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DIABETES AND CARDIOVASCULAR DISEASE OVERVIEW

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DIABETES AND CARDIOVASCULAR DISEASE OVERVIEW

The National Face of Diabetes

According to 2007 data published by the Center for Disease Control and Prevention, there are nearly 24 million, or 8%, of adults and children in the United States living with diabetes, and another 57 million people are considered at risk for developing diabetes. Internationally the World Health Organization estimates there are over 180 million people worldwide with diabetes. Globally, the number of people with diabetes is expected to reach 380 million by the year 2020.

In the United States, type 2 diabetes accounts for 90-95% of the overall diabetes population.³ Type 1 diabetes, also known as juvenile onset diabetes, accounts for only 5-10% of individuals with diabetes. It is estimated that a total of 1.7 million new cases of diabetes are diagnosed each year in the United States. While the majority of people with type 2 diabetes get diagnosed, every year more than 24% of all cases go undiagnosed. The prevalence and diagnosis of type 2 diabetes vary significantly by race and ethnicity. After adjusting for population and age, the data collected by the CDC from 2004 to 2006 indicate that 6.6% of non-Hispanic Whites, 7.5% of Asian Americans, 10.4% of Hispanics, and 11.8% of non-Hispanic Blacks were diagnosed with diabetes. Among Hispanics, this included 8.2% of Cubans, 11.9% of Mexican Americans, and 12.6% of Puerto Ricans.⁴

In California, 7.8% of adults have type 2 diabetes and 403,000 adults are pre-diabetic. American Indian/Alaskan Natives have the highest rate of diagnosed diabetes at 14.2%, followed by African Americans at 11.5%, Latinos at 9.2%, Asians at 6.4%, and Whites at 6.7%.⁵ In the Asian community, Koreans and Vietnamese have the highest reported prevalence of diabetes.⁶ While no data have been tabulated on the prevalence of diabetes in the Southeast Asian and South Asian communities, clinicians in California are seeing a dramatic presence of type 2 diabetes among their Hmong, Laotian, Cambodian and East Indian patients.

In the United States, chronic diseases (including cardiovascular disease, cancer and diabetes) are the leading causes of disability and premature death.⁷ Furthermore, the National Institutes of Health estimates that the total direct and indirect costs of diabetes for 2007 reached \$174 billion in the United States.⁸ While we have taken steps to improve the overall health of individuals in the United States, the rate and prevalence of type 2 diabetes have dramatically increased. This increase in the number of people with diabetes and pre-diabetes has resulted in more individuals at risk for developing cardiovascular complications, causing an increase in medical care costs, and further complicating the approaches to managing chronic disease conditions.

While there are “many faces of diabetes”, for the purposes of this provider guide we will focus primarily on the screening, diagnosis and management of type 2 diabetes and the links to cardiovascular disease in adult patient populations.

Diabetes and the Link to Cardiovascular Disease

Cardiovascular disease (CVD) is defined by the American College of Cardiology Foundation and the American Diabetes Association as a class of diseases that include coronary artery disease (CAD), cerebrovascular disease, and peripheral arterial disease.⁹ Today, cardiovascular disease is the leading cause of morbidity and mortality in the Western world among both men and women in every major ethnic group. Some studies have demonstrated that patients with diabetes, regardless of ethnic background, have poorer health outcomes and greater risk of mortality resulting from the development of cardiovascular disease and the occurrence of acute cardiovascular events.¹⁰

Patients with diabetes are at significantly higher risk for developing cardiovascular disease which can lead to complications including heart attacks, strokes, and even death. The occurrence of cardiovascular disease in patients with diabetes is commonly associated with clinical features that include hyperglycemia, dyslipidemia, and hypertension; sometimes collectively known as metabolic syndrome. Studies suggest that individuals with metabolic syndrome (MetS) have two-fold increased risk, and individuals with diabetes have four times the risk of developing coronary, cerebrovascular and peripheral arterial disease.^{11,12,13} It is estimated that 80% of patients with type 2 diabetes will develop and possibly die from related cardiovascular diseases.¹⁴ However, some studies have shown that mortality risk is equivalent for people with and without diabetes and a history of prior myocardial infarction.^{15,16} The resulting conclusion is that all patients with diabetes should be aggressively screened and treated for coronary heart disease regardless of prior cardiovascular event history. Treatment to minimize developing cardiovascular disease and/or experiencing CVD related events should include blood pressure and lipid-lowering therapies to reduce overall risk factors.

Heart failure is striking African Americans in their thirties and forties at the same rate as Caucasians in their fifties and sixties.¹⁷ Heart failure in African Americans was associated with risk factors such as hypertension and obesity that was already present when these adults were in their twenties. These findings should be a wake-up call on the need for African Americans and physicians to address risk factors that can lead to heart failure.

The Framingham Heart Study is an ongoing longitudinal cardiovascular study commissioned by the National Heart, Lung and Blood Institute in 1948 that focuses on identifying the common factors or characteristics that contribute to cardiovascular disease. The study followed a large group of participants who had not yet developed symptoms of cardiovascular disease, suffered a heart attack or had a stroke over a long period of time to evaluate long term risk factors.¹⁸ The Framingham Risk Score was developed based on study results to rapidly identify individual risk factors that may lead to cardiovascular disease. The Framingham Risk Score (FRS) and diagnosed metabolic syndrome (MetS) serve as simple tools health care providers can use to quickly identify individuals at higher risk for developing diabetes and/or cardiovascular disease. While both MetS and the FRS are strong predictors of cardiovascular disease, the study found that the presence of MetS is a stronger predictor of diabetes mellitus in comparison to the FRS as a predictor for developing coronary heart disease.¹⁹

Hypertension affects an estimated 50 million individuals in the United States, posing a major public health challenge. The Centers for Disease Control and Prevention (CDC) estimate that 1 out of 3 American adults have high blood pressure, affecting 2 of out 5 African Americans, 1 in 6 Asians and 1 in 5 Hispanics and Native Americans. Because there are no symptoms, 31.6% of adults don't even know they have it. Many people have high blood pressure for many years without knowing it which can lead to stroke, heart attack, heart failure and kidney failure, making it a 'silent killer'.²⁰ The presence of individual and genetic factors such as diabetes, obesity and dyslipidemia further increases the risk of developing hypertensive complications and mortality.

The American Heart Association estimates 107 million Americans over the age of 20 have total blood cholesterol levels that are higher than recommended values.²¹ Individuals with high blood cholesterol are at increased risk for developing cardiovascular disease. While most individuals with high blood cholesterol levels have no visible symptoms, over time elevated blood cholesterol levels result in narrowing and hardening of the arteries (arteriosclerosis or atherosclerosis) reducing the overall blood flow to the heart. The reduced blood flow increases the risk of developing hypertension, myocardial infarction, stroke, and eye damage. For many people, cholesterol levels are generally responsive to changes in lifestyle, diet and exercise. However, due to genetic factors, some individuals may require cholesterol lowering medications in combination with lifestyle modification to effectively manage high cholesterol levels.

The effective management of patients with type 2 diabetes requires promoting behavior/ lifestyle modification in combination with therapies focused on achieving adequate glycemic control and reducing cardiovascular disease risk factors, including dyslipidemia and hypertension. It involves using a well planned and patient-centered approach to providing care and education that promotes better diabetes self-management at home.

What Patients Need to Know About Type 2 Diabetes

Type 2 diabetes is a chronic disease that affects the body's ability to properly use or produce the insulin necessary to maintain a healthy blood glucose level and is characterized by a combination of insulin resistance and deficient beta-cell secretion of insulin. This results in the body having a harder time changing food and nutrients into usable energy. The excess build up of blood sugar in the body can damage the heart, kidneys, eyes, feet, and skin.

In most cases the diagnosis of type 2 diabetes in adult patients can be attributed to individual health and lifestyle factors such as obesity, daily physical activity levels, poor nutrition/dietary habits, and mental health status. Patients with cardiovascular disease, including hypertension and dyslipidemia, are at greater risk for developing diabetes related complications. Despite the increased risk of complications and the impact on multiple body systems, diabetes is a controllable disease.²² Many of the more effective clinical approaches to managing diabetes and associated cardiovascular disease start with lifestyle/behavior modification, weight loss, physical activity promotion, and dietary control. However, most patients with type 2 diabetes will also need oral or insulin medications at some point to help achieve glycemic control.

Patients with pre-diabetes and diabetes can take steps to manage and control this disease by eating healthily, adhering to prescribed medication and consulting with their primary care physicians. By taking steps to better manage their diabetes, many patients can lower their risk for developing complications such as cardiovascular disease, stroke and kidney disease.

Patients diagnosed with and at risk for developing diabetes need to understand the following:

- Diabetes is a lifelong chronic disease that must be effectively self-managed.
- Diabetes should not be ignored or taken lightly.
- Left untreated, diabetes can lead to serious complications and consequences.
- Most people do not notice the warning signs and symptoms of diabetes and/or cardiovascular diseases.
- People diagnosed with pre-diabetes are more likely to develop diabetes within 10 years.

Pre-Diabetes versus Diabetes

Patients with pre-diabetes are individuals at a significantly higher risk for developing diabetes with blood glucose levels that fall within the range between the normal and threshold values. While these patients may not yet have type 2 diabetes, steps to modify lifestyle patterns should be recommended to decrease the risk factors associated with developing type 2 diabetes. Current research indicates that type 2 diabetes can be prevented and/or delayed in adults through moderate weight loss, good nutrition and diet, and regular physical activity.²³

What about Insulin Resistance?

Insulin resistance occurs when the body does not respond appropriately to the presence of insulin. The result is a decrease in the glucose uptake by cells in the body which leads to elevated blood glucose levels. Insulin resistance commonly precedes the development of type 2 diabetes, can occur years before the symptoms of type 2 diabetes are even noticed and be caused by several individual factors including inherited genetics, medication use and the presence of other chronic diseases. If diabetes and related cardiovascular complications are left untreated, insulin resistance will continue to increase over time.

What Patients Can Do to Prevent Diabetes^{24,25}

The onset of type 2 diabetes in patients with pre-diabetes or at risk for developing diabetes can be prevented or delayed. The American Diabetes Association and the American Heart Association recommend implementing the following lifestyle changes to prevent or delay the onset of diabetes:

- Cut calorie intake by reducing serving sizes.
- Cut back on soft drinks and juice loaded with sugar.
- Reduce fat intake.
- Get 30-60 minutes of regular physical activity almost every day.
- Lose extra weight (5%-7%).
- Track your progress by writing down physical activity and what you eat.

Health care providers can promote primary prevention of diabetes by asking questions, discussing the importance of lifestyle modifications and providing educational resources to patients:

Ask: “Have you been told you are at risk for diabetes?”

Advise: “You can take steps to prevent or delay diabetes.”

Assist: Provide or refer the at-risk patients to resources that will help them understand the consequences of not taking action and making health changes.

End Notes

Diabetes as a Cardiovascular Disease Overview

- ³ National Diabetes Fact Sheet, 2003. HHS, Center for Disease Control and Prevention 2003. Retrieved from www.cdc.gov.
- ⁴ National Diabetes Statistics, 2007. National Diabetes Information Clearinghouse (NDIC). Retrieved from <http://www.diabetes.niddk.nih.gov/dm/pubs/statistics>.
- ⁵ 2007 California Health Interview Survey, <http://www.chis.ucla.edu/main/default.asp>
- ⁶ 2007 California Health Interview Survey, <http://www.chis.ucla.edu/main/default.asp>
- ⁷ The Diabetes Epidemic: The Case for Changing Diabetes. Institute for Alternative Funding. November 2005.
- ⁸ IBID
- ⁹ Brunzell et al. Lipoprotein management in patients with cardiometabolic risk: Consensus Conference Report from the American Diabetes Association and the American College of Cardiology Foundation. *J. Am. Coll. Cardiol.*, 2008; 51: 1512-1524. Retrieved from <http://content.onlinejacc.org>.
- ¹⁰ Orlander et al. The relation of diabetes to the severity of acute myocardial infarction and post-myocardial infarction survival in Mexican-American and non-hispanics whites. *Diabetes*, 1994; 43:892-902.
- ¹¹ Lusher et al. Diabetes and Vascular Disease – Pathophysiology, Clinical Consequences and Medical Therapy: Part II. *Circulation*, 2003;108-1655-1661.
- ¹² Beckman et al. Diabetes and atherosclerosis: epidemiology, pathophysiology and management. *JAMA*. 2002; 287:257-2581.
- ¹³ Reilly and Rader. The Metabolic syndrome: More than the sum of its parts? *Circulation*, 2003; 108: 1546-1661.
- ¹⁴ Fox, et al. Trends in cardiovascular complications of diabetes. *JAMA*, November 24, 2004 – Vol. 292, No. 20: 2495-2499. Retrieved from www.jama.com.
- ¹⁵ Haffner et al. Mortality from coronary heart disease in subjects with type 2 diabetes and in non-diabetic subjects with and without prior myocardial infarction. *NEJM*, 1998; 339: 229-34.
- ¹⁶ Haffner, S. and Goldberg, R. New Strategies for the Treatment of Diabetic Dyslipidemia. *Diabetes Care*, 2002; 25: 1237-39.
- ¹⁷ Racial Differences in Incident Heart Failure among Young Adults. Kirsten Bibbins-Domingo, PhD, MD, et al. *The New England Journal of Medicine*. March 19, 2009, Vol., 360, No. 12.
- ¹⁸ Profile of the Framingham Heart Study. February 2006. www.framingham.com/heart/.
- ¹⁹ Wannamethee et al. Metabolic syndrome vs Framingham Risk Score for prediction of coronary heart disease, stroke and type 2 diabetes mellitus. *Arch Int Med*, 2005; 165:2644-2650. Retrieved from www.archintmed.com.
- ²⁰ Facts about High Blood Pressure. American Heart Association. www.americaheart.org.
- ²¹ Cholesterol Statistics. American Heart Association, 2008. www.americanheart.org.
- ²² Team Care: Comprehensive Lifetime Management for Diabetes. National Diabetes Education Program, 2001. Retrieved from www.ndep.nih.gov
- ²³ “What you need to know about diabetes – An Introduction. American Diabetes Association, 2005.
- ²⁴ Working Together to Manage Diabetes, A guide for pharmacy, podiatry, optometry and dental professionals. National Diabetes Education Program. January 2007. Retrieved from www.ndep.nih.gov. 43-46.
- ²⁵ Pre-Diabetes, What is it and what can I do? – You can delay or prevent type 2 diabetes. American Diabetes Association, 2005.

