

Indian Health Service Improving Health Care Delivery Data Project



Preventing Complications among American Indian and Alaska Native Adults with Diabetes

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Topics



- I. Project overview
- II. Background information on IHS and Tribal treatment costs for American Indian and Alaska Native (AI/AN) adults with diabetes
- III. Overview of study conducted to examine patient outcomes among adults with diabetes who used diabetes and nutrition Education, Case management, and advanced practice Pharmacy services (ECP study)
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I. Project Overview

Improving Health Care Delivery Data Project

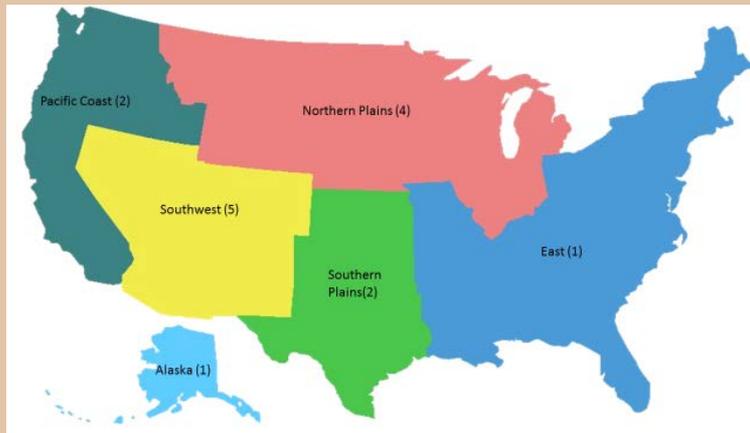


- Since 2010, the Indian Health Service (IHS) and Tribes have collaborated with the Centers for American Indian and Alaska Native (AI/AN) Health at the University of Colorado on the *Improving Health Care Delivery Data Project*.
- The project involves analysis of **existing data** from IHS and Tribes for 15 Service Units (geographic locations).
- Project Goal: Provide information for IHS, Tribal leaders, and communities on chronic diseases among AI/ANs and services provided to meet their needs. It is hoped the information may be used to identify service enhancements to improve health outcomes and resource use.
- Sources of data include 1) National Data Warehouse registration and utilization data, 2) Purchased and Referred Care data, 3) Data from CMS Cost Reports, and 4) Information from the IHS Supply Center.

I. Project Overview

Project Population and Oversight/Guidance

The 15 Service Units are located throughout the country.



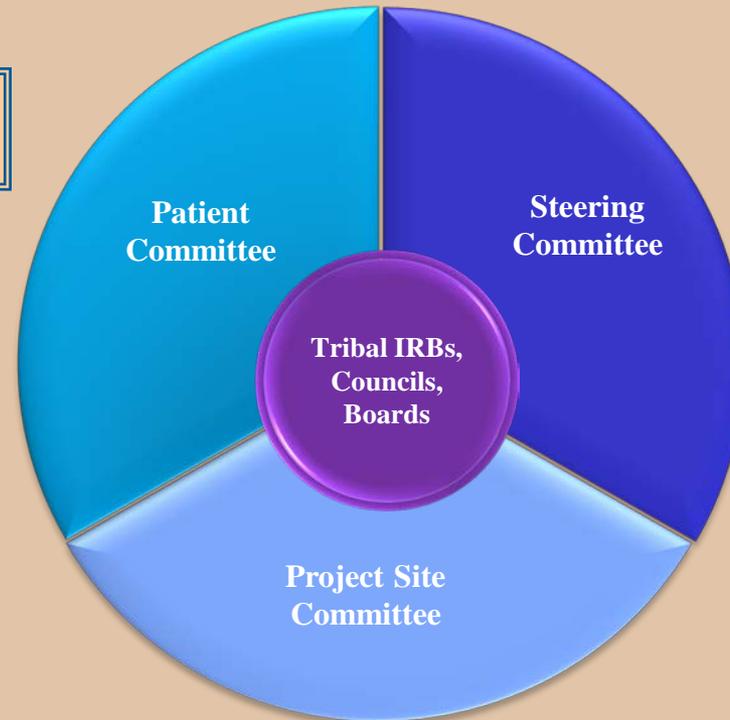
The project population represents nearly 30% of the IHS service population.

Project personnel partnered with IHS and the Tribal organizations that participate in the IHS Data Project.

This collaboration takes place through the project's Collaborative Network, which includes meetings of three advisory committees (i.e., Steering, Project Site, and Patient), travel to the project sites, and a process to obtain approvals from the IHS Institutional Review Board (IRB), Tribal IRBs, Tribal Councils, and/or Tribal Authorities in addition to the university's IRB.

I. Project Overview

Collaborative Network



- Project Site Representatives
 - Patients

- IHS & Tribal Representatives

- Project Site Representatives
 - Health Providers
 - Administrators

II. Background information on IHS and Tribal treatment costs for AI/AN adults with diabetes

- According to FY2010 treatment cost estimates developed as part of the Improving Health Care Delivery Data Project, the costs for treating AI/AN adults with diabetes are high, and costs increase with level of diabetes related comorbidity.
 - In 2010, the average treatment cost for an AI/AN adult with diabetes was estimated to be \$8,164, nearly 3 times that of an adult without diabetes (\$2,789).
 - In this population, 31.6% of adults had cardiovascular disease (CVD). Treatment costs for adults with diabetes and CVD (\$12,568), regardless of other comorbidities, were approximately twice that of adults with diabetes but not CVD (\$6,129).
 - Treatment costs for AI/AN adults with diabetes represented 1/3 of all treatment costs for AI/AN adults (33.6%), even though adults with diabetes represented 14.7% of the adult patient population.

Sample: # adults=295,393, #adults with diabetes=43,518

II. Background information on IHS and Tribal treatment costs for AI/AN adults with diabetes

Treatment costs for adults with diabetes generally increased with level of comorbidity. For this analysis, we defined 6 stages of diabetes related comorbidities. The data are for FY2010.

	Adults with diabetes	
	Percent of adults	Average treatment cost
Persons with diabetes - disease stage		
1: Diabetes alone	18.8	\$4,983
2: Diabetes and hypertension	46.3	\$6,303
3: Diabetes and CVD	20.5	\$10,377
4: Diabetes and renal disease (without ESRD)	9.3	\$13,282
5: Diabetes and amputation	1.8	\$22,959
6: Diabetes and ESRD	3.3	\$16,098



III. ECP Study

A. Background and Study Goals



- Indian Health Service and Tribes provide a number of services to prevent the onset of diabetes and meet the needs of patients with diabetes.
- These include services funded by the Special Diabetes Program for Indians.
- The goal of this study is to evaluate patient outcomes among adult with diabetes who use **Education, Case management, and advanced practice Pharmacy services**. We refer to these services as **ECP services**.
- Data for this analysis were extracted from a data infrastructure created through the Improving Health Care Delivery Data Project.

III. ECP Study

B. Study Population and Methods

ECP Services: Education, Case management, & Advanced Practice Pharmacy Services

Study population: Adults with diabetes who lived in 12 of the 15 Service Units.

Analyses:

1. Describe utilization of ECP services by adults with diabetes in fiscal year (FY) 2013 – the latest year for which we currently have data.
2. Assess patient outcomes in FY2013 associated with use of ECP services in FY2012, controlling for baseline values in FY2011.



For this analysis, adults had data for 3 consecutive years (FY2011-FY2013). Base population for the this analysis included 28,578 adults.



III. ECP Study

B. Study Population and Methods

ECP Services: Education, Case management, & Advanced Practice Pharmacy Services



2. Assess patient outcomes in FY2013 associated with use of ECP services in FY2012, controlling for baseline values in FY2010.

To control for patient self-selection into the group of patients that used ECP services, we used inverse probability of treatment weighted estimation.

- Equation 1: Propensity to use ECP services (1,0) in FY2012, controlling for FY2011 baseline characteristics; estimated logistic regression
- Equation 2: Compare FY2013 outcomes (e.g., high blood pressure, hospitalizations) between FY2012 ECP users and non-users, adjusting for propensity to use ECP
 - ❖ Specification of Equation 2 varied by patient outcome
 - ❖ Binary outcomes (1,0): Logistic regression
 - ❖ Number of hospital inpatient days and emergency department visits: Negative binomial regression

III. ECP Study

C. Analysis 1 Results – Use of ECP services in FY2013

Education, Case management, and Advanced Practice Pharmacy Services

Use of ECP services among adults with diabetes by cardiovascular disease (CVD) status. Fiscal year 2013.

	Adults with diabetes			Difference by CVD status
	All	Without CVD	With CVD	
Number of adults	32,995	23,674	9,321	
Average number of ECP visits	1.1	0.9	1.6	***
Percent of adults who had 1 or more ECP visits	40.9%	38.4%	47.3%	***
Average number of ECP visits among those who had at least 1 visit	2.6	2.3	3.3	***

C. Analysis 2 Results:

Study Population for ECP Outcomes Study

Characteristic	All adults with diabetes				
	ECP non-users		ECP users		
	N	%	N	%	
All adults with diabetes	16,855	100.0	11,723	100.0	
Health Condition					
Hypertension	11,798	70.0	9,081	77.5	***
Cardiovascular disease (CVD)	4,122	24.5	3,679	31.4	***
Renal disease	1,223	7.3	1,147	9.8	***
Neuropathy	2,287	13.6	2,002	17.1	***
Amputations ^b	213	1.3	159	1.4	
Mental health disorders ^c	3,510	20.8	2,880	24.6	***
Alcohol or drug use disorders	1,101	6.5	571	4.9	***
Tobacco use disorders	1,528	9.1	1,028	8.8	
Liver disease	700	4.2	588	5.0	***
FY2012 ECP access					
Drive time to services (min)	16,855	22.5	11,723	15.2	***
ECP facility rate	16,855	0.30	11,723	0.35	***
County-level demographic information ^e					
Percent of adults with less than high school degree	16,855	46.8	11,723	46.0	
Percent of households with low income	16,855	45.1	11,723	41.1	***



III. ECP Study

C. Results from the Propensity Model



Equation 1: Summary of Findings on any use of ECP during FY2012

Using multivariable regressions to control for a number of factors, we found

- ECP use increased with age.
- ECP use was higher among females than males.
- ECP use was higher among adults with cardiovascular disease and a number of other comorbidities. It was also higher for adults with renal disease, neuropathy, and mental health disorders. However, ECP use was lower among those with substance use disorders.
- ECP use was lower for persons who lived in communities that were further away from clinics that offered ECP than persons who lived closer.
- ECP use was lower for persons who lived in counties where AI/AN households had lower incomes.

C. Results from the Propensity Model

Equation 2: Patient Outcomes Associated with Any Use of ECP Services

Patient outcomes during fiscal year (FY) 2013 associated with use of education, case management, and advanced practice pharmacy (ECP) services during FY2012.

Patient outcomes associated with 1 or more ECP visits	Adults with diabetes					
	All adults		Absent CVD		With CVD	
	Average Treatment Effect	Odds Ratio	Average Treatment Effect	Odds Ratio	Average Treatment Effect	Odds Ratio
<u>Health status: Clinical measures</u>						
High SBP (≥ 140 mmHg)		0.85 ***		0.83 ***		0.93
High A1c ($\geq 8\%$)		1.08		1.07		1.11
High LDL cholesterol (≥ 100 mg/dL)		0.89 **		0.92		0.82 *
<u>Health status: Onset of comorbidities</u>						
Onset of CVD (noted: among those with 3+ versus 0 visits)	-	-		0.79 *	-	-
Onset of ESRD	-	-	-	-		0.60 *
<u>Hospital service utilization</u>						
Emergency department visits	-0.08 ***	-	-0.09 ***	-	-0.10 *	-
One or more hospitalizations		0.80 ***		0.77 ***		0.74 **
One or more potentially preventable hospitalizations		0.79 *		0.77		0.71 **
Hospital inpatient days	-0.13 **		-0.13 ***		-0.32 *	

Statistical Model: Inverse probability weighted model

The relationship between ECP use and patient outcomes varied by patient CVD status.

C. Results from the Propensity Model

Summary: Outcomes Associated with Any Use of ECP Services

- ECP users, compared to non-users, had lower odds of **high systolic blood pressure** (OR=0.85, $p<0.001$) and high **low-density lipoprotein cholesterol** (OR=0.89, $p<0.01$). We did not find a difference with high **A1c**.
- Among adults with diabetes absent **cardiovascular disease (CVD)** at baseline, 3 or more ECP visits, compared to no visits, was associated with lower odds of CVD onset (OR=0.79, $p<0.05$).
- Any ECP use was associated with lower odds of **end-stage renal disease** onset (OR=0.60, $p<0.05$) among adults with diabetes and CVD.
- Among adults with diabetes, ECP users had lower odds of 1 or more **hospitalizations** (OR=0.80, $p<0.001$) and 1 or more potentially preventable hospitalizations (OR=0.79, $p<0.05$). They also had fewer hospital inpatient days and **emergency department visits**.

C. Results for a Follow-up Analysis

Second Propensity Model Specification: Level of ECP Use

2. Assess patient outcomes in FY2013 associated with use of ECP services in FY2012, controlling for baseline values in FY2010.
 - Equation 1: Propensity to use ECP services at different levels (1-3 visits or 4+ visits, compared to no visits) in FY2012; controlling for FY2011 baseline characteristics; estimated ordered logistic regression
 - Equation 2: Compare FY2013 outcomes (e.g., high blood pressure, hospitalizations) between FY2012 ECP users and non-users, adjusting for propensity to use ECP
 - ❖ Specification of Equation 2 varied by patient outcome





C. Results for a Follow-up Analysis

Second Propensity Model Specification: Level of ECP Use



Summary of findings:

The level of ECP use was significantly associated with improved patient outcomes for 5 of the 9 outcomes assessed (e.g., high SBP, high LDL cholesterol, onset of CVD, potentially preventable hospitalizations, hospital inpatient days).



D. Limitations



- **Selection:** Persons who used ECP services differed from those who did not use ECP services. In the statistical analysis, we employed propensity models to control for differences in characteristics we had data on (e.g., age, gender, measures of health, drive times) between the 2 populations. No doubt unobserved differences contributed to ECP use. A limitation of this analysis is that we could not control for unobserved differences, such as motivation or self-management skills, not measured in these data.
- **Data:** We included existing administrative data in this analysis. While this approach makes use of existing data and allows for a large sample size, we did not have as many measures or as precise measures that could be obtained through another study design.
- **Sample:** While these data include information on a large number of AI/AN adults with diabetes, and a higher percentage of IHS/Tribal health program users, these data are not representative of all AI/AN peoples.



E. Summary



- According to these findings, approximately 40% of adults with diabetes used ECP services during FY2013. ECP use was lower among younger adults, compared to older adults. In addition, males were less likely to use services than females. ECP use was lower among adults with diabetes but not CVD, compared to adults with both conditions.
- Use of ECP services by adults with diabetes was associated with improvements in health status and lower use of hospital inpatient and emergency department services.
- We hope that these findings provide IHS, Tribal leaders, and patients information that may help with chronic disease management, and that the information may be used to identify service enhancements to improve AI/AN health outcomes and IHS and Tribal resource use.

IV. Current Projects

We are currently using data from the IHS Improving Health Care Delivery Data Project to examine other topics related to diabetes and service delivery. These projects include:

- Diabetes related projects: Describing Type I and II diabetes, social determinants of health associated with obesity throughout the life course
- A detailed assessment of AI/AN use of clinical pharmacy services.
- Assessing needs of adults with dementia
 - Describing comorbidities associated with dementia
 - Reporting on health service and pharmacy utilization
 - Characterizing treatment costs for adults with dementia

At the same time, we are finalizing IHS/Tribal approvals to obtain updated data, from more recent years, for these projects.

V. Funding, Acknowledgements, and Contact Information



Funding: Funding sources include the Patient-Centered Outcomes Research Institute (AD-1304-6451), NIH National Institute of Diabetes and Digestive and Kidney Diseases (R18DK114757 and P30DK092923), and the Agency for Healthcare Research and Quality (290-2006-00020-I).

Acknowledgements: This work was conducted with the guidance and advice of Indian Health Service representatives and members of the project's Steering, Project Site, and Patient Committees. Tribal institutional review boards, Tribal Councils, and Tribal Authorities educate us about their Tribal members' health concerns and how they hope this project will inform their work. This project relies on their support and approval.

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