

Is Prediabetes Overdiagnosed? No: A Clinician's Perspective

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Family physicians do not just treat acute illnesses; their regular contact and follow-up with patients allow them to act as preventive care managers. In the case of type 2 diabetes, preventive management can mitigate or reverse damage to a patient's heart, blood vessels, kidneys, eyes, and nerves, but the best time to intervene is often before the patient qualifies for a diagnosis. Type 2 diabetes is associated with metabolic syndrome, a highly prevalent, multifaceted condition characterized by a collection of abnormal measurements, including centralized adiposity, hypertension, dyslipidemia (hypertriglyceridemia, low high-density lipoprotein [HDL]) and elevated blood glucose. Metabolic syndrome affects one-third of American adults and disproportionately affects people of color and lower socioeconomic status groups. Metabolic syndrome has been linked with increased risk of all-cause mortality, cardiovascular mortality, risks of neurocognitive disorders, and risks of common cancers.¹⁻³ The hyperinsulinemia associated with metabolic syndrome may cause downstream inflammatory sequelae like pain, asthma, and allergy symptoms that can decrease a patient's quality of life.^{4,5}

Prediabetes, often a precursor to more severe conditions like type 2 diabetes and cardiovascular disease, represents a crucial stage for intervention in primary care. Contrary to views that it might be an overdiagnosis, prediabetes can be a harbinger of metabolic syndrome, offering a unique opportunity for early and effective management. To benefit from this opportunity without causing the anxiety highlighted in the "Point" essay, clinicians should take a holistic, multifaceted approach to patient care that integrates various health indicators for a comprehensive health assessment, without over-reliance on a single biomarker. To elucidate this approach, I discuss 3 hypothetical patients and the various biomarkers, symptoms, lifestyle factors, and patient values that inform my approach to the treatment and management of prediabetes and metabolic syndrome.

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Case 1. Clearly Prediabetes —Ms Wiley

Ms Wiley is a woman aged 48 years who saw her clinician for a health maintenance exam. The clinician ordered a hemoglobin A_{1c} (HbA_{1c}), and it came back elevated at 6.1%. At past appointments, she had reported persistent allergies, irregular menstruation, and joint pains. Similarly, during her health maintenance exam, she wanted to focus on her acid reflux and anxiety. She has a body mass index (BMI) of 37. She was started on blood pressure medication 3 years ago, and her previous HbA_{1c} 2 years ago was 5.6%.

Ms Wiley's case illustrates one scenario in which prediabetes helps understand and treat a patient's symptoms. Ms Wiley meets criteria for metabolic syndrome based on her elevated HbA_{1c} (prediabetes), hypertension, and elevated BMI. Viewing the patient in a holistic picture, I see that her complaints—her hypertension (HTN), prediabetes, obesity, allergies, joint pain, acid reflux, and anxiety—may all be related to her metabolic syndrome. With patients like Ms Wiley, I try to bring them back into clinic to discuss lifestyle changes. I want to know how they eat, how they move, and how they sleep.

Nutrition is a key component of metabolic disease. From my experience, the best way to ask an individual about their food choices is the 24-hour recall. "What did you eat yesterday?" "What snacks did you eat?" "What drinks did you have?" Metabolic syndrome and obesity are often related to hyperinsulinemia. Ultra-processed foods are significantly associated with the incidence of obesity, worsening insulin resistance, waist circumference, reduction in HDL cholesterol, and increases risk in type 2 diabetes.⁶ Individuals with metabolic syndrome who eat processed and high glycemic foods will have large insulin spikes which will lead to adiposopathy and inflammation.^{4,5}

Activity and movement are very important for how bodies—especially muscles—process energy, with mounting evidence that skeletal muscle insulin resistance plays a significant role in prediabetes, metabolic syndrome, and systemic insulin resistance.⁷ Many patients do not engage in any significant activity—yet their physicians often robotically recommend the ideal "150 min a week of exercise," which may be completely unrealistic for some patients. Incremental improvements matter. A 2022 study found an inverse relationship between all-cause mortality and cardiorespiratory fitness,



with the biggest improvement seen in moving from the lowest tier to the second lowest tier.⁸ Clinicians should strive to set attainable goals with patients. If patients are sedentary, even small improvements in activity can yield benefits—with goal setting like walking for 5 minutes or intermittent standing as starting points.^{9,10}

Sleep is an underutilized intervention for metabolic health. Sleep quality and quantity are vital, and it is important that patients understand this. People should aim for 6-8 hours per night of quality sleep, and clinicians should screen patients for sleep disorders like obstructive sleep apnea. Sleep disorders increase hunger hormones and decrease satiety hormones, making a person feel hungrier and less full and making it more difficult for them to control their appetite and motivation.¹¹

With Ms Wiley, the goal is to create a plan to help reverse her metabolic syndrome, of which her prediabetes is one factor. It is important that she understands that many of her ailments are related to this central underlying disorder and that she can treat this issue through lifestyle methods primarily. Her doctor can reevaluate in 3 months and see if her HbA_{1c} improves, but more importantly, are her co-morbidities improving as she is eating, moving, and sleeping better? Here, Ms Wiley's "prediabetes" elevated HbA_{1c} test, in context with other criteria, contributed to an earlier intervention to improve Ms Wiley's health.

Case 2. Prediabetes, but Is it? —Mr James

Mr James, aged 71 years, came to clinic for his Medicare wellness exam. Generally, he is a healthy individual who is up to date on screenings. He has never smoked and rarely drinks alcohol. He recently started playing pickleball and loves playing golf. He describes a Mediterranean Diet for nutrition and sleeps 7 hours a night. His HbA_{1c} is 5.9% (first time elevated), HDL, 68; Triglycerides, 89; low-density lipoprotein cholesterol (LDL-C), 98.

During his health maintenance exam, his doctor focused on his lifestyle because Mr James is a generally healthy person with limited complaints. Mr James saw the elevation on his HbA_{1c} and expressed concern.

To address his concerns, the physician can offer the reassurance that even if his HbA_{1c} is "abnormal," there are a variety of reasons the HbA_{1c} can be elevated, many of which may not have to do with insulin resistance, metabolic syndrome, or prediabetes. Hemoglobin A_{1c} can convey an average blood glucose level over a 2-to-3-month period, but its measurement is also affected by the age of red blood cells, underlying health conditions (kidney disease, liver disease, or anemia), hemoglobin subtype influence, and an individual's age.¹² The physician can also do additional tests, although in this case he has no signs of metabolic syndrome in his other biomarkers (he is normotensive and has normal triglycerides and HDL). If the physician is unsure, she can order fasting glucose and fasting insulin to calculate homeostatic model assessment for insulin resistance (HOMA-IR) to help supplement the information she already has.¹³ In contrast with Ms Wiley's case,

Mr James' single elevated HbA_{1c} test result is not currently contributing to a diagnosis of metabolic syndrome, and this contextual assessment and potential follow-up testing would ensure that Mr James does not feel stigma or shame from a lone test result.

Case 3. Normal HbA_{1c}—but Is She Healthy? —Ms Byron

Ms Byron is aged 33 years with a BMI of 41, polycystic ovary syndrome (PCOS), hypertension, depression, and chronic pain syndrome who presents for fatigue. She sleeps 8 hours every night but always feels tired. Her physician orders several laboratory tests, including HbA_{1c}, complete blood count (CBC), thyroid stimulating hormone (TSH), and all of them come back in normal range. Her HbA_{1c} is 5.4%.

Many physicians may not consider ordering a lipid panel on a woman aged 33 years in this context, but obtaining HDL cholesterol and triglycerides numbers helps assess parameters for metabolic syndrome. It would be helpful for Ms Byron, as she already meets 2/5 of the criteria without the lipid panel, and PCOS is often a comorbid condition associated with metabolic syndrome. Based on the information above, she is at high risk for sleep apnea and warrants a sleep study.

Ms Byron doesn't have "prediabetes," but the underlying pathophysiology and potential consequences of metabolic syndrome remain the same—she is at higher risk for cardiovascular disease, all-cause mortality, cancer, and diabetes. Intervention is indicated in her case, with or without prediabetes.

I would treat Ms Byron similar to Ms Wiley. With her permission, I would focus on nutrition, activity, and sleep as a starting point, and if necessary, consider medications to help treat her underlying pathology. As in Ms Wiley's and Mr James' cases, Ms. Byron's HbA_{1c} test result is just 1 factor and does not represent the beginning and end of the analysis.

CONCLUSION

As a family physician, I firmly believe that recognizing prediabetes is essential to holistic patient evaluation and management, underscoring its critical role in clinical practice. Prediabetes not only signals the onset of metabolic syndrome but also presents a window to intervene before the development of more severe conditions like type 2 diabetes and cardiovascular disease. The 3 cases I discussed illustrate the complexities of diagnosing and managing prediabetes, emphasizing the need for a multi-faceted approach that extends beyond a single biomarker like hemoglobin A_{1c}. This approach does not limit the analysis to prediabetes but instead uses HbA_{1c} as one of many arrows in the family doctor's quiver.

A nuanced understanding of each patient's lifestyle, including nutritional habits, physical activity, and sleep patterns are essential. This comprehensive approach enables physicians to tailor interventions that address the interconnected nature of metabolic health and address underlying

issues such as insulin resistance, adiposopathy, and inflammation through lifestyle modifications, which can lead to significant improvements in overall health and quality of life and a reduction in the risk of chronic diseases.

In my practice, emphasizing a proactive, preventive approach in primary care has proven invaluable, especially in the context of an increasingly prevalent condition like metabolic syndrome. By recognizing the early signs and adopting a holistic view of patient health, family physicians play a pivotal role in preventing the long-term risks associated with prediabetes and metabolic syndrome, and ultimately improving patient outcomes and quality of life.



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Key words: pre-diabetes; metabolic syndrome; early detection; effective intervention; primary care; preventive care; type 2 diabetes

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