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The impact of 'social determinants of health' on epilepsy prevalence and reported medication use

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Summary There is a limited understanding of the complex relationship between poverty and epilepsy. To address the complex interaction of environmental and psychosocial factors in epilepsy a 'social determinants of health' model is presented where individual factors are influenced through three pathways (social environment, work and material factors). In the 2005 California Health Interview Survey, 246 of 604 (41%) persons with a history of epilepsy were in poverty, defined as <200% Federal Poverty Level (FPL). Multivariable logistic regression analyses revealed persons in poverty are not more likely to report a history of epilepsy compared to those not in poverty. However, persons with a history of epilepsy in poverty were significantly less likely than those not in poverty to report taking medication for epilepsy (OR 0.5) once material factors (annual income and living situation) and healthcare access were controlled for in the final sequential model. Healthcare practitioners must continue to recognize that connection to social services and the cost of medications are significant barriers to optimal care in persons with epilepsy. Improved connection to patient advocacy organizations and medication assistance programs may help close these gaps.

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Introduction

Previous investigations found the incidence and prevalence of epilepsy in adults increases with socioeconomic deprivation (Heaney et al., 2002; Morgan et al., 2000; Noronha et al., 2007; Tellez-Zenteno et al., 2004). Population studies from the United States show persons with a history of epilepsy report lower educational attainment, lower household income and poorer health status compared to those without epilepsy (Elliott et al., 2008a,b; Kobau et al., 2007, 2008).

In the general population, insurance status and socioeconomic differences are thought to account for a large amount of disparities in health and healthcare among minorities (Kirby et al., 2006). While race/ethnicity differences in epilepsy prevalence have been found (Annegers et al., 1999; Centers for Disease Control and Prevention, 1995; Cowan et al., 1989; Haerer et al., 1986; Hussain et al., 2006; Shamansky and Glaser, 1979), there is evidence that these differences tend to disappear when other factors are controlled for (Strine et al., 2005). A number of studies suggest that race/ethnic minorities have limited knowledge about epilepsy and its treatment, experience barriers to care and have limited social support (Kelvin et al., 2007; Szaflarski et al., 2006). However, race/ethnic differences in psychosocial outcomes may still exist even after poverty levels are controlled for. For example, in a study of the psychological responses to having epilepsy in the very poor, African Americans had significantly lower levels of hopelessness and significantly more optimistic attributional styles than Caucasians (Gehlert et al., 2000).

Educational attainment improves health both directly and indirectly through work and economic conditions, psychosocial resources and a healthy lifestyle (Ross and Wu, 1995). Recent gains in life expectancy (with the exception of African American males) are significantly higher in better-educated groups (Meara et al., 2008). Persons with epilepsy are known to have significant difficulties obtaining and maintaining employment (Bautista and Wludyka, 2007; Smeets et al., 2007). Previous population research found low education was associated with an increased risk for epilepsy (OR 2.3) (Hesdorffer et al., 2005).

While age, gender, race/ethnicity and education are clearly important factors in clinical care, it is also important to understand the impact of environmental and psychosocial factors on the individual. Neighborhood living conditions link resources in the social environment to health outcomes (Anderson et al., 2003a,b). Previous research found living in a poor neighborhood is associated with a higher occurrence of coronary heart disease, hypertension, high cholesterol (Bond Huie, 2001) and carotid artery disease (Petersen et al., 2006).

In population surveys, persons with serious psychological distress have significantly lower levels of education and are more likely to be living in poverty (Pratt et al., 2007). Persons in such environments experience significantly higher amounts of stress, poor mental health (Drukker and van Os, 2003; Hill et al., 2005) and are more likely to adopt unhealthy coping behaviors such as smoking (Stimpson et al., 2007). Negative health behaviors (such as smoking) and an increased prevalence of comorbid conditions (heart dis-

ease, cancer, stroke and asthma) have been found in persons with epilepsy (Elliott et al., 2009; Kobau et al., 2008).

Poverty imposes constraints on the material conditions of everyday life through limitations on the fundamentals of health: housing, good nutrition and societal participation (Black and Laughlin, 1996). Material asset indicators such as home ownership are significantly associated with health outcomes after controlling for age, gender and income (Macintyre et al., 2001). People living in poverty, who have difficulty paying for affordable housing and utility bills, are less likely to have a usual source of care, are more likely to postpone treatment and are more likely to use emergency room services (Kushel et al., 2006). Previous research from Iceland found home ownership was associated with a decreased risk for epilepsy (OR 0.6) (Hesdorffer et al., 2005).

Of the 45 million people in the U.S. that were uninsured in 2007, 66% had annual incomes <200% of Federal Poverty Level (The Henry J Kaiser Family Foundation, 2008). The evidence suggests the financial burden of healthcare has continued to increase for both the uninsured and the insured (Banthin et al., 2008). Further compounding these issues, hospitals charge "self-pay" patients (the uninsured) at rates 2.5 times higher than Medicare-allowable costs (Anderson, 2007). The combination of these factors has led to greater medical debt, difficulties paying medical bills and higher rates of personal bankruptcy (Banthin et al., 2008). In many communities, lower cost providers (safety-net providers and community health centers) are available but less than half of the uninsured report they use or were aware of such providers (Cunningham et al., 2007). Such economic barriers are likely to influence health outcomes and reported use of medications, especially for individuals with chronic conditions such as epilepsy.

Lack of treatment adherence in patients with chronic diseases is a major problem (O'Brien et al., 1992). Poor adherence results in reduced treatment effectiveness, (Dunbar-Jacob et al., 2003) and increases the financial burden of chronic diseases (Breen and Thornhill, 1998). Barriers related to the cost of treatment account for as much as 50% of nonadherence with therapeutic regimens (Richardson et al., 1993). In multivariable models, higher out of pocket costs, poor patient-provider communication, low income and lack of prescription coverage are all associated with self-reported skipping of medications due to cost (Wilson et al., 2005). A 2001 Harris Interactive poll of 1100 adults found in households with incomes less than US\$ 25,000, 40% did not fill at least 1 prescription and 30% took their medications less often than prescribed in the last 12 months to save money (Taylor and Leitman, 2001). Anti-epileptic drugs (AEDs) are the foundation of care for many persons with epilepsy and long-term outcomes are better with adherence to treatment (Cereghino et al., 1981). However, poor compliance with AEDs is a common problem.

In a recent analysis of drug adherence rates in 706,032 adults only 55% of persons with epilepsy had drug adherence rates of 80% or better (Briesacher et al., 2008). A large study ($n = 33,658$) of AED non-adherence using retrospective Medicaid claims data found periods of non-adherence were more common among the elderly, females, non-Caucasians and those with higher amounts of comorbid conditions (Faught et al., 2008). Non-adherence to AEDs was associated with a

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