Predicting Diabetes amongst Native American Elders: The Importance of Comorbid Diseases and their Interactions

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ABSTRACT

One in three Americans will be diabetic by 2050, and the rate of diabetes is disproportionately high among Native Americans, especially among Native elders age 55 and older. Early identification and prevention strategies have been regarded as the cornerstone of preventative medicine. The objective of the authors’ research was to identify factors related to diabetes and their interactions specifically among Native elders and develop a simple prediction model which can be used by healthcare professionals while interacting with Native elders in remote or rural areas. Data from a survey of 18,078 Native American elders was used in their study. After eliminating outliers using Pearson’s residuals and Cook’s distance, the area under the receiver operating characteristic curve was 0.7812 for men and 0.7230 for women. The results from the authors’ analysis provide additional perspective on how diabetes affects Native elders thus helping healthcare providers and policy makers when dealing with these community members.

Keywords: Cook’s Distance, Diabetes, Logistic Regression, Native American Elders, Pearson’s Residual, Risk Factors

INTRODUCTION

Diabetes incidence worldwide increased from 30 million to 171 million between 1985 and 2000. The prevalence estimate is expected to continue to increase by 39% rise from 2000 to 2030. The most important demographic change to diabetes prevalence across the world appears to be the increase in the proportion of people aged 65 years and above. United States is one of the top three countries that has the highest numbers of people with diabetes. The Centers for Disease Control and Prevention (CDC) reported that one in three Americans will be diabetic by 2050, (Wild, Roglic, Green, Sicree,
and King, 2004). While diabetes awareness has increased in the U.S., the racial disparity in the prevalence of diabetes has not decreased.

Griffin, Gilliland, Perez, Upson D, and Carter (2000), pointed out that in New Mexico 1 in 3 AN/AIs suffer from Type 2 diabetes mellitus (Type 2 DM) already. In 1974 Dr. Kelly West, a well-known pioneer of diabetes epidemiology, performed an exhaustive review of literature related to American Indians and Alaska Natives (AI/AN) and stated that the overall prevalence of diabetes among AI/ANs was higher than all other races in the U.S (West, 1974). Statistics published by Trends in Indian Health 2002-2003 Edition (2003) showed that AI/ANs between the ages of 55-64 are 2.8 times more likely to develop diabetes and AI/ANs older than 64 are 1.6 times more likely to develop diabetes, compared to other races and According to American Diabetes Association (2012), 95% of diabetes cases among AI/ANs are of Type 2 DM.

A more troubling trend is the increase in the impact of comorbidities on diabetes. When patients with diabetes and other multiple chronic conditions (coronary heart failure, arthritis, osteoporosis, hypertension, poor vision) visit care givers, it creates competing demands. Screening, counseling, and treatment needs far exceed the time available for patient-provider interaction. Health problems requiring inpatient resources are treated during outpatient visits, further straining providers’ resources for addressing diabetes-specific goals, (Piette & Kerr, 2004).

Apart from genetic factors, a person’s lifestyle contributes to the development of diabetes (Ghodes, 1995). Gillies et al. (2007) stated that lifestyle related interventions are as effective as drug related treatment strategy. However there is a paucity of culturally appropriate lifestyle intervention strategies, especially those that relate to AI/AN elders with diabetes because very few studies directly ask the members of this population what they believe are important or relevant to them, (Griffin et al., 2000). Such lifestyle related intervention strategies are all the more important, considering most of the AI/AN elders reside in reservations and rural areas where hospitals and healthcare facilities normally used in by the elderly and diseased struggle to stay operational throughout the year due to lack of funding and other constraints, Willging, Waitzkin and Nicdao (2008).

Based on these factors, healthcare workers and policy makers, who in the past considered screening for diabetes traditionally as a clinical activity are now seeking other early identification and detection strategies that can help in reducing morbidity and mortality due to Type 2 DM and improving quality of life, especially among AI/AN elders (Koh & Tan, 2005).

Thus the objective of our study was to identify risk elements that were specifically significant Type 2 DM predictors among AI/AN elders, explore the interplay of these risk elements and lifestyle factors at various threshold levels for AI/AN elder men and women separately and develop a prediction model based on these risk elements. Thus assisting social workers or healthcare professionals in efficiently identifying AI/AN elders who possess a high risk of developing Type 2 DM. Henceforth men refer to elderly AI/AN men and women refers to elderly AI/AN women.

The remaining part of the paper is organized as follows: first, we provide a brief description of logistic regression which was used to develop the prediction model. The scoring procedure used to calculate the estimates and the prediction model developed using these parameter estimates obtained through the scoring procedure. In the next section we describe the results and model diagnostics performed using Pearson Chi Square test, standardized residual test and receiver operating characteristics (ROC) curve. Finally we draw relevant conclusions.

**METHODS**

We used the data from Cycle IV of the “Identifying our Needs: A Survey of Elders” needs assessment survey. This survey contains biological, social, psychological, and cultural determinants which represent AI/AN elders across