



# Making Data Count

Measuring Diabetes and Obesity in the Indian Health System

December 18-20, 2007

IHS Division of Diabetes Treatment and Prevention

## A Cost Analysis of Type 2 Diabetes in the Indian Health System

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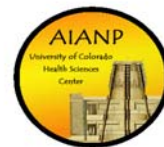
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## A Cost Analysis of Diabetes in the Indian Health Service

### Preliminary Findings



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and  
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Indian Health Service

American Indian and Alaska Native  
Programs  
University of Colorado Denver

## Background

- Diabetes in the United States is...
  - Common
  - Costly
  - Increasing
- 2001 Dr. Frank Vinicor, CDC

## Background

As far as Diabetes in the American Indian & Alaska Native (AI/AN) Population we can say:

- Common - 12.7% of AI/AN people age 20+ years have diabetes. (Acton MMWR 2003)
- Increasing - The prevalence rate among younger AI/ANs (<35 years) increased by 46% between 1990 and 1998. (Acton AJP 2002)

## Background

- **But, is it costly...**

**...do we know how much is spent treating diabetes within the Indian Health Service?**

## **A Cost Analysis of Diabetes in the Indian Health Service: A New Research Initiative**

- Collaboration between IHS and the University of Colorado with funding support from the DDTP
- Applying methods used in major health systems such as Medicare and large commercial health plans
- Following formal research and data management processes including Institutional Review Board (IRB) approvals:
  - IHS Phoenix Area IRB
  - Colorado Multiple Institutions IRB
- Sharing the information with IHS and Tribal leadership first

## **Part 1: A Cost Analysis of Diabetes in the IHS**

- Why
- Who
- Where

## **A Cost Analysis of Diabetes in the IHS: Aims**

1. Describe the prevalence of diabetes and important co-morbidities in an AI/AN population.
2. Describe health service utilization by persons with and without diabetes.
3. Identify the cost of health care
4. Use this data to understand differences in health care costs
  - for persons with and without diabetes
  - both in and outside our system.

## Where could we do such a study? What would an “ideal” study site look like?

- Large, representative AI/AN population
- Information retrievable on a wide range of possible health services
- Where some form of cost analysis exists
- Capacity to participate

## Phoenix Indian Medical Center: Facility Characteristics that meet the study requirements

Inpatient and Outpatient Care

Pharmacy, Lab, Ancillary Care

Cost Center Report

Extensive IT (RPMS) Usage with Validated Data Quality

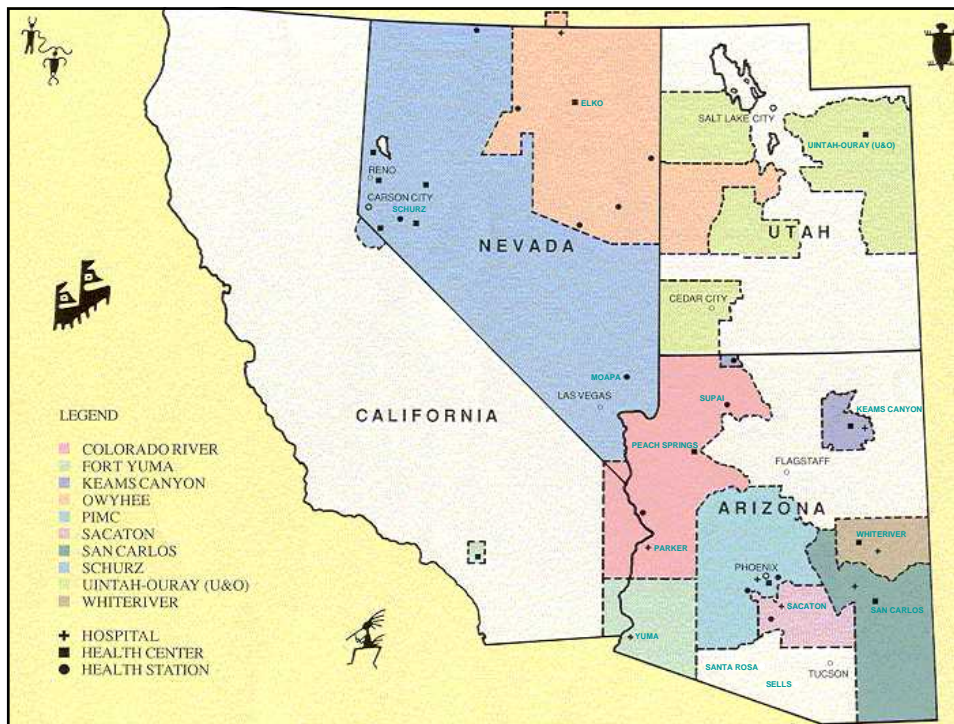
## Phoenix Indian Medical Center: Population Characteristics that meet the study requirements



A Primary Care Population Representing a range of  
Reservation, Rural, Suburban, and Urban settings

## Defining the study population

- Demographic Characteristics
  - American Indian and Alaska Native eligible to receive services in IHS
  - Age  $\geq$  18 years
- Geography
- Time Period



## Diabetes Cost Analysis Time Periods

- A visit within a three year period:  
October 1, 2002 – September, 30, 2005
- Examine medical service utilization during one year: October 1, 2004-September 30, 2005

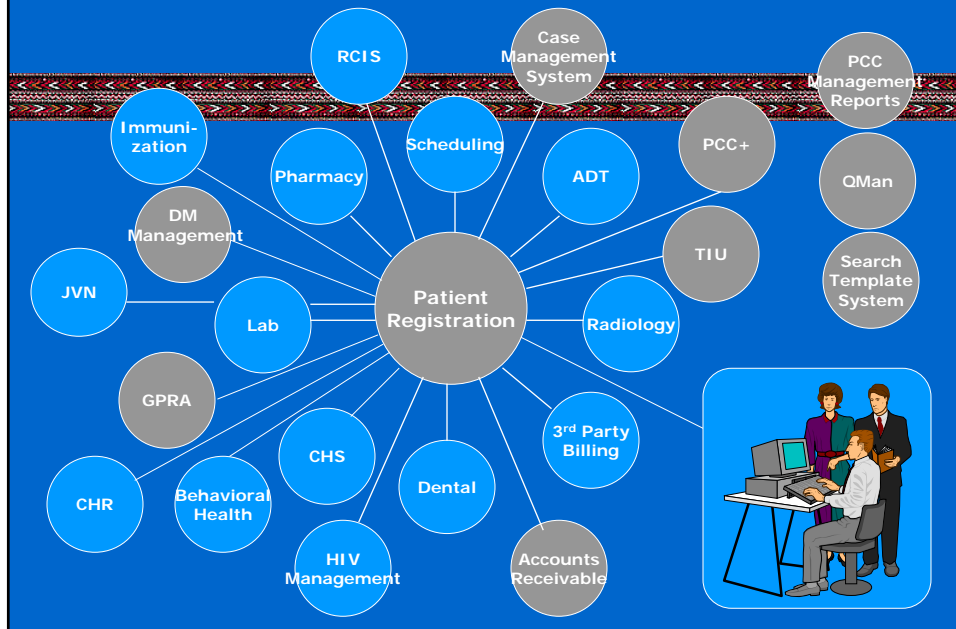
## **Part 1: Any Questions So Far?**

- Why
- Who
- Where

## **Part 2: A Cost Analysis of Diabetes in the IHS**

- What
- How

## RPMS-Resource Patient Management System



## Diabetes Cost Analysis Data Processing

### Hospital inpatient data:

Combined inpatient and contracted service files.

Data included admission and discharge dates, days of care, diagnostic codes, and clinic codes.

Totaled number of hospital admissions and days of care for each patient.

## Diabetes Cost Analysis Data Processing - continued

### Outpatient data:

Combined four IHS service files and a file for contracted health services

Data included service dates, diagnostic codes, clinic codes, provider codes, and CPT codes.

For each person, obtained the total number of visits during the year by type of service.

## Diabetes Cost Analysis Data Processing – Medical Conditions

PIMC RPMS inpatient and outpatient records include 15 diagnostic code fields.

Diagnostic code placement	Inpatient records	Outpatient records
	Percent	Percent
1st	100%	100%
2nd	96%	57%
3rd	86%	26%
4th	74%	14%
5th	62%	7%
6th	49%	4%
7th	39%	2%

Conditions noted on service records not recorded in RPMS would not be identified.

## **Diabetes Cost Analysis Data Processing - continued**

### **Prescribed medication file:**

**Data included: date filled, NDC codes, and drug therapeutic class.**

**For each patient totaled number of prescriptions filled during the year.**

## **Diabetes Cost Analysis Data Processing – Medical Conditions**

- Obtained research license for **RiskSmart** software.
- Used Diagnostic Cost Group (DCG) risk-adjustment model to identify the medical conditions PIMC adults were treated for.
- DCG models are used by CMS, AHRQ (MEPS), and private insurers to assess the morbidity of a population.

We would like to acknowledge the contribution of Dr. Rong Yi, a Senior Scientist at DxCG, to this analysis.

## **Diabetes Cost Analysis Data Processing – Medical Conditions**

**The DCGs models use diagnostic codes (Dx) from administrative and clinical records for inpatient and outpatient services to identify:**

- **781 Diagnostic Groups (Dx Groups)**
- **184 Hierarchical Condition Categories (HCCs)**
- **30 Aggregated Condition Categories (ACCs)**

## **Diabetes Cost Analysis DCG Medical Condition Categories**

**DCG models also use information from pharmacy records (NDC codes) to identify the types of conditions a person is being treated for.**

**These include:**

- **Diabetes**
- **Cerebro-vascular conditions**
- **Mental health conditions**

**The DCG Rx model identified 66 additional persons, not identified using the Dx model, with diabetes.**

## **Diabetes Cost Analysis DCG Medical Condition Categories**

- **Diabetes**
- **Hypertension**
- **Ischemic heart disease, other types of heart disease, cerebro-vascular conditions**
- **End stage renal failure**
- **Neuropathy**
- **Amputations**
- **Mental health and substance abuse**
- **Cancer**

## **Diabetes Cost Analysis Data: The Cost Center Report**

- **Cost Center Report is an annual cost accounting process used to establish the average “All Inclusive” cost for both ambulatory and inpatient services in a facility**
- **It is used to establish reimbursement for services provided to Medicare and Medicaid beneficiaries**
- **PIMC participates in the Cost Center Report process and has worked diligently to accurately classify costs**

## **IHS All Inclusive Rate Formulation (Overly) Simplified**

1. Defines 3 major cost categories
  - Overhead
  - Included (ex: clinical service)
  - Excluded (ex: community-based)
2. Allocate overhead to identify allowable cost
  - Included costs + % of overhead = allowable costs
3. Divide total allowable costs by included workload
4. Results in an average cost per unit of clinical work

## **Part 2: Any Questions Yet?**

- What
- How

## Part 3: Diabetes Cost Analysis Findings

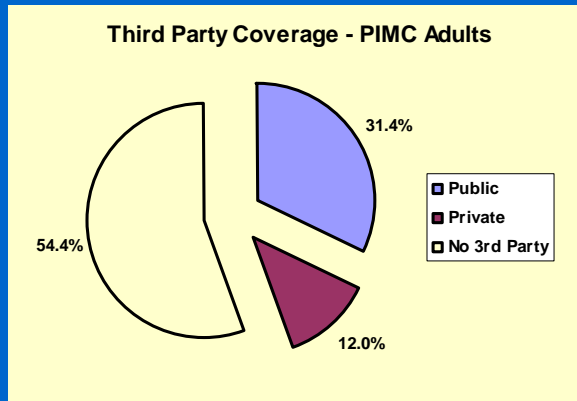
1. Population
2. Health status
  - comparisons by diabetes status
  - comparisons to other populations
3. Medical service utilization
4. IHS medical expenditures

## PIMC Adult Population Age and Gender

Males account for 42.4% of the PIMC adult population.

Age group	Females		Males		Total Number
	Number	Row percent	Number	Row percent	
18-34	10,881	57.7%	7,978	42.3%	18,859
35-44	3,653	55.3%	2,949	44.7%	6,602
45-54	2,157	57.7%	1,580	42.3%	3,737
55-64	1,049	60.3%	692	39.7%	1,741
65-74	479	63.0%	281	37.0%	760
75+	243	68.8%	110	31.2%	353
Total	18,462	57.6%	13,590	42.4%	32,052

## 1. Adult Population Third Party Coverage in addition to IHS



Note that a person may have more than one type of health coverage during a 12-month period.

## 2. Health Status Diabetes Status by Age Group

**3,386 of the 32,052 adults (10.6%) in this study population were classified as having diabetes**

Age group	Diabetes		no Diabetes		Total Number
	Number of adults	Row percent	Number of adults	Row percent	
18-34	664	3.5%	18,195	96.5%	18,859
35-44	799	12.1%	5,803	87.9%	6,602
45-54	881	23.6%	2,856	76.4%	3,737
55-64	624	35.8%	1,117	64.2%	1,741
65-74	308	40.5%	452	59.5%	760
75+	110	31.2%	243	68.8%	353
<b>Total</b>	<b>3,386</b>	<b>10.6%</b>	<b>28,666</b>	<b>89.4%</b>	<b>32,052</b>

## Diabetes Status by Age Group

43.2% of persons with diabetes are less than 45 years old and 12.3% are age 65 and older.

Age group	Diabetes	
	Number of adults	Column percent
18-34	664	19.6%
35-44	799	23.6%
45-54	881	26.0%
55-64	624	18.4%
65-74	308	9.1%
75+	110	3.2%
Total	3,386	100.0%

## Describing and Comparing Co-morbidities

Comparison between:

PIMC adults with and without diabetes

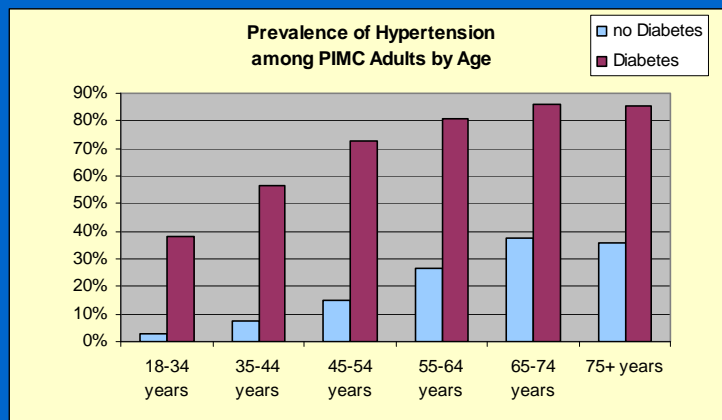
A US commercially-insured adult population with diabetes

The US population sample was matched with PIMC adults based on age and gender.

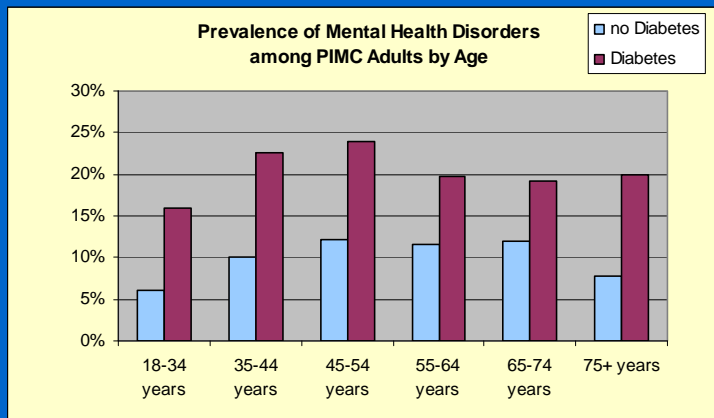
## Co-morbidities by Diabetes Status

Condition	Diabetes		no Diabetes		Total Number
	Number of adults	Column percent	Number of adults	Column percent	
Hypertension	2,211	65.3%	1,929	6.7%	4,140
All cardiovascular conditions	543	16.0%	609	2.1%	1,152
Ischemic heart disease	215	6.3%	138	0.5%	353
All heart disease	352	10.4%	353	1.2%	705
Cerebro-vascular disease	279	8.2%	307	1.1%	586
Renal failure	164	4.8%	75	0.3%	239
Neuropathy	663	19.6%	863	3.0%	1,526
Amputations	76	2.2%	11	0.0%	87
Eye conditions	596	17.6%	100	0.3%	696
Mental health conditions	702	20.7%	2,252	7.9%	2,954
Substance abuse disorders	339	10.0%	1,405	4.9%	1,744
Liver disease	217	6.4%	545	1.9%	762
Tobacco use disorder	301	8.9%	568	2.0%	869
<b>All adults</b>	<b>3,386</b>		<b>28,666</b>		<b>32,052</b>

## Comorbidities by Age and Diabetes Status Hypertension



## Comorbidities by Age and Diabetes Status Mental Health Disorders



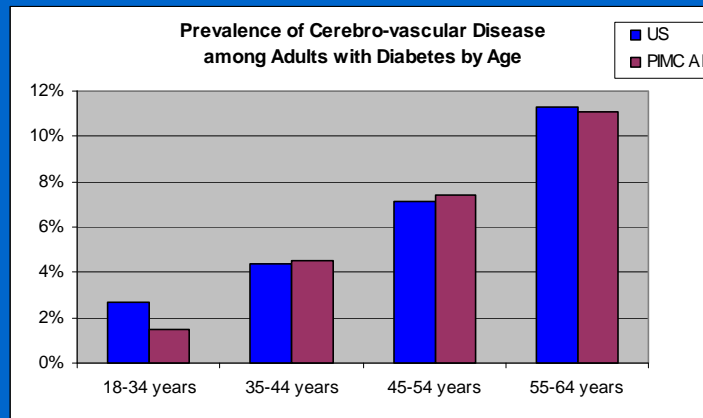
## The Relative Prevalence of Comorbidities among Persons with Diabetes as Compared to those without Diabetics

The odds of a person with diabetes having CVD are 3.89 those of a person without diabetes.

Condition	Odds Ratio *
Hypertension	15.59
All cardiovascular conditions	3.89
Ischemic heart disease	5.34
All heart disease	3.95
Cerebro-vascular disease	3.59
Renal failure	9.38
Neuropathy	5.08
Amputations	34.43
Eye conditions	36.83
Mental health conditions	2.38
Substance abuse disorders	1.98
Liver disease	2.45
Tobacco use disorder	3.33

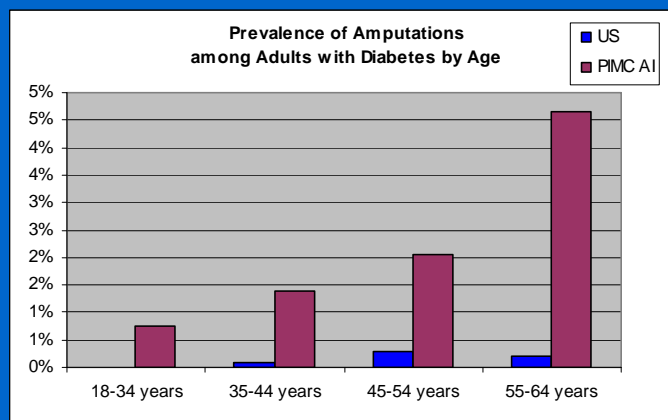
\* Adjusting for age differences between diabetics and non-diabetics.

## Comorbidities by Age American Indian and US People with Diabetes\*



\* US commercially-insured population

## Comorbidities by Age American Indian and US People with Diabetes\*



\* US commercially-insured population

## Diabetes Cost Analysis Medical Risk Scores

DCGs models were used to identify for each person the health conditions he/she was treated for and to estimate the relative risk of using medical services (medical expenditures).

Some DCG models account for a population's age and gender. Other models account for a population's age, gender, and morbidity.

The relative risk scores (risk score) used in this analysis account for the presence of acute and chronic conditions and use of hospital services, outpatient services, and prescribed medications.

## Diabetes Cost Analysis Medical Risk Scores

Risk scores may be averaged for various groups of adults.

Examples: Mean risk score by age  
Mean risk score for persons with and without diabetes

A mean Risk Score of 1 indicates the population has average risk.

A mean Risk Score of 1.5 indicates the population's risk of using health services is 50% higher than average.

## Relative Risk of Using Health Resources: IHS vs Commercial

Controlling for age and gender, AI adults age 18-64 years (excluding Medicare beneficiaries) are expected to use 57% more resources than a commercially insured population due to the health risk of this population.

	Age & Gender	Age, Gender, & Morbidity	Morbidity associated Risk
	Risk Score 1	Risk Score 2	Score 2 / Score 1
18-34 years	0.67	0.95	1.42
35-44 years	0.90	1.54	1.71
45-54 years	1.34	2.37	1.77
55-64 years	2.01	3.14	1.56
<b>Total</b>	<b>0.86</b>	<b>1.35</b>	<b>1.57</b>

Risk based on DCG commercial models truncated at \$100,000.

## Relative Risk of Using Health Resources by Diabetes Status among PIMC adults

Adults age 18-64 years (without Medicare coverage) with diabetes are expected to use approximately three times as many resources as those without diabetes.

Age-adjusted risk scores	no Diabetes		Risk Diabetes / no Diabetes
	Diabetes Risk Score	Diabetes Risk Score	
Adults age 18-64 without Medicare coverage	4.51	1.37	3.29

## Relative Risk of Using Health Resources by CVD Status

Among all persons with diabetes age 18-64 years (without Medicare coverage), those with CVD are expected to use approximately two times as many resources those without CVD.

Age-adjusted risk scores	Adults with Diabetes		
	with CVD	without CVD	Risk
	Risk Score	Risk Score	Diabetes / no Diabetes
Adults age 18-64 without Medicare coverage	9.74	4.11	2.37

## Risk of Using Health Resources by Persons with Diabetes

**PIMC adults with diabetes: 4.51**

**US commercially-insured  
population\* with diabetes: 3.49**

\* US population sample was matched with PIMC adults based on age and gender.

## **Part 3: How About Questions Now?**

### **1. Population**

### **2. Health status**

**comparisons by diabetes status**

**comparisons to other populations**

## **More Part 3: Medical Service Utilization**

- **Hospital inpatient services**
- **Outpatient services**  
Emergency room, Clinic visits,  
Education, etc.
- **Prescribed medications**

## Hospital Inpatient Services

The 10.6% of adults with diabetes accounted for nearly ½ of non-OB hospital inpatient utilization in the study population

	Hospital Inpatient Days	
	Number	Percent
All adults	7955	
All adults, excluding OB	6472	
Persons with diabetes	3109	48.0%
Persons without diabetes	3363	52.0%

Inpatient service utilization data includes data for IHS facilities and contracted health services.

## Hospital Inpatient Utilization

The hospital utilization rate for persons with diabetes is 986 days per 1,000 persons (approximately 1 day for each person).

	Diabetes		no Diabetes		All Adults	
	Number	Utilization rate	Number	Utilization rate	Number	Utilization rate
Admissions	567	167/1000	1,314	46/1000	1,881	59/1000
Inpatient days	3,339	986/1000	4,616	161/1000	7,955	248/1000
Length of stay		5.89		3.51		4.23

Inpatient service utilization data includes data for all types of services in IHS facilities and for contracted health services.

## Hospital Inpatient Utilization

Hospital inpatient utilization by persons with diabetes is approximately 4 times (986/251) higher than utilization by those without diabetes, controlling for age differences between the 2 populations.

	Diabetes	no Diabetes	
	Utilization rate	Utilization rate	Ratio diabetes / no diabetes
Admissions	167/1000	49/1000	3.4
Inpatient days	986/1000	251/1000	3.9
Length of stay	5.89	5.16	

## Hospital Inpatient Utilization by CVD Status

16% of adults with diabetes have CVD. They account for approximately 1/2 of all hospital inpatient utilization by all adults with diabetes.

	Hospital Inpatient Days	
	Number	Percent
Adults with diabetes	3339	
Adults with diabetes, excluding OB	3109	
Adults with diabetes and CVD	1461	47.0%
Adults with diabetes without CVD	1648	53.0%

Inpatient service utilization data includes data for IHS facilities and contracted health services.

## Outpatient Utilization

On average, persons with diabetes had 1.8 ED visits and 12.4 visits for other types of outpatient care.

Clinic visits	Diabetes		no Diabetes		All persons	
	Number	Mean # per person	Number	Mean # per person	Number	Mean # per person
Emergency	6,017	1.8	27,483	1.0	33,500	1.0
Other outpatient	42,087	12.4	83,335	2.9	125,422	3.9

Outpatient utilization data includes data for IHS facilities and for contracted health services.

## Outpatient Utilization

Adjusting for age differences, outpatient utilization for adults with diabetes was approximately 2-3 times higher than utilization among adults without diabetes.

Clinic visits	Diabetes	no Diabetes	Ratio Diabetes / no Diabetes
	Mean number per person	Mean number per person	
Emergency	1.8	0.9	2.0
Other outpatient	12.4	3.9	3.2

## Outpatient Utilization by CVD Status

Adults with both diabetes and CVD had higher use of outpatient services than persons with only diabetes. They averaged 1 more ED visit per year and 50% more visits for other types of outpatient services.

Adjusted Rates	Diabetes with CVD	Diabetes without CVD	
	Mean number per person	Mean number per person	Ratio diabetes / non-diabetes
Clinic visits			
Emergency	2.4	1.4	1.7
Other outpatient	18.1	12.0	1.5

## More Part 3: Questions on...?

- Hospital inpatient services
- Outpatient services  
Emergency room, Clinic visits,  
Education, etc.
- Prescribed medications

## The Last Part 3: Medical Expenditures within IHS

- Within IHS
- In comparison to US health system estimates



## Diabetes Cost Analysis Estimating Expenditures

- Option 1.** Use PIMC Medicaid cost report findings for the average cost of an inpatient stay and an outpatient visit.
- Option 2.** Use PIMC Medicare cost report findings supplemented by other Medicare payment information (DRG, CPTs, and medication information).
- Option 3.** Blend Options 1 and 2 with additional enhancements. Use PIMC Medicaid cost report findings to estimate expenditures for AIs with Medicaid coverage and AIs with no third party coverage. Use PIMC Medicare cost report findings supplemented by other Medicare payment data to estimate expenditures for AIs with Medicare, VA, and private coverage. Obtain improved estimates for payments for contract services.

## Diabetes Cost Analysis Expenditure Data

The CMS cost reports result in a reimbursement fee (all inclusive payment) for:

- a hospital inpatient day = \$1,962.57  
(facility and professional costs)
- an outpatient visit for Medicaid = \$325.33  
(facility and professional costs)

This is a facility specific cost center report corresponding to the study period. It is different than the national All Inclusive Rate used for reimbursement

## Expenditures for Hospital Inpatient Services Using Option 1

Adjusting for age differences, expenditures for hospital inpatient utilization were approximately 4 times higher (ratio=3.9) for persons with diabetes as compared to those without diabetes.

	Diabetes	no Diabetes	Ratio
	Expenditures per person	Expenditures per person	Diabetes / no Diabetes
Unadjusted use rates	\$1,935	\$316	6.1
Adjusted use rates	\$1,935	\$493	3.9

## Expenditures for Outpatient Services Using Option 1

Adjusting for age differences, expenditures for outpatient services were **3 times higher** for persons with diabetes as compared to those without diabetes.

	Diabetes	no Diabetes	Ratio
	Expenditures per person	Expenditures per person	Diabetes / no Diabetes
Unadjusted use rates	\$5,068	\$1,327	3.8
Adjusted use rates	\$5,068	\$1,711	3.0

## Total Health Expenditures Using Option 1

Adjusting for age differences, total health expenditures for persons with diabetes were **3 times higher** than expenditures for persons with diabetes without diabetes.

	Diabetes	no-Diabetes	Ratio
Total Expenditures	Expenditures per person	Expenditures per person	diabetes / non-diabetes
Using unadjusted rates	\$7,003	\$1,643	4.3
Using adjusted rates *	\$7,003	\$2,205	3.2

\* Adjusted for age differences between the 2 populations.

## Total Expenditures Using Option 1

**Health expenditures for adults with diabetes account for one third of expenditures for all adults.**

	Percent of all adults	Total Expenditures	
		Dollars	Percent
Persons with diabetes	10.6%	\$23,713,428	33.5%
Persons without diabetes	89.4%	\$47,087,931	66.5%
<b>Total</b>	<b>100.0%</b>	<b>\$70,801,359</b>	<b>100.0%</b>

Inpatient service utilization data includes data for IHS facilities and contracted health services.

## Expenditures among Persons with Diabetes by CVD Status - Using Option 1

Total Expenditures	Diabetes with CVD	Diabetes without CVD	Ratio with CVD / without CVD
	Expenditures per person	Expenditures per person	
Using unadjusted rates	\$12,693	\$5,917	2.1
Using adjusted rates *	\$12,693	\$6,049	2.1

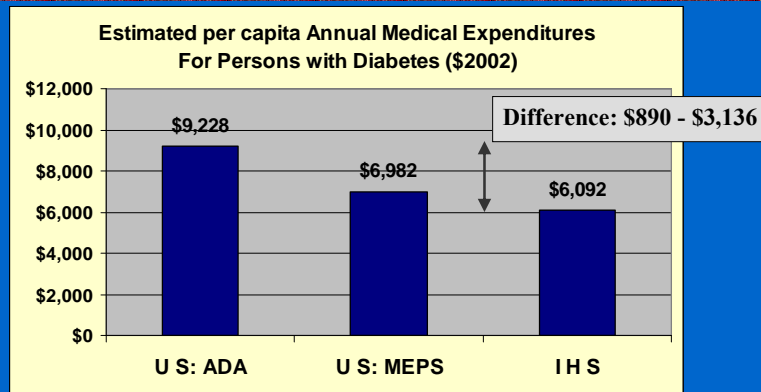
\* Adjusted for age differences between the 2 populations.

## US Estimates: Health Expenditures for Diabetes

Services	MEPS 2003 Adults only (non-institutionalized)		ADA Article All Ages	
	\$2,002	Percent	\$2,002	Percent
Hospital, all services	\$4,598	65.9%	\$7,164	77.6%
Office services	\$1,442		\$1,525	
Other services (includes home, dental)	\$942		\$23	
Home services	in above \$		\$516	
<b>Total medical services</b>	<b>\$6,982</b>		<b>\$9,228</b>	
Prescribed medications	\$2,878		\$1,790	
Total expenditures for above services	\$9,660		\$11,018	
Hospice			\$84	
Nursing home services			\$2,140	
Total for all services			\$13,242	

Sources: MEPS USDHHS report 2006 and ADA article in Diabetes Care 2003.

## Comparisons between IHS and US populations Health Expenditures for Persons with Diabetes (in 2002 Dollars)



Medical service expenditures include those for hospital, office, and home-based services. They exclude those for pharmaceuticals, nursing home services, and hospice services. US Estimates: MEPS (2006) & ADA (2003).

## **Comparisons between IHS and US populations Health Expenditures for Persons with Diabetes**

### **Potential sources of the \$890 - \$3,136 difference:**

- 1. IHS could be cost efficient**
- 2. Not all services accounted for within RPMS**
- 3. Differences in the age distribution/mortality**
- 4. Differences in types of and access to medical services**
- 5. Our “Cost Center Model” substantially under-estimates high cost care**

## **Expenditures for Persons with and without Diabetics Comparing Differences in Expenditures within IHS to Differences in US Population Estimates**

**Ratio of expenditures for persons with diabetes as  
compared to persons without diabetes  
(adjusting for age differences)**

**Within IHS: \$6,516 / \$2,062 = 3.2**

**US Estimate: \$9,228 / \$4,269 = 2.2**

Medical service expenditures include those for hospital, office, and home-based services. They exclude those for pharmaceuticals, nursing home services, and hospice services. US Estimate is in 2002 dollars (ADA, 2003) and HIS in 2005 dollars.

## Conclusions: Diabetes Cost Analysis Health Expenditures within IHS

*Diabetes is costly within the HIS.*

**Known health expenditures for an adult with diabetes within the IHS were \$7,003/year in FY2004 or three times that of adults without diabetes.**

**1 of every 3 IHS Dollars spent on adult health care is needed for people with diabetes.**

## Conclusions: Diabetes Cost Analysis Health Expenditures within IHS

**Co-morbidities were common among people with diabetes**

**Relative to other populations, the IHS diabetes population was at higher risk for health care utilization and expenditures.**

**Expenditures for adults with diabetes and CVD are approximately twice that of persons with only diabetes.**

## **Diabetes Cost Analysis Implications**

**We have demonstrated a method to estimate disease-related costs within the Indian Health System.**

**We have shown that the Federal Government is a very large payer source (IHS, M&M, VA) for diabetes care.**

## **Diabetes Cost Analysis Implications**

**These findings may be used to assess the cost-effectiveness of programs implemented to prevent the onset of diabetes and to prevent the onset of CVD among persons with diabetes.**

**This information can help align personal, public health, and economic stakeholders and help set sound public policy.**

## Diabetes Cost Analysis Implications

There is still much work to do

# Questions?

## Additional Slides

## There are other types of costs

- Direct
  - Personnel time and lab supplies to identify a case of diabetes
- Indirect
  - Loss of productivity
- Opportunity
  - The foregone value of not doing something else
- Marginal
  - The incremental cost

## Using RPMS to Estimate Health Expenditures - Strengths

1. RPMS includes detailed information on inpatient and outpatient service use.
2. RPMS includes detailed information on diagnoses.
3. RPMS data may be extracted from regional and national data sources.
4. Data may be extracted for all persons eligible for I/T/U services

## Using RPMS to Estimate Expenditures - Limitations

1. Data for contract services may be limited.
2. Data for services obtained elsewhere and paid for by Medicaid, Medicare, VA, and private coverage are not included. The services include:
  - Hospital inpatient services
  - Outpatient services (similar to those listed earlier)
  - Other services:
    - Nursing home services
    - Home health services (only a limited number)
    - Hospice services
3. It is difficult to assign a dollar value to an IHS service.

## Diabetes Cost Analysis Validation of Data

### In progress:

- Summary data from PIMC fiscal reports
- Reviewing individual data for 20 persons
- Compare findings to published studies and data reported elsewhere.

## Relative Risk of Using Health Resources: Medicare Only

Medicare beneficiaries and adults age 65 and older comprise 6% of the PIMC adult population. Risk for spending that is associated with health is lower than average for this population. The process used to identify the adult population and use of services not included in RPMS (financed by Medicare and/or Medicaid) influence the findings.

	Age & Gender	Age, Gender, & Morbidity	Morbidity associated Risk
	Risk Score 1	Risk Score 2	Score 2 / Score 1
18-34 years	0.89	0.44	0.49
35-44 years	0.91	0.92	1.01
45-54 years	1.01	1.12	1.11
55-64 years	1.20	1.11	0.93
65-74 years	0.78	0.64	0.82
75+ years	1.14	0.72	0.63
<b>Total</b>	<b>0.95</b>	<b>0.79</b>	<b>0.83</b>

Risk based on DCG Medicare models.

## Relative Risk of Using Health Resources

It is important to consider how we defined the adult AI population when interpreting the findings concerning their health risk.

**Definition:** Adults with their community of residence in the Phoenix Indian Medical Center (PIMC) Service Area

- AIANs eligible for I/T/U services
- Received I/T/U services at least once during the last 3 fiscal years (active users)

We expect the average health risk of a population defined by use of medical services to be higher than the health risk of a population that is not defined by service use. Mean health risk is also influenced by mortality of persons included in the sample and use of health services not accounted for in RPMS.

## Adjusting for Age Differences between Persons with and without Diabetes

Age group	Age Distribution		Hospital Utilization Rate		Number of age-adjusted hospital days for persons without diabetes (1) * (4)
	Diabetes (1)	no Diabetes (2)	Diabetes (3)	no Diabetes (4)	
18-34	664	18,195	819	124	82
35-44	799	5,803	995	179	143
45-54	881	2,856	947	185	163
55-64	624	1,117	992	477	298
65-74	308	452	828	429	132
75+	110	243	2655	292	32
Total	3,386	28,666	986	161	850

The age-adjusted hospital utilization rate for persons without diabetes:  
 $(\text{Total adjusted days}) / (\text{Number of persons with diabetes}) = 850 / 3386 = 251$

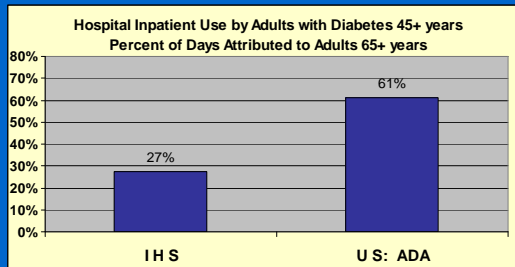
# Outpatient Utilization

	Diabetes		non-Diabetes		All adults	
	Total number	Mean # per person	Total number	Mean # per person	Total number	Mean # per person
Urgent care visits	579	0.17	1,754	0.06	2,333	0.07
Cardiology visits	152	0.04	115	0.00	267	0.01
Ambulatory Surgery	421	0.12	1,633	0.06	2,054	0.06
Behavioral health	1,515	0.45	7,363	0.26	8,878	0.28
Dental	4,958	1.46	12,780	0.45	17,738	0.55
Other specialities	418	0.12	439	0.02	857	0.03
Clinics for eye care	3,737	1.10	5,462	0.19	9,199	0.29
Clinics for foot care	3,461	1.02	3,075	0.11	6,536	0.20
Education	2,455	0.73	644	0.02	3,099	0.10
Case management	680	0.20	969	0.03	1,649	0.05
Home visits	213	0.06	475	0.02	688	0.02
Other visits (primary care, etc)	23,498	6.94	48,626	1.70	72,124	2.25

## Comparisons between IHS and US populations Health Expenditures for Persons with Diabetes

Hospital services account for 65-80% of US estimates for treating diabetes in hospitals, office settings, & at home.

Differences between the US and AI adults with diabetes age 65+ years in use of hospital inpatient services account for a large percentage of the estimated difference in medical expenditures.



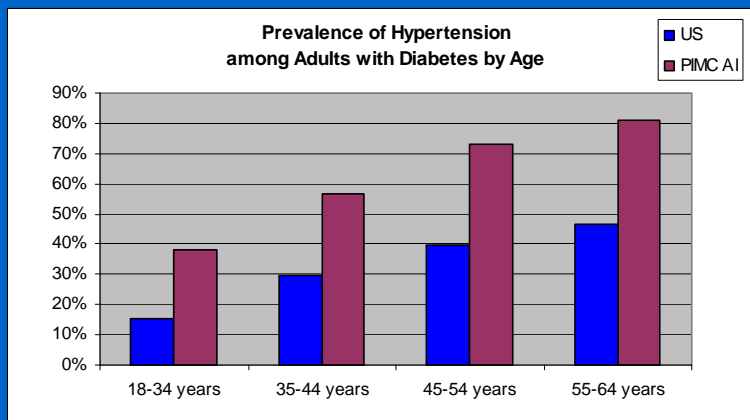
US Estimate: ADA (2003).

## 1. Population Third Party Coverage in addition to IHS

Age group	Medicaid	Private	Medicare	VA	No other	Total
18-34	34.3%	10.2%	0.7%	1.2%	57.6%	100.0%
35-44	30.4%	14.1%	2.6%	3.8%	55.3%	100.0%
45-54	27.2%	14.9%	6.1%	6.0%	53.7%	100.0%
55-64	21.3%	15.6%	16.1%	10.6%	47.7%	100.0%
65-74	18.7%	16.2%	87.8%	13.0%	8.0%	100.0%
75+	22.4%	9.1%	94.1%	14.7%	3.7%	100.0%
<b>Total</b>	<b>31.4%</b>	<b>12.0%</b>	<b>5.7%</b>	<b>3.2%</b>	<b>54.4%</b>	<b>100.0%</b>

Coverage for 1 or more months during the 12-month period. A person may have more than one type of health coverage.

## Comorbidities by Age American Indian and US People with Diabetes\*



\* US commercially-insured population