**Clinical interpretation of the findings**

As can be seen, this built model works well and it can predict diabetic cases with high accuracy. But a well-designed model should be clinically applicable. Therefore, we need to evaluate our findings from a clinical perspective along with metric scores. The above top twenty important features indicated with the model are rationally related to diabetic patients and most of them are direct or indirect clinical signs and symptoms of diabetes that help clinicians to have an accurate diagnosis.

*Symptoms and clinical complications of diabetes*

For instance, **hypercholesterolemia** picked as the top one feature by the model and it is proven that high or borderline high total cholesterol is common in diabetes and is present in 70% of adults with diagnosed diabetes in the U.S. population. **Malaise and fatigue** are common in diabetes that is referred to as ‘diabetes fatigue syndrome’ (DFS), which is commonly encountered in clinical practice. Diabetes mellitus is a strong, independent risk for **atrial fibrillation** and flutter in addition to other cardiovascular diseases specifically in older ages. Diabetic neuropathy is a common complication of diabetes. Nerves can be damaged from high blood sugar levels. It can cause **pain in limb and back** along with numbness and less sensation in the lower legs. One of the rheumatic conditions caused by diabetes is frozen shoulder (adhesive capsulitis), which is characterized by **pain in shoulder** and severe limited active and passive range of motion. As can be seen, this model perfectly included the pains in limb, low back and shoulder as the top important features. With regards to **hyperthyroidism**, several studies described that type 2 diabetes mellitus has an intersecting underlying pathology with thyroid dysfunction. Thyroid hormone dysfunction can cause insulin resistance that eventually can lead to type 2 diabetes. Moreover, studies showed type 2 diabetes was significantly associated with nuclear senile cataract and **urinary tract infections (UTI)**, UTI is a common clinical complication of diabetes.

*Important lab tests for diabetes*

We are no surprised to see the **A1C test** as one of the important features in the list since it is the first lab test that should be taken by diabetics. it is a blood test that reflects your average blood glucose levels over the past 3 months and it is the most important lab test that helps clinicians to diagnose diabetes.

The second clinically important lab test for diabetic patients is the **lipid panel test** because diabetes can cause hypercholesterolemia as mentioned above. The American Diabetes Association recommends that all adults with diabetes receive, at least annually, a fasting lipid profile test.

This model successfully could pick these two necessary lab tests as important features.

*Medications*

Our model selected several medications as important features including metformin, omeprazole, diltiazem, furosemide and amitriptyline. Obviously, **metformin** is an anti-diabetic medication that commonly is used to control blood sugar level. **Omeprazole** is not an anti-diabetic medication and it is a proton-pump inhibitor but omeprazole therapy significantly improved blood glucose levels and clinicians prescribe omeprazole for those who want to control diabetes mostly orally. **Diltiazem** and **furosemide** are used to control the blood pressure in diabetic patients who developed diabetic-related cardiovascular diseases. **Amitriptyline** is a nerve pain medication and commonly is used by diabetic patients to control diabetic neuropathy pains.

*Race and age*

According to the Centers for Disease Control and Prevention (CDC), 34.2 million people of all ages—or 10.5% of the US population—had diabetes. The estimated crude prevalence of adults with diabetes in the United States from 2013 to 2016, was **4.2% for the age under 44** and **44.3% for age 45 or higher**. Based on this fact, we categorized the cases in our model into two groups of under 45 and 45 years old or higher.

According to CDC, Among US adults aged 18 years or older for 2017–2018 indicated that blacks or **American Africans (8.2 per 1,000 persons)** had a higher incidence of diabetes compared to **whites (5.0 per 1,000 persons)**. Our model could select Black or American African as an important feature between other races.

In conclusion, the majority of selected important features by this model are clinically relevant to diabetes and the model could do its job with high accuracy.