

## **Annual Charges and Rates for Diabetic Amputations in Texas – An Expensive and Potentially Preventable Trend**

Diabetes mellitus is the leading cause many debilitating conditions, including non-traumatic lower-limb amputations, kidney failure and new cases of blindness among adults in the United States. In fact, diabetes is the most frequent cause of non-traumatic lower limb amputations. Non-traumatic Lower Extremity Amputation (LEA) is a costly and extremely disabling procedure and indications are that both diabetes and diabetic amputations are increasing in Texas. Diabetics have a risk of a leg amputation that is 15-40 times greater than for a non-diabetic. The Centers for Disease Control and Prevention report that in 2006 approximately 65,700 persons diagnosed with diabetes experienced a non-traumatic lower-limb amputation in the United States (CDC, 2011).

The diabetic amputation admissions were analyzed for each year, 2004 through 2010. The total annual charges for these admissions were noted and the mean annual charges calculated. As Table 1 demonstrates, although some variation year to year occurred, the cases of diabetic LEA have increased between the years 2004 and 2010 in Texas. The mean annual amputation charges have increased steadily during these years, from \$ 48,839 in 2004 to \$80,072 in 2010.

**TABLE 1.**

**TEXAS DIABETIC AMPUTATIONS with HOSPITALIZATION CHARGES**

<b>Year</b>	<b>Amputation admissions Reported*</b>	<b>Total Amputation Charges/yr \$</b>	<b>Mean Amputation Charge/yr \$</b>
2004	7577	370,050,899	48,839
2005	7730	420,562,432	54,407
2006	7722	481,432,446	62,346
2007	7863	537,449,901	68,352
2008	7830	554,138,686	70,771
2009	8194	609,291,990	74,358
2010	8876	710,720,892	80,072

\*Number of LEA admissions- Data from THCIC – Texas Hospital Discharge Public Use Data Files (PUDF)

\*\*Estimated Diagnosed Diabetes Case Data from CDC (2012):

[http://apps.nccd.cdc.gov/DDT\\_STRS2/CountyPrevalenceData.aspx?stateId=48&Mode=DBT](http://apps.nccd.cdc.gov/DDT_STRS2/CountyPrevalenceData.aspx?stateId=48&Mode=DBT)

Figure 1 is the graphic representation of the increasing charges for these diabetic LEA procedures.

**Figure 1.**

### Mean Annual Charges for Diabetic Amputations, 2004 -2010\*



\*Source: Texas Hospital Inpatient Discharge Public Use Data Files (PUDF), 2004-2010

Diabetic LEA is a challenge to healthcare systems in Texas and annual mean charges demonstrate a continuing upward trend, as shown in Figure 1.

The geographic distribution of the diabetic hospitalizations with amputations is delineated in the accompanying Texas Health Care Information Collection table on Lower-Extremity Amputation Among Patients with Diabetes Admission Rate, 2010 (posted here also). This table previously was analyzed and produced as part of the Preventable Hospitalizations in Texas, typically every three years. The updated table delineates the admissions for LEA for by county along with observed and expected admissions for each county. Additionally, the risk-adjusted rates with 95% confidence intervals are included by county and the caveat that rates for counties with less than 5 admissions were not calculated. The risks that were either lower or higher than the state average rate based

on the 95 percent confidence interval were marked with an asterick for lower rates and a double asterick for the higher rates. The counties with significantly higher rates than the state rate indicate an area of concern for these LEA procedures.

The analyses were done using Texas Health Care Information Collection (THCIC) Texas Hospital Inpatient Discharge Public Use Data File (PUDF) for 2010 and the Statistical Analysis System (SAS) software version 9.2. For the risk-adjusted rates, the Agency for Healthcare Research and Quality (AHRQ) provided regression coefficients from their reference population database derived from the Health Care Cost and Utilization Project (HCUP's) State Inpatient Databases and the U.S. Census Data (area-level only). To calculate the risk-adjusted rates, the regression coefficients from the reference database were applied to the individual Texas county data such that "the risk-adjusted rates will then reflect the age, sex, condition/severity and comorbidity (provider-level) or age, sex (area-level) distribution in the reference population file rather than the distribution for the hospitals or areas present in the user's data" (AHRQ, 2012). By having the rates risk-adjusted thusly, it allows for direct comparisons between counties and areas of the state. Comparisons with other states or areas of the United States is also possible using this methodology (AHRQ, 2012).

## References:

AHRQ Quality Indicators (2012). AHRQ Quality Indicator Software Instructions, SAS, pg. 37-38. Rockville, MD: Agency for Healthcare Research and Quality. Available at: [http://www.qualityindicators.ahrq.gov/Downloads/Software/SAS/V44/Software%20Instructions%20\(SAS\)%20V%204.4.pdf](http://www.qualityindicators.ahrq.gov/Downloads/Software/SAS/V44/Software%20Instructions%20(SAS)%20V%204.4.pdf)

The Centers for Disease Control and Prevention (2011). *The National Diabetes Fact Sheet, 2011*. Retrieved from: [http://www.cdc.gov/diabetes/pubs/pdf/ndfs\\_2011.pdf](http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf)

The Centers for Disease Control and Prevention (2011). *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)*. Retrieved from: <http://www.cdc.gov/nchs/icd/icd9cm.htm>

### See also:

Texas Health Care Information Collection (THCIC) (2012). Preventable Hospitalizations (2008). *Lower Extremity Amputations Among Patients with Diabetes*. Retrieved from: <http://www.dshs.state.tx.us/THCIC/Publications/Hospitals/PQIReport2008/PreventableHospitalizations2008.shtm>

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