Barriers to Diabetes Care in Appalachia:

Challenges Faced by Healthcare Providers

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Abstract

Appalachia is a region of the United States that is characterized by high rates of poverty, low levels of education, elevated incidence of chronic disease, and inadequate healthcare. Compared to the national average, the area has an elevated incidence of Type 2 diabetes. Though this disease process is an issue that must be addressed by healthcare providers, these providers face many challenges and barriers to providing adequate care for this disease in the Appalachian population. Barriers to care include geography with limited transportation, an inadequate number of healthcare personnel, patient inability to afford healthcare, patient attitudes toward diabetes care, and the depressed economy of the region. This thesis will examine such barriers and provide suggestions for improving the education and care of patients with diabetes who reside in Appalachia.

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Appalachia is a region of the United States that is comprised of portions of thirteen states, stretching from Mississippi to New England, and covering over 200,000 square miles. Within this mountainous area, 42% of the population lives in rural locations (Della, 2011), which can limit access to healthcare and perhaps prevent educational opportunities. Compared to the rest of the United States, Appalachia is characterized by high poverty rates, lower levels of education, elevated incidence of chronic disease, and inadequate healthcare (Denham, Wood & Remsberg, 2010).

Diabetes is a nationwide problem, affecting 25.8 million people, or 8.3% of the population (Centers for Disease Control and Prevention [CDC], 2011). Incidences of diabetes are recorded as higher in Appalachian areas as compared to the nationwide average. For example, Appalachian Kentucky had a diabetes rate of 10.4% in 2003 (Della, 2011). Certain Appalachian counties of Ohio had a recorded diabetes rate of 11.3% in 2006 (Denham et al., 2010). It is the seventh leading cause of death in the United States, and it increases a patient's risk for heart disease, stroke, and kidney failure (CDC, 2011).

For residents of Appalachia, many factors contribute to the development of diabetes, including poor food choices (Amarasinghe, D'Souza, Brown, Oh & Borisova, 2009) and obesity, which are often related to the low socioeconomic status that is prevalent in many areas of Appalachia (Connolly, Unwin, Sherriff, Bilous & Kelly, 2000). In addition, among other factors, a lack of early screening may contribute to the high incidence of diabetes in this region (Rosenblatt & Hart, 2001).

Barriers Faced by Healthcare Providers

Even with the genetic component of the disease, diabetes can often be prevented through lifestyle modification (Serrano, Leiferman, & Dauber, 2007). Knowledge of the factors that contribute to the disease will aid in motivating the patient to adhere to treatment plans (Schoenberg, Amey, & Coward, 1998). However, in Appalachia, there seem to be extra challenges that prevent healthcare providers from reaching the population to educate them regarding their risk factors. With proper knowledge, individuals can prevent or delay the progression of diabetes with preventative care. This prevention could reduce the morbidity and mortality of this disease (Tessaro, Smith & Rye, 2005). Barriers to care that will be discussed include geography, lack of healthcare providers, inadequate health literacy, poverty and economic status, and cultural characteristics of residents of Appalachia.

Geography

The Appalachian region is filled with breath-taking mountain vistas, tranquil valleys, and, often, isolated residents. Though this idyllic setting is filled with examples of natural beauty and unique culture, this same isolation and vast rural space can lead to challenges for healthcare professionals and their patients in need of care. Within the Appalachian region, approximately 42% of the population resides in rural areas. Comparatively, in the rest of the nation, only 20% live in rural locales (Denham & Rathbun, 2005).

In general, not specifically regarding Appalachia, rural living is associated with challenges in healthcare, including a lack of medical professionals and deficient risk factor education. The 20% of the American population living in rural areas is served by

only 9% of physicians (Rosenblatt & Hart, 2000). Furthermore, compared to urban residents, people living in rural locations often receive less education regarding risk factors and lifestyle-modification prevention (Della, 2010).

Lack of transportation and a long travel distance make good quality health care more difficult to receive. Because of the lack of physicians, many residents must travel to urban areas to receive healthcare. Reaching these urban areas is sometimes a challenge for residents of Appalachian states, such as West Virginia, for it involves narrow and winding roads where interstates are not available (Adams, Gravely & Doria, 2002). In severe weather conditions or in the winter, access becomes even more difficult. Public transportation is limited in rural areas, and a lack of mode of transportation can lead to inability of some patients to reach medical professionals (Tessaro, Smith & Rye, 2005). In one focus group study, participants indicated that long traveling distances are indeed a barrier to care (Coyne, Demian-Popeacu, Friend, 2006). This barrier is particularly challenging for the aging population, who make up a large percentage of some Appalachian states, such as West Virginia with the oldest median age of any state in the country (Adams et al., 2002).

Interestingly, one study found that a lengthy commute to work is significantly related to obesity risk. This study found that rural residents not only commute to work and to healthcare facilities, but also to supermarkets and daily needs. The authors linked this decrease in physical activity to obesity, along with cardiovascular disease and diabetes (Amarasinghe, D'Souza, Brown, Oh & Borisova, 2009). The rural location of communities in Appalachia may contribute to a higher susceptibility to health problems (Denham & Rathbun, 2005), with residents that are less able to access healthcare because

of limited healthcare professionals (Rosenblatt & Hart, 2000) and extended commute times (Coyne et al., 2006).

Lack of Healthcare Providers

Residents of Appalachia often have limited access to healthcare. Rural areas in general tend to have fewer accessible physicians than urban areas (Denham & Rathbun, 2005). As a result, as discussed earlier, residents often must travel long distances to reach a health provider (Coyne et al., 2006). This limited access to healthcare that these populations face can have an effect on mortality and morbidity rates (Huttlinger, Schaller-Ayers & Lawson, 2004).

Inadequate number of healthcare professionals. In many areas of rural America, such as Appalachia, the ratio of healthcare providers to the population is significantly lower than the ratio found in urban areas. Typically, urban areas have one primary care physician for every 600 people, while rural areas have one for every 2,000 people. The U.S. government categorizes areas with a low physician:patient ratio (one primary care physician for every 3,500 or more people) as a Health Professional Shortage Area, or HPSA (Denham & Rathbun, 2005). High numbers of HPSA's exist throughout Appalachia. The U.S. Department of Health and Human Services currently records 113 HPSA's in West Virginia, 185 in Kentucky, and 69 in Appalachian counties of Tennessee (Health Resources and Services Administration, 2013). Because of the sparse population of some areas, the distance between the patients and the available healthcare provider may be great (Rosenblatt & Hart, 2000).

One reason for the shortage of healthcare providers is that many new graduates simply do not desire to work in rural locations. Healthcare Financial Management

conducted a study of three hundred medical residents, all of whom stated that they did not wish to work in an area with a population of fewer than ten thousand people. These medical residents cited reasons for choosing more urban areas that included "family issues, spouse's careers, schools, shopping, entertainment, and social life" (Denham & Rathbun, 2005, p. 2). If these reasons do indeed impact their plans, then much of Appalachia is composed of areas that would not attract new physicians. Throughout Appalachia, some counties have a lower population density than the rest of the country. For example, Appalachian Kentucky has a mean of 64.9 people per square mile of land, as compared to 146.0 people per square mile in the non-Appalachian counties of Kentucky. With the exception of South Carolina, Georgia, and Alabama, where large cities are located in the region, the trend of a lower population density for Appalachian counties continues (Pollard & Jacobsen, 2012). If physicians are not drawn to these counties, then the populations within could perhaps be at risk for inadequate healthcare. Because there are few rural health professionals, a lack of initial physician interaction exists, decreasing the amount of preventative education that can occur (Della, 2011). The U.S. Department of Health and Human Services estimates that over eighty percent of diabetes care is provided by primary care physicians (National Diabetes Education Program, 2011). Because diabetes is often closely related to lifestyle, education regarding risk factors and lifestyle modification can sometimes help prevent a person from developing the disease (Tessaro, Smith & Rye, 2005). Specifically, research has indicated that modifications to diet and exercise can indeed prevent or delay the onset of type two diabetes (U.S. Department of Health and Human Services, 2011). Because of the shortage of physicians, and particularly specialists, in Appalachia limits the

availability of this education (Tessaro, Smith & Rye, 2005). Even when physicians are available, one study indicated that populations in rural locations, and particularly the elderly residing in these areas, are less likely to receive screening tests than patients in urban areas (Rosenblatt & Hart, 2001). Because of such disparities, receiving adequate management for chronic diseases, such as diabetes, can pose a challenge for residents of Appalachia (Denham & Rathbun, 2005).

Not only are primary care physicians in short supply, but, following this trend, specialists also are often not available in Appalachian communities. One study performed in 2009 surveyed health providers throughout Appalachia regarding diabetes care, and the results indicated that most healthcare facilities did not employ specialists such as endocrinologists (Denham, Wood & Remsberg, 2010). Slightly more than one third of the facilities that responded to the survey in this study indicated that they employ a certified diabetes educator, less than one third indicated that they have non-certified diabetes educators, and over 85% did not have an endocrinologist (Denham, Wood & Remsberg, 2010). Compared to non-distressed counties in the area, the facilities in distressed or at-risk counties were less likely to hire specialists in diabetes care or education (Denham, Wood & Remsberg, 2010). The Appalachian Regional Commission labels counties in Appalachia as distressed, at-risk, or non-distressed based on three criteria (Appalachian Regional Commission [ARC], 2012a). The following criteria designate a county as distressed: three-year average unemployment rate of one hundred fifty percent of more of U.S. average, per capita market income of sixty seven percent or less of U.S. average, and poverty rate of one hundred fifty or more of U.S. average (Appalachian Regional Commission [ARC], 2006). At-risk counties have unemployment

and poverty rates of one hundred twenty five percent or more of the U.S. average and per capita market income of sixty seven percent or less of U.S. average (ARC, 2006).

This shortage of specialists is somewhat expected, considering the more scarce patient population in Appalachian areas (Pollard & Jacobsen, 2012). In the survey of medical residents that was conducted by Healthcare Financial Management, referenced earlier in this paper, some residents say that they would not consider practicing in a rural area because their specialty could not be supported in an area with such a small population (Denham & Rathbun, 2005). As a result, residents of some Appalachian areas must travel to more urban areas to receive specialized treatment (Coyne et al., 2006).

Hospital closings. Not only are there limited numbers of healthcare providers for the population, but the situation is also continuing to worsen because of hospital closings. In the 1980s and 1990s, a high rate of hospital closures (up to 10%) was recorded, due to a multitude of reasons, including Medicare reimbursement levels, a changing economy, and shortages of healthcare providers (Bull, Krout, Rathbone-McCuan, & Shreffler, 2008). Over the last decades, as the U.S. national economy has weakened, many citizens, and particularly residents of rural locations, have lost jobs and are therefore unable to afford healthcare (American Hospital Association, 2011). In addition, a shortage of healthcare providers already exists, and many researchers project that this shortage will only continue to increase as much of America's "baby boomer" population ages and requires more care (Association of American Medical Colleges, 2012). Finally, limited Medicare reimbursement places a financial burden on hospitals across the nation (Bull et al., 2008).

Local reasons for hospital closures include rural poverty, widespread unemployment, a lack of health insurance, and an aging population. As the population ages and unemployment rates continue to rise, the disparity between increasing needs and available healthcare continues to widen (Bull et al., 2008). As mentioned earlier, the elderly make up a significant portion of the population of Appalachia. Poverty rates, unemployment, and a lack of health insurance are all socioeconomic characteristics of Appalachia that will be described later in more depth. Because of these characteristics, though, patients may not be able to afford healthcare, which can lead to an inability of the hospitals to afford provision of healthcare. Limited income also is related to a decreased tax base (which then affects hospital funding) and a lack of donations to hospitals for patient care (Bull et al., 2008). In addition, because community hospitals are often smaller and therefore provide less specialized care, those who can afford care often bypass these hospitals for those in neighboring urban areas, contributing to closures (Bull et al., 2008).

When a rural hospital closes, the community's healthcare and economy are affected. While the loss of the hospital obviously leads to a deficit of acute care, it also impacts community-based services, for such services and hospitals are often mutually dependent on each other financially (Bull et al., 2008). Hospitals are major employers for healthcare providers, and when this system is altered, healthcare professionals often leave the area for other career opportunities (Holmes, Slifkin, Randolph & Poley, 2006). Because of the loss of healthcare and support jobs, the economy of the community often suffers, potentially discouraging new physicians from settling in the area for the reasons listed above. In the 1990s, while many of the hospital closures were occurring, a case

study was performed that examined the perspectives of healthcare providers of various healthcare providers practicing in the areas where closures had occurred. These health care providers provided a variety of responses, and this study explained some of the effects that they cited, including a decrease in access to healthcare, a need to learn to adapt to a greater travel distance to reach hospitals, and, in some communities, a slower rate of growth of per-capita Medicare expenditures (Reif, DesHarnais & Bernard, 1998). Concerns expressed by many of the participants included access to care for vulnerable populations, such as the elderly, those with a low socio-economic status, and those with disabilities. In addition, they were concerned about recruiting physicians to the area, as well as about the lack of local emergency care (Reif et al., 1998).

In 1997, the Balanced Budget Act enacted legislation that allowed for the classification of some rural hospitals as Critical Access Hospitals (CAH), allowing them to receive cost-based Medicare reimbursement to help with the cost of providing care (Medpac, 2007). Across the nation, 40% of rural hospitals are CAH status (Holmes et al., 2006), and many hospitals throughout Appalachia are a part of this program. In West Virginia, 18 rural hospitals are CAH status (WVOCHS, 2005). Because these hospitals receive cost-based reimbursement, the services that they provide to Medicare beneficiaries are repaid at a rate of 101%. This is in contrast to the Prospective Payment System that is used in non-CAH hospitals (Holmes et al., 2006). In typical hospitals, the facility receives reimbursement for the type of service provided and the number of patients served, not for the actual cost of these services (Medpac, 2007). On average, Medicare pays 98 cents per dollar for the care of Medicare patients, and Medicaid pays 96 cents per dollar (American Hospital Association, n.d.). When a patient does not have

health insurance, the hospital is obligated to provide basic treatment according to the Emergency Medical Treatment and Labor Act, but the hospital usually absorbs the cost of caring for this patient (American Hospital Association, n.d.). Tax subsidies sometimes help public hospitals with a portion of the bill for these patients (usually 12 cents per dollar) (American Hospital Association, n.d.). However, in Appalachia, tax revenue is low because of unemployment and a damaged economy (Lane et al, 2012). The CAH program helps rural hospitals attempt to avoid the debt that occurs from treating Medicare patients, but it does not cover all of the costs associated with healthcare, nor does it assist with those who are uninsured (American Hospital Association, 2011). In addition, new healthcare legislation in the form of the Patient Protection and Affordable Care Act will begin to impact many areas of healthcare in the next few years, leading to uncertainty regarding the future status of small rural hospitals (American Hospital Association, 2011).

Inadequate Health Literacy

A national issue that is also present and very prevalent in Appalachia is a lack of health literacy. Health literacy involves how well a person can read and understand health information, such as medication bottles, patient brochures, or informed consent forms (Denham & Rathbun, 2005). According the American Medical Society, health literacy is defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services need to make appropriate health decisions" (Ratzan & Parker, 2000, cited by Institute of Medicine, 2004, p. 32). In 1992, the National Adult Literacy Survey was performed, surveying Americans and rating their literacy level on a scale from one to five, with one representing the poorest

reading capability (difficulty with printed materials), three representing the minimum reading capacity that will allow for success in culture, and five representing reading well (Demhan & Rathbun, 2005). This study found that the average American reads at the level of an eighth or ninth grader, and that one in five Americans reads below the level of a fifth grader (Denham & Rathbun, 2005). Throughout Appalachia, educational attainments are often lower than other areas of the nation; in many counties in 2000, only 49.2 to 68.7% had completed high school, and only 4.9 to 11.5% had completed college (Appalachian Regional Commission, 2010). Although educational attainment does not always indicate functional literacy, those who are illiterate are more likely to have had fewer years of education than those who are literate (Foulk, Carroll & Wood, 2001). Because of that fact, much of Appalachia is likely to have a comparatively low level of literacy. The literacy survey was performed in Ohio, and, in three of the four Appalachian counties that were included in the study, more than 50% of participants had a literacy level of one or two, indicating that their literacy level was below the minimal capacity that allows for success in today's culture (Denham & Rathbun, 2005). In a qualitative study in which researchers interviewed focus groups from southwestern West Virginia, participants said that they believed that people living in their region have low levels of medical knowledge (Coyne et al., 2006).

Three of the most common causes of illiteracy are socioeconomic status, poverty, and low parental educational attainment (Denham & Rathbun, 2005), all of which are factors in many Appalachian communities. Compared to the rest of the population, elderly and minorities are more likely to have impaired literacy (Foulk et al., 2001). As the primary users of Medicare and Medicaid (Foulk et al., 2001), this population does

have healthcare available, but their literacy level may prevent them from actually being able to understand much of the material that is provided to them. As a result, individuals with low literacy are less likely to seek health care, but have an increased risk for acute illness and hospital stays (Denham & Rathbun, 2005).

Although the average American reads at an eighth or ninth grade level, and many at a much lower level, most healthcare materials are written above the tenth grade level (Denham & Rathbun, 2005). This disparity prevents those with a lower literacy from truly understanding the risk factors, process, and treatments for a disease. Foulk, Carroll and Wood emphasize that this presents a problem specifically to those with chronic diseases, such as diabetes. People with diabetes or other chronic diseases particularly need to understand health behaviors and lifestyle modification, but illiteracy prevents education (Foulk et al., 2001). A study of healthcare in Appalachia cites educational deficit as being associated with a lack of participation in activities that promote health (Huttlinger et al., 2004). In addition, those who are illiterate are less likely to seek help in disease or use screening tests (Foulk, Carroll & Wood). Low health literacy has been associated with poor glycemic control, a low likelihood of achieving glycemic control, and higher prevalence of retinopathy and diabetes complications (Schillinger et al., 2002). Those with lower health literacy are also more likely to be admitted to a hospital (Baker, Parker, Williams & Clark, 1998).

Poverty and Economic Status

In many areas, poverty is a prevalent aspect of Appalachian culture (Smith & Tessaro, 2005). In the 1960's, President Lyndon Johnson declared a "war on poverty" after visiting Appalachia and seeing the conditions in which people were living in this

region (Ezzell et al., 2012). At that time, the income of residents of Appalachian Kentucky was only 40% of the national average, only 32% percent of adults had graduated from high school, and 12% of people had not complete school through the fifth grade (Ezzell et al., 2012). Since that time, conditions have improved dramatically throughout most of Appalachia; the income of residents of Appalachian Kentucky is now 20% below the national average, and, throughout all of the region, 82.3% of adults have obtained a high school diploma (Ezzell et al., 2012). However, regions still exist where educational attainments are lower (as discussed earlier) and where the economic situation is less promising. Out of the 410 counties in Appalachia (Wood, 2005), 98 counties are currently classified as "distressed" by the Appalachian Regional Commission based on three criteria discussed earlier (Appalachian Regional Commission [ARC], 2012a). In addition to the counties that are distressed, more counties are labeled as "at-risk" (ARC, 2012a). Compared to the 223 counties that were distressed in 1960, drastic improvements have indeed occurred. However, since 21.7% of Appalachian counties are still distressed, economic issues remain (Wood, 2005).

Reasons for the depressed economy of distressed counties are varied depending on the location and characteristics of the county, but there are a few overarching contributors to the issue. First, throughout the United States, depressed counties are usually not proximate to urban areas (Wood, 2005). This trend continues in Appalachia, particularly Central Appalachia, and this region in fact has the lowest levels of urbanization in the nation (Wood, 2005). This isolation not only decreases access to healthcare, as described earlier, but also increases the distance that residents must travel in order to reach their occupations. For some, the distance may be too great for a

commute to be feasible (Wood, 2005). In addition, many of the distressed counties were formerly dependent on professions related to natural resources, such as forestry, agriculture, and coal mining (Wood, 2005). As these professions have employer fewer and fewer people, the areas have become more depressed. Many of these counties were distressed in the 1960s as well, because counties associated with coal mining have historically been associated with higher poverty and unemployment rates and lower income and education rates (Wood, 2005). Wood points out the following observations regarding employment and economic changes in Central Appalachia:

> As employment in Central Appalachia's mining sector has declined over time, with levels of employment in the mining industry being 10 percent in 1960 and declining to only 2 percent in 2000, many counties that were already typically experiencing poor and tenuous economic circumstances in the past have been unable to successfully adapt to changing economic conditions. Furthermore…Central Appalachian counties that have remained distressed over time have tended to have low levels of employment in key industries, such as in manufacturing and professional services, (2005, p. 43-44)

Manufacturing industries have provided jobs that have helped bring many counties in Southern Appalachia out of distress (Wood, 2005), but these industries have not taken root in Central Appalachia, as they tend to be successful only in the "most productive, capital-intensive sectors" (Wood & Bischak, 2000). Even when manufacturing jobs are available, an economy that is not diversified with a mix of professions can be easily depressed by changes in the major source of employment (for example, the closing of a factory) (Wood, 2005).

Because of the economics of the region, low income and unemployment are common. Compared to the 2009 United States average income of $39,635, the Appalachian average income was $32,426. However, in at-risk counties, the average was between $25,546 and $29,476, and in distressed counties, the average was $15,506 to $25,545 (ARC, 2012b). The overall Appalachian average of rates of unemployment of 9.7% is only slightly higher than the national rate of 9.6%, but, again, certain distressed counties are in worse condition, with rates as high as 19.7% (ARC, 2012c). As described by Foulk, Carroll & Wood, populations with a higher socioeconomic status are more likely to live with a healthier lifestyle than those who are poorer or less educated (2001).

These economic challenges affect healthcare because certain risk factors for diabetes, including obesity, physical inactivity, smoking, and low birth weight, are all associated with low socioeconomic status (Connolly, Unwin, Sherriff, Bilous & Kelly, 2000). One study found that diabetes itself is strongly associated with populations with low socioeconomic status (Connolly et al., 2000). In general, patients in rural areas with a lower socioeconomic status and education level are less likely to participate in positive behavior change than those with a higher socioeconomic status and more education (McGarvey, Leon-Verdin, Killos, Guterbock & Cohn, 2011). In addition, populations with a low socio-economic status are more likely to engage in less physical activity and to smoke, increasing their risk for diabetes (Connolly et al., 2000). This association with risk behaviors (Connolly et al., 2000) and the decreased likelihood of positive behavior change (McGarvey et al., 2011), along with the inability to actually afford self-management (Smith & Tessaro, 2005), can be a barrier for health care for Appalachian populations.

Lack of insurance. Because of uncertain employment and low wages, many residents of Appalachia are focused on meeting their basic needs, not on healthcare or changing lifestyles in a healthy way (Smith & Tessaro, 2005). In general, according to the ARC study, health insurance coverage is better in Appalachia than in other distressed areas of the country. The rates of insurance coverage do vary throughout the region, however, and, in many counties, between zero and 59% of people have insurance coverage (Lane et al., 2012). In the qualitative study of southern West Virginia populations, participants identified an inability to afford care as one of the barriers preventing them from accessing healthcare. These residents stated that many do not have health insurance or have limited insurance (Coyne et al., 2006). As mentioned earlier, the Emergency Medical Treatment and Labor Act guarantees that these people will receive care for emergencies (American Hospital Association, n.d.), but they may not be able to afford healthcare apart from these services.

Inability to afford management of care. Affording healthcare is one of the barriers to diabetes care, but another challenge involves affording the lifestyle changes necessary to managing the disease effectively. Even if a person does have access to care because of insurance, they could potentially still believe that they do not have adequate income for nutritious food choices or other prevention strategies. In a qualitative study of residents of West Virginia, researchers found that economic hardship did change the way that the patients managed their disease, with many ignoring medical care because of financial reasons (Smith & Tessaro, 2005).

Diabetes medications place a financial burden on individuals with the disease, especially those who are uninsured. A recent study conducted over two and a half years

found that, during the time of the study, the average patient with diabetes spent $772 on prescription testing strips and supplies and $2,078 on insulin prescriptions and supplies (Yeaw, Lee, Aagren & Christensen, 2012). In addition, oral diabetes medications can range in cost from $4 to $26 per month for metformin, to $135 to $285 per month for thiazolidinediones (Consumer Reports, 2011).

Food insecurity. Obesity is one of the major risk factors for diabetes, as well as other chronic diseases such as cardiovascular disease and cancer (Amarasinghe et al., 2009). Studies indicate that, compared to the general population, the obesity rate is higher among racial minorities or among those with lower income and the least amount of education (Amarasinghe et al., 2009). Appalachian areas have the highest obesity rates in the nation; for example, West Virginia has the third highest obesity rate in the nation, following Mississippi and Alabama (Amarasinghe et al., 2009). This is probably related to the fact that people with a low income who are living in a rich society often cannot afford high quality diets, resulting in a lack of nutritious foods such as fresh fruits and vegetables, lean meats, and fish (Amarasinghe et al., 2009). According to Amarasinghe et al., the economy impacts the food choices made by those in poverty, linking these choices with obesity (2009). In general, fatty and sweet foods are less costly than foods that are rich in nutrients (Drewnowski, 2009). Diabetes risk has been correlated with intake of dietary fat, regardless of caloric intake (Franz et al., 2002), putting those with a diet high in fat at risk for developing the disease. Food-insecure participants in one study self-reported higher rates of diabetes than those who were food-secure (Holben & Pheley, 2006). As defined by the study performed by Holben and Pheley, food security means “having access, at all times, to enough food for an active,

healthy life without resorting to using emergency food supplies, begging, stealing, or scavenging for food" (2006, p. 1). When that particular study was performed, the sample of participants from Appalachian Ohio was found to have an incidence of food insecurity that was two and a half times the 1999 national average rate of 10.1% (Holben & Pheley, 2006).

Culture and Attitudes of Residents of Appalachia

Within the Appalachian region, distinct characteristics and attitudes form a unique culture. In a qualitative study of residents of Southern West Virginia, participants characterized Appalachian residents as "kind," "outgoing," "open-hearted," and "helpful" (Coyne et al., 2006, p. 2). These participants also identified the following strengths in their population: "spiritual beliefs or faith in God," "family values," "good moral values," "sense of community," "commitment and dedication to work," "mutual respect," "hospitality," and "pride" (Coyne et al., 2006, p. 3).

Perceptions of diabetes held by Appalachian residents are often negative and judgmental. Many believe that the disease is a new development in Appalachia, as jobs requiring physical labor, such as farming and coal mining, have decreased (Della, 2011). In addition, researchers found that participants stigmatized diabetics as "lazy, irresponsible, and overindulgent" (Della, 2011, p. 5). Another study found that participants believed that diabetes is self-induced, resulting from sugar over-consumption and lack of physical activity. The participants blamed diabetics as being morally weak or lacking self-control, often leading patients with diabetes to feel guilty about their disease (Smith & Tessaro, 2005).

Perceptions of healthcare are often negative, and many Appalachian residents view healthcare as a last resort, rather than an ongoing part of life (Coyne et al., 2006). Participants of the qualitative study indicated that they are uncomfortable with the lack of American-born physicians and with the turnover rate in their area, saying that these factors prevent them from building trust with their healthcare providers (Coyne et al., 2006). Although they did acknowledge that specialized care is sometimes necessary, some participants revealed that they did not trust specialists and that they were fearful of addiction to prescription medication (Coyne et al., 2006).

Finally, many residents of Appalachia are self-reliant, preferring to manage diabetes and other health-related issues on their own instead of seeking medical attention (Della, 2011). Instead of using prescriptions, they often prefer herbs or over-the-counter medications (Smith & Tessaro, 2005). In addition, they believe that each individual is responsible for his or her own disease management, often disapproving of governmental assistance (Smith & Tessaro, 2005). As Della (2011) observes, "unlike substance abuse or cancer, which were viewed as an unanticipated and frightening scourge, heart disease and diabetes were discussed as an unfortunate result of changing community circumstances, occurring from the inside" (p. 8). Because they do not see the disease as an important issue, they may not take the prevention measures that are available to slow development of the disease (Della, 2011).

Proposed Solutions or Improvements

The situation in Appalachia indeed presents a unique challenge to healthcare providers. The remote location discourages populations from accessing healthcare providers, and also prevents medical personnel from being able to reach these

populations in an economically feasible way. A low patient to physician ratio and hospital closings further complicate access to care, forcing residents to travel longer distances to receive care when they need it. In addition, many residents of Appalachia struggle with reading and understanding health information. The lack of health literacy complicates care, preventing those with chronic disease from adequately understanding their disease process, lifestyle modification or medication therapy. An educational deficit is related to a lack of engagement in health promotion activities (Huttlinger et al., 2004). A distressed economy further discourages patients from visiting their primary care physician if they are uninsured, and the large numbers of uninsured, Medicare, and Medicaid patients strains the budgets of hospitals. Many counties that are currently distressed have a long history of economic issues, and the lifestyle of poverty prevents these populations from being able to afford lifestyles or medications that improve their health status. Finally, the culture of the region emphasizes self-reliance, and its distrust of medical personnel and judgment of those who develop diabetes can lead to many individuals attempting to manage their disease on their own. Solving the problem of diabetes and healthcare deficiencies in Appalachia is not an easy fix, and improvements most likely will not be able to occur suddenly or drastically. However, as conditions have improved since Johnson's "war on poverty" in the 1960s (Ezzell et al., 2012, p. 2), hope remains that such improvements can continue and perhaps even affect those counties that have remained distressed since that time.

Social Ecological Model

The ecological model is a theory of public health that proposes interdependence between all of the processes that occur within a person and in the person's environment

(DeMarco & Segraves, 2012). According to this model, behavior change is related to multiple levels of influence, which include intrapersonal factors, interpersonal processes, institutional factors, community factors, and public policy. For lasting behavior change to occur, multiple levels of influence must be influenced (Whittemore, Melkus & Grey, 2004). This model has been effectively used in promotion of breast cancer screening and safe sex practices (DeMarco & Segraves, 2012). Looking at Appalachian diabetes through this model, it is evident that many factors contribute to the prevalence of this disease and that, for personal change to occur, all of the social and environmental factors must be addressed as well. Whittemore, Melkus & Grey (2004) describe the situation in the following words in their study on application of the ecological model to prevention and management of diabetes:

> Expanding the reach of diabetes prevention and management within the current health care climate of cost containment will not be simple or easy. Persistent and collaborative efforts will be necessary to begin to address the complex challenges facing health care professionals today. Securing the time and the finances to implement new programs require ingenuity. Small, viable programs must be the starting point and the usage of existing resources are imperative... (p. 96)

Because of the large number of variables that contribute to diabetes in Appalachia, using the ecological model could help to address the entire picture of diabetes. Steps to be taken need to influence multiple levels of influence, need to be culturally sensitive, and need to be constantly evaluated for effectiveness and the need for change (Whittemore, Melkus & Grey, 2004).

Intrapersonal changes. Intrapersonal factors of a person's health behaviors involve attitudes, beliefs, self-efficacy, expectations of positive outcomes, and communication skills (DeMarco & Segraves, 2012). As explained earlier, many Appalachian residents hold a negative perception of diabetes, stigmatizing diabetics as lacking self-control. Because of their lack of health education, patients may not understand the steps that they may take toward avoiding risk factors for diabetes. In addition, because of a mistrust of healthcare providers and a lack of access to care (Coyne et al., 2006), patients may choose to try to treat the disease on their own. According to Hochbaum and Rosenstock's health belief model, a person's health-related behavior depends upon the following four factors: severity of the potential disease, level of "conceivable susceptibility," benefits of preventative action, and barriers to taking health-promoting actions (DeMarco & Segraves, 2012). For a person to realize the health-promoting factors that he must take to prevent diabetes, he first must understand how the disease will affect him, that he is susceptible (through blood glucose or hemoglobin A1c tests), and that taking preventative action will indeed help him avoid disease. However, each of these steps requires health education and, without the ability to understand written health education materials and without access to healthcare providers for screening and explanation, those with low literacy levels in Appalachia may be at risk for developing the disease.

Behavior change is specifically influenced by knowledge, skills, beliefs, attitudes and self-confidence (Whittemore et al., 2004). In Appalachia, many of these factors could be improved through health education. There is evidence that understanding the relationship between diet and disease can lead to better choices in lifestyle behaviors,

including diet, smoking, exercise, sleep, and stress (Amarasinghe et al., 2009). Because of the low level of health literacy, materials that are easy to read could help Appalachian residents understand their health information. Providing information on one page at a very low readability level, instead of on long documents, has been shown to encourage patients toward health behaviors (Foulk et al., 2001). In addition, healthcare professionals could attempt to demonstrate skills and have the patient repeat the action to ensure understanding (Foulk et al., 2001).

Several educational tools are available to assist healthcare professionals in providing understandable information to communities. The National Diabetes Education Program, a branch of the U.S. Department of Health and Human Services, has started a campaign with the slogan, "Small steps, Big rewards, Prevent type two diabetes" (National Diabetes Education Program [NDEP], n.d.). This campaign encourages modest weight loss and a low calorie, low fat diet to prevent prediabetes from progressing to diabetes (NDEP, n.d.). On the campaign website, printable brochures and handouts are available for healthcare providers to distribute to patients. The American Diabetes Association also has educational materials that can be used to educate patients. Healthcare providers who wish to lead a diabetes lifestyle modification program can also use programs such as the DPP Lifestyle Program, which includes information for a 16-session course on diabetes prevention (Ahmad & Crandall, 2010).

Interpersonal changes. A patient's interpersonal processes are composed of relationships that he holds with peers and family (Whittemore et al., 2004). Studies indicate that social support positively affects health status and that it helps with levels of stress, promotes well-being, and encourages healthy behaviors. Specifically for patients

with diabetes, social support encourages diabetes self-management and metabolic control (Whittemore et al., 2004).

Studies of Appalachian residents have indicated that families are very cohesive, with communities often composed of large, close-knit families (Coyne et al., 2006). Participants in surveys identified that mothers are particularly influential in the health of their families: "A common cultural experience is among the influences that shape health concerns, mothers' influence on health matters, and the household production of health in Appalachian families…Women in the region also give members of their families concrete suggestions about health" (Denham, Meyer, Toborg & Mande, 2004, pp. 294, 298). Perhaps providing health education to mothers or other key family members would help impact the culture of diabetes in Appalachia (Denham, Meyer, Toborg & Mande, 2004).

Institutional changes. A person's institutional factors are influenced by the time that he or she spends in an organizational setting, such as work, school, or church (Whittemore et al., 2004). Because workers or students are very likely to come in contact with health information if it is presented at their workplace or school, promoting healthy lifestyles and diabetes prevention in these institutions may be an efficient method of reaching a wide range of people. Because a large group of people are being encouraged to make healthy decisions, a social support is formed, further encouraging the process. Studies have found strong evidence that workplace health promotion programs, such as smoking policies, cafeteria food choices, food labeling, and physical activity incentives support decisions toward healthy behavior (Whittemore et al., 2004). As obesity has become more of an issue among children and youth, school health promotion activities

are becoming more important as well (Whittemore et al., 2004). Participants in focus groups indicated that many in Appalachia have a strong faith in God (Coyne, Demian-Popeacu, Friend, 2006). Because of this, perhaps using churches as a meeting place for health education could encourage people to attend the programs. Studies recognize the impact that church-based health education has had on the African-American community in particular (Whittemore et al., 2004).

It may appear obvious that the health systems and hospitals in communities should be a primary source of health information and education, but, as explained earlier, many health education materials are written at a tenth grade education level or higher. However, for any behavior change to be made, people at risk for developing diabetes must be able to understand the health information that is given to them. As a result, Foulk, Carroll & Wood (2001) suggest that physicians should include risk management, risk behavior change, counseling, and health education when meeting with patients, instead of simply treating illness when it occurs. Nurses armed with knowledge of diabetes pathophysiology, prevention, and management could also ensure understanding through education. If the physicians and nurses are providing such education, it could also reduce the need for endocrinologists or other specialists that are in short supply in Appalachia. To address the shortage of healthcare providers, perhaps the use of new health monitoring technology, such as Telehealth, could allow patients to reach medical professionals for assessment, monitoring, and counseling (Harkness, 2012).

Community changes. A patient's community factors involve the conditions in the area where he resides (Whittemore et al., 2004). In Appalachia, distressed communities are sometimes associated with health illiteracy, poverty, and inability to

afford lifestyle changes. In order for health promotion education to be effective, it must address these factors and provide solutions. As Denham, Meyer, Toborg and Mande (2004) explain, "health promotion should be culturally sensitive…health education that reflects the understandings and perceptions of an identified population would lead that population to an appreciation of the message and ultimately disposed to the adoption of the desired behavior change" (p. 293). Addressing poverty while explaining diabetes prevention and management techniques in plain language that is understandable for those who are less health literate could provide individuals with the strategies they need for healthy lifestyles. One study suggested that education regarding self-management techniques while dealing with economic hardship would be beneficial in distressed areas (Smith & Tessaro, 2005).

In areas where the severity of diabetes is realized and local residents desire to take action, coalitions could be formed for the development of plans and interventions that are sensitive to the needs of their particular area (Whittemore et al., 2004). For example, in some areas, fruits and vegetables are often unavailable or are more expensive than some residents are able to afford. One study suggested that improving production and availability of fruits and vegetables is a worthwhile cause; suggestions included encouraging fast food chains to serve these foods or encouraging those with a low income to obtain fresh food through their welfare program (Amarasinghe et al., 2009). Another study encouraged rural communities to maintain or reestablish quality local health care providers, stating that this would contribute to the health of all age groups, but particularly the elderly and children who cannot travel long distances to hospitals (Bull et al., 2001).

Public policy changes. Through legislation passed at the federal, state, and local level, public policy impacts a person's health behaviors as well (Whittemore et al., 2004). Over the next few years, the Patient Protection and Affordable Care Act that was enacted in 2010 will begin to have more effects of the American healthcare system as a whole. This act is designed to increase health insurance coverage to up to ninety five percent of Americans, improve availability of primary care, and lower costs (Harkness, 2012).

Conclusion

Appalachia is a beautiful region of the United States, filled with its own unique culture and challenges for healthcare providers. Diabetes is a major threat to the health and wellness of the Appalachian population, with regional rates exceeding the national average. Though diabetes may often be prevented through lifestyle modification and managed through dietary and pharmacologic therapies, healthcare providers face barriers that prevent them from adequately treating residents of Appalachia, particularly those in distressed counties. These barriers include remote locations, a lack of healthcare providers and hospitals, health illiteracy, poverty and a distressed economy, and cultural attitudes regarding diabetes. These barriers present a challenge that must be addressed in communities on multiple levels for behavior change to occur. Clear education regarding affordable, culturally-sensitive behavior change in individuals, families, and communities could potentially lead to positive lifestyle modifications. Members of churches who are healthcare personnel could volunteer to lead educational programs at their church, or at other churches in the area, allowing a wide variety of ages and a large number of people to be reached with information that is presented by someone from their own community. In addition, according to the distinct needs of each community, coalitions could plan

interventions and seek to improve characteristics of their communities. Though the long-term effects of healthcare reform on the American healthcare system are unknown, they most certainly will impact rural healthcare in some way. The effects remain to be seen over the next years. In order to definitively say that the ecological model would lead to behavior change, further research needs to be performed on the effectiveness of the techniques discussed. In their study, Whittemore, Melkus & Grey (2004) quoted Duhl (1996), who stated, "Health is not deliverable; it cannot be given to anyone. What can be done is to set up the conditions that optimize health" (p. 96). In the Appalachian region, medical professionals cannot deliver health and a lack of diabetes. However, healthcare providers may provide the education and the lifestyle techniques that this population needs in order to live healthy lives.

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