Trials. *Diabetes Care*, *42*(3), 400–405. https://doi.org/10.2337/dc18-1444

Bennett, B. L., & Puhl, R. M. (2023). Diabetes stigma and weight stigma among physicians treating type 2 diabetes: Overlapping patterns of bias. *Diabetes Research and Clinical Practice*, *202*, 110827. https://doi.org/10.1016/j.diabres.2023.110827

Bennett, B. L., & Puhl, R. M. (2023). Diabetes stigma and weight stigma among physicians treating type 2 diabetes: Overlapping patterns of bias. *Diabetes Research and Clinical Practice*, *202*, 110827. https://doi.org/10.1016/j.diabres.2023.110827

Beverly, E. A., Guseman, E. H., Jensen, L. L., & Fredricks, T. R. (2019). Reducing the Stigma of Diabetes in Medical Education: A Contact-Based Educational Approach. *Clinical diabetes : a publication of the American Diabetes Association*, *37*(2), 108–115. https://doi.org/10.2337/cd18-0020

Bharati, R., Kovach, K. A., Bonnet, J. P., Sayess, P., Polk, E., Harvey, K., & Vorbeck, L. (2023). Incorporating Lifestyle Medicine into Primary Care Practice: Perceptions and Practices of Family Physicians. *American Journal of Lifestyle Medicine*, *17*(5), 704–716. https://doi.org/10.1177/15598276211072506

Booth, A. O., Lowis, C., Dean, M., Hunter, S. J., & McKinley, M. C. (2013). Diet and physical activity in the self-management of type 2 diabetes: Barriers and facilitators identified by patients and health professionals. *Primary Health Care Research & Development*, *14*(3), 293–306. https://doi.org/10.1017/S1463423612000412

Care Coordination. (n.d.). Retrieved April 29, 2024, from https://www.ahrq.gov/ncepcr/research/care-coordination/index.html

Cavanaugh, K. L. (2011). Health literacy in diabetes care: Explanation, evidence and equipment. *Diabetes Management (London, England)*, *1*(2), 191–199. https://doi.org/10.2217/dmt.11.5

CDC. (2022, June 21). *Diabetes Education Linked to Better Diabetes Self-Care*. Centers for Disease Control and Prevention. https://www.cdc.gov/diabetes/resources-publications/research-summaries/DSMES-research-summary.html

CDC. (2022, June 21). *Diabetes Education Linked to Better Diabetes Self-Care*. Centers for Disease Control and Prevention. https://www.cdc.gov/diabetes/resources-publications/research-summaries/DSMES-research-summary.html

CDC. (2022, June 21). *Diabetes Education Linked to Better Diabetes Self-Care*. Centers for Disease Control and Prevention. https://www.cdc.gov/diabetes/resources-publications/research-summaries/DSMES-research-summary.html

Chen, D., Lew, R., Hershman, W., & Orlander, J. (2007). A Cross-sectional Measurement of Medical Student Empathy. *Journal of General Internal Medicine*, *22*(10), 1434–1438. https://doi.org/10.1007/s11606-007-0298-x

Chen, L., Magliano, D. J., & Zimmet, P. Z. (2011). The worldwide epidemiology of type 2 diabetes mellitus—Present and future perspectives. *Nature Reviews. Endocrinology*, *8*(4), 228–236. https://doi.org/10.1038/nrendo.2011.183

Clement, M., Harvey, B., Rabi, D. M., Roscoe, R. S., & Sherifali, D. (2013). Organization of Diabetes Care. *Canadian Journal of Diabetes*, *37*, S20–S25. https://doi.org/10.1016/j.jcjd.2013.01.014

Davis, J., Fischl, A. H., Beck, J., Browning, L., Carter, A., Condon, J. E., Dennison, M., Francis, T., Hughes, P. J., Jaime, S., Lau, K. H. K., McArthur, T., McAvoy, K., Magee, M., Newby, O., Ponder, S. W., Quraishi, U., Rawlings, K., Socke, J., … Villalobos, S. (2022). 2022 National Standards for Diabetes Self-Management Education and Support. *The Science of Diabetes Self-Management and Care*, *48*(1), 44–59. https://doi.org/10.1177/26350106211072203

de Groot, M., Golden, S. H., & Wagner, J. (2016). Psychological Conditions in Adults with Diabetes. *The American Psychologist*, *71*(7), Article 7. https://doi.org/10.1037/a0040408

Diabetes Canada Clinical Practice Guidelines Expert Committee. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. Can J Diabetes 2018; 42 (Suppl); S1-S325

Diabetes Canada Clinical Practice Guidelines Expert Committee. *Diabetes Canada 2018*

Clinical Practice Guidelines for the Prevention and Management of Diabetes in

Canada. Can J Diabetes. 2018;42(Suppl 1):S1-S325.

Diabetes rates continue to climb in Canada. (n.d.). DiabetesCanadaWebsite. Retrieved

August 10, 2023, from https://www.diabetes.ca/media-room/press-

releases/diabetes-rates-continue-to-climb-in-canada

Dickinson, J. K. (2017). Commentary: The Effect of Words on Health and Diabetes. *Diabetes*

Spectrum : A Publication of the American Diabetes Association, *30*(1), 11–16.

https://doi.org/10.2337/ds15-0054

Dreesen, Stefan. (2022, July 6). With diabetes on the rise, Time in Range is a powerful

management tool. Hospital News. https://hospitalnews.com/with-diabetes-on-the-

rise-time-in-range-is-a-powerful-management-tool/

Duong, D., & Vogel, L. (2023). National survey highlights worsening primary care access.

CMAJ, *195*(16), E592–E593. https://doi.org/10.1503/cmaj.1096049

Empathy Levels in Medical Students: A Single Center Study—PMC. (n.d.). Retrieved March

29, 2024, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10237306/

Fernandez-Lazaro, C. I., García-González, J. M., Adams, D. P., Fernandez-Lazaro, D.,

Mielgo-Ayuso, J., Caballero-Garcia, A., Moreno Racionero, F., Córdova, A., & Miron-

Canelo, J. A. (2019). Adherence to treatment and related factors among patients with

chronic conditions in primary care: A cross-sectional study. *BMC Family Practice*,

20(1), 132. https://doi.org/10.1186/s12875-019-1019-3

Food Insecurity and Diabetes: A Position Statement. Ottawa: Diabetes Canada; 2020.

88

Food Security and Diabetes: A Position Statement. Ottawa: Diabetes Canada, 2020.

Freedhoff, Y. (2016). The physician's role in cultivating healthful lifestyles. *CMAJ*, *188*(13), 933–934. https://doi.org/10.1503/cmaj.160043

Freedhoff, Y. (2016). The physician's role in cultivating healthful lifestyles. *CMAJ : Canadian Medical Association Journal*, *188*(13), 933–934. https://doi.org/10.1503/cmaj.160043

Gabbay, M. A. L., Rodacki, M., Calliari, L. E., Vianna, A. G. D., Krakauer, M., Pinto, M. S., Reis, J. S., Puñales, M., Miranda, L. G., Ramalho, A. C., Franco, D. R., & Pedrosa, H. P. C. (2020). Time in range: A new parameter to evaluate blood glucose control in patients with diabetes. *Diabetology & Metabolic Syndrome*, *12*(1), Article 1. https://doi.org/10.1186/s13098-020-00529-z

Gopisetty, D., Levine, B., Liu, N., Younge, P., Brown, A., Close, K. L., & Wood, R. (2018). How Does Diabetes Affect Daily Life? A Beyond-A1C Perspective on Unmet Needs. *Clinical Diabetes : A Publication of the American Diabetes Association*, *36*(2), 133–137. https://doi.org/10.2337/cd17-0093

Grant, K. (2024, March 25). *Doctors are working less than they did 30 years ago, with married men putting in fewer hours, study says*. The Globe and Mail. https://www.theglobeandmail.com/canada/article-married-male-doctors-hours-decline/

Grohmann, B., Espin, S., & Gucciardi, E. (2017). Patients' experiences of diabetes education teams integrated into primary care. *Canadian Family Physician*, *63*(2), e128–e136.

Groopman, Jerome. (2008) How Doctors Think, Marner Books

Harris, S. B., Kapor, J., Lank, C. N., Willan, A. R., & Houston, T. (2010). Clinical inertia in
patients with T2DM requiring insulin in family practice. *Canadian Family Physician*,
56(12), e418–e424.

Hart, J. Bryne-Davis, L, Maltinsky, W, Bull, E. (2023)Training to Practice Change , Wiley
Balkwell

*Health information on TikTok: The good, the bad and the ugly | Biological Sciences Division |
The University of Chicago*. (2024, April 23).
https://biologicalsciences.uchicago.edu/news/health-information-tiktok

Hojat, M., Shannon, S. C., DeSantis, J., Speicher, M. R., Bragan, L., & Calabrese, L. H.
(2020). Does Empathy Decline in the Clinical Phase of Medical Education? A
Nationwide, Multi-Institutional, Cross-Sectional Study of Students at DO-Granting
Medical Schools. *Academic medicine : journal of the Association of American Medical
Colleges*, *95*(6), 911–918. https://doi.org/10.1097/ACM.0000000000003175

Igde, F. A., & Sahin, M. K. (2017). Changes in Empathy during Medical Education: An
Example from Turkey. *Pakistan Journal of Medical Sciences*, *33*(5), 1177–1181.
https://doi.org/10.12669/pjms.335.13074

*Impact of diabetes on healthcare costs in a population-based cohort: A cost analysis—
PubMed*. (n.d.). Retrieved April 29, 2024, from
https://pubmed.ncbi.nlm.nih.gov/26201986/

Inagaki, S., Matsuda, T., Muramae, N., Abe, K., & Kato, K. (2022). Diabetes-related shame
among people with type 2 diabetes: An internet-based cross-sectional study. *BMJ*

Open Diabetes Research and Care, *10*(6), e003001. https://doi.org/10.1136/bmjdrc-2022-003001

Inagaki, S., Matsuda, T., Muramae, N., Abe, K., & Kato, K. (2022). Diabetes-related shame among people with type 2 diabetes: An internet-based cross-sectional study. *BMJ Open Diabetes Research & Care*, *10*(6), e003001. https://doi.org/10.1136/bmjdrc-2022-003001

Inayatullah, S. (1998). Causal layered analysis: Poststructuralism as method. *Futures*, *30*(8), 815–829. https://doi.org/10.1016/S0016-3287(98)00086-X

Incorporating Lifestyle Medicine into Primary Care Practice: Perceptions and Practices of Family Physicians—Rajani Bharati, Kevin A. Kovach, Jonathan P. Bonnet, Polina Sayess, Elizabeth Polk, Keisha Harvey, Lauren Vorbeck, 2023. (n.d.). Retrieved April 29, 2024, from https://journals.sagepub.com/doi/10.1177/15598276211072506

Johnston, A. R., Poll, J. B., Hays, E. M., & Jones, C. W. (2022). Perceived impact of continuous glucose monitor use on quality of life and self-care for patients with type 2 diabetes. *Diabetes Epidemiology and Management*, *6*, 100068. https://doi.org/10.1016/j.deman.2022.100068

Johnston, A. R., Poll, J. B., Hays, E. M., & Jones, C. W. (2022). Perceived impact of continuous glucose monitor use on quality of life and self-care for patients with type 2 diabetes. *Diabetes Epidemiology and Management*, *6*, 100068. https://doi.org/10.1016/j.deman.2022.100068

Kato, A., Yamauchi, T., & Kadowaki, T. (2020). A closer inspection of diabetes-related stigma: Why more research is needed. *Diabetology International*, *11*(2), 73–75. https://doi.org/10.1007/s13340-019-00421-w

Khan, T., Wozniak, G. D., & Kirley, K. (2019). An assessment of medical students' knowledge of prediabetes and diabetes prevention. *BMC Medical Education*, *19*(1), 285. https://doi.org/10.1186/s12909-019-1721-9

Khunti, K., Wolden, M. L., Thorsted, B. L., Andersen, M., & Davies, M. J. (2013). Clinical Inertia in People with Type 2 Diabetes: A retrospective cohort study of more than 80,000 people. *Diabetes Care*, *36*(11), 3411–3417. https://doi.org/10.2337/dc13-0331

Kruger, D., & Marcus, A. O. (2000). Psychological Motivation and Patient Education: A Role for Continuous Glucose Monitoring. *Diabetes Technology & Therapeutics*, *2*(supplement 1), Article Deci, E. L., & Ryan, R. M. (2012). Self-determination theory in health care and its relations to motivational interviewing: A few comments. *International Journal of Behavioral Nutrition and Physical Activity*, *9*(1), Article 1. https://doi.org/10.1186/1479-5868-9-24

Lawton, J., Blackburn, M., Allen, J., Campbell, F., Elleri, D., Leelarathna, L., Rankin, D., Tauschmann, M., Thabit, H., & Hovorka, R. (2018). Patients' and caregivers' experiences of using continuous glucose monitoring to support diabetes self-management: Qualitative study. *BMC Endocrine Disorders*, *18*, 12. https://doi.org/10.1186/s12902-018-0239-1

Légaré, F., Freitas, A., Thompson-Leduc, P., Borduas, F., Luconi, F., Boucher, A., Witteman, H. O., & Jacques, A. (2015). The majority of accredited continuing professional

development activities do not target clinical behavior change. *Academic Medicine: Journal of the Association of American Medical Colleges*, *90*(2), 197–202. https://doi.org/10.1097/ACM.0000000000000543

Lessans, S., Pasarica, M., & Kay, D. (2022). Do Medical Students Appreciate Lifestyle Medicine and Are They Confident in Their Skills? *PRiMER*, *6*. https://doi.org/10.22454/PRiMER.2022.968910

Lessans, S., Pasarica, M., & Kay, D. (2022). Do Medical Students Appreciate Lifestyle Medicine and Are They Confident in Their Skills? *PRiMER*, *6*. https://doi.org/10.22454/PRiMER.2022.968910

Lieter, L, Cheng, A. et al (2019) Glycated Hemoglobin Level Goal Achievement in Adults with Type 2 Diabetes in Canada: Still Room for Improvement

Liu, N. F., Brown, A. S., Folias, A. E., Younge, M. F., Guzman, S. J., Close, K. L., & Wood, R. (2017). Stigma in People with Type 1 or Type 2 Diabetes. *Clinical Diabetes : A Publication of the American Diabetes Association*, *35*(1), Article 1. https://doi.org/10.2337/cd16-0020

Miche, S. Atkins, L., West, Robert (2014) The Behavior Change Wheel . Silverback Publishing

Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*(1), Article 1. https://doi.org/10.1186/1748-5908-6-42

Nagelkerk, J., Reick, K., & Meengs, L. (2006). Perceived barriers and effective strategies to diabetes self-management. *Journal of Advanced Nursing, 54*(2), 151–158. https://doi.org/10.1111/j.1365-2648.2006.03799.x

O'Connor, P. J., Sperl-Hillen, J. M., Johnson, P. E., Rush, W. A., & Biltz, G. (2005). Clinical Inertia and Outpatient Medical Errors. In K. Henriksen, J. B. Battles, E. S. Marks, & D. I. Lewin (Eds.), *Advances in Patient Safety: From Research to Implementation (Volume 2: Concepts and Methodology)*. Agency for Healthcare Research and Quality (US). http://www.ncbi.nlm.nih.gov/books/NBK20513/

Okemah, J., Peng, J., & Quiñones, M. (2018). Addressing Clinical Inertia in Type 2 Diabetes Mellitus: A Review. *Advances in Therapy*, *35*(11), Article 11. https://doi.org/10.1007/s12325-018-0819-5

One in five search results for diabetes reveal misinformation, IDF warns. (n.d.). International Diabetes Federation. Retrieved April 29, 2024, from https://idf.org/news/one-in-five-search-results-for-diabetes-reveal-misinformation-idf-warns/

Organization of Diabetes Care. (n.d.). DiabetesCanadaWebsite. Retrieved August 10, 2023, from https://www.diabetes.ca/health-care-providers/clinical-practice-guidelines/chapter-6

PatientEngagementHIT. (2018, October 17). *Understanding Physician Empathy, How It Impacts Patient Care*. PatientEngagementHIT. https://patientengagementhit.com/news/understanding-physician-empathy-how-it-impacts-patient-care

Pauls, K. (2023, April 5). *Medical students' interest in being family doctors on decline even as provinces boost training spots*. CBC. https://www.cbc.ca/news/health/medical-students-family-doctors-declining-interest-1.6801372

Peckham, A., Ho, J., & Marchildon, G. (n.d.). *POLICY INNOVATIONS IN PRIMARY CARE ACROSS CANADA*. 63.

Petrie, J. R., Peters, A. L., Bergenstal, R. M., Holl, R. W., Fleming, G. A., & Heinemann, L. (2017). Improving the clinical value and utility of CGM systems: Issues and recommendations : A joint statement of the European Association for the Study of Diabetes and the American Diabetes Association Diabetes Technology Working Group. *Diabetologia*, *60*(12), Article 12. https://doi.org/10.1007/s00125-017-4463-4

Phelan, S., Burgess, D., Yeazel, M., Hellerstedt, W., Griffin, J., & van Ryn, M. (2015). Impact of weight bias and stigma on quality of care and outcomes for patients with obesity. *Obesity Reviews*, *16*(4), 319–326. https://doi.org/10.1111/obr.12266

Phillips, K. A., Ospina, N. S., & Montori, V. M. (2019). Physicians Interrupting Patients. *Journal of General Internal Medicine*, *34*(10), 1965. https://doi.org/10.1007/s11606-019-05247-5

Phillips, L. S., Branch, W. T., Cook, C. B., Doyle, J. P., El-Kebbi, I. M., Gallina, D. L., Miller, C. D., Ziemer, D. C., & Barnes, C. S. (2001). Clinical inertia. *Annals of Internal Medicine*, *135*(9), 825–834. https://doi.org/10.7326/0003-4819-135-9-200111060-00012

Pikkemaat, M., Boström, K. B., & Strandberg, E. L. (2019). "I have got diabetes!" – interviews of patients newly diagnosed with type 2 diabetes. *BMC Endocrine Disorders*, *19*(1), Article 1. https://doi.org/10.1186/s12902-019-0380-5

Polonsky, W. H., & Henry, R. R. (2016). Poor medication adherence in type 2 diabetes: Recognizing the scope of the problem and its key contributors. *Patient Preference and Adherence*, *10*, 1299–1307. https://doi.org/10.2147/PPA.S106821

Private Member's Bill C-237 (43-2)—Royal Assent—National Framework for Diabetes Act—Parliament of Canada. (n.d.). Retrieved April 29, 2024, from https://www.parl.ca/DocumentViewer/en/43-2/bill/C-237/royal-assent

Public Health aAgency of Canada, Framework for Diabetes in Canada, Government of Canada, 2022

Rao, S., Ferris, T. G., Hidrue, M. K., Lehrhoff, S. R., Lenz, S., Heffernan, J., McKee, K. E., & Del Carmen, M. G. (2020). Physician Burnout, Engagement and Career Satisfaction in a Large Academic Medical Practice. *Clinical Medicine & Research*, *18*(1), 3–10. https://doi.org/10.3121/cmr.2019.1516

Rea, B., Worthman, S., Shetty, P., Alexander, M., & Trilk, J. L. (2021). Medical Education Transformation: Lifestyle Medicine in Undergraduate and Graduate Medical Education, Fellowship, and Continuing Medical Education. *American Journal of Lifestyle Medicine*, *15*(5), 514–525. https://doi.org/10.1177/15598276211006629

Rebicki, C. V. M. (n.d.). *Family Physician's Clinical Inertia in the Management of Hypoglycemia*.

Rebicki, C. V. M., Ryan, B. L., Ratzki-Leewing, A., Tremblay, P. F., & Harris, S. B. (2022). Family Physician Clinical Inertia in Managing Hypoglycemia. *Primary Care Diabetes*, *16*(3), Article 3. https://doi.org/10.1016/j.pcd.2022.02.005

Reichert, S., Harris, S., Mequanint, S., Ryan, B. L., Webster-Bogaert, S., Ratzki-Leewing, A., & Brown, J. B. (2016). A National Survey of Physicians' and Allied Health Professionals' Practices and Perspectives Regarding Hypoglycemia Management: The InHYPO-DM Study Image 8. *Canadian Journal of Diabetes*, *40*(5), S58–S59. https://doi.org/10.1016/j.jcjd.2016.08.164

Ruhe, M. C., Bobiak, S. N., Litaker, D., Carter, C. A., Wu, L., Schroeder, C., Zyzanski, S., Weyer, S. M., Werner, J. J., Fry, R. E., & Stange, K. C. (2011). Appreciative Inquiry for Quality Improvement in Primary Care Practices. *Quality Management in Health Care*, *20*(1), 37–48. https://doi.org/10.1097/QMH.0b013e31820311be

Saboo, B., Kesavadev, J., Shankar, A., Krishna, M. B., Sheth, S., Patel, V., & Krishnan, G. (2021). Time-in-range as a target in type 2 diabetes: An urgent need. *Heliyon*, *7*(1), e05967. https://doi.org/10.1016/j.heliyon.2021.e05967

Stratton, I. M., Adler, A. I., Neil, H. A., Matthews, D. R., Manley, S. E., Cull, C. A., Hadden, D., Turner, R. C., & Holman, R. R. (2000). Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): Prospective observational study. *BMJ (Clinical Research Ed.)*, *321*(7258), 405–412. https://doi.org/10.1136/bmj.321.7258.405

supplement 1. https://doi.org/10.1089/15209150050214195

Sweet, C. C., Jasik, C. B., Diebold, A., DuPuis, A., & Jendretzke, B. (2020). Cost Savings and Reduced Health Care Utilization Associated with Participation in a Digital Diabetes Prevention Program in an Adult Workforce Population. *Journal of Health Economics and Outcomes Research*, *7*(2), 139–147. https://doi.org/10.36469/jheor.2020.14529

Szafran, O., Kennett, S. L., Bell, N. R., & Torti, J. M. I. (2019). Interprofessional collaboration in diabetes care: Perceptions of family physicians practicing in or not in a primary health care team. *BMC Family Practice*, *20*, 44. https://doi.org/10.1186/s12875-019-0932-9

Tantengco, O. A. G. (2021). Increased global online interest in diabetes during the COVID-19 pandemic: An infodemiology study. *Obesity Medicine*, *28*, 100374. https://doi.org/10.1016/j.obmed.2021.100374

Teaching empathy to medical students: An updated, systematic review—PubMed. (2022, May 13). https://pubmed.ncbi.nlm.nih.gov/23807099/

van Bruggen, R., Gorter, K., Stolk, R., Klungel, O., & Rutten, G. (2009). Clinical inertia in general practice: Widespread and related to the outcome of diabetes care. *Family Practice*, *26*(6), 428–436. https://doi.org/10.1093/fampra/cmp053

Team, L. (2024, March 4). *What is glycemic variability and why does it matter?* Levels. https://www.levelshealth.com/blog/what-is-glycemic-variability-and-why-does-it-matter#:~:text=Studies%20show%20that%20these%20big,%2C%20diabetes%2C%20and%20metabolic%20dysfunction.

Veltheim, H. (2023, February 6). *Scenario Analysis: A Powerful Way to Thrive in a Volatile World — Futures Platform*. Futures Platform. https://www.futuresplatform.com/blog/scenario-analysis-benefits-for-organisations

Walton, M. (n.d.). Patients' autonomy: Does doctor know best? *Medicine Today*, 107.

Wang, L., Li, X., Wang, Z., Bancks, M. P., Carnethon, M. R., Greenland, P., Feng, Y.-Q., Wang, H., & Zhong, V. W. (2021). Trends in Prevalence of Diabetes and Control of Risk Factors in Diabetes Among US Adults, 1999-2018. *JAMA*, *326*(8), 1–13. https://doi.org/10.1001/jama.2021.9883

Wang, T., Tan, J.-Y. (Benjamin), Liu, X.-L., & Zhao, I. (2023). Barriers and enablers to implementing clinical practice guidelines in primary care: An overview of systematic reviews. *BMJ Open*, *13*(1), e062158. https://doi.org/10.1136/bmjopen-2022-062158

Williams, G. C., McGregor, H. A., Zeldman, A., Freedman, Z. R., & Deci, E. L. (2004). Testing a Self-Determination Theory Process Model for Promoting Glycemic Control Through Diabetes Self-Management. *Health Psychology*, *23*(1), Article 1. https://doi.org/10.1037/0278-6133.23.1.58

Wrzal, P. K., Bunko, A., Myageri, V., Kukaswadia, A., Neish, C. S., & Ivers, N. M. (2021). Strategies to Overcome Therapeutic Inertia in Type 2 Diabetes Mellitus: A Scoping Review. *Canadian Journal of Diabetes*, *45*(3), Article 3. https://doi.org/10.1016/j.jcjd.2020.08.109

Zafar, A., Davies, M., Azhar, A., & Khunti, K. (2010). Clinical inertia in the management of T2DM. *Primary Care Diabetes*, *4*(4), 203–207. https://doi.org/10.1016/j.pcd.2010.07.003