Comparison of Cardiovascular Risk Factors Between Slavic Immigrant Women with Type 2 Diabetes and Non-Immigrant, Non-Hispanic White Women with Type 2 Diabetes

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Purpose: This study compares cardiovascular risk factors among immigrant women with type 2 diabetes. The study sample consists of women immigrants from the former Soviet Union (Slavic immigrants) and non-immigrant, non-Hispanic, white women with type 2 diabetes.
Method: Lifestyle behaviors and healthcare access were assessed using questions from the 2002 Behavioral Risk Factor Surveillance System interview. Pharmacological regimes were analyzed and selected physiologic risk data were prospectively collected.
Results: Based on descriptive/comparative analyses, Slavic immigrants reported healthier lifestyle behaviors, similar disease prevalence, but worse physiologic markers and health care barriers. Specific factors creating greater cardiovascular risk for the Slavic women included higher total cholesterol, higher LDL, higher triglycerides, less aggressive pharmacological management, and greater diastolic blood pressure and greater mean arterial blood pressure.
Conclusion: Although both cohorts received suboptimal management, because of the greater prevalence of hypertension, dyslipidemia, and less aggressive pharmacological management, combined with health care barriers, the Slavic immigrant group exhibited greater relative risk. Implications to enhance culturally congruent care and policy changes to facilitate chronic disease management are suggested.

Introduction and Review of Literature

An estimated 24 million people living in the United States have type 2 diabetes and cardiovascular disease is the leading cause of death among people with diabetes (CDC, 2008). Diabetes without previous coronary heart disease (CHD) carries a lifetime risk of cardiovascular-associated death as high as that for CHD alone (Whiteley, Padmanabhan, Hole, & Isles, 2005) and is considered a cardiovascular risk equivalent. Additionally, type 2 diabetes is commonly associated with other comorbid factors that further increase the likelihood of cardiovascular events. Comorbid cardiovascular risk factors include poor glycemic control, physical inactivity, elevated blood pressure, and dyslipidemia.

Poor glycemic control can result from diabetes severity, ineffective diabetes management, comorbid illness, dietary influences, lifestyle choices, medications, and/or other confounding factors such as stress. Controlling hyperglycemia can reduce complications from diabetes and thus

reduce the morbidity and mortality from heart disease (Gavin, Peterson, & Warren-Boulton, 2003). Physical inactivity, hypertension and dyslipidemia contribute to increased morbidity risk. Exercise increases insulin sensitivity and enhances energy expenditure, thus helping lower body weight and protecting against the development of CVD risk factors (Blair & Church, 2003; Carmethon, et al. 2003; Leung, et al., 2008). Exercise is known to be cardio-protective by lowering blood pressure and favorably changing the lipid profile. Cardiovascular complications are directly related to an elevated blood pressure. There is lower cardiovascular risk associated with lower systolic pressure (Adler, et al., 2000). Dyslipidemia likewise increases CVD risk. The highest risk from dyslipidemia results when the total cholesterol, low density lipoproteins (LDL), and triglycerides are high and high density lipoproteins (HDL) are low (Haffner, 2004; Lehto, et al., 1997; Turner, et al., 1998).

Controlling blood glucose, blood pressure, and blood lipids can reduce complications from diabetes and reduce the morbidity and mortality from heart disease. Total diabetes costs are conservatively calculated to be $174 billion annually in the United States (American Diabetes Association (ADA), 2008). Sex-related differences influence health risk, health seeking behavior, and CHD risk for women (ADA, 2004; Centers for Disease Control (CDC), 2001; Folsom, et al., 1997; Gerstle, Varenne & Contento, 2001). Race and ethnicity also affect the prevalence of diabetes and CHD risk factors as traditionally underserved populations generally have increased risk. Cultural beliefs, language barriers, health practices, and health care access barriers contribute to the prevalence of disease within ethnically distinct populations (Agency for Healthcare Research and Quality (AHRQ), 2000; Aroian, 2001; Walker & Jaranson, 1999). Immigrants face additional resettlement challenges (Aroian, Spitzer, & Bell, 1996) and may find American values in conflict with the Soviet cultural values (Duncan & Simmons, 1996).

Over the past two decades, the United States has seen a large influx of Russian-speaking immigrants from the former Soviet Union (Slavic immigrants). In Washington State, Slavic immigrants constitute a large, but often hidden, minority group, with demonstrated health disparities; although exacts counts do not exist, sources associated with the Slavic community and local authorities estimate that greater than 20,000 immigrants have settled in Spokane County (Spokane Regional Health District (SRHD)/ Epidemiology Center, 2005). Russian-speaking Slavic immigrants have high rates of obesity, cardiovascular disease, and diabetes (Duncan, 1996; Fridman, Vandalovsky, & Bergmann, 2006; Mehler, et al., 2001; Miller, Wilbur, Chandler, & Sorokin, 2003; Miller & Gross, 2004; SRHD/ Epidemiology Center, 2005). Comparing risk factors between Soviet women living in Russia with their American counterparts, residents of Russia have a greater median body mass index (BMI), a higher mean blood pressure, and double prevalence of hypercholesterolemia (Berrios, et al., 1997). The purpose of this study was to compare selected physiological markers and health related behaviors of Slavic immigrant women (Slavic group) who have type 2 diabetes with an age-matched cohort of non-Slavic, non-Hispanic white women living in the northwestern United States with type 2 diabetes (NW US group).

Methods

Research Design

A comparative descriptive design was used to explore differences in the prevalence of risk factors within the two distinct cohorts. The first cohort, the Slavic Group, is comprised of Russian-speaking immigrants from the former Soviet Union who have type 2 diabetes. The second

cohort, the northwestern United States (NW US) Group, is comprised of age-matched, non-Hispanic white women who have type 2 diabetes. This study compared and described each cohort's health-related behaviors and access to care. Participants' cardiovascular risk factors including lipid panel, A1C, BP, BMI, hip and waist circumferences were measured. Medication usage information was collected for prescription medications, over the counter medications, and herbal medication. Access to care, dietary patterns, and physical activity participation data were self-reported using questions from the Behavioral Risk Factor Surveillance System Survey. The setting for this study was an urban community in Eastern Washington State, which has seen a large influx of Slavic immigrants and where Slavic immigrants are identified as the largest ethnic minority (De Leon & Harris, 2002). A convenience sample of 60 women, 30 for each cohort, participated. Slavic group participants were recruited by inviting women who had participated in a different diabetes-related study conducted by researchers at Washington State University to enroll in this investigation. A research assistant, familiar to the participants, contacted each participant to determine their willingness to participate in this study. After the immigrant group was selected, an age-matched, non-immigrant group was then recruited. The NW US participants also had been involved in previous diabetes-related research. For both groups, their involvement in prior research included diabetes-related education classes and/or illness self-management education. Answers were sought to the following research questions:

1. What are the differences and similarities in health-related behaviors among Slavic immigrant women with type 2 diabetes and the NW US women with type 2 diabetes?
2. Are there differences in specific physiologic cardiovascular risk factors between Slavic immigrant women and NW US women with type 2 diabetes (e.g. lipid panel, A1C, blood pressure, BMI)?
3. What are the differences, if any, between Slavic immigrant women and the NW US women groups' access to health care?

Non-parametric analysis between the cohorts' data were analyzed for comparisons of differences and similarities in health-related behaviors and differences in cardiovascular risk factors between groups using the Statistical Program for the Social Sciences 15.0 (SPSS). The study was approved by the Washington State University (WSU) Institutional Review Board and the human subjects' protection protocol was strictly followed. Risks to participants included breach of confidentiality and complications from finger-stick blood collection. To protect subjects' confidentiality, data was coded and stored in securely locked files following strict WSU protocol. To protect for complications of finger stick blood sample collection, blood samples were obtained using universal precautions protocol and following accepted medical practice and standardized finger-stick collection procedure. Written informed consent was obtained from all participants. A bilingual research assistant, who was trained in human subject protection protocol, conducted the consent process with the Slavic group participants. The primary investigator conducted the consent process with the NW US group participants. All participants were given a copy of the consent written in their native language. The Purnell Model for Cultural Competence guided this study. The model's intent is to promote health care providers' understanding of a person's situation within the context of culture and assist health professionals to provide culturally appropriate care during illness, wellness, and health promotion (Purnell, 2000).

Instrument

Interview questions were selected from the Centers for Disease Control's (CDC, 2003) Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS contains questions

developed to estimate health risk behavior among the U.S. adult population. BRFSS questions that were applicable to this study were selected and translated into the Russian language by a state-certified translator. A bilingual research assistant administered questions to the Slavic women. NW US participants were asked the same questions in English. Each participant's physical characteristics were measured and their body mass indexes (BMI) and hip-to-waist ratios were calculated using the standard CDC formulas. Blood pressure measurements were obtained on both arms, with participants in a sitting position, and rechecked with the mean systolic and diastolic readings used for analysis. Each participant's lipid panel and A1C were assessed using portable monitoring equipment commonly referred to as point-of-care technology. A1C was monitored utilizing the A1CNow™ which is a point-of-care device that is approved by the Food and Drug Administration and National Glycohemoglobin Standardization Program. The portable device has been shown to have good correlation (r=0.758) to standardized laboratory tests (Sicard & Taylor, 2005). Lipids were assessed using the CardioChek™, a point-of-care analyzer that directly measures cholesterol, HDL, and triglycerides and calculates LDL. The CardioChek device has been approved by the Food and Drug Administration and reported to have acceptable results, as compared to standard laboratory procedures (Panz, Raal, Paiker, Immelman, & Miles, 2005). Antihypertensive and lipid lowering medication use was evaluated by two doctorally prepared pharmacists for each participant in conjunction with each participant's BP and lipid results to determine therapeutic efficacy. Therapeutic efficacy was based on the American Diabetes Association Standards of Medical Care (2006) and National Cholesterol Education Panel ATP III cholesterol goals.

Results

Descriptive statistics were used to quantify specific physiologic markers, behavioral patterns, and health care access. Answers to research questions were sought to help health professionals identify and better target the Slavic immigrant community's specific health care needs. Women in the Slavic cohort had a mean age of 63 years and had lived in the United States for a mean of 8 years. Only two Slavic women reported being "fluent" in English and all Slavic participants requested to be interviewed in the Russian language. Over 75% of the Slavic cohort reported that they were married and/or lived with family members, compared to less than 15%

Table 1. Demographic and Health Related Characteristics

Cohort	Slavic	NW US		
Variable	Mean	Mean	t	p
Mean Age (Years)	62.5	63.97	-0.492	0.625
Years T2DM Diagnosis	5.91	11.08	-2.650	0.010
Age T2DM diagnosis	56.90	53.53	1.201	0.235
Years Education	9.30	12.23	-3.612	0.001
Annual Provider Visits	4.38	4.67	0.358	0.772
Annual A1C checks	3.07	3.34	-0.409	0.684

Table 2. Comparison of Physiologic Clinical Markers

Cohort	Slavic		NW US			
Variable	Mean	S.D.	Mean	S.D.	t	p
A1C (%)	7.33	1.5	7.11	1.05	0.67	0.5
Total Cholesterol (mg/dL)	228.52	43.60	193.90	63.23	2.47	0.02
HDL (mg/dL)	40.77	15.35	41.48	16.03	-0.18	0.86
LDL (mg/dL)	140.31	37.77	114.33	28.66	2.54	0.01
Triglycerides (mg/dL)	219.13	89.77	158.82	89.46	2.56	0.01
Systolic BP (mm/Hg)	136.03	18.95	128.23	21.60	1.49	0.14
Diastolic BP (mm/Hg)	85.65	6.81	74.33	12.47	4.36	0.00
Mean Arterial Pressure	102.63	9.86	92.40	14.17	3.25	0.00
Body Mass Index	36.08	7.52	37.99	9.17	-0.88	0.38
Waist to Hip Ratio	0.88	0.06	0.90	0.09	-1.06	0.30

of the NW US cohort ($p<0.001$). Slavic women were much more likely to be married and their divorce rates were 1/3 that of their NW US cohort counterparts ($p<0.001$). The Slavic group report fewer years of formal education (9.3 years vs. 12.2 years, $p=0.001$). Years of formal education did not significantly correlate to any risk factor for participants in this study. The groups were well matched in other respects (Table 1).

Slavic participants had significantly higher mean total cholesterol, greater mean LDL, and greater mean triglycerides, while mean HDL levels were similar between groups (Table 2). The Slavic group had significantly greater mean arterial pressure and greater mean diastolic blood pressure. Mean systolic blood pressures were similar for each cohort. Likewise, BMI and hip-to-waist ratios were similar.

NW US participants reported having been diagnosed with type 2 diabetes longer than the Slavic participants (11 years versus 6 years, $p=0.010$). Although both cohorts reported similar rates of being diagnosed with hypertension, hypercholesterolemia, angina, and coronary artery disease, and nearly identical rates of heart attack and stroke. Significantly more Slavic woman (55%) reported their health as being "poor" as compared to 16.7% of the NW US group ($p<0.001$). Fewer members of the Slavic group reported having health insurance ($p=0.006$)

and access to health care (p=0.05). When they did seek care, members of both groups were far more likely to use their usual clinic and see their usual provider than access other forms of health care, such as urgent or emergency care. Both cohorts reported activity levels well below Federal exercise guidelines.

Based on dietary interview items from the BRFSS, Slavic group members reported consuming significantly more fruit (p=0.016), salad (p=0.001), and vegetables (p=0.01) and eating fewer fatty foods (p=0.035). None of the Slavic participants had ever smoked, while one sixth of the NW US group reported they currently smoked cigarettes. Alcohol use was low in the NW US group and nonexistent within the Slavic immigrant group.

Frequency of provider visits for diabetes care during the previous 12 months was similar for both groups; each group reported an average of four-to-five visits. The average number of times each groups' members had their A1C monitored was three times.

All participants were candidates for cholesterol-lowering therapy based on cholesterol screening results and the nationally accepted cholesterol goals (ATP III). However, only 55% of the participants received treatment for hyperlipidemia. The frequency of cholesterol lowering therapy was similar between groups (p=0.194). Of those currently receiving cholesterol-lowering therapy, dosage regimens were not optimized for either group. Only 42.1% of NW US and 18.2% of Slavic participants had a LDL of less than 100mg/dL (p=0.002). When considering the recommended optimal LDL goal of less than 70 mg/dL for high-risk patients, only 10.5% of participants in the NW US cohort and none of the Slavic participants met this recommendation (p=0.136).

Similar disparity was found between the Slavic and NW US cohorts for blood pressure management. In the Slavic cohort only seven of 30 (13.3%) participants achieved the American Diabetes Association goal of <130/80, while 16 of 30 (53.3%) participants of the NW US group were at goal (p=0.017). Currently, the standard of care for patients with diabetes is to use an angiotensin converting enzyme inhibitor (ACEI) or angiotensin II receptor blocker (ARB) as first line pharmacotherapy when treating patients with diabetes and co-existing hypertension. In the Slavic cohort 50% of participants received an ACEI or ARB while 76.7% of the NW US participants received an ACEI or ARB (p=0.032).

Discussion and Implications

Data clearly demonstrated differences in specific physiologic markers between the two groups. These differences placed women in the Slavic immigrant group at increased risk for cardiovascular morbidity and mortality. Specific factors creating greater risk for the Slavic women included higher total cholesterol, higher LDL, higher triglycerides, and greater diastolic blood pressure and greater mean arterial blood pressure. These findings are consistent with those of other researchers studying the Slavic population (Berrios et al., 1997; Fridman et al., 2006; Miller, Wilbur, Chandler & Sorokin, 2003) and with epidemiologic data (Spokane Regional Health District/Epidemiology Center, 2005).

It is widely demonstrated that hypertension and dyslipidemia greatly increase the risk of morbidity and mortality from cardiovascular disease (Adler et al., 2000; Coccheri, 2007; Haffner 2004; Lehto et al., 1997; Turner et al., 1998). Nowhere is that risk greater than in a person with type 2 diabetes (Folsom et al., 1997; Lehto, 1997; Turner et al., 1998). In this study, only about half of the participants were receiving treatment for hyperlipidemia. Of those receiving treatment, women in the Slavic group were less likely to have an LDL less than 100mg/dL as compared to

the NW US group. Similar disparities were found between the Slavic and NW US groups when examining blood pressure management. Less than one third of the Slavic participants are at the ADA goal of less than 130/80 compared to over half of the NW US group. Also, fewer Slavic women received an angiotension converting enzyme inhibitor (ACEI) or angiotension receptor blocker (ARB). Tight glycemic control reduces cardiovascular risk (Hawkins et al., 2002; Stratton et al., 2000).

Both participant groups reported low levels of exercise. The average participant reported achieving far less than the 30-minutes of daily exercise recommended by United States government guidelines (National Heart, Lung, and Blood Institute, 2005). Exercise is shown to benefit persons with type 2 diabetes (Thomas, Elliott, & Naughton, 2006). Although Slavic women reported eating more healthy foods, they demonstrated worse dyslipidemia and similar A1C results compared to the NW US cohort. This study did not clarify the extent to which lifelong dietary habits and culturally learned dietary preferences contribute to current dietary choices and overall physiologic risk.

Despite similarities in hypertension, hypercholesterolemia, angina, and coronary artery disease, heart disease and stroke, Slavic participants were far more likely to perceive their health as being "poor." Although NW US participants reported having been diagnosed with type 2 diabetes for a significantly longer time, speculations about the rate of disease progression cannot be assessed because access to care prior to immigration and differences in the U.S. and former Soviet health care systems was not investigated.

The majority of Slavic participants (23) lived with other family members, while did few NW US participants (4). Family support is viewed as critical for Russian-speaking Slavic immigrants to successfully adapt to the US culture (Aroian et al., 1996; Miller et al., 2006). The Purnell Model directs health professionals to consider the individual Slavic woman immigrant within the context of family, community, and society in order to ascertain risk behavior, nutrition choices, and health care practices. It is necessary to acknowledge the individual's interconnectedness to understand the dynamics of the Slavic immigrant's situation. This study did not address the effect that immigration had on the participant or the family environment. Future research to answer how these readjustment issues affect Slavic immigrant women with type 2 diabetes would likely advance care for this population. Although the vast majority of Slavic participants lived with other family members, about 25% of this sample lived alone.

A language barrier undoubtedly exists between the care providers and Slavic immigrants. The average Slavic participant arrived in America with a rich cultural imprint long after receiving any formal education. Russian was the primary language for most immigrants in the Slavic cohort. Some had a primary language specific to their country of origin, but all were fluent in Russian, the official language of the former Soviet Union. Language and cultural barriers have been widely claimed to account for some of the disparities between ethnically distinct populations (AHRQ, 2000; Aroian, 2001; Miller et al., 2003; Walker & Jaranson, 1999). This study provides additional evidence of such disparities. Specifically, the Slavic immigrant group reported lower rates of health insurance. Statistical analysis of access to health care straddled the apriori significance level ($p = 0.05$) used in this study depending on the statistical analysis method (chi square vs. Fisher's exact test). We can conservatively state that there was a trend toward poor care access for Slavic participants.

Study Limitations and Considerations for Future Research

The participants in this study had all been involved in previous diabetes-related research. The Slavic participants were recruited after participating in a study that included a series of nutrition and diabetes-related education classes. These classes were offered in Russian. It is likely that much of their diabetes knowledge and learned self-care behaviors were acquired from these classes. Similarly, the NW US group participants had either participated in those same classes (offered in English) or in a study that provided chronic illness self-management and diabetes-related education. The convenience sample of participants, who had received prior diabetes related education, limits the generalizability of this study's findings to less informed groups. Further, it heightens the probability that participants in this study had better knowledge and life-style skills than would be found in a more representative sample.

Tobacco and alcohol use was nonexistent among the Slavic immigrant group. Tobacco and alcohol abstinence is not true of the greater population of women from the former Soviet Union (Berrios et al., 1997) and may limit generalizability of the findings. The economic status of each group and the type and quality of each participant's insurance coverage was not evaluated. These parameters are important considerations, as they are widely reported to limit treatment options and healthcare access. Being uninsured, underinsured, or economically disadvantaged, unquestionably influences health behavior and adherence to health care providers' recommendations. An understanding of these influences within the Slavic immigrant community would likely better explain disease management, health care choices, and health behaviors.

Practice Implications and Conclusions

Multiple differences in health-related behaviors, health care access, and cardiovascular risk factors between the Slavic immigrant group and the NW US group were identified. Although the study setting was a geographically isolated region in the Eastern Washington State, many findings may be applicable to other Slavic immigrant communities. First, Slavic immigrant women, who have type 2 diabetes, come from cultures where family and community are emphasized. The importance of family and culture to all individuals notwithstanding, the Slavic immigrant women investigated herein are far more likely to live with other family members as compared to NW US group participants. Given this strong family presence, and considering the rich cultural imprint, it is reasonable to conclude that the context of family, community, and culture must be considered paramount to fully understand the Slavic immigrant situation. Recognition of these dynamics is necessary to facilitate diabetes and cardiovascular disease management within the Slavic immigrant community. Although family support for both cohorts is an important consideration, Slavic immigrants who live alone will likely have increased vulnerability given their cultural imprint and language barriers. Health professionals need to be vigilant in assessing the adequacy of family and community support for all women, particularly immigrant women.

Second, health care professionals should consider that there is room for gain in utilizing exercise as a tool to manage diabetes and cardiovascular risk factors within both cultural groups. Without question, the sequella from poor diabetes management can ravage the microvascular system of the afflicted individual. When a person with diabetes fails to exercise, that person fails to gain the advantages of improved glucose metabolism and loses physical capacity as their age and disease advance. Health professionals must remain watchful for the person who has

diabetes and is complacent and failing to exploit exercise as the mechanism to achieve diabetic control. Accomplishing this goal will likely require system changes, including reimbursement for self-management education and monitoring. Advocating for such policy changes is crucial to delivering cost-effective, quality health care.

Finally, the Slavic women with type 2 diabetes in this study clearly had greater hypertension and more severe dyslipidemia. Aggressive management of type 2 diabetes and confounding risk factors is essential. Effective management can modify the course of the illness and help avoid long-term health consequences. Health professionals must fully exploit the whole repertoire of available tools within the management armamentarium.

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