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Quality of Diabetes Care among Recent Immigrants to the United States

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Abstract

Background: This study investigated the relationship between immigration status and quality of care for patients with diabetes.

Methods: We used the Medical Expenditure Panel (MEPS) dataset between 2002–2011 to examine the association between quality of care and immigration status. Quality of care was measured by report of dilated eye exam, foot exam, A1c test, an annual doctor's visit, and having blood pressure checked. Immigration status was defined as: US born, non-US born but living in the US for less than 15 years, and non-US born but living in the US for more than 15 years. Bivariate analyses were used to compare receiving quality of care and immigration status. Multiple logistic regression was used to examine the association of immigration status with quality of care, adjusting for demographic and medical variables. Results: Bivariate analyses showed significant differences for all quality of care measures compared to immigration status. However, after adjusting for sociodemographic factors and comorbidities, the only quality of care measures that were significantly associated with immigration status was having blood pressure checked

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Author Contributions:

LEE obtained funding for the study. RS, KGB, RJW, JSW, and LEE designed the study, KGB analyzed the data, KGB, RJW, and LEE interpreted the results, RS and KGB, drafted the article, and RJW, JSW, and LEE critically revised the manuscript for important intellectual content. All authors approved the final manuscript.

Conflict of Interest:

The authors report no competing financial interests exist.

Ethical approval:

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent:

Informed consent was obtained from all individual participants included in the study.

(OR=0.37 for <15 years and 0.90 for >15 years compared to US born, $p<0.001$) and having dilated eye exam (OR=0.77 for <15 years and 0.89 for >15 years compared to US born, $p=0.046$).

Conclusions: After adjustment for socioeconomic and comorbidity factors, blood pressure testing and dilated eye exams were the only measures significantly associated with immigration status. The highest risk was in the first 15 years after entering the US and should be a target for interventions.

Keywords

diabetes; immigration; quality of care; blood pressure

INTRODUCTION

Diabetes is a chronic disease that is characterized by high blood glucose. In the past 32 years, the number of adults diagnosed with diabetes in the US has nearly quadrupled to 21.3 million [1]. The total cost to the US for diagnosed diabetes in 2012 was \$245 billion US dollars, with direct medical costs totaling 176 billion, and indirect costs 69 billion [1]. In addition to physical comorbidities and medical expenditures, patients with diabetes experience mental comorbidities, for example, the odds of depression are twice as high in individuals with diabetes as those without diabetes [2]. This significant impact on patients highlights the need for aggressive diabetes management to slow disease progression and minimize comorbidity and economic burdens of the disease [3].

As a complex and chronic disease, diabetes requires regular engagement with the healthcare system and consistent self-management to control glucose levels and minimize complications [1]. The quality of diabetes care, however, needs improvement at the patient, provider and healthcare systems levels [4, 5]. Some variation in care is due to clinical differences, for example, older patients, who are more likely to have higher number of comorbidities, may need care that does not adhere completely to the clinical practice guidelines [4, 5]. However, other reasons such as patient profiling have been suggested as a reason guidelines are not met, and in fact has been suggested as a reason physician “report cards” are unreliable in assessing quality of care for diabetes [6–10]. Differences in quality of care have been suggested as a factor in health disparities. For example, African Americans were shown to receive a lower quality of care for their diabetes in non-managed care settings [11–12].

Immigration is an important factor for consideration by the healthcare system because regulations make it difficult for immigrants to access care. For example, immigrants with cancer have been shown to struggle with both language barriers and lack of knowledge when accessing care [13]. Low-income immigrants are particularly vulnerable and are less likely to have access to high quality healthcare than low-income native-born citizens, even when they are insured [14]. The Affordable Care Act, passed in 2010, specifically excludes access to care for the 11 million undocumented immigrants living in the United States [15]. As a result, a common reason that this group does not request healthcare is because of the fear of deportation [16]. Latinos, who may soon be the largest minority group in the United States, cited language problems, poverty, lack of insurance, transportation difficulties, and long

waiting times as barriers to accessing healthcare for their children [17–18]. In addition, for many Asian and Latina immigrants, loyalty to keeping family together was a cited explanation for lack of patient-provider trust and poor communication [19–20]. For example, the fear of a family being isolated or shamed for a divorce affects the ability for many women to open up to their providers [21]. In addition, many immigrants are simply unaware of health services that they can use and where to get them [22–23]. Often, when immigrants do see their providers, they feel as though they are mistreated by them, especially Latina patients [24].

There is insufficient literature to understand the relationship between immigration and quality of care for patients with diabetes. It has been noted that immigrants are less likely than US born citizens to adhere to any one of the seven diabetes care recommendations [25]. However, it has also been observed that longer length of residence in the United States is associated with increased odds of obesity, hyperlipidemia, and cigarette smoking, after adjusting for relevant confounding factors [26–27]. As a result, the aim of this study was to investigate the relationship between immigration status and quality of care for patients with diabetes using a nationally representative dataset. Based on evidence from the literature, we hypothesized apriori that non-US born individuals who have lived in the United States for less than 15 years will have lower measurements of quality of care indicators that include A1c testing, foot and eye examinations, blood pressure monitoring, and visits to providers.

METHODS

Data Source and Study Population

The Medical Expenditure Panel Survey (MEPS) Household Component data from 2002/2003–2007/2011 was used to examine the association between quality of care and immigration status among adults with diabetes (aged ≥ 18 years). In this retrospective study, we identified 12,627 (weighted sample of 12,810,201) individuals that self-reported diabetes based on the question “Has a doctor or health professional ever told you that you have diabetes or sugar diabetes”. This includes participants with both type 1 and type 2 diabetes. MEPS is a nationally representative survey of the U.S. civilian non-institutionalized population and is administered by the Agency for Healthcare Research and Quality (AHRQ) [28–30]. The MEPS sample is drawn from reporting units in the previous year’s National Health Interview Survey (NHIS), a nationally representative sample with oversampling for Black and Hispanics of the US civilian non-institutionalized population [28–30]. MEPS obtains information on participants’ quality of care as well as information on medical spending, demographics, and socioeconomics (28,30). AHRQ administers quality assurance procedures like validation of an interviewer’s work and compares MEPS numbers with other data source numbers like the Census Bureau and NHIS [31].

To ensure sufficient sample size and robust estimation for our analysis, we pooled 7 years of MEPS data. We did not include data for 2004–2006 as immigration status variables were not available for those years. Because the pooled data have a common variance structure, we can ensure compatibility and reasonable comparisons of our variables within the complex sample design [30]. This analysis accounts for sampling weights, clustering and

stratification design to estimate the nationally representative study for the US population [31].

Variables of interest

The dependent variables in this study were five binary indicators to measure processes of care, which based on clinical guidelines are defined as quality of care measures for patients with diabetes. Each of the five quality of care measures was based on a self-report question regarding care over the past year: 1) Having an A1C test, 2) Having a foot examination, 3) Having a dilated eye exam, 4) Having checked blood pressure by a doctor, and 5) Having at least one visit to a doctor office for care [32–33]. The primary independent variable was immigration status defined by two questions ‘were you born in the United States’, and ‘how many years have you lived in the United States’. These were then categorized into: US Born, Non-US Born <15 years, Non-US Born ≥ 15 years.

All covariates used for analysis were based on self-report. Binary indicators of comorbidities were based on a positive response to a question “Have you ever been diagnosed with the respective comorbidity....”. Cardiovascular disease (CVD) indicates a positive response to a coronary heart disease, angina, myocardial infarction or other heart diseases. Race/ethnic groups were categorized into: Non-Hispanic White (NHW), Non-Hispanic Black (NHB), Hispanic or others. Education was categorized into: less than high school (grade 11), high school (grade 12) and college or more (grade ≥ 13). Marital status was categorized into: married, non-married and never married. Gender was dichotomized as female vs male. Age was categorized into: 18–44, 45–64 and ≥ 65 years. Metropolitan Statistical Area (MSA) was dichotomized. Census region was categorized into: Northeast, Midwest, South and West. Health insurance was categorized into: private, public only and uninsured at all time in the year. The income level was defined as a percentage of the poverty level and grouped in to four categories: poor (<125%), low income (125% to less than 200%), middle income (200% to less than 400%) and high income (≥ 400%). Calendar year was grouped in to three sets of consecutive years of 2002/03, 2007/09, 2010/11 for the pooled data.

Statistical Analysis

The baseline characteristics of adults with diabetes were compared by immigration status, with percentage differences for categorical variables tested using χ^2 tests. Bivariate analyses were then used to compare receiving each of the quality of care measures by immigration status. We used multiple logistic regression to examine factors associated with immigration status and quality of care measures. Models controlled for age, sex, race/ethnicity, marital status, education, insurance status, metropolitan statistical area status, census region, household income, comorbidities, and time trend. For interpretation, we use the odds ratio coefficient of the logistic regressions.

F-adjusted mean residual goodness-of-fit were applied to test the adequacy of the models. After fitting the logistic regression models taking the survey design into account, the F-adjusted mean residual goodness-of-fit suggested no evidence of lack of fit [34]. We used the link test that considers complex survey design, as a diagnostic test to examine the model

specification error. We verified the evidence of proper specification of the model [35–36]. Finally, using the Variance Inflation Factor (VIF) test, it was determined that no multicollinearity problems existed between predictors of the model. We performed all analyses at the person-level using STATA 14 (StataCorp LP College Station, TX). Estimates that are statistically significant at the $p < 0.05$ level are discussed in the paper.

RESULTS

Table 1 shows the baseline characteristics of the study subjects stratified by US born, Non-US Born <15 years, and Non-US Born ≥15 years. The unweighted sample size was 12,627 for adults with diabetes who reported immigration status, which represented a weighted sample size of 12,810,201 within the U.S. population.

Table 2 shows unadjusted bivariate analyses, which indicate significant differences for all quality of care measures by immigration status. For A1c testing, 81.3% for US born compared to 72.4% for <15 years and 74.77% for ≥15 years reported being tested the previous year. For foot checked, we found 69.8% were US born compared to 56.7% for <15 years and 64.0% for ≥15 years. For dilated eye exam, 64.7% were US born compared to 49.5% for <15 years and 58.6% for ≥15 years. For BP checked, 98.5% were US born compared to 88.6% for <15 years and 96.6% for ≥15 years. For visited medical office, 92.0% were US born compared to 76.7% for <15 years and 85.5% for ≥15 years.

After adjusting for sociodemographic factors and comorbidities (Table 3), the two quality of care measures that were significantly associated with immigration status were having blood pressure checked (OR=0.37 for <15 years and 0.90 for ≥15 years compared to US born, $p < 0.001$) and dilated eye exam (OR=0.77 for <15 years and 0.89 for ≥15 years compared to US born, $p = 0.046$). The odds of A1c being taken increased over time (OR=1.41 for 2010/11 compared to 2002/03, $p < 0.001$). The odds of foot exams being completed decreased over time (OR=0.76 for 2007/2009 and OR=0.87 for 2010/11 compared to 2002/03, $p < 0.01$).

DISCUSSION

Among patients with diabetes, being non-US born and living within the US for less than 15 years showed significantly worse likelihood of receiving quality of care indicators, however, after adjustment for sociodemographic factors only having blood pressure checked and having a dilated eye exam remained significant. This suggests that the differences seen between those recently immigrated to the US and those living in the US over 15 years or born in the US may be explained by differing risk related to sociodemographic factors with the exception of blood pressure measurement and dilated eye exams. All measures showed the highest report of quality of care measures in US born, and the lowest report in non-US born living in the US <15 years, suggesting the first 15 years after immigration are an important target for policy efforts.

Though prior studies found associations between immigration status and access to healthcare, this is one of the first study to specifically look at associations between quality of care in patients with diabetes and immigration status. Understanding differences in quality of care and immigration status can help identify the most vulnerable populations and assist

in focusing interventions to promote high quality of care. Since blood pressure and dilated eye exams are important clinical indicators for patients with diabetes, it will be important to understand why these specific quality of care measures were less likely to occur in recently immigrated patients with diabetes. Since the quality of care measures were self-reported, it is possible blood pressure was taken, but not recognized by the respondent as being part of the office visit. However, dilated eye exam may be more of an insurance or cost issue since dilated eye exams typically require referral to an eye specialist. Based on these results, the highest risk is during the first 15 years after a person immigrates to the US. This time period should be a target for policy measures aimed at increasing access for patients with chronic diseases, such as diabetes, to ensure high quality care and improve long-term outcomes. Health care policy measures need to be implemented for green card holders to ensure that all diabetes quality of care measures are checked, including blood pressure and dilated eye exam. Educating immigrants on importance of receiving healthcare and being checked for diabetes once they have immigrated will also be of important given prior literature suggesting risk increases with length of residence in the US.

Though this study has several strengths, including the large sample size, there are limitations worth mentioning. First, generalizability to the United States population and all immigrants is limited. Second, cross-sectional panel data precludes discussion of causation in results. Third, measures were based on self-report and therefore can be influenced by recall bias or communication problems. MEPS is delivered in both English and Spanish, however, immigrants who did not speak either of these languages would not have completed the survey. Finally, variables included in the analysis were constrained by those available in the MEPS dataset and other confounders may exist.

In conclusion, this study found that for the most part quality of care is equal across immigration categories for individuals with diabetes, however, those who immigrated to the United States less than 15 years ago are less likely to report having their blood pressure checked at the doctor's office or have a dilated eye exam. Thus, it is vital for these two components to be emphasized in routine care for patients with diabetes, especially health systems that care for large immigrant populations. Healthcare providers may benefit from awareness of the differences in health care and the challenges faced by the recently immigrated population, so steps can be taken to ensure high quality care.

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Highlights:

- Aim is to investigate relationship between immigration status and quality of diabetes care
- Used 12,627 (weighted sample of 12,810,201) that self-reported diabetes from the MEPS dataset
- Differences existed in unadjusted analyses for most quality of care measures
- After adjustment, blood pressure testing and dilated eye exam were the only measures significantly associated with immigration status
- The highest risk group were those in the first 15 years after entering the US

Table 1:

Sample Demographics

		US Born	<15 years	>15 years
Race				
	Non-Hispanic White	96.4	0.5	3.1
	Non-Hispanic Black	93.5	0.9	5.6
	Hispanic	41.4	9.2	49.4
	Others	43.8	12.8	43.4
Age				
	18–44	84.1	6.1	9.8
	45–64	84.0	2.2	13.8
	65+	86.7	1.8	11.5
Gender				
	Men	85.1	2.4	12.5
	Women	85.0	2.8	12.2
Marital Status				
	Married	83.3	3.1	13.6
	Unmarried	88.2	1.6	10.2
	Never	85.2	2.7	12.1
Education				
	Less than High School	73.8	4.5	21.7
	High School	90.1	1.6	8.3
	College	88.4	2.1	9.5
Insurance				
	Private	89.1	1.6	9.3
	Public	81.6	2.9	15.5
	Uninsured	67.9	9.1	23.0
MSA				
	Non-MSA (rural)	96.1	0.7	3.2
	MSA (non-rural)	82.4	3.0	14.6
Region				
	Northeast	79.2	3.7	17.1
	Midwest	94.5	0.7	4.8
	South	89.8	2.1	8.1
	West	71.2	4.3	24.5
Poverty Level				
	Poor/NEA	79.0	4.0	17.0
	Low Income	82.0	3.9	14.1
	Middle income	85.9	2.5	11.6
	High Income	89.5	1.1	9.4

		US Born	<15 years	>15 years
Comorbidities				
	Hypertension	86.0	2.1	11.9
	CVD	89.0	1.3	9.7
	Stroke	88.9	1.1	10.0
	Emphysema	96.7	0.2	3.1
	Joint Pain	88.9	1.5	9.6
	Arthritis	89.4	1.2	9.4
	Asthma	90.3	1.00	8.7
Year				
	2002/03	86.5	2.8	10.8
	2007/2009	85.1	2.5	12.4
	2010/2011	84.1	2.5	13.4

Table 2:

Unadjusted Proportion of those receiving Quality of Care measures by Immigration Status

	US Born	<15 years	>15 years	p-value
A1c Tested	81.4	72.4	74.8	<0.001
Foot Checked	69.8	56.7	64.0	<0.001
Dilated Eye Exam	64.7	49.5	58.6	<0.001
BP Checked	98.5	88.6	96.6	<0.001
Visited Medical Office	92.0	76.7	85.5	<0.001

Table 3:

Adjusted Models for Quality of Care measures by Immigration Status

	Odds Ratio (95% confidence interval)	
	<15 years	>15 years
A1c Tested	0.88 (0.62, 1.26)	0.82 (0.64, 1.03)
Foot Checked	0.77 (0.59, 1.02)	0.88 (0.75, 1.03)
Eye Exam	0.77 (0.59, 1.00)	0.89 (0.75, 1.06)
BP Checked	0.37 (0.23, 0.61)	0.90 (0.54, 1.49)
Visited Medical Office	0.72 (0.52, 1.01)	0.92 (0.73, 1.18)

Reference group: US born

Note: Models adjusted for age, race, gender, marital status, education, insurance, MSA, region, poverty level, comorbidities, and time.