September 2018

URBAN DIABETES CARE & OUTCOMES SUMMARY REPORT

Audit Years 2013-2017

Urban Indian Health Institute
A Division of the Seattle Indian Health Board

Acknowledgments
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The mission of UIHI is to decolonize data for indigenous people, by indigenous people.

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EXECUTIVE SUMMARY

The Urban Indian Health Institute analyzes diabetes data from 31 participating Urban Indian Health Programs (UIHPs) each year. This data is used to estimate rates and trends for audit outcomes and reports these findings here. *Urban Diabetes Care & Outcomes Summary Report, Audit Years 2013-2017* (2017 Diabetes Audit) highlights strengths and gaps of diabetes health in urban AI/AN people.

The Indian Health Service (IHS) Division of Diabetes Treatment and Prevention (DDTP) processes and collects the data from the facilities. This version includes data collected from 2013 to 2017. Data captured in the 2017 Diabetes Audit reflects care administered in 2016. This report aims to motivate collaboration and communication in the field of diabetes care for urban AI/AN patients. It can inform research, prevention funding, and programmatic efforts, to ensure success in achieving diabetes care and outcomes.

KEY FINDINGS

- 55.1% of urban AI/AN patients with diabetes had an A1c < 8.0%.
- The target for 2017 for blood pressure control was 63.8%.
- Over 80% of tobacco users were referred to cessation counseling and there was a significant increase between 2013 and 2017.
- More than 85% of urban AI/AN patients with diabetes who did not have diagnosed depression were screened for depression all five years.
- Hepatitis B vaccination more than tripled over the five-year period.
- 62.4% of urban AI/AN patients with diabetes had both eGFR and UACR completed in 2017, falling slightly short of the 2017 target of 63.3%. These are measurements to screen for nephropathy.
- The proportion of urban AI/AN patients with diabetes with UACR>300 significantly increased, however it is still less than 5% with no significant changes in eGFR<15 .
- 47.4% of urban AI/AN patients with diabetes were prescribed a statin, falling below the target of 61.9% for 2017.
- 52.1% urban AI/ANs had a dilated eye exam in 2017, 11% lower than the target of 63.1% for 2017.
- In 2017, more than 80% of urban AI/AN patients had an unknown tuberculosis status.
- The rate of refusal of the pneumococcal vaccine has risen significantly, whereas the rate of those who never received the vaccine has decreased significantly over the last five years.

INTRODUCTION

BACKGROUND

Diabetes Mellitus is a chronic disease that inhibits the body's capacity to produce and/or utilize insulin, a hormone necessary to break down and absorb glucose. The three main types of diabetes are: type 1 diabetes, type 2 diabetes, and gestational diabetes. Type 2 is the most common type of the three, accounting for 90% to 95% of all diabetic cases.[1] It results from the body's development of insulin resistance. Type 1 is an autoimmune condition that usually develops during childhood and accounts for just 5% of all diabetes cases.[1] Gestational diabetes is a condition that can develop during pregnancy.[2] Over time, these types of diabetes result in excessive blood sugar levels that can cause many health issues and can ultimately lead to death. Therefore, it is important to manage and track the risks, treatment, and outcomes associated with diabetes.

AI/AN are twice as likely to have diabetes as non-Hispanic Whites.[3]

THE DIABETES EPIDEMIC

For thousands of years, "diabetes" was not even a word in the vocabulary of American Indians and Alaska Natives (AI/AN); it was essentially unknown until World War II when cases of the disease were first reported to Indian Health Service (IHS) providers.[3] In 1963, a research project in the Pima Indian community of Arizona identified the first type 2 diabetes epidemic among AI/AN people.[4] In response to this growing epidemic, the U.S. Congress created the Special Diabetes Program for Indians (SDPI) in 1997.[5] Since then, knowledge in public health of AI/AN communities has grown, shedding light on immunological and psychological vulnerabilities resulting from a legacy of historical trauma, including colonization that forced Native people off their lands, diminished their natural resources, and eliminated their abilities to harvest their own foods.[6]

The pressure for AI/ANs to adjust their ways of life caused stress and historical trauma that would impact the health of Native people for generations to follow. Today, type 2 diabetes is more prevalent in the AI/AN population than in any other race or ethnicity; the prevalence is two times higher than that of non-Hispanic whites.[7] AI/ANs with diabetes are also more likely than the general population to experience related complications such as kidney failure, heart disease, and death.[8] Additionally, AI/AN populations have higher proportions of diabetes precursors such as poor nutrition, high blood pressure, insufficient physical activity, heart disease, and obesity.[9]

SPECIAL DIABETES PROGRAM FOR INDIANS (SDPI)

In its two decades of existence, SDPI has addressed AI/AN health disparities by providing critically needed resources to improve diabetes surveillance, prevention, treatment, and education. Evidence-based and community-directed initiatives in Indian country have yielded major improvements in diabetes-related health indicators and helped to reduce federal spending on AI/AN patients with diabetes and diabetes-related complications. **The 2017 Diabetes Audit, mostly funded by SDPI, uses data from 31 Urban Indian Health Programs (UIHPs) to highlight strengths and disparities of diabetes health in urban AI/AN patients.**

Map 1. Urban Indian Health Programs in Diabetes Audit, 2017

URBAN INDIAN HEALTH PROGRAMS (UIHPS)

UIHPs are a network of independent health agencies that provide primary health care services, including traditional health care and cultural activities, as well as provide a culturally-appropriate place for urban Natives to receive health care. UIHPs are non-profit 501 (c)(3) programs that are funded through grants and contracts from IHS, under Title V of the Indian Health Care Improvement Act, PL 94-437, as amended. The 31 programs in this report are in 17 states and serve individuals in approximately 80 U.S. counties where over 1.1 million Native people reside (Map 1).

ABOUT THE URBAN INDIAN HEALTH INSTITUTE

Urban Indian Health Institute (UIHI) is a division of Seattle Indian Health Board and is one of 12 Tribal Epidemiology Centers (TEC) in the country. A TEC is an IHS-funded organization that serves American Indian and Alaska Native tribal and urban communities. In total, UIHI serves 42 UIHPs in 21 states throughout the country.

UIHI recognizes research, data, and evaluation as indigenous values. We utilize the strengths of western science but remain grounded in indigenous values as we conduct research and evaluation, collect and analyze data, identify health priorities, make recommendations for health service needs and for improving health care delivery systems, offer epidemiologic technical assistance, and provide disease surveillance.

Our mission is to decolonize data, for indigenous people, by indigenous people.

METHODS

The data for this analysis was obtained from the annual Indian Health Service (IHS) Diabetes Care and Outcomes Audit for participating Urban Indian Health Programs (UIHPs) from 2013 to 2017. Every year, IHS, Tribal, and Urban (I/T/U) facilities, submit audit data for American Indian and Alaska Native (AI/AN) patients with diabetes that meet certain inclusion criteria.

INCLUSION CRITERIA

- Have a diagnosis of diabetes
- AI/ANs eligible for services at I/T/U facilities
- Have at least one visit to an eligible clinic at a UIHP during the audit period

EXCLUSION CRITERIA

- Receive the majority of their primary care outside the UIHP
- Currently on dialysis AND received the majority of their primary care at the dialysis unit during the audit period
- Die before the end of the audit period
- Women pregnant during any part of the audit period
- Are pre-diabetic
- Move away from the service area

Diabetes Audit data for each participating facility are obtained electronically from an electronic health record system or manually via review of paper chart. Some UIHPs use Resource and Patient Management System (RPMS), the electronic health record system developed by IHS to gather epidemiological and personal health information, while others use different systems. The extracted data are submitted to IHS via the WebAudit, a set of internet-based tools for data submission, processing, and reporting. The WebAudit provides each participating UIHP with summary reports of their audit data. Data from all participating UIHPs were aggregated for this report.

Audit year data reflects care administered in the previous year. For example, Diabetes Audit 2017 estimates reflect services received in 2016. Therefore, all references to years in this report, including in graphs and tables, reflect the audit year, not the year that services were received.

Aggregate estimates are weighted to account for differing sampling approaches (electronic vs. manual entry of data). Electronic audits generally include all eligible patients while most manual audits use a systematic random sampling scheme.

Percentages shown are calculated as a proportion of all audited records for each audit year, including those with missing/unknown values, unless otherwise indicated. They are presented separately for each of the five years included in this report. Rounding was used in presenting percentages. For each indicator, unknown or missing status that are less than 1% are not shown. For these reasons, the sum of the percentages for each indicator may not equal exactly 100.

Trends over the five years were analyzed using Joinpoint Regression Program version 4.6.0.0. This statistical software was developed by National Institutes of Health (NIH) to analyze trends in data, such as percentages or rates, using joinpoint models. These models use several straight lines connected at joinpoints to fit a trend. A maximum number of one joinpoint was used and the average annual percent change (AAPC) was analyzed. More information about this software and joinpoint models can be found at: https://surveillance.cancer.gov/joinpoint/

R version 3.4.3 (R, Vienna, Austria) was used to perform all statistical analyses. Results were considered statistically significant for p-values less than 0.05.

For more information about the Diabetes Audit process, visit the website: https://www.ihs.gov/diabetes/audit/

METHODS

SPECIAL DIABETES PROGRAM FOR INDIANS (SDPI) BEST PRACTICES

SDPI best practices are focus areas for improvement of diabetes prevention and treatment outcomes. Each best practice has a required key measure (RKM) that is used to report progress on related outcomes. These RKMs are all assessed by the Diabetes Audit, and are summarized in Table 2. For more information on SDPI best practices, visit: https://www.ihs.gov/sdpi/sdpi-community-directed/diabetes-best-practices/#BPTOPICS

GOVERNMENT PERFORMANCE AND RESULTS ACT (GPRA)

Passed by Congress in 1993, this act was designed to address government accountability and performance in the management of government-funded programs. IHS reports on a range of health topics for GPRA, including diabetes. In this report, we compare the audit data to five IHS GPRA targets related to diabetes. **However, official GPRA results are prepared and distributed by the IHS Planning and Evaluation office and are different from the estimates presented in this report.** Official GPRA results are among all AI/AN people, whereas this report focuses on urban AI/AN people specifically. Additionally, the Diabetes Audit and GPRA use different criteria to determine which diabetes patients to include in the results. Furthermore, official GPRA results are from data over the fiscal year whereas the data in this report is over the calendar year. Finally, whereas GPRA results include all UIHPs' diabetes patients, some of the UIHPs that participate in the Diabetes Audit submit a sample of their diabetes patients. Therefore, these comparisons should be interpreted with caution. They are incorporated here to provide additional important benchmarks for comparing improvements or needs over time. They are summarized in Table 1. All five GPRA diabetes targets overlap with SDPI RKMs. For more information about IHS GPRA targets and measurements, visit: https://www.ihs.gov/CRS/.

Table 1. Government Performance and Results Act (GPRA) Diabetes-Related Targets, 2017

FY2017 GPRA Indicators for Diabetes	Target
Good Glycemic Control Percentage of patients with diagnosed diabetes with good glycemic control (A1c less than < 8.0%).	48.4%
Blood Pressure Control Percentage of patients with diagnosed diabetes that have achieved blood pressure control (less than < 140/90 mmHg).	63.8%
Statin Therapy to Reduce CVD Risk Percentage of patients with diagnosed diabetes who received a prescription for statin therapy.	61.9%
Nephropathy Assessment Proportion of patients with diagnosed diabetes assessed for nephropathy (eGFR and UACR).	63.3%
Retinopathy Assessment Proportion of patients with diagnosed diabetes who received an annual retinal examination.	63.1%

Table 2. Special Diabetes Program for Indians (SDPI) Best Practice Required Key Measures (RKMs)

Glycemic Control: Percent of individuals with most recent A1c < 8.0%.

Chronic Kidney Disease Screening & Monitoring: Percent of individuals who have both urine albumin-creatinine ratio (UACR) and estimated glomerular filtration rate (eGFR) completed.

Blood Pressure Control: Percent of individuals who have a mean blood pressure < 140/< 90 mmHg.

Aspirin or Other Antiplatelet Therapy in Cardiovascular Disease: Percent of individuals who are prescribed aspirin or other antiplatelet therapy.

Lipid Management in Cardiovascular Disease: Percent of individuals who are prescribed a statin.

Tobacco Use & Screening: Percent of individuals who are screened for tobacco use.

Eye Exam: Percent of individuals who receive a dilated eye examination or digital retinal imaging performed by an optometrist or ophthalmologist.

Foot Exam: Percent of individuals who receive a comprehensive foot exam that includes assessment of sensation and vascular status.

Dental Exam: Percent of individuals who receive a dental exam performed by a dental professional.

Physical Activity Education: Percent of individuals who receive physical activity education.

Nutrition Education: Percent of individuals who receive nutrition education performed by a registered dietitian or other health or wellness program staff.

Diabetes-related Education: Percent of individuals who receive education on any diabetes topic, including nutrition education, physical activity education, and any other diabetes education, either in a group or individual setting.

Depression Screening: Percent of individuals who were screened for depression.

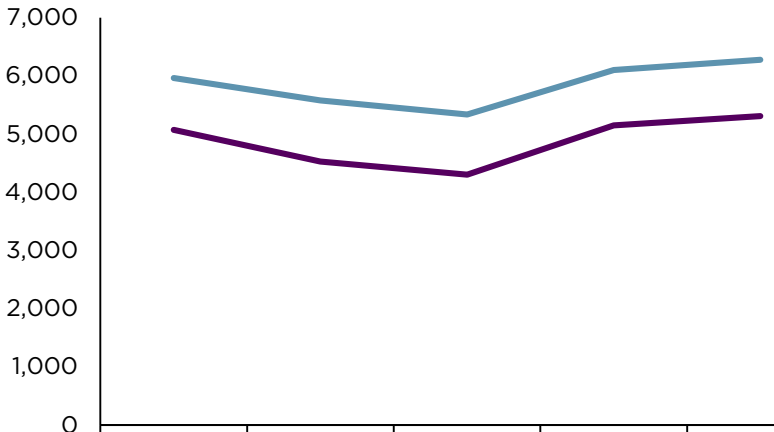
Immunizations: Percent of individuals who receive each of the following vaccines: influenza, pneumococcal, tetanus/diphtheria and pertussis (Tdap) in the past 10 years, and hepatitis B 3-dose series.

Tuberculosis Screening: Percent of individuals who have ever had a TB test result documented.

I. PATIENT REGISTRY

5,308 urban American Indian/Alaska Native (AI/AN) patients with diabetes across 31 facilities were included in the 2017 Diabetes Audit, representing 84.6% of those in the diabetes registries. Figure 1 shows the number and percentage of records audited over the five-year period, as well as the number of urban facilities included in the Audit. The 2017 Audit included the highest number of records over the past five years, however the percentage was similar to that of 2013 and 2016 and has overall remained stable over the five-year period (Appendix A, Table 1).

Figure 1. Patients in Diabetes Registries, Urban Indian Health Programs 2013-2017



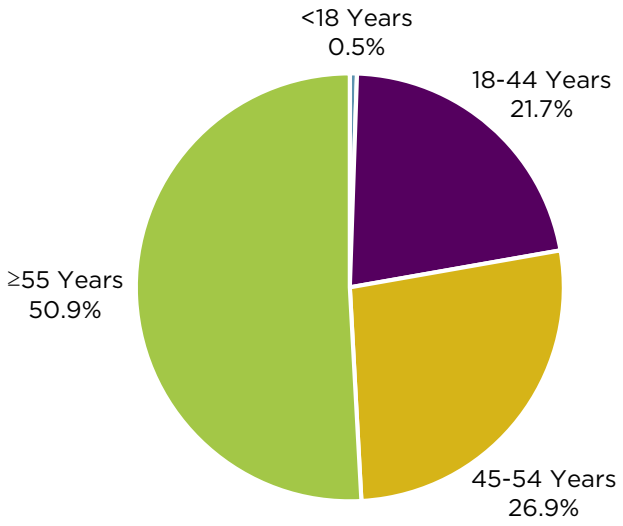
	2013	2014	2015	2016	2017
Total Number in Registry	5,965	5,578	5,335	6,098	6,276
Total Number Audited	5,074	4,529	4,305	5,150	5,308
Percent of Patients Audited	85.1	81.2	80.7	84.5	84.6
Number of Programs	33	33	32	32	31

II. DEMOGRAPHICS & VITAL STATISTICS

More than half of the patients included in the Diabetes Audit were female (59.8%). The average age in 2017 was 54.5 years, with half of patients (50.9%) being 55 years or older (Figure 2). For the 2017 Audit, the highest age group was lowered to 55 years and above and is unique to this report. Although some services, such as those provided through the Older American Act and Medicare, provide services to those 60 and 65 years or older, respectively, AI/AN elders may be younger and have unique needs.[10] Many Urban Indian Health Programs (UIHPs), as well as community stakeholders, request information on individuals 55 years or older to capture elders' health. Additionally, in the past, Indian Health Service (IHS) has defined the AI/AN elder population as 55 years and older.[10,11]

There was a significant increase in the proportion of those 55 and older and a decrease in those aged 45 to 54 from 2013 to 2017 ($p<0.05$, $p<0.05$; Appendix A, Table 2). These trends suggest an aging population.

Figure 2. Age Categories of Urban AI/AN Patients with Diabetes, 2017

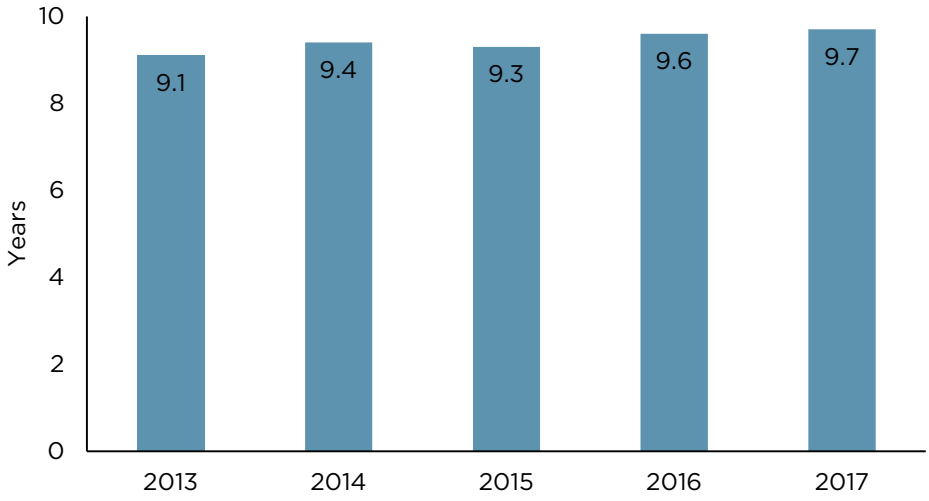


More than half (50.9%) of audit patients were over 55 years old

As in previous years, the majority of audited patients had type 2 diabetes, with only approximately 2% having type 1 (Appendix A, Table 2).

On average, urban AI/AN patients with diabetes had been living with diabetes for approximately 9.1 to 9.7 years from 2013 to 2017, as seen in Figure 3. This measure was based on length of time since first known diagnosis.

Figure 3. Average Duration of Diabetes of Urban AI/AN Patients with Diabetes, 2013-2017



III. GLYCEMIC CONTROL

Hemoglobin A1c, also known as A1c, measures a person's average blood glucose in the past two to three months.[12] Those with A1c levels of 6.5% or higher are considered to have diabetes.[12] Since all patients included in the 2017 Audit have diabetes, IHS considers those with A1c levels below 8% as demonstrating good glycemic control, as per the relevant GPRA measurement. Figure 4 shows that **55.1% of urban AI/AN patients with diabetes had an A1c < 8.0% in 2017, exceeding the GPRA target of 48.4% (data not shown).** Furthermore, in 2017, 36.1% had A1c levels below 7.0% (Figure 5). The proportion of patients with A1c levels < 8% has remained relatively stable from 2013 to 2017 (Appendix A, Table 3). Additionally, the proportion that remained untested or had invalid results for A1c was approximately 6% on average each year over the 5-year period and has remained stable (p=0.500).

55.1% of audited patients had an A1c below 8.0%.

Figure 4. Good Glycemic Control

2017 IHS GPRA Target: 48.4% of patients with diabetes achieve good glycemic control (A1c less than < 8.0%).

2017 Audit Results: More than half (55.1%) of audited urban diabetes patients achieved good glycemic control (A1c less than < 8.0%).

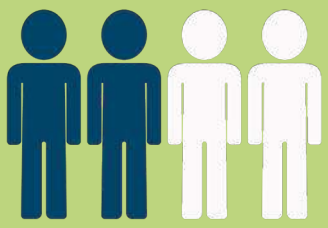
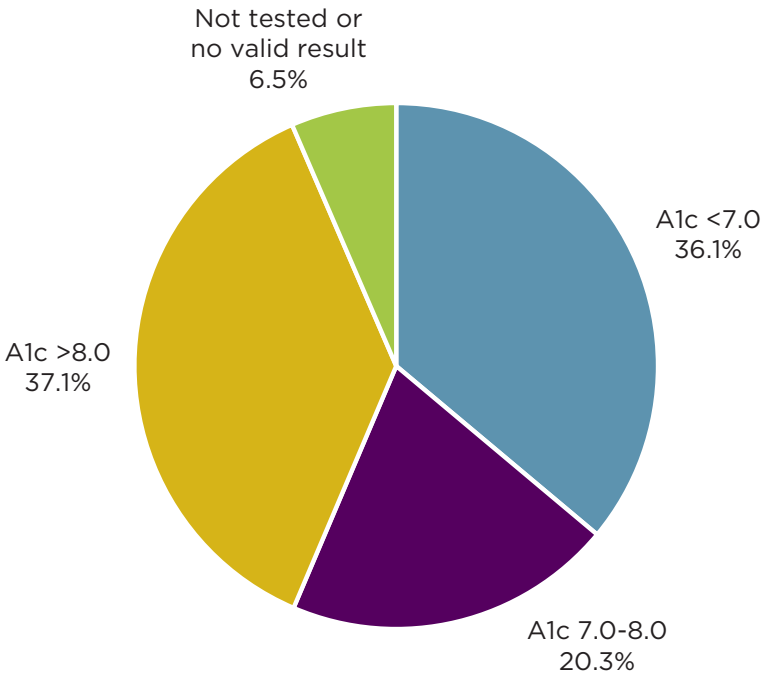
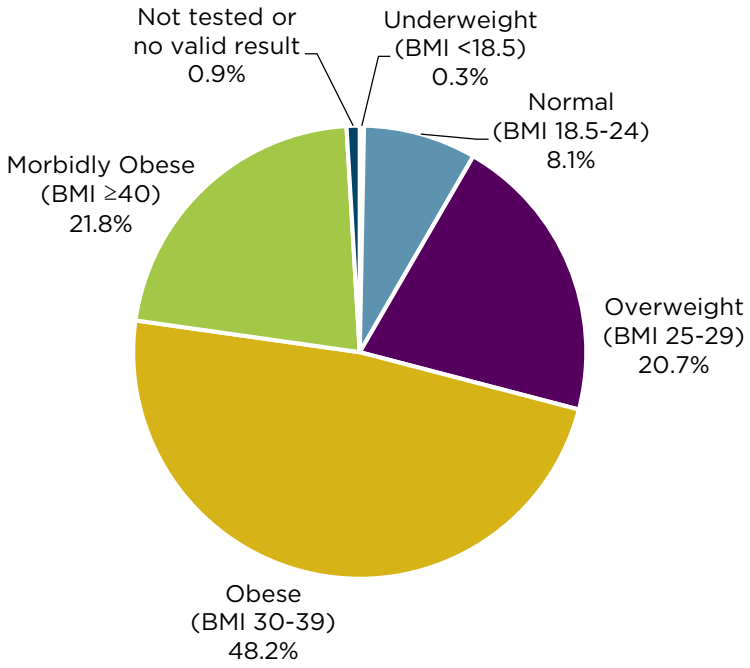


Figure 5. Hemoglobin A1c Levels among Urban AI/AN Patients with Diabetes, 2017



Overweight and obesity are major risk factors for type 2 diabetes and are determined using body mass index (BMI).[13] **The largest proportion of urban AI/AN patients with diabetes in 2017 were considered obese (48.2%)** and had BMIs between 30-39 (Figure 6). An additional 21.8% were considered morbidly obese with BMIs greater than or equal to 40. The mean BMI was 34.6. From 2013 to 2017, BMI results did not vary greatly from year to year. More in-depth BMI data for other years can be found in Appendix A, Table 3.

Figure 6. Body Mass Index Categories among Urban AI/AN Patients with Diabetes, 2017



IV. CHRONIC KIDNEY DISEASE

Chronic kidney disease (CKD) is the kidney's inability to adequately filter waste from the blood and indicates an overall decrease in kidney function.[14] This decrease in function can lead to end stage renal disease (ESRD) which requires dialysis or a kidney transplant.[15] Diabetes is a leading cause of CKD in the United States, with one in three diabetic adults having CKD.[16] Due to this, it is important for diabetic patients to regularly be screened for CKD and diabetic nephropathy. This is assessed through estimated glomerular filtration rate (eGFR) and urine albumin-creatinine ratio (UACR).[17, 18] **In the 2017 Audit, 62.4% of urban AI/AN patients with diabetes had both eGFR and UACR assessed, falling just short of the GPRA target of 63.3% for diabetic nephropathy screening (Figure 7)**.

The proportion of urban AI/AN patients with diabetes with a UACR>300, often a sign of severe kidney damage, increased significantly from 2013 to 2017, 2.8% to 4.5% ($p<0.05$; Figure 8; Appendix A, Table 4).[19] There were no statistically significant trends over the past five years for ESRD prevalence, defined as an eGFR < 15 ml/min/1.72m^2 ($p=0.100$; Figure 8). **However, recent findings show decreasing national rates since 2006 of diabetes-attributed ESRD in AI/AN patients.[20] This warrants additional data collection and analysis in urban AI/AN patients to determine future diabetes-attributed ESRD trends.**

Figure 7. Nephropathy Assessment

2017 IHS GPRA Target: 63.3% of patients with diabetes are assessed for nephropathy.

2017 Audit Results: More than 3 in 5 (62.4%) audited urban diabetes patients were assessed for nephropathy (both eGFR and UACR assessed).

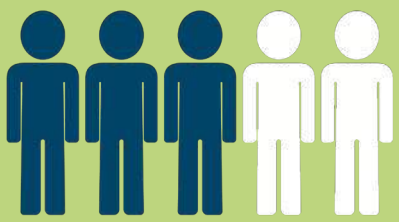
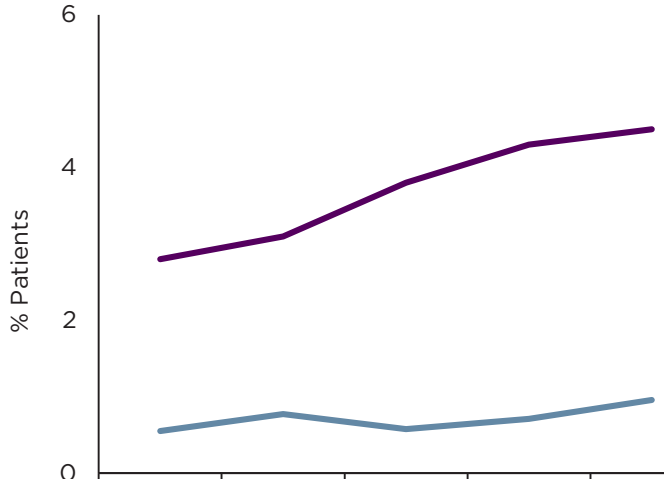


Figure 8. eGFR and UACR Indicators of Low Kidney Function among Urban AI/AN Patients with Diabetes, 2013-2017



	2013	2014	2015	2016	2017
eGFR < 15: End Stage Renal Disease	0.6	0.8	0.6	0.7	1.0
UACR > 300	2.8	3.1	3.8	4.3	4.5

PROGRAM SPOTLIGHT: THE SUGAR SHAKERS

Urban Inter-Tribal Center of Texas, *Dallas, TX*

"Sugar Shakers is the name of our diabetes support group here at the Urban Inter-Tribal Center of Texas. We felt that changing the name from Diabetes Support Group to Sugar Shakers would make it more appealing rather than "a class." At Sugar Shakers we start off with a light "diabetic friendly" lunch and discuss the recipe's nutritional content. Members get a chance to engage in asking questions, which includes healthy food substitutions. During the second portion of our meeting, we include a physical or educational activity. When we meet, we discuss barriers but also emphasize on any accomplishments or tips and advice. Our goal is to provide a fun and relaxed environment so that patients can better engage in learning about diabetes and to remove any stigma associated with the label of being diabetic.

In the picture above we had a demonstration on resistance bands. We all sat in a big circle and learned how to use them for different exercises. What I liked about these is that you could do them sitting down, which is convenient for some patients due to limited mobility."

- Rose Vasquez, Diabetes Program Coordinator

Learn more about the work of UITCT and the Sugar Shakers at http://uitct.com/
Photo courtesy of UITCT.

V. CARDIOVASCULAR HEALTH

Cardiovascular disease (CVD) is the leading cause of death in both men and women and the second leading cause of death in AI/AN people.[21] Adults with diabetes are two times more likely to die from CVD than those without diabetes.[22] IHS tracks the progression of lipid levels and blood pressure in diabetic AI/AN patients to help understand this large risk area. **Rates of CVD and hypertension have remained relatively stable in urban AI/AN patients with diabetes, with approximately 18.9% having diagnosed CVD and 74.3% having diagnosed hypertension in 2017 (Appendix A, Table 6).**

LIPID MANAGEMENT

Lipids are a cardiovascular health measurement that is tracked through levels of low-density lipids (LDL), high-density lipids (HDL), and triglycerides, as well as the use of lipid-lowering medications. In 2017, slightly less than half (47.3%) of urban AI/AN patients with diabetes had healthy LDL levels below 100 mg/dL. Similarly, slightly less than half (46.9%) had healthy HDL levels above 50 mg/dL for females (29.7%) and 40 mg/dL for males (17.2%). More comprehensive data on these measurements can be found in Appendix A, Table 5.

Statins are a class of medication that lower lipid levels and reduce the overall risk of CVD. The GPRA target aimed to have 61.9% of AI/AN patients with diabetes on statin therapy. I**n 2017, 47.4% urban AI/AN patients with diabetes were on statin therapy, which was below the GPRA target (Figure 9).**

Figure 9. Statin Therapy

2017 IHS GPRA Target: 61.9% of patients with diabetes receive a prescription for statin therapy to reduce CVD risk.

2017 Audit Results: Less than half (47.4%) of audited urban diabetes patients were on statin therapy.

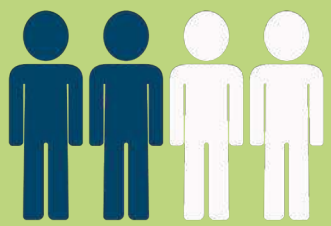
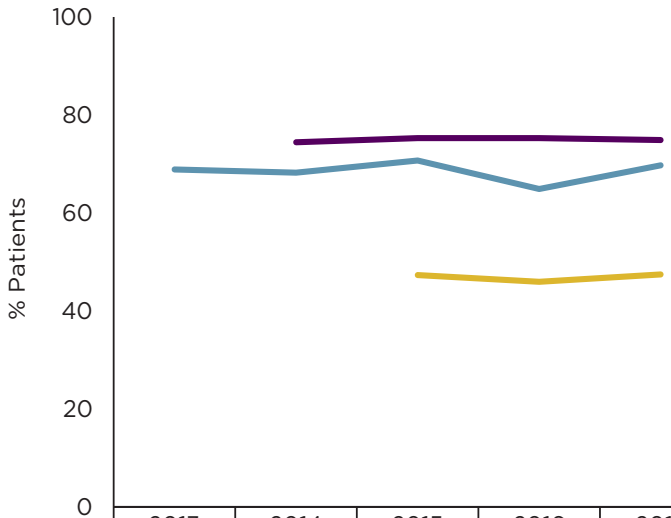


Figure 10. Medications among Urban AI/AN Patients with Diabetes, 2013-2017



	2013	2014	2015	2016	2017
Aspirin/Antiplatelet Therapy^	68.9	68.2	70.7	64.9	69.7
ACE Inhibitor/ARBs*		74.4	75.3	75.3	74.9
Statin			47.3	46.0	47.4

^ Among patients with diagnosed cardiovascular disease

* Among patients with known hypertension

The proportion of urban AI/AN patients with diabetes that were prescribed statins remained steady from 2015 to 2017, with no significant change from previous years (Figure 10; Appendix A, Table 5).

BLOOD PRESSURE CONTROL

Blood pressure is another measure of cardiovascular health. Those with systolic blood pressure (SBP) and diastolic blood pressure (DBP) below 140 and 90, respectively, are considered to have achieved good blood pressure control. Overall, urban AI/AN patients with diabetes in 2017 had a mean SBP of 128.7 mmHg and DBP of 77.8 mmHg (Appendix A, Table 6). **In 2017, 78.0% of diabetic urban AI/AN patients had blood pressures below 140 and 90, exceeding the GPRA target of 63.8% by nearly 15% (Figure 11)**. Furthermore, the proportion of patients who have achieved blood pressure control increased over the audit years in this report (Figure 12), although this trend was not statistically significant (p=0.200; Appendix A, Table 6). Also of note, the proportion of urban AI/AN patients with diabetes that were not tested or did not have a valid result for blood pressure decreased to less than 1% by 2017 (Figure 12). Finally, 74.9% diabetic urban AI/AN patients diagnosed with hypertension were prescribed ACE inhibitors during the audit period, while 69.7% of those diagnosed with CVD were prescribed aspirin or antiplatelet therapy to help decrease the risk of diabetes-related cardiovascular health problems (Figure 10).

Figure 11. Blood Pressure Control

2017 IHS GPRA Target: 63.8% of patients with diabetes have achieved blood pressure control (< 140/90).

2017 Audit Results: More than 3 in 4 (78.0%) audited urban diabetes patients achieved blood pressure control (< 140/90).

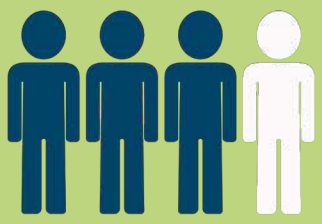
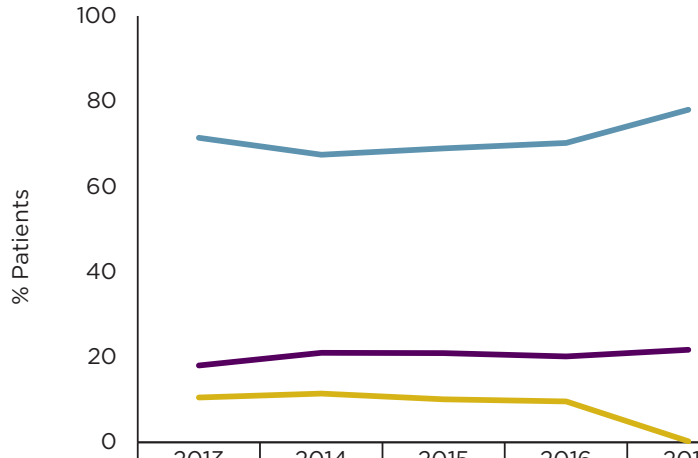


Figure 12. Blood Pressure Levels among Urban AI/AN Patients with Diabetes, 2013-2017

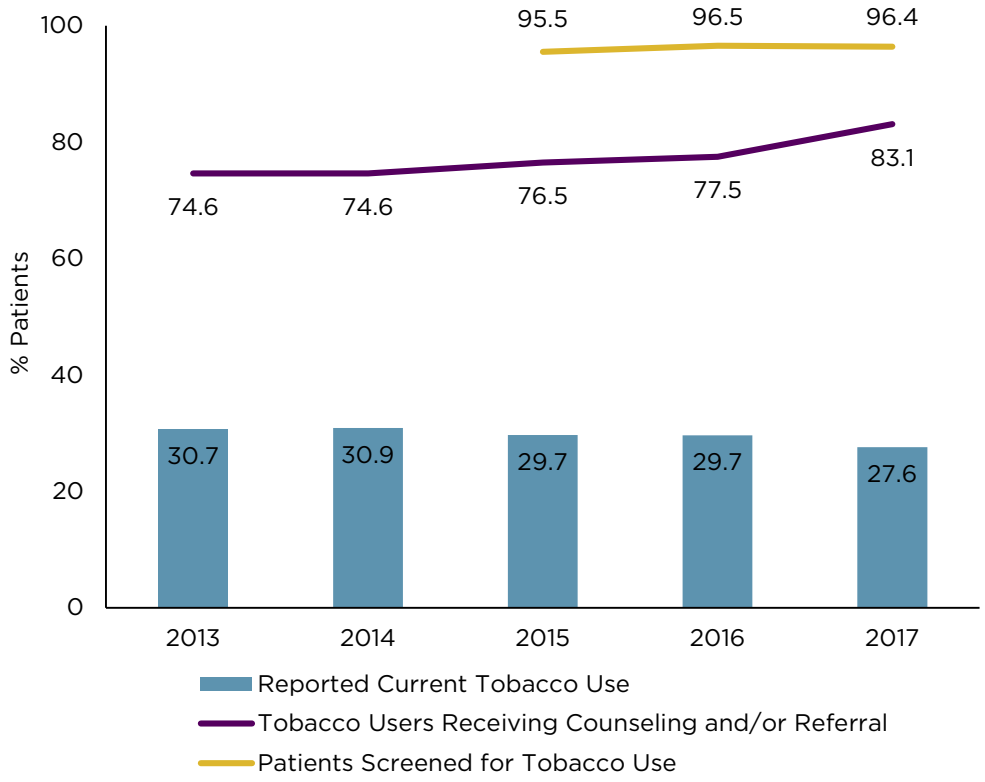


	2013	2014	2015	2016	2017
<140 and <90	71.4	67.5	69.0	70.2	78.0
>140 or >90	18.1	21.0	20.9	20.2	21.7
Not tested or no valid result	10.5	11.5	10.1	9.6	0.3

VI. TOBACCO USE & SCREENING

Tobacco use is one of the largest risk factors of CVD.[23] Therefore, it is important not only to screen diabetic patients for tobacco use, but also refer patients to cessation counseling. **In 2017, 96.4% of patients were screened for use (Figure 13).** Overall, a little more than a 25% of diabetic urban AI/AN patients were tobacco users, which has decreased significantly over the five-year period ($p<0.05$; Appendix A, Table 7). Of those users, 83.1% were referred to or received cessation counseling in 2017. There was a significant increase in overall users referred to counseling over the five years reported as seen in Figure 13 ($p<0.05$).

Figure 13. Tobacco Use, Screening, and Referrals, among Urban AI/AN Patients with Diabetes, 2013-2017



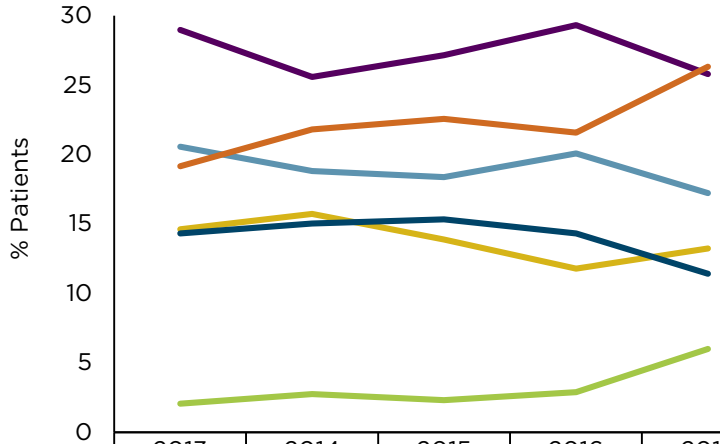
83.1% of audited tobacco users received cessation counseling or referral

VII. DIABETES THERAPY

Therapies to manage diabetes range from lifestyle changes to oral or injectable therapies and vary between those with type 1 and type 2 diabetes. Those with type 2 diabetes, which is most of the urban AI/AN patients included in the 2017 Audit, start by managing their health through diet and exercise alone.[24] If unsuccessful, other therapies can be utilized. However, those with type 1 must use insulin since they cannot produce it naturally.[25] Insulin is an injectable therapy that can be used alone or in tandem with other medication.[24] The 2017 Diabetes Audit collects information on 11 different diabetic therapies, use of diet and exercise alone, and insulin. Types of medications and therapies are listed in Appendix B, Table 1.

Figure 14 shows the proportion of urban AI/AN patients with diabetes that use diet and exercise alone, insulin, insulin and other medication, or those that use one, two, or three or more medications that are not insulin. Although not statistically significant, the proportion using diet and exercise alone decreased during the years reported (p=0.200; Appendix A, Table 8). Conversely, **the percentage of those on three or more medications and those on insulin and other medication increased significantly (p<0.05; p<0.05).** Overall, therapy regimens may change overtime depending on the change in condition as well as effectiveness of therapies for individuals. Patient-centered approaches to care and individualized treatment plans are important to consider when looking at diabetes therapy.

Figure 14. Standard Therapies among Urban AI/AN Patients with Diabetes, 2013-2017



	2013	2014	2015	2016	2017
Diet/Exercise alone	20.6	18.8	18.4	20.1	17.2
1 Medication	29.0	25.6	27.2	29.3	25.8
2 Medications	14.6	15.7	13.9	11.8	13.2
3 Medications or More	2.1	2.8	2.3	2.9	6.0
Insulin Only	14.3	15.0	15.3	14.3	11.4
Insulin and Other Medication	19.2	21.8	22.6	21.6	26.3

VIII. SCREENING EXAMS & HEALTH EDUCATION

Poor glycemic control caused by diabetes can lead to significant microvascular damage in the blood vessels, most notably in the eyes, feet, and mouth.[26, 27, 28, 29] This damage can be prevented and managed with regular exams.

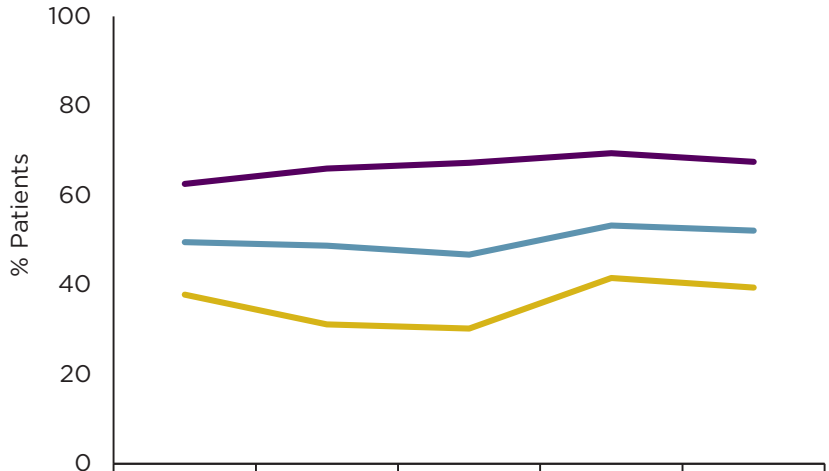
SCREENING EXAMS

Diabetic retinopathy is caused by damage to blood vessels in the retina due to high blood sugar levels and can lead to a loss of vision.[26] It is the leading cause of blindness in adults with diabetes and often lacks early symptoms to patients but can be detected through regular eye exams.[27] Therefore, it is important for those with diabetes to receive annual dilated eye exams.[27]

Diabetic neuropathy is nerve damage that can lead to a loss of feeling, most commonly in the feet, and is experienced by 60% to 70% of diabetic patients in the United States.[28] This may result in foot sores or wounds that will not heal, also known as foot ulcers. Subsequently, it can lead to amputation of the toe, foot, or part of the leg. Annual foot exams are recommended to help prevent these complications.

The risk for oral health problems, such as tooth decay, infections, and gum disease, is also increased in diabetic patients.[29] Regular dental exams and cleanings can help to prevent these issues.[29]

Figure 15. Documented Exams among Urban AI/AN Patients with Diabetes, 2013-2017

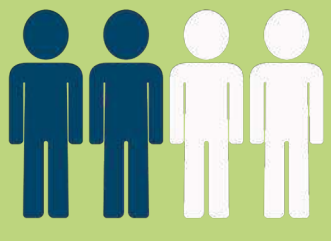


	2013	2014	2015	2016	2017
Eye Exam	49.6	48.8	46.7	53.2	52.1
Foot Exam	62.5	66.0	67.3	69.4	67.5
Dental Exam	37.8	31.2	30.2	41.5	39.4

Figure 16. Retinopathy Assessment

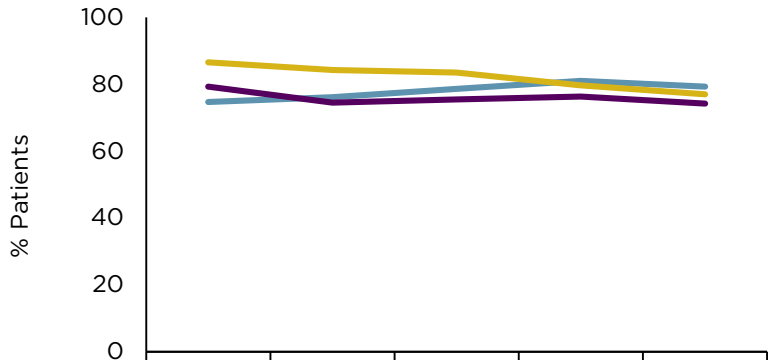
2017 IHS GPRA Target: 63.1% of patients with diabetes receive an annual retinal examination.

2017 Audit Results: More than half (52.1%) of audited urban diabetes patients received an annual retinal exam.



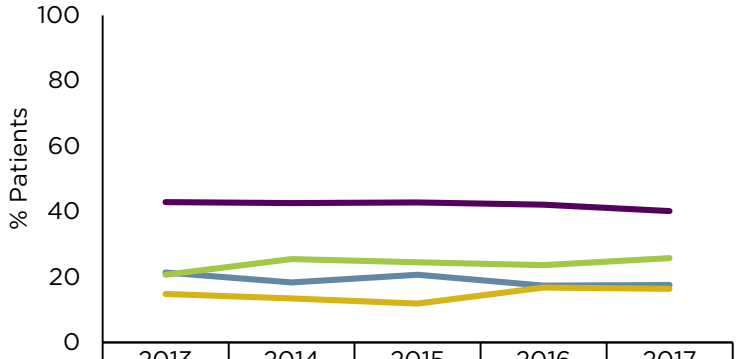
Despite the importance of these exams, many urban AI/AN patients with diabetes were not documented as having received them in 2017 (Figure 15). **In 2017, only 52.1% of diabetic urban AI/AN patients received an eye exam, well below the GPRA target of 63.1%** (Figure 16). Similarly, only **39.4% received a dental exam in 2017.** 67.5% did receive a foot exam, although the increase over the five-year period was not statistically significant (p=0.100; Appendix A, Table 9).

Figure 17. Diabetes Management Education among Urban AI/AN Patients with Diabetes, 2013-2017



	2013	2014	2015	2016	2017
Exercise Instruction	74.7	76.2	78.7	81.0	79.3
Nutrition Education	79.3	74.5	75.5	76.4	74.2
Diabetes Education (Other)	86.6	84.3	83.5	79.6	77.0

Figure 18. Nutrition Education by Provider Type among Urban AI/AN Patients with Diabetes, 2013-2017



	2013	2014	2015	2016	2017
Registered Dietitian	21.4	18.4	20.7	17.4	17.6
Other Staff Only	43.0	42.7	42.8	42.1	40.2
Both Registered Dietitian and Staff	14.9	13.5	11.9	16.8	16.5
Neither	20.7	25.5	24.5	23.6	25.8

HEALTH EDUCATION

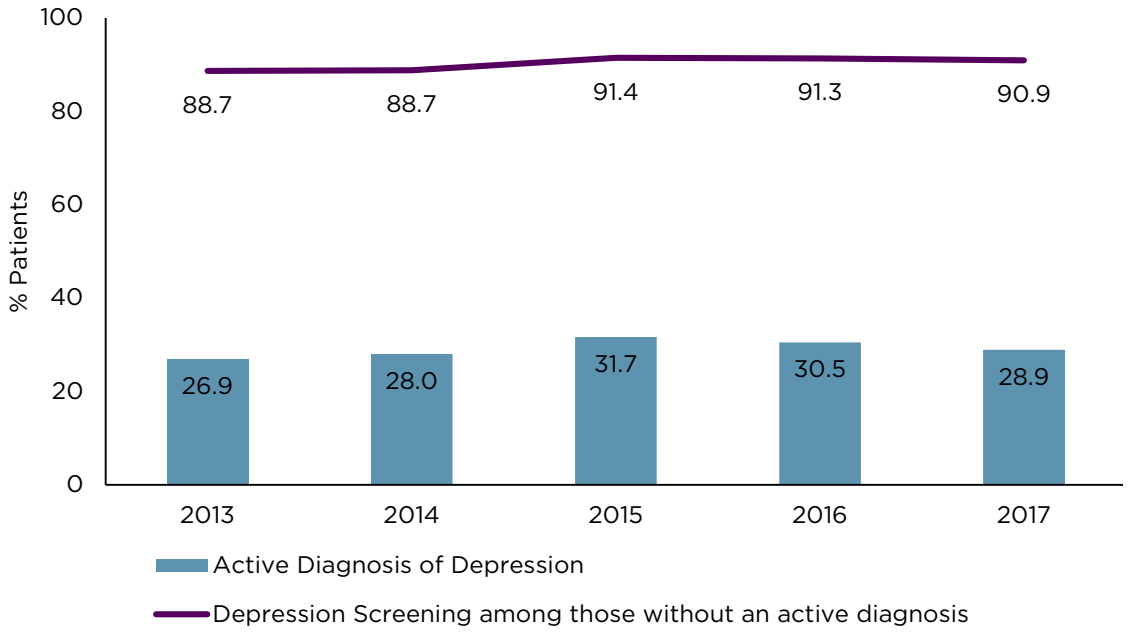
In addition to annual exams, education on nutrition, physical activity, or other diabetes resources, can help patients manage diabetes. Physical activity and learning to shop, cook, and eat nutritionally, can help to lower blood glucose levels, lower the risk for heart disease and nerve damage, and potentially lead to weight loss.[30] Figure 17, shows that approximately 75% or more of urban AI/AN patients with diabetes received nutrition, other diabetes, or exercise education. **There was, however, a statistically significant decrease in other diabetes education during the years reported (p<0.05; Appendix A, Table 10)**. Conversely, there was a significant increase in exercise instruction over the five-year period, approximately 5% (p<0.05). Nutrition education received from a registered dietitian, other staff only, both, or neither, remained stable over the five-year period (Figure 18).

IX. DEPRESSION SCREENING & MANAGEMENT

Diabetes is associated with an increased risk of depression, and depression can contribute to worsened diabetes outcomes and care.[31] These include: worsened glycemic control, worsened self-care, and an increase in risk for other complications. **The odds of depression are 1.6 to 2 times higher in those with diabetes compared to those without the disease.**[32,33] Furthermore, a study of 18,814 people found the rates in AI/AN people to be 3 times higher compared to Non-Hispanic whites.[34] Given the negative consequences and higher rates of depression in those who have diabetes, especially for AI/AN patients, it is important to screen for depression in urban AI/AN patients with diabetes.

In 2017, 28.9% of urban AI/AN patients with diabetes had an active diagnosis of depression (Figure 19). Of those without a current diagnosis, 90.9% were screened for depression. For all five years, this proportion of patients screened among those without an active diagnosis of depression was above 85% and has remained steady (Appendix A, Table 11).

Figure 19. Depression Diagnosis and Screening among Urban AI/AN Patients with Diabetes, 2013-2017



9 out of 10 audited patients without an active diagnosis were screened for depression

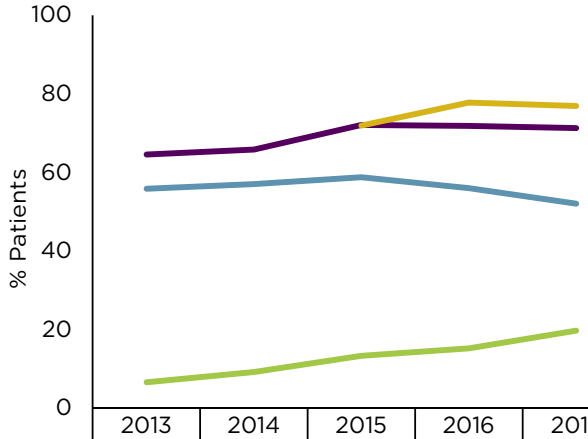
X. IMMUNIZATIONS

Those with diabetes are at an increased risk for acquiring certain vaccine-preventable diseases and developing more complications when ill, due to the strain on the immune system from diabetes.[35] The immunizations that are tracked in the Diabetes Audit are annual influenza vaccine, hepatitis B vaccine (ever completed series of three), pneumococcal vaccine ever, and tetanus/diphtheria in the last ten years. In all cases, the 2017 Audit tracks both those who received the vaccine as well as those who refused.

Influenza annual rates and Tdap rates have remained relatively stable over the last five and three years, respectively (Figure 20). **Hepatitis B, however, had a significant increase in those receiving the vaccine, with the rate more than tripling from 2013 to 2017 (p<0.05; Figure 20; Appendix A, Table 12).**

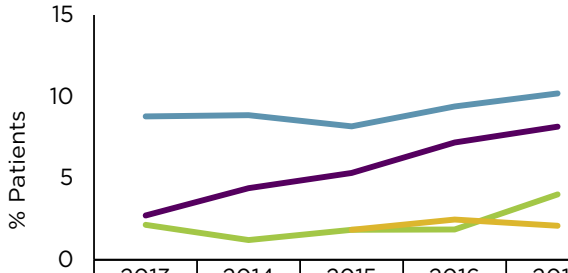
The refusal rate for pneumococcal vaccine significantly increased from approximately 3% to 8% (p<0.05; Figure 21). Although there is data on the refusal rates of childhood vaccinations, there is a lack of data on similar rates for adults.[36] Therefore, this trend could reflect a trend that exists in the general population but better data on adult vaccination rates, specifically refusal rates, would need to be collected. Also of note, the rate of those who have never received the pneumococcal vaccine significantly decreased nearly 12% from 2013 to 2017 (p<0.05; Appendix A, Table 12). The other three refusal rates remained stable during the years reported.

Figure 20. Documented Immunizations among Urban AI/AN Patients with Diabetes, 2013-2017



	2013	2014	2015	2016	2017
Influenza Vaccine in Past Year	55.8	57.0	58.8	56.0	52.0
Pneumococcal Vaccine Ever	64.5	65.8	72.1	71.8	71.3
Hepatitis B Series	6.5	9.2	13.3	15.2	19.7
Tdap Vaccine in Past 10 Years			71.9	77.7	76.9

Figure 21. Documented Immunization Refusals among Urban AI/AN Patients with Diabetes, 2013-2017



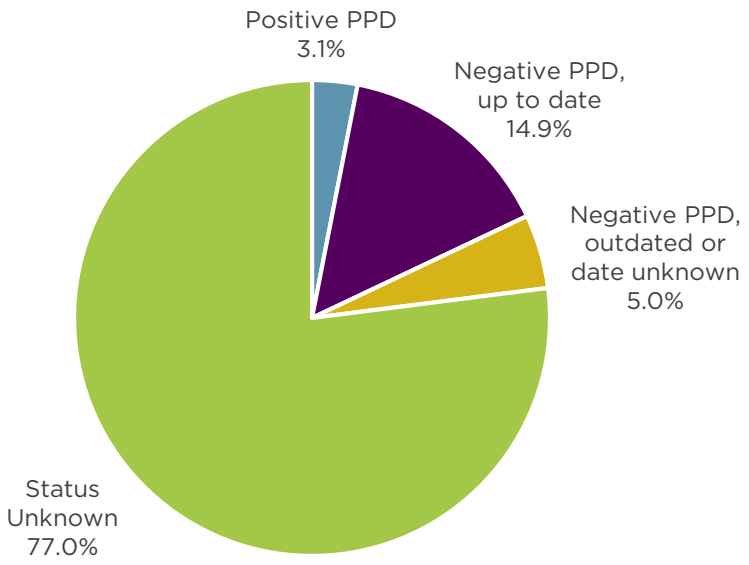
	2013	2014	2015	2016	2017
Refused Influenza Vaccine in Past Year	8.8	8.9	8.2	9.4	10.2
Refused Pneumococcal Vaccine Ever	2.7	4.4	5.3	7.2	8.1
Refused Hepatitis B Series	2.1	1.2	1.8	1.9	4.0
Refused Tdap Vaccine in Past 10 Years			1.8	2.5	2.1

XI. TUBERCULOSIS SCREENING

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis* (MTB). Not everyone infected with MTB become sick, however, it may result in two related conditions: latent TB infection (LTBI) and active TB disease.[37] LTBI can easily progress to active TB in patients with weakened immune systems, as in diabetes.[38] Those with diabetes have a 2 to 6 times higher risk of developing active TB.[1, 39] Therefore, it is recommended that those with diabetes receive TB screening at least once after diabetes diagnosis.

Figure 22 shows that **over 80% of urban AI/AN patients with diabetes had an unknown or outdated TB status in the 2017 Audit.** The proportion of those with unknown status or negative, date unknown has increased over the five-year period ($p<0.05$; Appendix A, Table 13). Furthermore, the percent of those who tested positive but did not receive treatment has also significantly decreased, approximately 3% over the last five years ($p<0.05$). Given the higher risk of TB for those with diabetes, it is important to determine the TB status of diabetic patients.

Figure 22. TB PPD Status among Urban AI/AN Patients with Diabetes, 2017



DISCUSSION

The purpose of the 2017 Diabetes Audit is to assess care and health outcomes for American Indians and Alaska Natives (AI/AN) with diagnosed diabetes from 2013 to 2017. Audit year data reflects care administered in the previous year. Data for urban AI/AN patients come from Urban Indian Health Programs (UIHPs) that participate in the Diabetes Audit annually performed by Indian Health Service (IHS). **Overall, the goal of the 2017 Audit is to assess outcomes for UIHPs' diabetic patients and identify areas that have improved over the years as well as highlight challenges that exist.** The 2017 Audit included more urban AI/AN patients with diabetes than previous years which can assist in creating a more comprehensive picture of diabetes care and outcomes in this population.

Audit data from UIHPs showed great progress in a few key measurements and practices in the five-year period. **In 2017, the Diabetes Audit found that the GPRA targets were exceeded for good glycemic control and for blood pressure control. Although not official GPRA results, these are important measurements of diabetes care,** and meeting and exceeding them demonstrates successes in urban AI/AN diabetes programs. In addition, the proportion of urban AI/AN patients with diabetes using tobacco has decreased significantly while the proportion of users referred to cessation counseling services was high and significantly increased from 2013 to 2017. This indicates good prevention measures to address a major risk factor of diabetes outcomes as well as co-morbidities such as CVD. Another strength was over 85% of urban AI/AN patients with diabetes without an active diagnosis of depression had been screened all five years. Although information on referral to counseling services as follow-up is outside the scope of the 2017 Diabetes Audit, it indicates a strong effort by providers to address a well-documented and under-diagnosed disease. Finally, hepatitis B vaccinations more than tripled over the five years reported. Since those with diabetes are at a much higher risk for hepatitis B, it is encouraging to see an increase in vaccinations among diabetic urban AI/AN patients, despite vaccination rates being only at approximately 20%.

Audit data from UIHPs also identified areas where there are opportunities to improve care and outcomes for urban AI/AN patients. **One of the largest gaps seen was in the proportion of urban AI/AN patients with diabetes on statin therapy.** This proportion was approximately 14% below the GPRA target and leaves opportunity for improvement in the future to better combat cardiovascular disease in urban AI/AN patients with diabetes. Furthermore, despite being below the GPRA target by 9% for those receiving

Data brings awareness to UIHP staff and stakeholders about the gaps and strengths of diabetes care in urban settings.

dilated eye exams, more than half (52.1%) still received these eye exams. Finally, 62.4% of urban AI/ANs with diabetes received an annual nephropathy assessment which fell just short of the GPRA target by less than 1%. This indicates that the GPRA goal is on track to be met in the near future. In addition, less than 40% received a dental exam. This could be addressed moving forward with additional research into potential barriers to dental care. There was also a significant increase in the proportion of urban AI/AN patients with diabetes who have a UACR over 300. However, this makes up less than 5% of patients and the rate of eGFR <15, an indicator of end-stage renal disease, remained stable. Furthermore, there was a significant increase in the refusal of pneumococcal vaccine. However, this increase was coupled with a significant decrease in those who never received the vaccine and could mirror national trends of vaccine refusal rates. Greater research of adult vaccination refusal rates, both nationally and in urban AI/AN patients, should be done to understand the trends observed. **Finally, despite the importance of TB testing in those with diabetes, unknown TB statuses have only increased over the five-year period.** With increased screening for TB in diabetes programs or clinical visits, this rate can be lowered.

Some additional areas the Diabetes Audit should consider would be to collect demographic data on socioeconomic indicators such as education, income, housing, or employment status. These indicators can provide greater context around the social determinants of health for diabetic AI/AN patients. Other relevant health indicators for diabetes that are not captured are disability, death, retinopathy, and neuropathy. Although this info cannot be collected by the Audit, we believe this data should be used to supplement the audit data and can provide a more comprehensive picture of diabetes in urban AI/AN people. However, standardized data on these measures can be difficult to capture or are not available in electronic health records and therefore would need to be collected from other sources outside of health records.

Overall, this data helps bring awareness to UIHP staff and stakeholders about the gaps and strengths of diabetes care in urban settings. Even though each facility is unique, they all hold an ongoing commitment to provide diabetes care to urban AI/AN patients with diabetes. With proper management, overall risks due to type II diabetes can be lowered for patients. **This report aims to motivate collaboration and communication in the field of diabetes care for urban AI/AN patients and inform research, prevention funding, and programmatic efforts, to ensure that success is achieved in diabetes care and outcomes.**

RECOMMENDATIONS

Based on our findings of the *Urban Diabetes Care & Outcomes Summary Report, Audit Years 2013-2017*, we recommend improvements in the following areas:

DATA COLLECTION

- Gather information on diabetes patients' care and outcomes consistently to better identify ongoing improvements and continuing gaps.

PROGRAMMATIC RECOMMENDATIONS

- Encourage urban diabetes patients to stay up to date on all immunizations and routine screenings.

RESEARCH

- Investigate the trends of end-stage renal disease in urban AI/ANs to determine if the trend is similar to what has been observed in the overall AI/AN population.

PREVENTION FUNDING

- Invest in community efforts that increase access to dental exams, retinopathy assessment, and nephropathy assessment.
- Continue support of successful efforts for depression screening and referral of tobacco users to cessation counseling.

APPENDIX A

Table 1. Number of Audited Patients with Diabetes, 2013-2017

Year	2013	2014	2015	2016	2017	Trend P-Value
Total Number in Registry	5,965	5,578	5,335	6,098	6,276	
Total Number Audited	5,074	4,529	4,305	5,150	5,308	
Percent of Patients Audited	85.1	81.2	80.7	84.5	84.6	0.800
Number of Facilities	33	33	32	32	31	

Table 2. Demographics of Audited Patients with Diabetes, 2013-2017

Year Number of charts audited	2013 5,074		2014 4,529		2015 4,305		2016 5,150		2017 5,308		Trend P-Value
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
Sex											
Male	2,050	40.8	1,825	39.6	1,763	40.5	2,096	40.4	2,164	40.2	0.800
Female	3,024	59.2	2,704	60.4	2,542	59.5	3,053	59.5	3,144	59.8	0.800
Age (Years)											
<18	12	0.2	16	0.3	#	#	24	0.5	26	0.5	0.200
18-44	1,195	24.0	1,022	23.8	849	20.6	1,061	21.4	1,092	21.7	0.100
45-54	**1,488**	**29.3**	**1,305**	**28.6**	**1,203**	**28.7**	**1,386**	**27.5**	**1,389**	**26.9**	**<0.05**
≥55	**2,379**	**46.5**	**2,186**	**47.3**	**2,247**	**50.6**	**2,679**	**50.6**	**2,801**	**50.9**	**<0.05**
Mean age*	53.3		53.4		54.3		54.2		54.5		
Diabetes Duration (Years)											
<5	956	21.7	897	23.1	1,013	27.1	973	20.7	1,019	21.0	0.700
5-9	834	17.5	763	17.1	900	21.0	1,054	19.9	1,103	20.8	0.200
≥10	1,325	26.6	1,328	28.5	1,409	32.1	1,603	30.9	1,758	31.6	0.100
Not documented	1,959	34.2	1,541	31.3	983	19.8	1,520	28.7	1,428	27.5	0.400
Mean duration*	9.1		9.4		9.3		9.6		9.7		
Diabetes Type											
Type 1	127	2.6	108	2.4	108	2.6	110	2.1	121	2.1	0.100
Type 2	4,947	97.4	4,421	97.6	4,197	97.4	5,040	97.9	5,187	97.9	0.100

***Weighted Estimate**
 # Suppressed
Bolded p-values are statistically significant

APPENDIX A

Table 3. Glycemic Control among Audited Patients with Diabetes, 2013-2017

Year Number of charts audited	2013 5,074		2014 4,529		2015 4,305		2016 5,150		2017 5,308		Trend P-Value
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
A1c (%)											
<7.0	1,897	36.7	1,676	36.6	1,552	35.7	1,962	37.4	1,969	36.1	0.900
7.0-8.0	1,049	20.5	870	19.3	948	21.5	1,095	20.7	1,106	20.3	0.700
>8.0	1,779	36.3	1,672	36.8	1,563	37.5	1,837	36.6	1,940	37.1	0.400
Not tested or no valid result	349	6.6	311	7.4	242	5.3	256	5.4	293	6.5	0.500
Mean A1c*	8.0		8.0		8.1		8.0		8.0		
Body Mass Index (BMI) (kg/m*m)											
Underweight (BMI <18.5)	#	#	#	#	12	0.4	13	0.3	16	0.3	0.200
Normal (BMI 18.5-24)	386	7.7	344	7.8	331	7.2	375	7.4	417	8.1	0.800
Overweight (BMI 25-29)	1,118	21.4	994	21.6	936	21.4	1,129	22.2	1,091	20.7	0.800
Obese (BMI 30-39)	2,447	48.9	2,148	47.0	2,088	49.0	2,491	47.5	2,557	48.2	0.700
Morbidly Obese (BMI ≥40)	1,083	21.3	983	22.4	898	21.1	1,115	22.0	1,181	21.8	0.700
Not tested or no valid result	32	0.6	52	1.0	40	0.8	27	0.6	46	0.9	0.600
Mean BMI*	34.7		34.8		34.7		34.7		34.6		

*Weighted Estimate
Suppressed

Table 4. Chronic Kidney Disease among Audited Patients with Diabetes, 2013-2017

Year Number of charts audited	2013 5,074		2014 4,529		2015 4,305		2016 5,150		2017 5,308		Trend P-Value
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
Estimated glom. filtration rate (eGRF)(ml/min/1.7m^2)											
eGFR > 60	3,609	71.2	3,330	73.2	3,124	74.4	3,803	74.0	3,641	69.0	0.800
eGFR 30-59: Moderate Reduction (CKD)	439	8.7	436	9.8	460	9.9	536	9.8	778	13.7	0.100
eGFR 15-29: Severe Reduction (CKD)	69	1.4	60	1.1	58	1.4	62	1.1	81	1.3	0.700
eGFR < 15: End Stage Renal Disease	32	0.6	38	0.8	30	0.6	40	0.7	60	1.0	0.100
Not tested or no valid result	925	18.1	665	15.2	633	13.7	709	14.4	748	15.0	0.200
Mean eGFR	76.7		78.0		78.7		74.5		73.4		
Urine albumin to creatinine ratio (UACR) (mg/g)											
<30	2,284	42.6	2,136	43.3	2,261	50.7	2,523	47.7	2,403	43.5	0.600
30-300	594	11.8	725	17.0	612	14.7	841	16.8	843	16.4	0.200
> 300	**150**	**2.8**	**145**	**3.1**	**160**	**3.8**	**234**	**4.3**	**235**	**4.5**	**<0.05**
Not tested or no valid result	2,046	42.8	1,523	36.5	1,272	30.7	1,552	31.2	1,827	35.6	0.200
Mean UACR	61.6		70.8		68.1		83.8		79.9		
Both eGFR and UACR Assessed*											
Yes			2,940	62.2	2,939	67.7	3,560	68.0	3,364	62.4	1.000
No			1,589	37.8	1,366	32.3	1,590	32.0	1,944	37.6	1.000

*Weighted Estimate
Bolded p-values are statistically significant

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Table 5. Lipid Management among Audited Patients with Diabetes, 2013-2017

Year Number of charts audited	2013 5,074		2014 4,529		2015 4,305		2016 5,150		2017 5,308		Trend P-Value
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
LDL Cholesterol (mg/dL)											
<100	**2,186**	**42.1**	**2,079**	**44.6**	**1,973**	**45.6**	**2,467**	**47.4**	**2,540**	**47.3**	**<0.05**
100-129	**1,126**	**22.4**	**992**	**22.3**	**868**	**19.7**	**1,044**	**20.1**	**1,056**	**19.2**	**<0.05**
130-160	**482**	**9.5**	**389**	**8.6**	**382**	**8.4**	**431**	**8.3**	**426**	**7.9**	**<0.05**
>160	189	3.9	166	3.7	197	4.4	215	4.3	183	3.2	0.600
Not tested/no valid result	1,091	22.1	903	20.7	885	21.9	993	19.9	1,103	22.4	0.900
Mean LDL cholesterol*	99.6		96.7		96.6		95.7		93.1		
HDL Cholesterol (mg/dL)											
Females											
≤50	1463	28.6	1,398	31.2	1,291	29.5	1,546	29.7	1,577	29.7	0.800
>50	744	14.6	756	16.5	686	16.7	819	16.4	829	15.5	0.600
Not tested/no valid result	817	16.0	550	12.7	565	13.3	688	13.3	738	14.6	0.600
Mean HDL cholesterol*	47.1		47.4		48.5		47.4		48.1		
Males											
≤40	809	15.9	769	16.9	728	15.9	922	17.3	951	17.2	0.200
>40	708	14.2	697	14.8	667	15.8	743	15.1	771	14.7	0.500
Not tested/no valid result	553	10.7	359	7.8	368	8.8	431	8.0	442	8.3	0.200
Mean HDL cholesterol*	42.1		42.2		42.7		41.8		41.9		
Triglyceride (mg/dL)											
≤400	3,502	68.9	3,408	74.9	3,176	73.1	3,800	74.2	3,885	72.3	0.500
>400	231	4.6	216	4.8	198	4.9	231	4.5	247	4.8	0.700
Not tested/no valid result	1,341	26.5	905	20.3	931	22.0	1,119	21.3	1,176	22.9	0.400
Mean triglyceride*	195.3		193.0		189.4		191.7		194.0		
Statin											
Yes					2,047	47.3	2,416	46.0	2,597	47.4	0.900
No					2,152	50.2	2,626	52.1	2,610	50.5	1.000
Allergy					105	2.4	108	1.9	98	2.0	0.500

*Weighted Estimate
Bolded p-values are statistically significant

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Table 6. Blood Pressure Control among Audited Patients with Diabetes, 2013-2017

Year Number of charts audited	2013 5,074		2014 4,529		2015 4,305		2016 5,150		2017 5,308		Trend P-Value
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
Hypertension Diagnosis											
Yes			2,997	66.5	3,312	74.6	3,993	75.3	4,096	74.3	0.300
No			1,532	33.5	993	25.4	1,157	24.7	1,212	25.7	0.200
Blood Pressure (mmHg)											
<140 and <90	3,578	71.4	3,026	67.5	2,949	69.0	3,604	70.2	4,156	78.0	0.200
>140 or >90	923	18.1	955	21.0	868	20.9	1,037	20.2	1,135	21.7	0.200
Not tested/no valid result	573	10.5	548	11.5	488	10.1	509	9.6	17	0.3	0.600
Mean systolic*	128.6		129.6		129.7		129.3		128.7		
Mean diastolic*	77.4		78.0		78.2		78.0		77.8		
Cardiovascular Disease											
Yes	788	15.2	703	15.2	775	17.5	1,046	21.6	1,071	18.9	0.100
No	4,286	84.8	3,826	84.8	3,530	82.5	4,104	78.4	4,237	81.1	0.100
Aspirin/Antiplatelet Therapy^											
Yes	551	68.9	472	68.2	548	70.7	723	64.9	742	69.7	1.000
No	237	31.1	231	31.8	227	29.3	323	35.1	329	30.3	0.900
ACE Inhibitor/ARBs^^											
Yes			2,193	74.4	2,482	75.3	3,008	75.3	3,055	74.9	0.600
No			804	25.6	830	24.7	985	24.7	1,041	25.1	0.500

* Weighted Estimate
^ Among patients with diagnosed cardiovascular disease
^^ Among patients with known hypertension

Table 7. Tobacco Use, Screening and Referral among Audited Patients with Diabetes, 2013-2017

Year Number of charts audited	2013 5,074		2014 4,529		2015 4,305		2016 5,150		2017 5,308		Trend P-Value
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
Screened for Tobacco Use											
Yes					4,123	95.5	4,988	96.5	5,129	96.4	0.500
No					182	4.5	162	3.5	179	3.6	0.400
Current Tobacco Use											
User	**1,577**	**30.7**	**1,402**	**30.9**	**1,367**	**29.7**	**1,573**	**29.7**	**1,528**	**27.6**	**<0.05**
Non-user	**3,433**	**68.0**	**3,077**	**67.9**	**2,905**	**69.4**	**3,551**	**69.8**	**3,734**	**71.0**	**<0.05**
Not documented	64	1.3	50	1.2	33	1.0	26	0.5	46	1.4	0.600
Cessation Referral of Users^											
Yes	**1,168**	**74.6**	**1,044**	**74.6**	**1,065**	**76.5**	**1,237**	**77.5**	**1,301**	**83.1**	**<0.05**
No	409	25.4	352	23.8	302	23.5	336	22.5	227	16.9	0.100

* Weighted Estimate
Bolded p-values are statistically significant

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Table 8. Standard Therapies among Audited Patients with Diabetes, 2013-2017

Year	2013		2014		2015		2016		2017		Trend P-Value
Number of charts audited	5,074		4,529		4,305		5,150		5,308		
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
Number of Medications											
Diet/Exercise alone	1,180	20.6	957	18.8	874	18.4	1,086	20.1	948	17.2	0.200
1 Medication	1,425	29.0	1,084	25.6	1,137	27.2	1,429	29.3	1,342	25.8	0.600
2 Medications	725	14.6	737	15.7	583	13.9	624	11.8	718	13.2	0.200
3 Medications or More	**114**	**2.1**	**141**	**2.8**	**99**	**2.3**	**164**	**2.9**	**364**	**6.0**	**<0.05**
Insulin Only	694	14.3	641	15.0	666	15.3	785	14.3	601	11.4	0.300
Insulin and Other Medication	**922**	**19.2**	**962**	**21.8**	**937**	**22.6**	**1,062**	**21.6**	**1,335**	**26.3**	**<0.05**

*Weighted Estimate
Bolded p-values are statistically significant

Table 9. Screening Examinations among Audited Patients with Diabetes 2013-2017

Year	2013		2014		2015		2016		2017		Trend P-Value
Number of charts audited	5,074		4,529		4,305		5,150		5,308		
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
Eye Exam											
Yes	2,564	49.6	2,307	48.8	2,113	46.7	2,903	53.2	3,000	52.1	0.300
No	2,510	50.4	2,221	51.2	2,192	53.3	2,247	46.8	2,308	47.9	0.300
Foot Exam											
Yes	3,164	62.5	3,115	66.0	3,058	67.3	3,714	69.4	3,762	67.5	0.100
No	1,910	37.5	1,413	34.0	1,247	32.7	1,436	30.6	1,546	32.5	0.100
Dental Exam											
Yes	2,072	37.8	1,487	31.2	1,344	30.2	2,266	41.5	2,157	39.4	0.500
No	3,002	62.2	3,040	68.7	2,961	69.8	2,884	58.5	3,151	60.6	0.500

*Weighted Estimate

Table 10. Diabetes Education among Audited Patients with Diabetes 2013-2017

Year	2013		2014		2015		2016		2017		Trend P-Value
Number of charts audited	5,074		4,529		4,305		5,150		5,308		
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
Exercise Instruction											
Yes	**3,829**	**74.7**	**3,449**	**76.2**	**3,444**	**78.7**	**4,370**	**81.0**	**4,384**	**79.3**	**<0.05**
No	**1,245**	**25.3**	**1,080**	**23.8**	**861**	**21.3**	**780**	**19.0**	**924**	**20.7**	**<0.05**
Nutrition Education											
Registered Dietitian	1,077	21.4	858	18.4	872	20.7	892	17.4	904	17.6	0.100
Other Staff Only	2,237	43.0	1,833	42.7	1,800	42.8	2,133	42.1	2,118	40.2	0.100
Both Registered Dietitian & Staff	735	14.9	661	13.5	603	11.9	974	16.8	941	16.5	0.300
Neither	1,025	20.7	1,177	25.5	1,030	24.5	1,151	23.6	1,345	25.8	0.200
Diabetes Education (Other)											
Yes	**4,392**	**86.6**	**3,792**	**84.3**	**3,621**	**83.5**	**4,195**	**79.6**	**4,085**	**77.0**	**<0.05**
No	**682**	**13.4**	**736**	**15.7**	**684**	**16.5**	**955**	**20.4**	**1,223**	**23.0**	**<0.05**

*Weighted Estimate
Bolded p-values are statistically significant

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Table 11. Depression among Audited Patients with Diabetes 2013-2017

Year Number of charts audited	2013 5,074		2014 4,529		2015 4,305		2016 5,150		2017 5,308		Trend P-Value
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
Active Diagnosis of Depression											
Yes	1,334	26.9	1,237	28.0	1,290	31.7	1,529	30.5	1,551	28.9	0.300
No	3,740	73.1	3,290	71.9	3,015	68.3	3,621	69.5	3,757	71.1	0.300
Depression Screening^											
Yes	3,372	88.7	2,961	88.7	2,771	91.4	3,356	91.3	3,458	90.9	0.100
No	368	11.3	329	11.3	244	8.6	265	8.7	299	9.1	0.100

* Weighted Estimate

^ Among those without an active diagnosis of depression

Table 12. Immunizations among Audited Patients with Diabetes 2013-2017

Year Number of charts audited	2013 5,074		2014 4,529		2015 4,305		2016 5,150		2017 5,308		Trend P-Value
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
Influenza Vaccine in Past Year											
Yes	2,857	55.8	2,669	57.0	2,563	58.8	2,915	56.0	2,781	52.0	0.300
No	1,733	35.4	1,421	34.0	1,358	33.1	1,709	34.6	1,963	37.8	0.400
Refused	484	8.8	438	8.9	384	8.2	526	9.4	564	10.2	0.100
Pneumococcal Vaccine Ever											
Yes	3,336	64.5	3,111	65.8	3,186	72.1	3,800	71.8	3,876	71.3	0.100
No	**1,587**	**32.8**	**1,200**	**29.6**	**854**	**22.6**	**960**	**21.0**	**966**	**20.6**	**<0.05**
Refused	**151**	**2.7**	**216**	**4.4**	**265**	**5.3**	**390**	**7.2**	**466**	**8.1**	**<0.05**
Tdap Vaccine in Past 10 Years											
Yes					3,164	71.9	4,144	77.7	4,227	76.9	0.500
No					1,048	26.2	888	19.8	964	21.0	0.400
Refused					93	1.8	118	2.5	117	2.1	0.700
Hepatitis B Series											
Yes	**281**	**6.5**	**405**	**9.2**	**602**	**13.3**	**806**	**15.2**	**976**	**19.7**	**<0.05**
No	**4,669**	**91.4**	**4,058**	**89.3**	**3,550**	**83.3**	**4,152**	**81.4**	**4,022**	**74.1**	**<0.05**
Refused	124	2.1	61	1.2	77	1.8	105	1.9	224	4.0	0.200
Immune					76	1.6	87	1.6	86	2.2	0.300

* Weighted Estimate

Bolded p-values are statistically significant

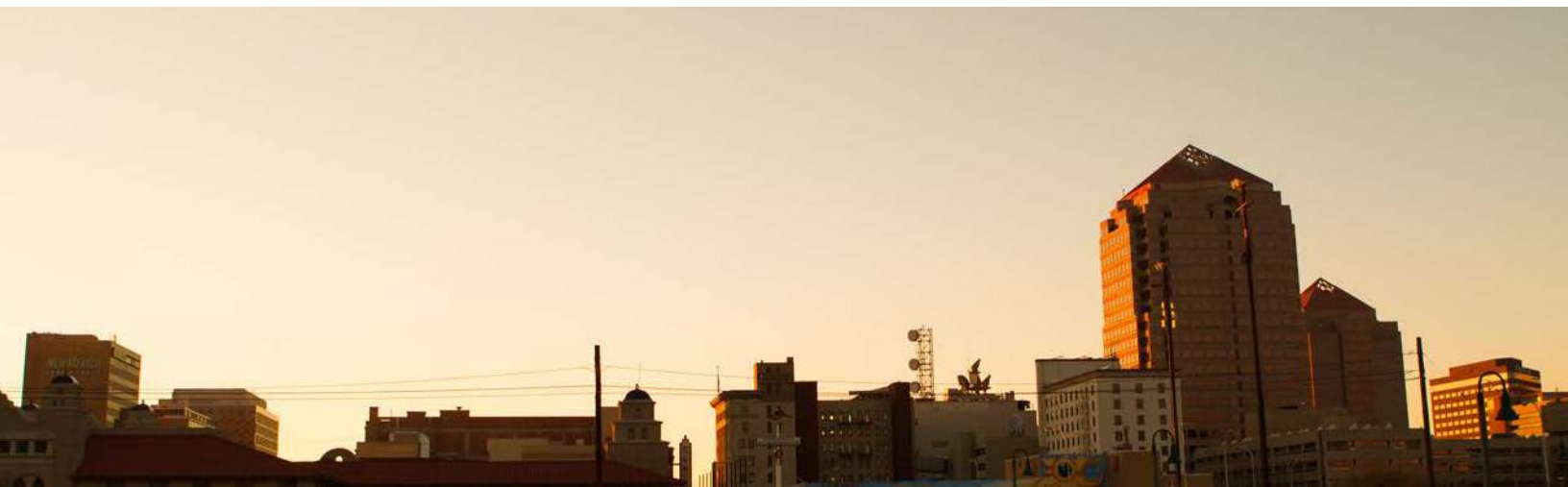

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Table 13. Tuberculosis among Audited Patients with Diabetes, 2013-2017

Year Number of charts audited	2013 5,074		2014 4,529		2015 4,305		2016 5,150		2017 5,308		Trend P-Value
	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	
TB Test Done Ever											
Blood Test	#	#	27	0.7	78	1.6	59	1.1	93	1.6	0.200
Skin Test	**1,603**	**30.4**	**1,317**	**27.1**	**1,252**	**27.5**	**1,369**	**24.9**	**1,318**	**23.0**	**<0.05**
Unknown/not offered	**3,460**	**69.3**	**3,181**	**72.2**	**2,974**	**70.9**	**3,718**	**73.9**	**3,897**	**75.4**	**<0.05**
TB Status (PPD)											
Positive, INH complete	75	1.5	80	1.6	81	1.8	58	1.2	53	0.9	0.200
Positive, not treated	**258**	**5.0**	**196**	**4.0**	**109**	**2.6**	**118**	**2.1**	**126**	**2.2**	**<0.05**
Negative, up to date	845	16.2	722	14.8	831	17.6	899	16.0	889	14.9	0.700
Negative, outdated	113	2.0	105	2.1	140	3.2	155	2.7	178	3.2	0.100
Negative, date unknown	295	5.1	202	4.0	91	1.8	140	2.7	97	1.9	0.100
Status unknown	**3,488**	**70.2**	**3,224**	**73.5**	**3,053**	**73.0**	**3,780**	**75.3**	**3,965**	**77.0**	**<0.05**

* Weighted Estimate
# Suppressed
Bolded p-values are statistically significant

APPENDIX B

Table 1. Standard Diabetes Therapies

Diabetes and Exercise alone
Insulin
Metformin (Glucophage©)
Acarbose (Precose©) or Miglitol (Glyset©)
Pioglitazone (Actose©) or Rosiglitazone (Avandia©)
GLP-1 medication (Byetta©, Bydureon©, Victoze©, Tanzeum©, Trulicity©)
DPP-4 Inhibitor (Januvia©, Onglyza©, Tradjenta©, Nesina©)
Amylin Analog (Smylin©)
Bromocriptine (Cycloset©)
Colesevelam (Welchol©)
SGLT-2 Inhibitor (Invokana©, Farxiga©, Jardiance©)

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