



Cardiovascular risk and treatment for adults with intellectual or developmental disabilities[☆]



Steven R. Erickson^{a,*}, Patrick Spotz^{b,2}, Michael Dorsch^a, Barry Bleske^{c,2}

^a University of Michigan College of Pharmacy, Department of Pharmacy Practice, United States

^b Department of Veterans Affairs, VISN Region 15, Kansas City, MO, United States

^c Department of Pharmacy Practice and Administrative Sciences, University of New Mexico College of Pharmacy, United States

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ABSTRACT

Background: People with intellectual/developmental disabilities (IDDs) face the development of cardiovascular disease (CVD) similar to the general population. The purpose of this study was to describe and compare the presence of CVD risk factors, the atherosclerotic cardiovascular (ASCVD) risk score, and medication prescribing patterns for medications to treat related risk factors for patients with IDD and those without.

Methods: This was a retrospective study of patients age 18 years and older of a health system's primary care medicine practices. The IDD group had documentation of a diagnosis related to IDD. The comparison group was a random sample of patients from the same practices who had no indication of IDD. Patient characteristics included demographics, smoking status, cholesterol, and blood pressure. The presence of a diagnosis of hypertension, hyperlipidemia, diabetes, coronary artery disease, history of stroke or myocardial infarction, and related medication therapy were documented. The dependent variable was the estimated 10-year primary risk of ASCVD.

Results: The IDD group included 78 patients while the GenMed group included 187. There were no significant differences in the prevalence of risk-related diagnoses or in blood pressure and cholesterol between the two groups. The estimated 10-year ASCVD risk was significantly higher in the GenMed group compared to the IDD group ($p = 0.02$). Prescribing was similar between the groups. The regression analysis found that group assignment was not significantly associated with ASCVD risk, while age, gender, and race were.

Conclusions: CV risk and related treatment among patients with IDD was similar to that of the general population.

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1. Introduction

Individuals with intellectual or developmental disabilities (IDD), such as Down syndrome, autism spectrum disorders, or cerebral palsy, are living longer and more independent lives in part due to improved medical care and living conditions [1]. As this population ages, individuals develop many diseases associated with aging, including dementia, coronary heart disease (CHD), and hypertension [2–9]. For example, the life expectancy of individuals with Down syndrome has increased to 55 years over the last half century with many patients living even longer into their sixties and

seventies [3]. In addition to the increase in life expectancy, there has been an increase in the prevalence of IDD. Estimates place the number of people with developmental disability in the United States at 1.1%, or approximately 3.5 million individuals [10]. Increases in rates of diagnosis (particularly for autism spectrum disorders) as well as improved rates of survival account for much of the increase in IDD prevalence [11]. Some conditions associated with IDD have higher occurrence of cardiovascular risk factors. For example, individuals with autism are more likely to be obese or have hypertension than the general population, a powerful risk factor for diabetes, high cholesterol, and hypertension [12].

Studies have examined the prevalence of risk factors for CHD in this population though there are no studies examining overall levels of CHD risk in this population [3,13]. A more thorough understanding of this population's overall level of CHD event risk is needed in order to assist clinicians understanding the needs of their own patients who may have IDD. The objectives of the study were to describe and compare the level of monitoring of cardiovascular risk factors, to calculate cardiovascular risk score, and characterize medication prescribing patterns for medications used to treat CHD related risk factors for individuals with

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* Corresponding author at: University of Michigan College of Pharmacy, 428 Church Street, Ann Arbor, Michigan 48109-1065, United States.

E-mail address: serick@med.umich.edu (S.R. Erickson).

¹ These authors take responsibility for all aspects of the reliability and freedom from bias of the data presented and their discussed interpretation.

² This author takes responsibility for all aspects of the reliability and freedom from bias of the data presented and their discussed interpretation.

IDD to those of patients from the same medical practices within a large academic health system who do not have IDD.

2. Methods

2.1. Study design

This was a retrospective, cross-sectional analysis using a health systems electronic medical records and data warehouse.

2.2. Subjects

Subjects were identified from the adult general internal medicine clinic practices of a large Midwestern academic health system. Working with the health system's data warehouse, a total of 751 patients was identified as being a patient of an adult general internal medicine clinic in 2012 who met the inclusion criteria of (1) being 18 years of age or older; (2) having an ICD9 diagnosis of Mental Retardation (intellectual/developmental disability) code of 317, 318.0, 318.1, 318.2, or 319 or having a diagnosis of one of the more common conditions associated with intellectual/developmental disability including autism spectrum disorders, Down syndrome, Williams Syndrome, Fragile X syndrome, cerebral palsy, fetal alcohol syndrome; and (3) treatment by a general internal medicine clinician within the previous year. A random sample of 200 patients was chosen from this group to create the IDD (intellectual/developmental disability) group. Of these patients, 187 had adequate documentation of an IDD related condition in the medical record. The comparison group of 497 adult general medicine patients was constructed by obtaining a random sample of the adult (age 18 years and older) patients seen by clinicians in the same time period, and at the same clinics, as the IDD sample population. This sample is referred to as the "GenMed" sample. The study was approved by the institutional IRB.

2.3. Data collection

Researchers obtained data by reviewing the electronic medical record. The patients' electronic medical records viewed included the problem summary list, physician notes, vital signs, and laboratory data. Data collection occurred in 2013, examining data from 2012. The most recent data were recorded for all variables that were available in 2012. No data was used from inpatient hospitalizations.

2.4. Data

Patient demographic information included age and gender. Other data obtained include smoking status, total cholesterol, high density lipoprotein cholesterol, and systolic/diastolic blood pressure. Smoking was defined as current smoker. The presence of a diagnosis of hypertension, hyperlipidemia, diabetes, coronary artery disease, history of stroke or myocardial infarction, was also documented. Data were also collected from the problem summary list in the electronic medical record. These data included the name of any medication used for the treatment of hypertension, diabetes, cardiovascular disease, and elevated cholesterol. The IDD-related condition was documented for the IDD group. These included Down syndrome, Fetal Alcohol Syndrome, Cerebral Palsy, Autism Spectrum Disorder, Mental Retardation, Developmental Disability, or not specified/other.

The dependent variable in this study was the estimated 10-year primary risk of atherosclerotic cardiovascular disease (ASCVD) among patients without preexisting cardiovascular disease. (2013 ACC/AHA Guideline on the Assessment of cardiovascular risk. Doi:10.1161/01.cir.0000437741.48606.98). Data for each patient as entered into the AHA/ACC 2013 Prevention Guidelines Tools CV Risk Calculator, available at https://my.americanheart.org/professional/StatementsGuidelines/Prevention-Guidelines_UCM-457698_subHomePage.jsp. Variables include subject age, gender, race, total cholesterol, HDL cholesterol, systolic blood pressure, current history of being treated for hypertension, history of diabetes, or history of currently smoking.

Guidelines for the treatment of cholesterol to reduce cardiovascular risk recommend that the following four groups are candidates for statin therapy: individuals with atherosclerotic cardiovascular disease (ASCVD); individuals with primary elevations of LDL \geq 190 mg/dL; individuals 40 to 75 years of age with diabetes and an LDL of 70 to 189 mg/dL without clinical evidence of ASCVD; and individuals without clinical ASCVD or diabetes who are age 40 to 75 years with LDL 70 to 180 mg/dL and a 10-year ASCVD risk of 7.5% or higher [14].

2.5. Analysis

Characteristics of the subjects are presented as means with standard deviations for continuous variables and as frequencies with percent for categorical variables. Comparisons of patient characteristics between the IDD and GenMed groups were conducted using Student's t-test for continuous variables and Chi-square test for categorical variables.

The primary outcome for this study was the 10-year ASCVD risk value for patients aged 40 to 79 without a history of cardiovascular disease. Comparisons between the IDD and GenMed group of patients age 40 to 79 years of age for the risk value was conducted using Student's t-test. The proportion of patients in the 10-year ASCVD high risk group and low risk groups was compared between the IDD and GenMed groups using Chi-squared test. Multivariable linear regression analysis with the 10-year risk score as the dependent variable was conducted to determine the association of group assignment (IDD versus GenMed) with the risk score, controlling for patient demographics.

Two subgroup analyses were also conducted. First was conducted to examine the cardiovascular risk of both IDD and GenMed group in patients with a 10-year risk score of 7.5 or higher, categorized as high risk; and secondly, an analysis of the study sample that was less than age 40, in an effort to identify whether cardiovascular risk factors were present in any greater proportion of subjects in either group in the younger ages.

3. Results

3.1. ASCVD risk assessment and comparison between groups

A total of 78 patients in the IDD group and 187 in the GenMed group were between the age of 40 and 79 years and had data available to calculate cardiovascular risk. Table 1 provides results of the comparison of characteristics between the IDD and GenMed groups for patients between ages 40 and 79 years. Patients of the IDD group were younger, more were male gender, while race was similar between the groups. In the IDD group, a documented diagnosis of Developmental Disability was most common ($n = 63$, 34.8%), followed by cerebral palsy ($n = 50$, 27.6%), mental retardation ($n = 41$, 22.7%), Down syndrome ($n = 17$, 9.4%), autism spectrum disorder ($n = 6$, 3.3%), and fetal alcohol syndrome ($n = 4$, 2.2%).

There were no significant differences in the percentage of patients with a documented diagnosis of hypertension, hyperlipidemia, or diabetes, or in the percentage of patients who currently smoked (Table 1) between the two groups. Blood pressure values were similar between the two groups, as were total and LDL cholesterol values. HDL cholesterol was significantly lower in the IDD group, but it was still in a clinically desirable range. The average 10-year ASCVD risk was significantly higher in the GenMed group compared to the IDD group ($p = 0.02$), while the lifetime ASCVD risk was slightly but not significantly higher in the IDD group with $p = 0.74$. Prescribing of prescription medications for the treatment of hypertension, hyperlipidemia, and diabetes was similar between the 2 groups. Refer to Table 2 for the medication data.

The regression analysis which examined the association between group assignment (IDD or GenMed) and the 10-year risk score, controlling for patient demographics, included age, gender, and race. The overall model adjusted r^2 was 0.62, $p < 0.001$. Group assignment was not significant ($p = 0.07$, Beta or standardized coefficient 0.07, IDD group assignment associated with lower risk), while age ($p < 0.001$, Beta = 0.75), gender ($p < 0.001$, Beta = -0.2), and race dichotomized ($p = 0.001$, Beta = 0.13) were all significant. Higher risk was associated with greater age, male gender, and minority race.

3.2. ASCVD risk – high risk – assessment and comparison between groups

Table 3 compares the cardiovascular risk factors in both IDD and GenMed group within those that had an ASCVD risk score categorized as high risk (10 year risk \geq 7.5). Demographic and clinical data are not significantly different between groups except for the diagnosis of diabetes, with significantly fewer patients in the IDD group having that diagnosis. Drug therapy for cardiovascular risk-related conditions was similar between the two groups. Antiplatelet therapy was less common in the IDD group, although the difference was not statistically significant.

3.3. Comparisons of risk factors in patients aged 18 to 39 years

Table 4 provides comparison of demographic and clinical data for patients under age 40 years between the two groups. There were significant differences between the two groups, with the IDD group being significantly older and having significantly more males. Although not statistically significant, fewer patients in the IDD group smoked; total, HDL, and LDL cholesterol was lower; and more patients had a diagnosis of hypertension, hyperlipidemia, diabetes, and previous stroke compared to the GenMed patient group. There were more patients in the IDD group who were prescribed antihypertensive or diabetes therapy,

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