Racial Disparities in Non-Traumatic Lower Extremity Amputation Rates in Illinois, 2013-2016

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ABSTRACT

Background. Racial disparities in amputation rates have been widely recognized, including studies of higher rates in the Chicago metropolitan area among predominantly non-Hispanic black as compared to predominantly non-Hispanic white zip code areas. These disparities persisted into the 2000s despite a declining overall amputation rate after 1996. This study compares racial and ethnic amputation rates from more recent years for all residents of Illinois.

Methods. Illinois hospital discharge data from 154 non-federal Illinois hospitals were used to calculate lower extremity amputation rates for the years 2013-2016 by race and ethnicity. ACS 5-year Census data were utilized to create race and ethnicity population denominators for patients 35 years of age or older in the state of Illinois, as well as for the populations of 3 different groups being compared (non-Hispanic white, non-Hispanic black, and Hispanic or Latino). The study assessed statewide amputation procedure trends as well as trends in population-based differences in through foot, below knee, and above knee amputation rates per 100,000.

Results. Between 2010 and 2014, there was an apparent 14.7% increase in total lower extremity amputations in National Inpatient Sample estimates. In Illinois, statewide amputation procedure rates at all levels increased steadily from 2013 to 2016, increasing to 38.29 per 100,000 in 2016. However, there were very apparent ICD-9 to ICD-10 coding effects, with a 13% jump in through foot amputations and a 10% decline in above knee procedures between quarters when coding transitioned in 2015. Though only representing approximately 13% of the Illinois population, 26.9% of all lower extremity

procedures were performed for non-Hispanic blacks, with the disparity in overall rates averaging 48.5 per 100,000, twice the non-Hispanic white rate.

Conclusions. There was an increase nationally in the number of amputation procedures preceding the change to ICD-10 coded procedures in 2015. These data from Illinois hospitals indicate an apparent continuing increase in amputations driven by a large 2016 increase in through foot procedures, that is to some extent an IVC-10 coding change artifact. While ICD-10 coded above knee amputations appear to have declined in 2016, we cannot determine whether this was a real or a coding-related decline. Racial disparities in lower extremity amputation rates in Illinois continue to exist. Compared to a prior study looking at amputation rates in Northern Illinois, it possible that the racial gap has narrowed since the early 2000s, suggesting that public health interventions involving education and addressing social determinants of health may be promising to continue to reduce the gap.

BACKGROUND AND PUBLIC HEALTH RELEVANCE

Peripheral Arterial Disease

Peripheral arterial disease (PAD) due to atherosclerosis in the lower extremities has become increasingly more common as a result of an overall aging population and an increase in the prevalence of diabetes.[1] PAD affects approximately ten million people in the United States, with greater than 20% of individuals 70 years of age or older thought to have the disease.[1,2] This is significant because PAD is a harbinger for much higher risk of mortality from cardiovascular or cerebrovascular disease.[1] Some of the known atherosclerotic risk factors associated with PAD prevalence include male sex, older age, diabetes, history of smoking, hypertension, and coronary artery disease.[1]

As PAD progresses, some patients develop a symptom known as claudication, which consists of leg pain with walking that is relieved with rest, resulting from compromised blood flow to the muscles of the lower extremity during activity. Approximately 1-2% percent of PAD patients aged 50 years or older progress to chronic limb-threatening ischemia.[3] In these advanced cases of PAD, typically involving the iliac, femoral, or popliteal arteries, patients develop pain at rest (that is relieved with dependency), tissue ulceration, or gangrene.[1,2] One-year outcomes for patients with chronic limb-threatening ischemia indicate that only about half of patients will avoid an amputation, a quarter will have undergone an amputation procedure, and a quarter will have suffered a cardiovascular-related death.[3]

Treatment of Peripheral Arterial Disease

It is recommended that all patients with PAD be treated with an antiplatelet agent, generally aspirin or clopidogrel as an alternative option.[4] Lipid lowering therapy is

recommended for all patients with PAD.[5] There is strong research to support graded exercise programs for patients with symptoms of claudication. Cilostazol is sometimes prescribed to help relieve pain.

It is estimated that 5% of PAD patients with symptoms of claudication undergo amputation within 10-15 years of their initial symptoms, while amputation is the initial treatment for as many as 5-10% of patients who develop critical limb ischemia or ulceration, often after endovascular or surgical bypass approaches to restoring blood flow have failed.[1]

In situations of critical limb-threatening ischemia, and depending on imaging and arteriography, endovascular approaches or surgical bypass may be attempted. Endovascular approaches include angioplasty to stent open occluded arteries. Surgical bypass is a surgical procedure in which one of the patient's veins is harvested and used as a conduit to divert blood flow around the occluded artery. The Inter-Society Consensus for the management of PAD, TASC II, developed a 4-tier grading system for iliac, femoral, and popliteal PAD lesions that suggests the primary treatment approach depending on the lesions' severity. Type A and B lesions are preferably treated with endovascular therapy, while Type C and Type D lesions are preferably treated with surgical bypass.[2] According to the American College of Cardiology (ACC) and the American Heart Association (AHA), amputation is indicated as the primary treatment option in the following scenarios: significant necrosis of weight-bearing parts of the foot in ambulatory patients, an uncorrectable flexion contracture, paresis of the extremity, ischemic rest pain, sepsis, or limited life expectancy due to comorbid disease.[3]

Trends in Non-Traumatic Lower Extremity Amputations

Studies analyzing national trends in both diabetic and non-diabetic lower extremity amputations reported a decline in rates over time.[6,7] A study from 2014 that assessed trends in diabetes complications in the U.S. found that amputation rates declined by 51.4% from 1990 to 2010.[7] This same study found that there was no decline in amputation rates observed when looking at rates for the non-diabetic population overall.

In a limb loss prevalence study, Ziegler-Graham et al. found that 38% of the amputees had diabetes.[8] Up to half of patients who have undergone a diabetes-associated lower extremity amputation will have a second amputation of the opposite leg within 5 years of the first procedure.[1] Lower extremity amputations occur more commonly for men and in smokers. Greater than 50% of amputations are performed for diabetic patients.[1]

Racial Disparities in Lower Extremity Amputations

Racial disparities in lower extremity amputation rates have been demonstrated in multiple studies, all of which emphasize the disproportionately higher amputation rates among black populations compared to white populations.[6,8-13] One study found that black patients had the highest incidence rate per 10,000 of both diabetes and non-diabetes related amputations at all levels of amputation, as well as a larger proportion of major amputations.[13] Hispanics were found to have the lowest amputation rate among the three racial groups, though they had the highest proportion of diabetic amputations compared to both black and non-Hispanic white patients.[13] Many studies of patients hospitalized for PAD complications demonstrate how black patients are much more likely to undergo lower extremity amputation procedures and are conversely much less likely to undergo revascularization procedures as white patients.[10-12] This discrepancy in procedure type

may be related to delay in diagnosis or access to primary care, differences in the underlying severity of PAD, and which hospitals patients of different race and ethnicity go to for emergent care. The disparities that exist in lower extremity amputations may also be related to differences in services available at the hospitals serving different populations, such as lack of angiography equipment or training in endovascular techniques and/or lack of a trained vascular surgeon to perform surgical bypass procedures.[14] The absence of vascular surgery expertise and blood flow lab facilities could lead to more amputation procedures performed. A 2008 study by Feinglass et al. looked at racial disparities for residents of nine Chicago-area counties in Northern Illinois.[15] The study calculated trends in racial disparities in lower extremity amputation rates per 100,000 residents in Northern Illinois for the years 1987 to 2004.[15] The major amputation rate in Northern Illinois declined from 24 to 17 per 100,000. Predominantly African American zip codes in Northern Illinois had a five times higher amputation rate than the predominantly white zip codes, with an 11 per 100,000 increase in through foot level amputations in predominantly African American areas.[15]

Specific Aims

This study was undertaken to determine more recent amputation rates by race and ethnicity for the state of Illinois. The study first describes national trends from estimates from the national inpatient Sample (NIS) from 2010-2014. The study then calculates Illinois 2013-2016 amputation rates per 100,000 by patients' race and ethnicity using Illinois census population denominator estimates. One issue of concern was the possible coding difference for amputation procedures introduced by the change from ICD-9 to ICD-10 procedure codes (**Appendix I**). Because the coding change occurred during the

last quarter of 2015, we can identify potential coding bias by comparing yearly change from 2013-2015 (ICD-9 era) versus 2016 (ICD-10 era).

Study findings reflect the extent to which amputation rates have further declined (or increased) during the four-year study period. The study describes amputee characteristics and annual trends in above knee, below knee, and through foot amputation procedure rates per 100,000 for the state of Illinois from 2013-2016. Using separate census population denominators for residents of different races and ethnicities, the study compares lower extremity amputation rates for non-Hispanic white, non-Hispanic black, and Hispanic or Latino patients.

METHODS

National Lower Extremity Amputation Data

The study obtained national data for lower extremity amputations (through foot, below knee, and above knee) from the Agency for Healthcare Research and Quality's (AHRQ) Healthcare Cost and Utilization Project's (HCUP) National (Nationwide) Inpatient Sample (NIS).[16] NIS data for the years 2010 through 2014 using ICD-9 procedure codes for through foot (84.12), below the knee (84.15), and above the knee (84.17) amputations were obtained in order to analyze national trends in amputations in recent years.

Illinois Hospital Claims Data

This study utilized de-identified hospital inpatient discharge data for patients 35 years of age or older living in zip codes in Illinois, obtained from the Illinois Health and Hospital Administration (IHA) COMPdata files for the years 2013 through 2016.[17] The study does not include discharge data from Veterans Affairs hospitals in Illinois, which

were estimated to account for approximately 5% of yearly amputation procedures in the state in 2007.[18]

All amputation procedures were recorded as separate admissions, with no unique patient identifiers. Therefore, all rates were calculated at the procedure level and include patients who underwent multiple amputations. In addition to excluding patients under 35 years of age, patients with ICD-9 or ICD-10 codes for traumatic amputations were also excluded from the analysis.

There are 16 quarters available for the 2013-2016 analysis. Data from 2013 through quarter three in 2015 utilized ICD-9 amputation procedure codes, while discharges beginning in the fourth quarter of 2015 utilized ICD-10 amputation procedure codes. ICD-9 coded discharges for amputation procedures were limited to the most widely used codes for each specific operation: through foot (84.12), below knee (84.15), or above knee (84.17). The equivalent ICD-10 procedure codes were selected to include through foot (0Y6M0Z), below knee (0Y6H0Z and 0Y6J0Z), or above knee (0Y6C0Z). Hospital discharge data was used to identify patient race and ethnicity categorized as non-Hispanic white, non-Hispanic black, Hispanic/ Latino, or "other/unknown". Patient age, sex, insurance status, diagnosis of diabetes (per coding in **Appendix II**), as well as patients' Illinois county area categorized as Cook; suburban Chicago 'collar'; or 'downstate' counties, were included for each year of admission. Median household zip code income was assigned to each patient from matched data from 2013 five year ACS estimates and low income was categorized as a median household income under $35,000 per year. Patients were stratified into the age groups: 34-45, 46-54, 55-64, 65-74, and 75

and older. For primary insurance status, patients were categorized as private, Medicaid, Medicare, uninsured, and other or unknown insurance.

Population Rate Denominators

Amputation rate denominators were derived for the total Illinois male and female population 35 years of age or older, and for non-Hispanic white, non-Hispanic black, and Hispanic or Latino populations from 2016 five-year ACS survey estimates. The ACS provides five year rolling estimates to derive a single 'mid-point' population estimate for age 35+ Illinois residents, including estimates for age 35+ residents of each racial and ethnic group.

Statistical Analysis

The proportions of lower extremity amputations were calculated for age groups (34-45, 46-54, 55-64, 65-74, and 75 or older), race and ethnicity, insurance status, and by Illinois county area, zip code household income, and whether the patient had a code for diabetes. Amputation rates per 100,000 were calculated for the years 2013-2016 for total lower extremity amputations and separately for through foot, below knee, and above knee levels of amputation for all residents and for non-Hispanic white, non-Hispanic black and Hispanic or Latino populations. Chi square tests were used to determine the statistical significance of differences by patient characteristics. We present amputation rates by year, including rate differences between racial and ethnic groups, to examine trends in disparities between race and ethnic populations. STATA Version 14 (College Station, TX) was used for analysis.

RESULTS

National Inpatient Sample Data

Table 1 presents HCUP NIS estimates of annual hospital discharges with amputation procedures for the years 2010 through 2014.[16] There was an increasing trend in the number of lower extremity amputations from 2010-2014 (unadjusted for growth in the older population during those years).[16] This trend of increasing number of amputation procedures nationally is similar when looking at amputations by level, with increases in through foot, below knee, and above knee.

Illinois Amputation Admissions

A total of 245 (2.5%) of all amputation procedures at study hospitals were excluded from the analysis because the patients did not have Illinois zip codes, and 271 procedures (2.6%) were excluded because the patients were younger than 35 years of age. From 2013 to 2016, there were a total of 9911 discharges with ICD-9 or ICD-10 codes as lower extremity amputations for patients aged 35 years or older, with Illinois zip codes. These patients were treated at 154 Illinois hospitals. Of those, 38 hospitals had 100 or more admissions during the study period, accounting for 6403 or about two-thirds of all admissions (64.6%). Illinois COMPdata procedures were within 3% of the number of procedures at each level identified by NIS for Illinois for 2014.[16]-

ICD-9 versus ICD-10 Coding Change Effects

Appendix III provides detailed data by quarter for the entire study period, including the change between the third and fourth quarters (quarters 11 versus 12) of 2015 when the ICD-9 to ICD-10 coding transition occurred. There was an abrupt 13% quarterly increase in ICD-10 coded through foot procedures, with a corresponding sharp 10% quarterly decline in ICD-10 coded above knee procedures when coding regimes

changed. Below knee procedure numbers were continuous, with approximately the same rates before and after the end of 2015.

Patient Characteristics

Table 2 demonstrates the proportion of amputations at each amputation level. Differences by age group, sex, race and ethnicity, insurance status, household income, comorbid conditions, Illinois county area, and year are presented. The largest number of amputations were below knee, followed by through foot, and then above knee. As expected, for all levels of amputation, the percent of amputations increased with age, then dropped at the 75 years or older group. Of note, non-Hispanic blacks accounted for 26.9% of total amputations, 29.5% of above knee amputations, 27.0% of below knee amputations, and 24.4% of through foot amputations, despite representing only 13% of the population of Illinois.

Change in Annual Amputation Rates per 100,000 by Race and Ethnicity

Table 3 presents amputation rates per 100,000 residents aged 35 years or older by year, for each amputation level and by race and ethnicity. Total lower extremity amputation rates increased over time, beginning with increases in 2013-2015 while ICD-9 codes were used. Increases were seen for all racial and ethnic groups, with three-fold differences between non-Hispanic white and non-Hispanic black rates (Figure 1). Amputation rates were highest among the non-Hispanic black population for all years and for all levels of amputation, with the highest disparity observed for below knee amputations.

In the most recent year of 2016, non-Hispanic blacks had a 2.56 times higher total amputation rate compared to non-Hispanic whites, and a 2.22 times higher total

amputation rate compared to Hispanics or Latinos. Hispanic or Latinos also consistently demonstrated higher total, below knee, and through foot amputation rates compared to non-Hispanic whites across all years of study, with a 1.15 times higher total amputation rate in 2016.

Total above knee and below knee amputations rates were fairly steady over the four study years (Figure 3, Figure 4). A similar trend over time was seen for above knee amputation rates for all three racial groups, and for below knee amputation rates among the non-Hispanic white and the Hispanic or Latino populations. The below knee amputation rate among non-Hispanic blacks followed a different trend, demonstrating an considerable peak in 2014, a subsequent decrease in rate, and finally a moderate increase from 2015 to 2016 (Figure 4). The bottom rows of Table 3 show no major improvement in racial or ethnic rate disparities. Total through foot amputations increased steadily over time, with rates sharply increasing between 2015 and 2016 as coding changed, with this trend being consistent across all racial groups (Figure 5).

DISCUSSION

Public Health Relevance

The public health relevance of this study is derived from the close link between diabetes, smoking, and PAD, which offer a multitude of secondary prevention opportunities that might reduce the ultimate risk of lower extremity amputation. The significant racial disparity in lower extremity amputations raises the additional issue of social determinants of health and their role in PAD outcomes. The higher amputation rate among black populations exists regardless of a higher prevalence of diabetes, with an even higher racial disparity among non-diabetic amputees.[10,11] Patient education level and

health literacy, access to care, cultural and behavioral beliefs, and whether household income and wealth offer patients the option of care at home, all likely play a role in the racial disparity in amputation rates.

Trends in Lower Extremity Amputations

Total lower extremity amputation rates in the state of Illinois increased between 2013-2016 from 34.60 to 38.29 per 100,000. This increase was largely attributable to a rising rate of through foot amputations over time, as the major amputation rate remained steady. It remains unclear the extent to which these changes are driven by changes in ICD-9 to ICD-10 procedure coding.

Though lower extremity amputations often fall under the vascular surgeons' purview, it is crucial that communication exists between primary care providers and surgeons regarding the modifiable factors that could prevent progression to lower extremity amputation. It is also crucial for both primary care physicians and surgeons to recognize the racial disparities that exist and to work toward educational and other public health efforts that can optimize outcomes in more vulnerable populations. From the surgeon's perspective, an example of such a focus could include looking to increase the success of minimally invasive revascularization approaches in non-Hispanic black patients. From the primary care physician standpoint (and also the surgeon standpoint), an example could involve collaboration with public health departments and work to improve diabetes screening, diabetes care, smoking cessation, as well as specifically targeting interventions to more vulnerable populations.

Without continued public health interventions and appropriate primary care efforts, it is likely that many of the through foot amputees will progress to more advanced disease and subsequent amputation procedures.

Racial Disparities in Lower Extremity Amputations

Consistent with prior studies demonstrating higher amputation rates among black populations, the current study found that there continues to be a significant racial disparity in lower extremity amputation rates in the state of Illinois. The non-Hispanic black population in Illinois continues to be disproportionately affected by amputation procedures, as it represents only 13% of the population in Illinois and was found to account for 26.9% of all amputation procedures during the period of study. This is very consistent with the findings in the prior Feinglass et al. study of amputation rates in Northern Illinois, which found that the predominantly African American zip codes accounted for 27% of amputations despite representing less than 15% of the areas studied.[15] The current study showed that the non-Hispanic black population in Illinois demonstrated the highest amputation rates across all levels of amputation, and demonstrated greater than a 2.5 times higher amputation rate in 2016 compared to non-Hispanic whites.

Hispanic or Latino Population

The current study also looked at amputation rates for the Hispanic or Latino population in Illinois. Hispanic or Latinos were found to have slightly higher amputation rates for total, below the knee, and through foot amputations compared to the non-Hispanic white population, with a significantly smaller disparity existing between these two populations compared to the non-Hispanic black population.

Risk Factors for Amputation Disparities

Though this study did not specifically compare the prevalence of diabetes or smoking among the different racial groups, it is unlikely that comorbid diabetes, differences of severity of diabetes, or smoking could entirely explain the disparities observed. The reason for higher amputation rates among the non-Hispanic blacks is likely multifactorial and related to many social determinants of health that disproportionately impact this population. Factors such as health education, insurance status and access to care, healthcare beliefs, and income may all play a role.

The racial disparity in amputation rates between non-Hispanic black and non-Hispanic white populations has narrowed from the apparent five-fold differences in Feinglass et al.'s 2008 zip code characteristics (rather than individual patient race and ethnicity) study of just the Chicago metro area.[15] A narrowing gap in rates may be indicative of improvements in public health interventions addressing social determinants of health. Specifically, it may be indicative of improvements in health education, access to care, availability of primary care services, and/or of higher quality care. Despite this improvement, it is important to acknowledge that the racial disparity in lower extremity amputation rates between non-Hispanic blacks, Hispanic or Latinos, and non-Hispanic whites continues to exist.

Limitations

First, the IHA COMPdata file only includes data from non-federal hospitals in the state of Illinois, and therefore excludes any lower extremity amputation data from VA hospitals in Illinois. Therefore, the results presented are likely an underestimate of the number of amputation procedures occurring in the state of Illinois from 2013-2016.

A second limitation involves the data utilized to estimate population denominators for amputation rate calculations. The census data denominator for the three different racial and ethnic groups are estimates with confidence intervals, and numerators exclude over 7% of all amputation admissions classified as "other/unknown race".

Finally, the most important limitation is the potential bias of the change in ICD coding in 2015. It is unlikely that this difference has anything to do with rarely used ICD-9 codes such as 84.13 or 84.16, which usually reflect traumatic amputation procedures. There were only a few hundred such codes nationally in the NIS and only a couple dozen in Illinois during the study years.[16] While the source of the discrepancy in coding used (Appendix I) is unknown, it may be impossible to construct a valid time series for amputation procedures before and after 2015.

CONCLUSIONS AND FUTURE DIRECTIONS

Amputation Outcomes

Lower extremity amputations significantly impact and alter a patients' quality of life, as it requires a patient to adapt to several challenges that come with being an amputee. Patients undergoing amputations are typically very ill, as lower extremity amputation is an indicator of significant systemic disease.[1] In fact, nearly one third of patients who undergo a below knee or above knee amputation will die within a couple years.[1] The utility of attempted revascularization in these systemically ill patients has also been questioned.[19] Patients who present with critical limb ischemia that are selected to undergo a revascularization procedure are so ill and often their risk factors for progression of PAD are unmodified post-revascularization, such that they frequently must undergo multiple limb salvage procedures. Given this typical sequence of care, can

revascularization procedures ever truly be considered successful? It is worth questioning whether this approach provides patients with improved quality of life compared to choosing to proceed with a primary amputation at the initial presentation. It is possible that the alternative of primary amputation may also serve a palliative role in this severely ill patient population. In addition to patient quality of life, the necessity of multiple revascularization procedures for limb salvage also brings up the issue of cost-effectiveness of this approach.

Current Status and Moving Forward

The increase in amputation rate in this study appears to be mostly attributable to an increase in the rate of through foot amputations, while rates of major amputations have remained fairly steady. Racial disparities between non-Hispanic black and non-Hispanic white amputation rates continue to exist, though the racial gap in rates may have narrowed since it was last assessed. Many social determinants of health are likely responsible for the remaining racial gap, and it will likely require targeted public health interventions on behalf of primary care providers, vascular surgeons, and public health agencies to address risk factors for lower extremity amputation as well as efforts to improve operative outcomes for more vulnerable populations.

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Table 1. National Trends in Amputation Procedure Admissions by Level				
	Amputation Level			
Year	**All**	**Above Knee**	**Below Knee**	**Through Foot**
2010	68170	22589	29312	16269
2011	73667	24127	32239	17302
2012	70440	22630	30290	17520
2013	73925	22310	33325	18290
2014	78215	23035	34305	20875
National estimates of amputations from the Agency for Healthcare Research and Quality (AHRQ), the Healthcare Cost and Utilization Project (HCUP).[16]				

Figure 1. National Estimates from the Agency for Healthcare Research and Quality's (AHRQ) Healthcare Cost and Utilization Project (HCUP).

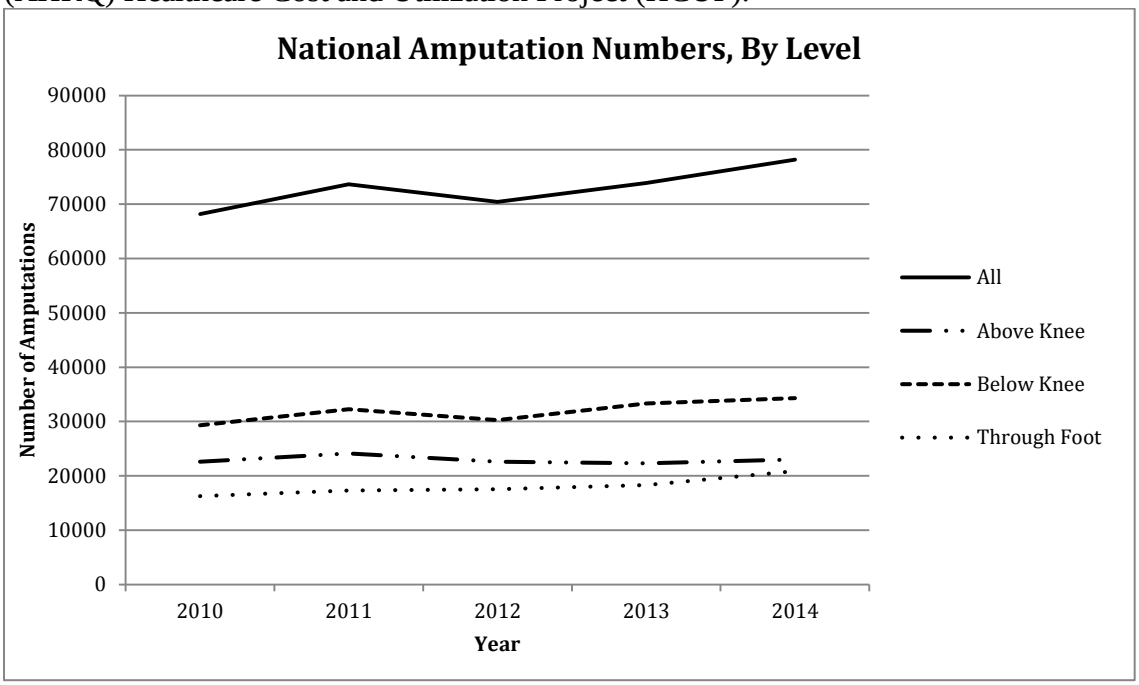


Table 2. Patient Characteristics for Illinois Amputation Admissions				
	Percent Amputations by Amputation Level			
	All n=9911	**Above Knee n=2702**	**Below Knee n=4425**	**Through Foot n=3061**
Age Group		**	**	**
34-45	4.1	2.4	4.8	4.7
46-54	9.7	7.0	10.6	10.6
55-64	19.5	17.7	20.3	20.6
65-74	49.5	46.0	48.9	52.9
≥75	17.3	26.8	15.4	11.1
Sex		**		**
Male		58.3	68.1	73.5
Race & Ethnicity		**		**
Non-Hispanic white	55.1	54.3	54.7	55.8
Non-Hispanic black	26.9	29.5	27.0	24.4
Hispanic	10.1	7.9	10.1	12.1
Other/Unknown	8.0	8.2	8.1	7.8
Insurance Status		**		**
Private	18.1	13.7	18.4	22.0
Medicaid	20.0	18.4	20.3	21.4
Medicare	57.3	65.4	56.8	49.6
Uninsured	3.6	1.9	3.5	5.6
Other/Unknown	1.0	0.6	1.0	1.4
Income		**	*	#
Median Zip Code Household Income < $35,000		16.9	14.3	14.8
Comorbid Conditions		**	**	**
Diabetes	74.2	57.0	76.8	85.8
Illinois County Area		**	**	*
Cook	15.5	41.2	38.4	37.9
Dupage, Will, McHenry, or Lake	45.3	45.3	44.4	47.3
Downstate	39.1	13.6	17.1	14.9
Year		**	*	**
2013	23.9	25.8	24.8	20.9
2014	24.6	27.3	24.1	23.1
2015	25.1	26.0	25.9	23.2
2016	26.4	20.9	25.2	32.8
**p<0.01 *p<.05				

Table 3. Amputation Rates per 100,000 for Illinois Population Age 35 or Older, by Race & Ethnicity				
	Year			
	2013	**2014**	**2015**	**2016**
Above Knee				
All	10.19	10.78	10.27	8.28
Non-Hispanic white	7.54	7.44	6.99	6.12
Non-Hispanic black	22.54	24.90	24.00	18.06
Hispanic or Latino	5.99	7.21	7.82	5.13
Below Knee				
All	15.72	15.27	16.41	15.98
Non-Hispanic white	11.48	10.35	11.90	11.69
Non-Hispanic black	30.96	36.00	31.85	32.64
Hispanic or Latino	12.83	13.69	13.20	13.81
Through Foot				
All	8.69	9.64	9.70	14.02
Non-Hispanic white	6.35	6.70	6.91	11.06
Non-Hispanic black	16.82	19.63	17.95	23.33
Hispanic or Latino	8.06	10.02	9.65	14.42
Total Amputations				
All	34.60	35.68	36.37	38.29
Non-Hispanic white	25.38	24.50	25.80	28.88
Non-Hispanic black	70.33	80.53	73.80	74.03
Hispanic or Latino	26.88	30.92	30.67	33.36
Rate Differences				
Non-Hispanic black to non-Hispanic white	44.95	56.03	48.00	45.15
Hispanic or Latino to non-Hispanic white	1.50	6.42	4.87	4.48
Population denominator data obtained from US census bureau data.[20]				

Figure 2. Illinois total amputation rates per 100,000 for population age 35 years or older, by race and ethnicity

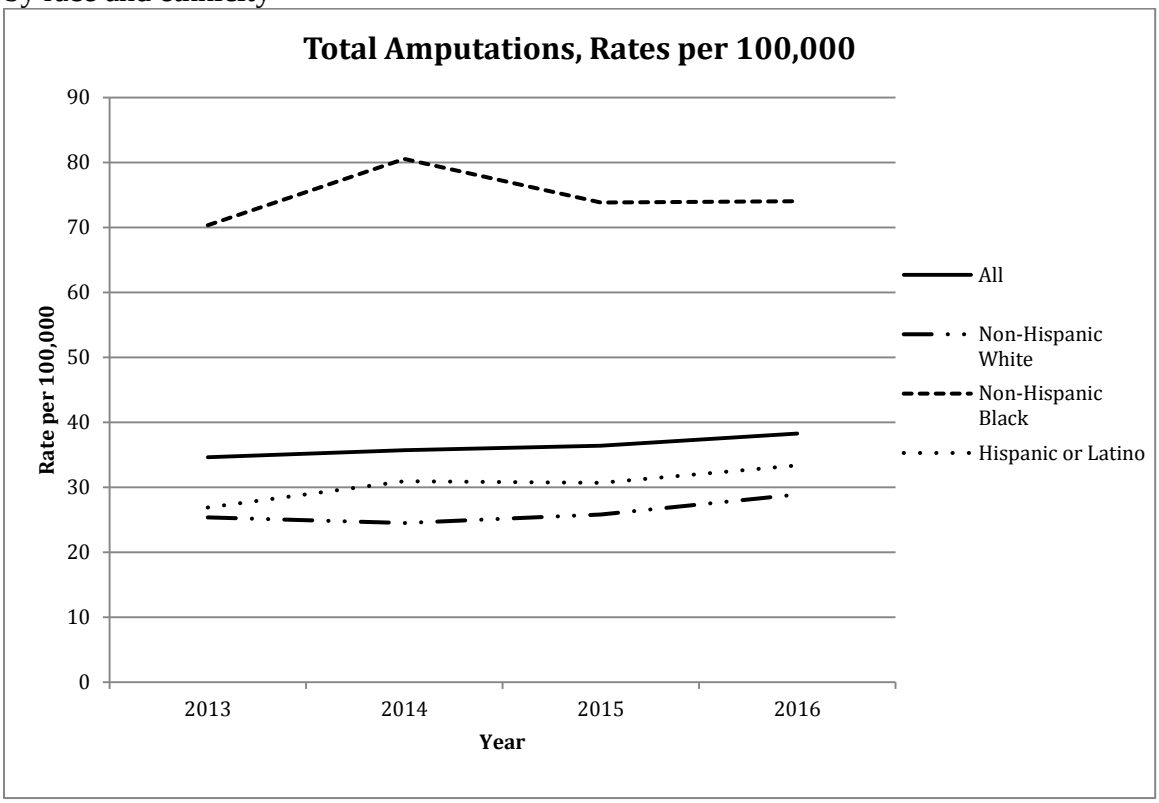


Figure 3. Illinois above knee amputation rates per 100,000 for population 35 years of age or older, by race and ethnicity.

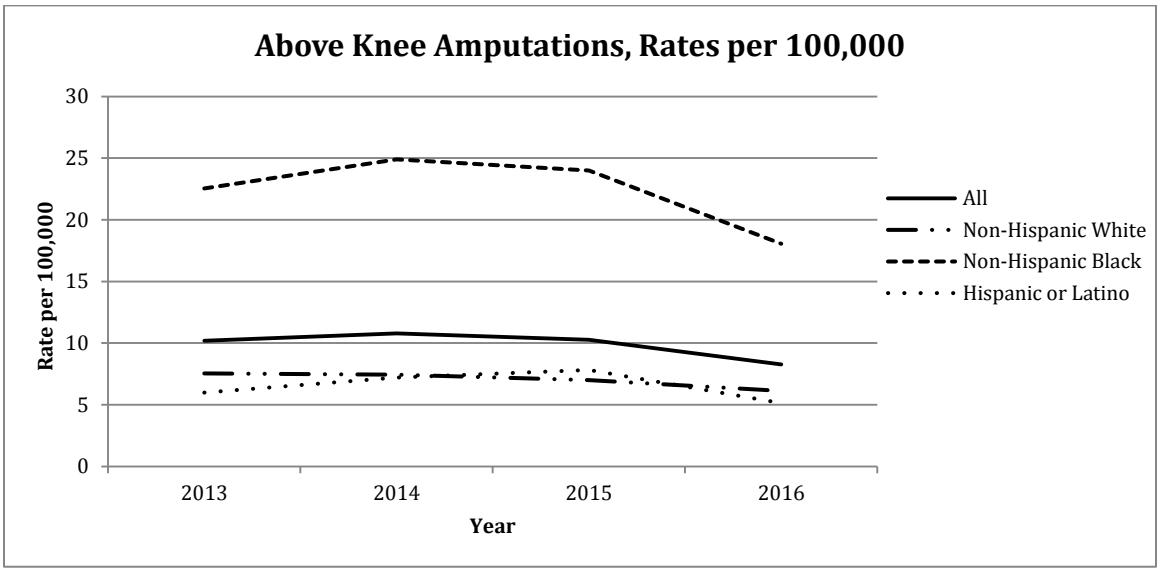


Figure 4. Illinois below knee amputation rates per 100,000 for population 35 years of age or older, by race and ethnicity.

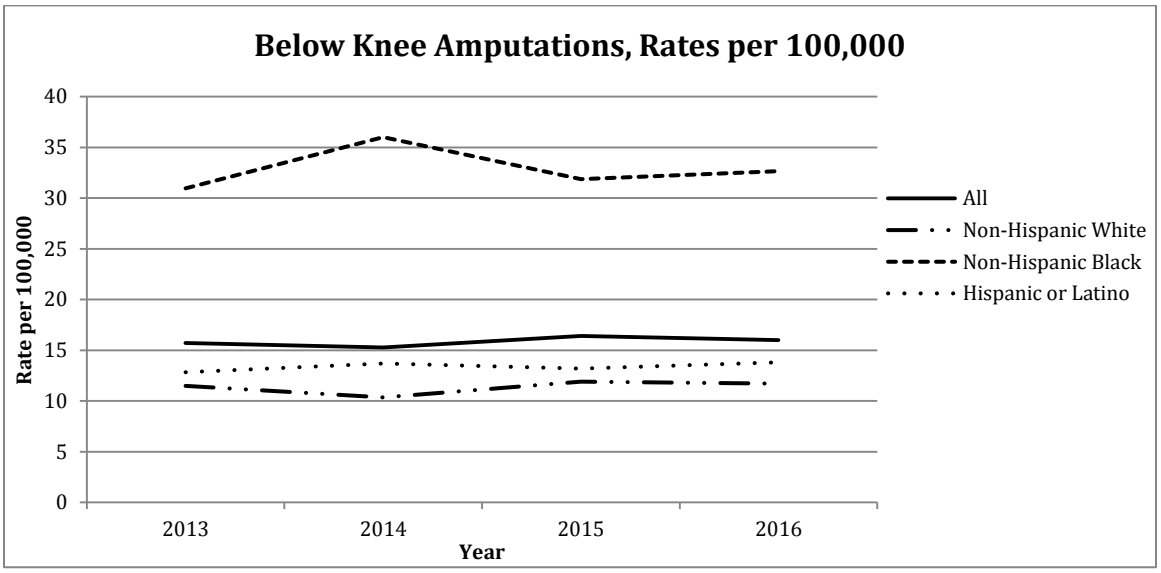
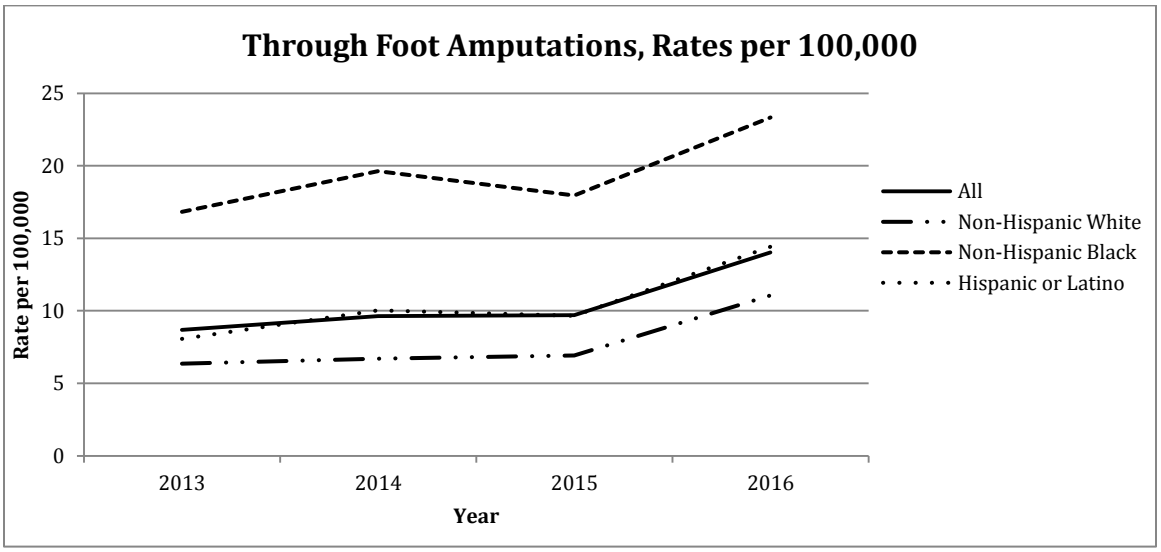


Figure 5. Illinois through foot amputation rates per 100,000 for population 35 years of age or older, by race and ethnicity.



Appendix I. Comparable ICD-9 and ICD-10 amputation procedure codes.

Level	ICD-9 CM Procedure Code		ICD-10 PCS Procedure Code	
Through Foot	84.12	Amputation through foot	0Y6M0Z4	Detachment at Right Foot, Complete 1st Ray, Open Approach
			0Y6M0Z5	Detachment at Right Foot, Complete 2nd Ray, Open Approach
			0Y6M0Z6	Detachment at Right Foot, Complete 3rd Ray, Open Approach
			0Y6M0Z7	Detachment at Right Foot, Complete 4th Ray, Open Approach
			0Y6M0Z8	Detachment at Right Foot, Complete 5th Ray, Open Approach
			0Y6M0Z9	Detachment at Right Foot, Partial 1st Ray, Open Approach
			0Y6M0ZB	Detachment at Right Foot, Partial 2nd Ray, Open Approach
			0Y6M0ZC	Detachment at Right Foot, Partial 3rd Ray, Open Approach
			0Y6M0ZD	Detachment at Right Foot, Partial 4th Ray, Open Approach
			0Y6M0ZF	Detachment at Right Foot, Partial 5th Ray, Open Approach
			0Y6N0Z4	Detachment at Left Foot, Complete 1st Ray, Open Approach
			0Y6N0Z5	Detachment at Left Foot, Complete 2nd Ray, Open Approach
			0Y6N0Z6	Detachment at Left Foot, Complete 3rd Ray, Open Approach
			0Y6N0Z7	Detachment at Left Foot, Complete 4th Ray, Open Approach
			0Y6N0Z8	Detachment at Left Foot, Complete 5th Ray, Open Approach
			0Y6N0Z9	Detachment at Left Foot, Partial 1st Ray, Open Approach
			0Y6N0ZB	Detachment at Left Foot, Partial 2nd Ray, Open Approach
			0Y6N0ZC	Detachment at Left Foot, Partial 3rd Ray, Open Approach
			0Y6N0ZD	Detachment at Left Foot, Partial 4th Ray, Open Approach
			0Y6N0ZBF	Detachment at Left Foot, Partial 5th Ray, Open Approach
Below Knee	84.15	Other amputation	0Y6H0Z1	Detachment at Right Lower Leg, High, Open Approach

		below knee	0Y6H0Z2	Detachment at Right Lower Leg, Mid, Open Approach
			0Y6H0Z3	Detachment at Right Lower Leg, Low, Open Approach
			0Y6J0Z1	Detachment at Left Lower Leg, High, Open Approach
			0Y6J0Z2	Detachment at Left Lower Leg, Mid, Open Approach
			0Y6J0Z3	Detachment at Left Lower Leg, Low, Open Approach
Above knee	84.17	Amputation above knee	0Y6C0Z1	Detachment at Right Upper Leg, High, Open Approach
			0Y6C0Z2	Detachment at Right Upper Leg, Mid, Open Approach
			0Y6C0Z3	Detachment at Right Upper Leg, Low, Open Approach
			0Y6D0Z1	Detachment at Left Upper Leg, High, Open Approach
			0Y6D0Z2	Detachment at Left Upper Leg, Mid, Open Approach
			0Y6D0Z3	Detachment at Left Upper Leg, Low, Open Approach

Appendix II. Comparable ICD-9 and ICD-10 diabetes diagnosis codes.

ICD-9 CM Diagnosis Code		ICD-10 CM Diagnosis Code	
250	**Diabetes mellitus**	**E10**	**TYPE 1 DIABETES MELLITUS**
250.00	Diabetes mellitus without mention of complication, type II or unspecified type, not stated as uncontrolled	**E10.1**	**Type 1 diabetes mellitus with ketoacidosis**
250.01	Diabetes mellitus without mention of complication, type I [juvenile type], not stated as uncontrolled	E10.10	... without coma
250.02	Diabetes mellitus without mention of complication, type II or unspecified type, uncontrolled	E10.11	... with coma
250.03	Diabetes mellitus without mention of complication, type I [juvenile type], uncontrolled	**E10.2**	**Type 1 diabetes mellitus with kidney complications**
250.1	**Diabetes with ketoacidosis**	E10.21	Type 1 diabetes mellitus with diabetic nephropathy
250.10	Diabetes with ketoacidosis, type II or unspecified type, not stated as uncontrolled	E10.22	Type 1 diabetes mellitus with diabetic chronic kidney disease
250.11	Diabetes with ketoacidosis, type I [juvenile type], not stated as uncontrolled	E10.29	Type 1 diabetes mellitus with other diabetic kidney complication
250.12	Diabetes with ketoacidosis, type II or unspecified type, uncontrolled	**E10.3**	**Type 1 diabetes mellitus with ophthalmic complications**
250.13	Diabetes with ketoacidosis, type I [juvenile type], uncontrolled	E10.31	Type 1 diabetes mellitus with unspecified diabetic retinopathy
250.2	**Diabetes with hyperosmolarity**	E10.311	… with macular edema
250.20	Diabetes with hyperosmolarity, type II or unspecified type, not stated as uncontrolled	E10.319	… without macular edema
250.21	Diabetes with hyperosmolarity, type I [juvenile type], not stated as uncontrolled	**E10.32**	**Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy**
250.22	Diabetes with hyperosmolarity, type II or unspecified type, uncontrolled	E10.321	Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema
250.23	Diabetes with hyperosmolarity, type I [juvenile type], uncontrolled	E10.3211	...right eye
250.3	**Diabetes with other coma**	E10.3212	…left eye
250.30	Diabetes with other coma, type II or unspecified type, not stated as uncontrolled	E10.3213	…bilateral
250.31	Diabetes with other coma, type I [juvenile type], not stated as uncontrolled	E10.3219	…unspecified eye

250.32	Diabetes with other coma, type II or unspecified type, uncontrolled
250.33	Diabetes with other coma, type I [juvenile type], uncontrolled
250.4	**Diabetes with renal manifestations**
250.40	Diabetes with renal manifestations, type II or unspecified type, not stated as uncontrolled
250.41	Diabetes with renal manifestations, type I [juvenile type], not stated as uncontrolled
250.42	Diabetes with renal manifestations, type II or unspecified type, uncontrolled
250.43	Diabetes with renal manifestations, type I [juvenile type], uncontrolled
250.5	**Diabetes with ophthalmic manifestations**
250.50	Diabetes with ophthalmic manifestations, type II or unspecified type, not stated as uncontrolled
250.51	Diabetes with ophthalmic manifestations, type I [juvenile type], not stated as uncontrolled
250.52	Diabetes with ophthalmic manifestations, type II or unspecified type, uncontrolled
250.53	Diabetes with ophthalmic manifestations, type I [juvenile type], uncontrolled
250.6	**Diabetes with neurological manifestations**
250.60	Diabetes with neurological manifestations, type II or unspecified type, not stated as uncontrolled
250.61	Diabetes with neurological manifestations, type I [juvenile type], not stated as uncontrolled
250.62	Diabetes with neurological manifestations, type II or unspecified type, uncontrolled
250.63	Diabetes with neurological manifestations, type I [juvenile type], uncontrolled
250.7	**Diabetes with peripheral circulatory**

E10.329	**Type 1 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema**
E10.3291	…right eye
E10.3292	…left eye
E10.3293	…bilateral
E10.3299	…unspecified eye
E10.33	**Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy**
E10.331	**Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema**
E10.3311	...right eye
E10.3312	…left eye
E10.3313	…bilateral
E10.3319	…unspecified eye
E10.339	**Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema**
E10.3391	...right eye
E10.3392	…left eye
E10.3393	…bilateral
E10.3399	…unspecified eye
E10.34	**Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy**
E10.341	**Type 1 diabetes mellitus with severe**

	disorders
250.70	Diabetes with peripheral circulatory disorders, type II or unspecified type, not stated as uncontrolled
250.71	Diabetes with peripheral circulatory disorders, type I [juvenile type], not stated as uncontrolled
250.72	Diabetes with peripheral circulatory disorders, type II or unspecified type, uncontrolled
250.73	Diabetes with peripheral circulatory disorders, type I [juvenile type], uncontrolled
250.8	**Diabetes with other specified manifestations**
250.80	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled
250.81	Diabetes with other specified manifestations, type I [juvenile type], not stated as uncontrolled
250.82	Diabetes with other specified manifestations, type II or unspecified type, uncontrolled
250.83	Diabetes with other specified manifestations, type I [juvenile type], uncontrolled
250.9	Diabetes with unspecified complication
250.90	Diabetes with unspecified complication, type II or unspecified type, not stated as uncontrolled
250.91	Diabetes with unspecified complication, type I [juvenile type], not stated as uncontrolled
250.92	Diabetes with unspecified complication, type II or unspecified type, uncontrolled
250.93	Diabetes with unspecified complication, type I [juvenile type], uncontrolled

	nonproliferative diabetic retinopathy with macular edema
E10.3411	...right eye
E10.3412	…left eye
E10.3413	…bilateral
E10.3419	…unspecified eye
E10.349	**Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema**
E10.3491	...right eye
E10.3492	…left eye
E10.3493	…bilateral
E10.3499	…unspecified eye
E10.35	**Type 1 diabetes mellitus with proliferative diabetic retinopathy**
E10.351	**Type 1 diabetes mellitus with proliferative diabetic retinopathy with macular edema**
E10.3511	...right eye
E10.3512	…left eye
E10.3513	…bilateral
E10.3519	…unspecified eye
E10.352	**Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment**

	involving the macula
E10.3521	...right eye
E10.3522	…left eye
E10.3523	…bilateral
E10.3529	…unspecified eye
E10.353	**Type 1 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula**
E10.3531	...right eye
E10.3532	…left eye
E10.3533	…bilateral
E10.3539	…unspecified eye
E10.354	**Type 1 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment**
E10.3541	...right eye
E10.3542	…left eye
E10.3543	…bilateral
E10.3549	…unspecified eye
E10.355	**Type 1 diabetes mellitus with stable proliferative diabetic retinopathy**
E10.3551	...right eye
E10.3552	…left eye
E10.3553	…bilateral
E10.3559	…unspecified eye
E10.359	**Type 1 diabetes mellitus with proliferative diabetic retinopathy without macular edema**
E10.3591	...right eye
E10.3592	…left eye
E10.3593	…bilateral
E10.3599	…unspecified eye
E10.36	**Type 1 diabetes mellitus with diabetic cataract**
E10.37	**Type 1 diabetes mellitus with diabetic macular edema, resolved following treatment**
E10.37X1	...right eye
E10.37X2	…left eye
E10.37X3	…bilateral
E10.37X9	…unspecified eye

E10.39	**Type 1 diabetes mellitus with other diabetic ophthalmic complication**
E10.4	**Type 1 diabetes mellitus with neurological complications**
E10.40	Type 1 diabetes mellitus with diabetic neuropathy, unspecified
E10.41	Type 1 diabetes mellitus with diabetic mononeuropathy
E10.42	Type 1 diabetes mellitus with diabetic polyneuropathy
E10.43	Type 1 diabetes mellitus with diabetic autonomic (poly)neuropathy
E10.44	Type 1 diabetes mellitus with diabetic amyotrophy
E10.49	Type 1 diabetes mellitus with other diabetic neurological complication
E10.5	**Type 1 diabetes mellitus with circulatory complications**
E10.51	Type 1 diabetes mellitus with diabetic peripheral angiopathy without gangrene
E10.52	Type 1 diabetes mellitus with diabetic peripheral angiopathy with gangrene
E10.59	Type 1 diabetes mellitus with other circulatory complications
E10.6	**Type 1 diabetes mellitus with other specified complications**
E10.61	**Type 1 diabetes mellitus with diabetic arthropathy**
E10.610	Type 1 diabetes mellitus with diabetic neuropathic arthropathy
E10.618	Type 1 diabetes mellitus with other diabetic arthropathy
E10.62	**Type 1 diabetes mellitus with skin complications**
E10.620	Type 1 diabetes mellitus with diabetic dermatitis
E10.621	Type 1 diabetes mellitus with foot ulcer
E10.622	Type 1 diabetes mellitus with other skin ulcer
E10.628	Type 1 diabetes mellitus with other skin complications
E10.63	**Type 1 diabetes mellitus with oral complications**
E10.630	Type 1 diabetes mellitus with periodontal disease
E10.638	Type 1 diabetes mellitus with other oral

	complications
E10.64	**Type 1 diabetes mellitus with hypoglycemia**
E10.641 E10.649	…with coma …without coma
E10.65	**Type 1 diabetes mellitus with hyperglycemia**
E10.69	**Type 1 diabetes mellitus with other specified complication**
E10.8	**Type 1 diabetes mellitus with unspecified complications**
E10.9	**Type 1 diabetes mellitus without complications**
E11	**TYPE 2 DIABETES MELLITUS**
E11.0	**Type 2 diabetes mellitus with hyperosmolarity**
E11.00 E11.01	…… without nonketotic hyperglycemic-hyperosmolar coma (NKHHC) …… with coma
E11.1	**Type 2 diabetes mellitus with ketoacidosis**
E11.10 E11.11	…… without coma …… with coma
E11.2	**Type 2 diabetes mellitus with kidney complications**
E11.21 E11.22 E11.29	Type 2 diabetes mellitus with diabetic nephropathy Type 2 diabetes mellitus with diabetic chronic kidney disease Type 2 diabetes mellitus with other diabetic kidney complication
E11.3	**Type 2 diabetes mellitus with ophthalmic complications**
E11.31	**Type 2 diabetes mellitus with unspecified diabetic retinopathy**
E11.311 E11.319	…… with macular edema …… without macular edema
E11.32	**Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy**
E11.321	**Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema**
E11.3211	...right eye

E11.3212	…left eye
E11.3213	…bilateral
E11.3219	…unspecified eye
E11.329	**Type 2 diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema**
E11.3291	...right eye
E11.3292	…left eye
E11.3293	…bilateral
E11.3299	…unspecified eye
E11.33	**Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy**
E11.331	**Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema**
E11.3311	...right eye
E11.3312	…left eye
E11.3313	…bilateral
E11.3319	…unspecified eye
E11.339	**Type 2 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema**
E11.3391	...right eye
E11.3392	…left eye
E11.3393	…bilateral
E11.3399	…unspecified eye
E11.34	**Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy**
E11.341	**Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema**
E11.3411	...right eye
E11.3412	…left eye
E11.3413	…bilateral
E11.3419	…unspecified eye
E11.349	**Type 2 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema**
E11.3491	...right eye
E11.3492	…left eye
E11.3493	…bilateral
E11.3499	…unspecified eye
E11.35	**Type 2 diabetes mellitus with**

	proliferative diabetic retinopathy
E11.351	**Type 2 diabetes mellitus with proliferative diabetic retinopathy with macular edema**
E11.3511	...right eye
E11.3512	…left eye
E11.3513	…bilateral
E11.3519	…unspecified eye
E11.352	**Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment involving the macula**
E11.3521	...right eye
E11.3522	…left eye
E11.3523	…bilateral
E11.3529	…unspecified eye
E11.353	**Type 2 diabetes mellitus with proliferative diabetic retinopathy with traction retinal detachment not involving the macula**
E11.3531	...right eye
E11.3532	…left eye
E11.3533	…bilateral
E11.3539	…unspecified eye
E11.354	**Type 2 diabetes mellitus with proliferative diabetic retinopathy with combined traction retinal detachment and rhegmatogenous retinal detachment**
E11.3541	...right eye
E11.3542	…left eye
E11.3543	…bilateral
E11.3549	…unspecified eye
E11.355	**Type 2 diabetes mellitus with stable proliferative diabetic retinopathy**
E11.3551	...right eye
E11.3552	…left eye
E11.3553	…bilateral
E11.3559	…unspecified eye
E11.359	**Type 2 diabetes mellitus with proliferative diabetic retinopathy without macular edema**
E11.3591	...right eye
E11.3592	…left eye

E11.3593 E11.3599	…bilateral …unspecified eye
E11.36	**Type 2 diabetes mellitus with diabetic cataract**
E11.37	**Type 2 diabetes mellitus with diabetic macular edema, resolved following treatment**
E11.37X1 E11.37X2 E11.37X3 E11.37X9	...right eye …left eye …bilateral …unspecified eye
E11.39	**Type 2 diabetes mellitus with other diabetic ophthalmic complication**
E11.4	**Type 2 diabetes mellitus with neurological complications**
E11.40 E11.41 E11.42 E11.43 E11.44 E11.49	Type 2 diabetes mellitus with diabetic neuropathy, unspecified Type 2 diabetes mellitus with diabetic mononeuropathy Type 2 diabetes mellitus with diabetic polyneuropathy Type 2 diabetes mellitus with diabetic autonomic (poly)neuropathy Type 2 diabetes mellitus with diabetic amyotrophy Type 2 diabetes mellitus with other diabetic neurological complication
E11.5	**Type 2 diabetes mellitus with circulatory complications**
E11.51 E11.52 E11.59	Type 2 diabetes mellitus with diabetic peripheral angiopathy without gangrene Type 2 diabetes mellitus with diabetic peripheral angiopathy with gangrene Type 2 diabetes mellitus with other circulatory complications
E11.6	**Type 2 diabetes mellitus with other specified complications**
E11.61	**Type 2 diabetes mellitus with diabetic arthropathy**
E11.610 E11.618	Type 2 diabetes mellitus with diabetic neuropathic arthropathy Type 2 diabetes mellitus with other diabetic arthropathy
E11.62	**Type 2 diabetes mellitus with skin complications**

E11.620	Type 2 diabetes mellitus with diabetic dermatitis
E11.621	Type 2 diabetes mellitus with foot ulcer
E11.622	Type 2 diabetes mellitus with other skin ulcer
E11.628	Type 2 diabetes mellitus with other skin complications
E11.63	**Type 2 diabetes mellitus with oral complications**
E11.630	Type 2 diabetes mellitus with periodontal disease
E11.638	Type 2 diabetes mellitus with other oral complications
E11.64	**Type 2 diabetes mellitus with hypoglycemia**
E11.641	…… with coma
E11.649	…… without coma
E11.65	**Type 2 diabetes mellitus with hyperglycemia**
E11.69	**Type 2 diabetes mellitus with other specified complication**
E11.8	**Type 2 diabetes mellitus with unspecified complications**
E11.9	**Type 2 diabetes mellitus without complications**

Appendix III. Quarter 11 is last ICD-9 coded quarter (7-9/2015) versus 12, first ICD-10 coded quarter (10-12/2015). See contrast between quarter 11 to quarter 12 in each series.

year_month * thrufoot Crosstabulation

			thrufoot		
			.00	1.00	Total
year_month	1.00	Count	411	162	573
		% within year_month	71.7%	28.3%	100.0%
	2.00	Count	426	128	554
		% within year_month	76.9%	23.1%	100.0%
	3.00	Count	449	179	628
		% within year_month	71.5%	28.5%	100.0%
	4.00	Count	441	170	611
		% within year_month	72.2%	27.8%	100.0%
	5.00	Count	440	217	657
		% within year_month	67.0%	33.0%	100.0%
	6.00	Count	410	175	585
		% within year_month	70.1%	29.9%	100.0%
	7.00	Count	483	151	634
		% within year_month	76.2%	23.8%	100.0%
	8.00	Count	399	165	564
		% within year_month	70.7%	29.3%	100.0%
	9.00	Count	469	163	632
		% within year_month	74.2%	25.8%	100.0%
	10.00	Count	442	171	613
		% within year_month	72.1%	27.9%	100.0%
	11.00	Count	489	155	644
		% within year_month	75.9%	24.1%	100.0%

	12.00	Count	376	222	598
		% within year_month	62.9%	37.1%	100.0%
	13.00	Count	382	247	629
		% within year_month	60.7%	39.3%	100.0%
	14.00	Count	409	223	632
		% within year_month	64.7%	35.3%	100.0%
	15.00	Count	425	262	687
		% within year_month	61.9%	38.1%	100.0%
	16.00	Count	399	271	670
		% within year_month	59.6%	40.4%	100.0%
Total		Count	6850	3061	9911
		% within year_month	69.1%	30.9%	100.0%

Above knee: see year_month=11 vs year_month=12

Crosstab

			ak		
			.00	1.00	Total
year_month	1.00	Count	415	158	573
		% within year_month	72.4%	27.6%	100.0%
	2.00	Count	381	173	554
		% within year_month	68.8%	31.2%	100.0%
	3.00	Count	437	191	628
		% within year_month	69.6%	30.4%	100.0%
	4.00	Count	436	175	611
		% within year_month	71.4%	28.6%	100.0%
	5.00	Count	467	190	657
		% within year_month	71.1%	28.9%	100.0%

	6.00	Count	412	173	585
		% within year_month	70.4%	29.6%	100.0%
	7.00	Count	445	189	634
		% within year_month	70.2%	29.8%	100.0%
	8.00	Count	379	185	564
		% within year_month	67.2%	32.8%	100.0%
	9.00	Count	430	202	632
		% within year_month	68.0%	32.0%	100.0%
	10.00	Count	437	176	613
		% within year_month	71.3%	28.7%	100.0%
	11.00	Count	445	199	644
		% within year_month	69.1%	30.9%	100.0%
	12.00	Count	473	125	598
		% within year_month	79.1%	20.9%	100.0%
	13.00	Count	503	126	629
		% within year_month	80.0%	20.0%	100.0%
	14.00	Count	476	156	632
		% within year_month	75.3%	24.7%	100.0%
	15.00	Count	550	137	687
		% within year_month	80.1%	19.9%	100.0%
	16.00	Count	523	147	670
		% within year_month	78.1%	21.9%	100.0%
Total		Count	7209	2702	9911
		% within year_month	72.7%	27.3%	100.0%

Below knee: smoother

Crosstab

			bk		
			.00	1.00	Total
year_month	1.00	Count	306	267	573
		% within year_month	53.4%	46.6%	100.0%
	2.00	Count	278	276	554
		% within year_month	50.2%	49.8%	100.0%
	3.00	Count	354	274	628
		% within year_month	56.4%	43.6%	100.0%
	4.00	Count	329	282	611
		% within year_month	53.8%	46.2%	100.0%
	5.00	Count	386	271	657
		% within year_month	58.8%	41.2%	100.0%
	6.00	Count	330	255	585
		% within year_month	56.4%	43.6%	100.0%
	7.00	Count	323	311	634
		% within year_month	50.9%	49.1%	100.0%
	8.00	Count	333	231	564
		% within year_month	59.0%	41.0%	100.0%
	9.00	Count	342	290	632
		% within year_month	54.1%	45.9%	100.0%
	10.00	Count	335	278	613
		% within year_month	54.6%	45.4%	100.0%
	11.00	Count	336	308	644
		% within year_month	52.2%	47.8%	100.0%
	12.00	Count	329	269	598

		% within year_month	55.0%	45.0%	100.0%
	13.00	Count	356	273	629
		% within year_month	56.6%	43.4%	100.0%
	14.00	Count	365	267	632
		% within year_month	57.8%	42.2%	100.0%
	15.00	Count	383	304	687
		% within year_month	55.7%	44.3%	100.0%
	16.00	Count	401	269	670
		% within year_month	59.9%	40.1%	100.0%
Total		Count	5486	4425	9911
		% within year_month	55.4%	44.6%	100.0%