

INTRODUCTION

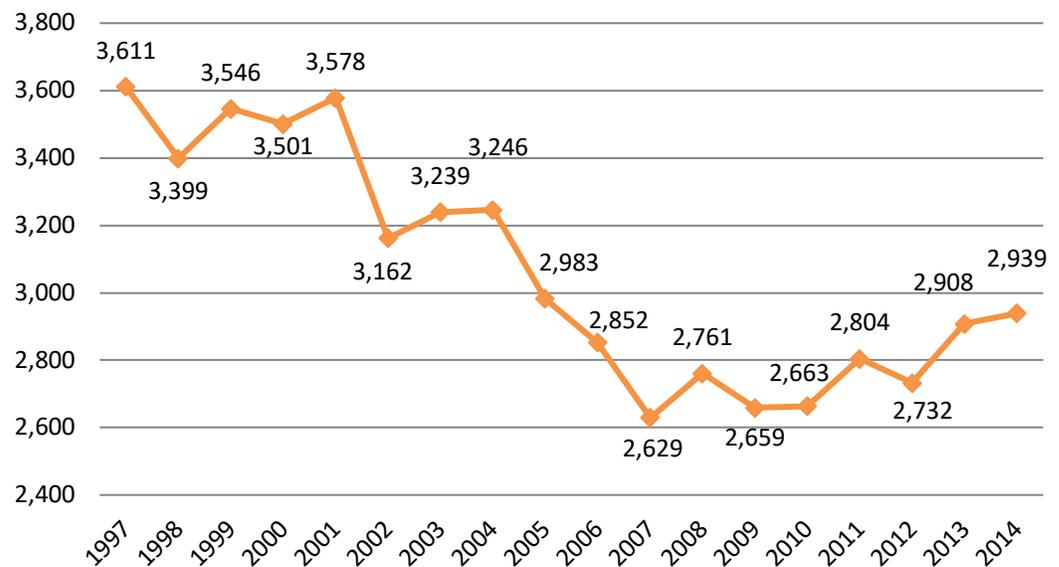
Currently, 1.9 million people are living with limb loss in the United States, with an average of 507 people continuing to lose a limb every day. This results in an estimated 185,000 amputations per year (1), and this number is expected to double by the year 2050 due to increasing rates of diabetes and vascular disease (1). Among those living with limb loss, the major causes of their amputations are vascular disease (54%) – including diabetes and peripheral arterial disease – trauma (45%) and cancer (less than 2%) (2). The most common causes of pediatric amputations, however, are lawn mower accidents (3). Non-whites comprise about 42% of the limb loss population in the U.S. (1). In 2008, the diabetes related amputation rate among African Americans was nearly four times that of whites (4).

A total of 2,939 amputations were performed in Massachusetts hospitals in 2014. These amputations were performed for a variety of reasons, including diabetes and peripheral arterial disease complications. The following information details the trends and most current rates of amputation and diabetes in Massachusetts.

1. AMPUTATION TRENDS OVER TIME

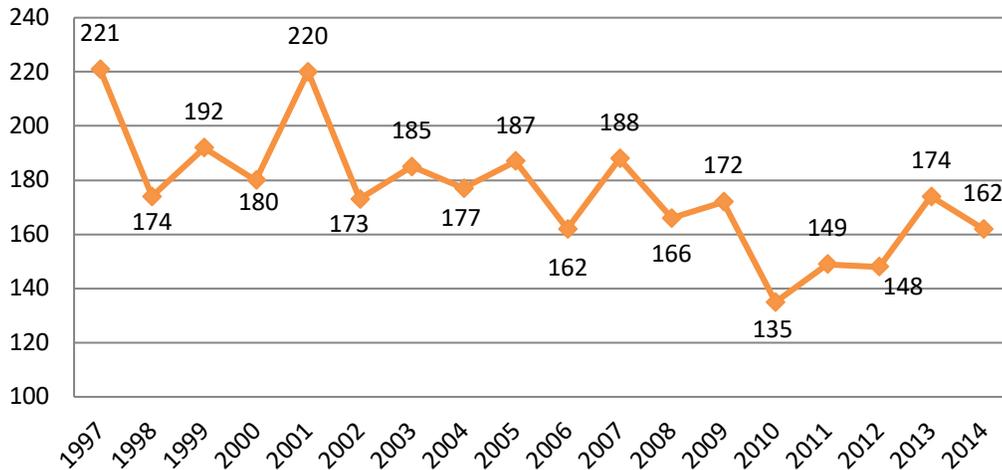
**1.1: Amputation Trends,
Massachusetts (1997-2014)**

According to hospital discharge data, there was an overall 18.61% decrease in total amputations performed in Massachusetts from 1997-2014. A total of 55,212 amputations were performed in this time period. Amputations per year were at the highest in 1997 (3,611) and dropped to their low in 2007 (2,629), and then climbed slightly to 2,939 in 2014. (See Graph 1.1)



Source: Healthcare Cost and Utilization Project HCUPnet database <http://hcupnet.ahrq.gov/>

1.2: Upper-Extremity Amputations Trends, Massachusetts (1997-2014)

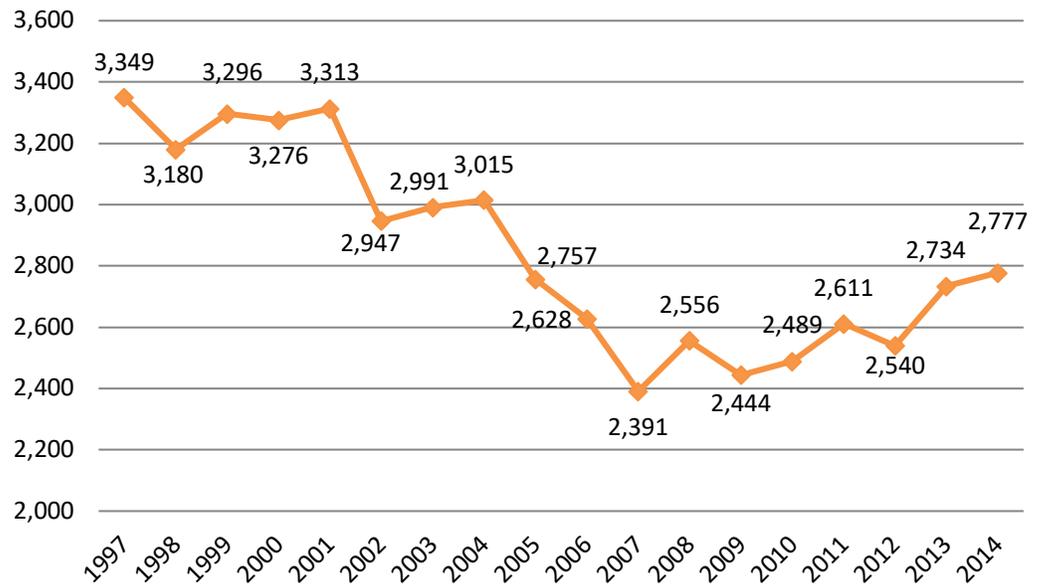


The number of upper-extremity amputations performed each year ultimately decreased 26.7% from 1997 to 2014. A total of 3,165 upper-extremity amputations were performed in this time period. The highest incidence of these amputations (221) occurred in 1997, while 2010 saw the least upper-extremity amputations (135) in this time period. (See Graph 1.2)

Source: Healthcare Cost and Utilization Project HCUPnet database <http://hcupnet.ahrq.gov/>

1.3: Lower-Extremity Amputation Trends, Massachusetts (1997-2014)

The number of lower-extremity amputations performed each year ultimately decreased 17.08% from 1997 to 2014. A total of 51,294 lower-extremity amputations were performed in this time period. A decline in these amputations occurred between the years of 1997 and 2007, with the highest incidence in 1997 (3,349) and the lowest incidence (2,391) occurring in 2007. (See Graph 1.3)

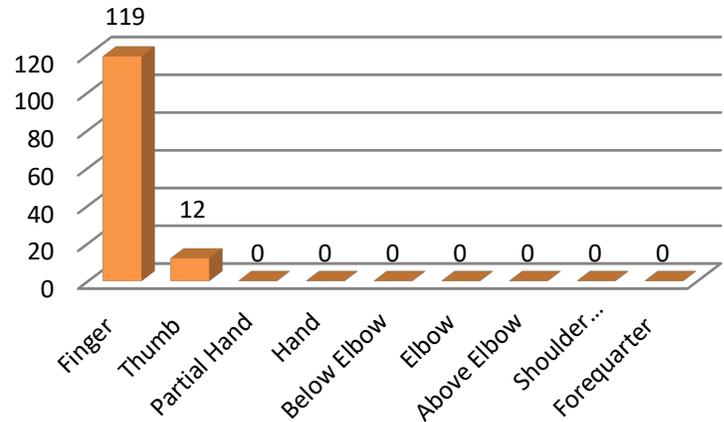


Source: Healthcare Cost and Utilization Project HCUPnet database <http://hcupnet.ahrq.gov/>

2. TYPES OF AMPUTATIONS PERFORMED

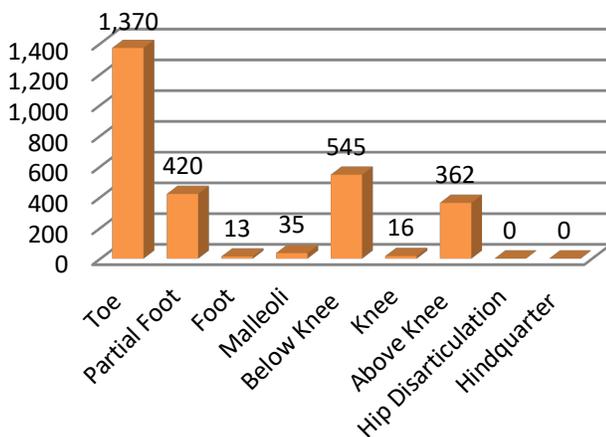
119 upper-extremity amputation types were recorded in 2014. The most common minor upper-extremity amputations were of the fingers (119) and records indicate that no major upper-extremity procedures were performed. (See Graph 2.1)

2.1: Upper-Extremity Amputations, Massachusetts (2014)



Source: Healthcare Cost and Utilization Project HCUPnet database
<http://hcupnet.ahrq.gov/>

2.2: Lower-Extremity Amputations, Massachusetts (2014)



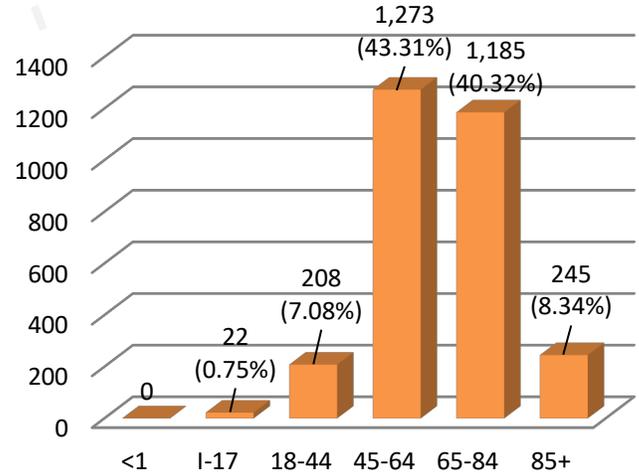
1,370 lower-extremity amputations were performed in 2014. In terms of minor lower-extremity amputations, toes (1,370) were amputated more often than part of the foot (420). For major lower-extremity amputations, below-knee (545) amputation was the most common procedure. (See Graph 2.2)

Source: Healthcare Cost and Utilization Project HCUPnet database
<http://hcupnet.ahrq.gov/>

3. WHO LOSES A LIMB?

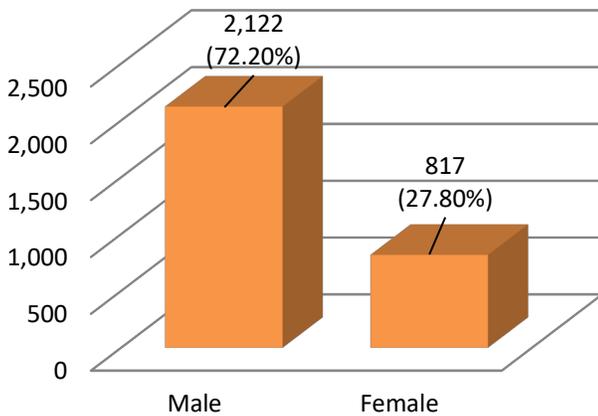
In 2014, most amputations were performed on individuals aged 45-64 years old, followed by the age group of 65-84 year olds (See Graph 3.1).

3.1: Amputations by Age Group, Massachusetts (2014)



Source: Healthcare Cost and Utilization Project HCUPnet database
<http://hcupnet.ahrq.gov/>

3.2: Amputations by Sex, Massachusetts (2014)

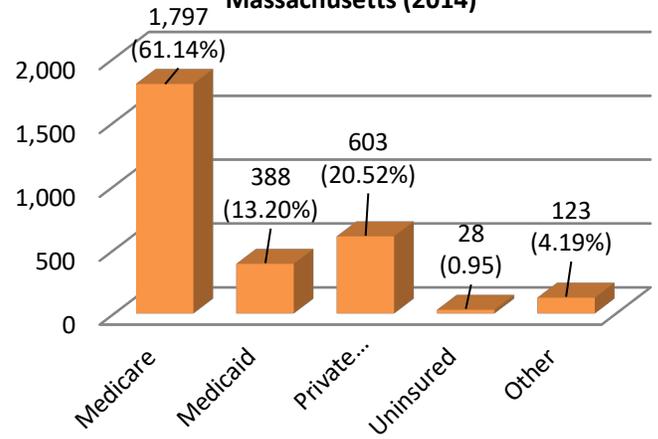


There were nearly 2.5 times more amputations performed on male patients in Massachusetts than on female patients (See Graph 3.2).

Source: Healthcare Cost and Utilization Project HCUPnet database
<http://hcupnet.ahrq.gov/>

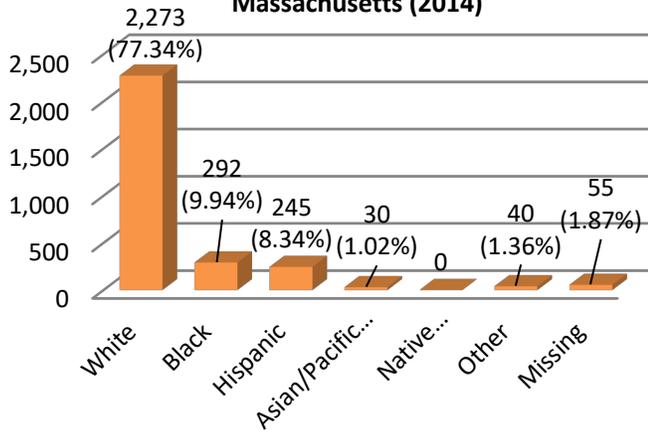
Medicare recipients (61.14%) ranked as the most common group to have an amputation procedure, followed by private insurance (20.52%) (See Graph 3.3).

3.3: Amputations by Payer Type, Massachusetts (2014)



Source: Healthcare Cost and Utilization Project HCUPnet database
<http://hcupnet.ahrq.gov/>

3.4: Amputations by Race/Ethnicity, Massachusetts (2014)



We can see that the African American population of Massachusetts bears the heaviest burden of amputation (0.085% of the African American population underwent amputations). This is evident when compared with the percentage of the white population that underwent amputations (0.036%), and with amputations in the state's population as a whole (0.046%). (See Graph 3.4)

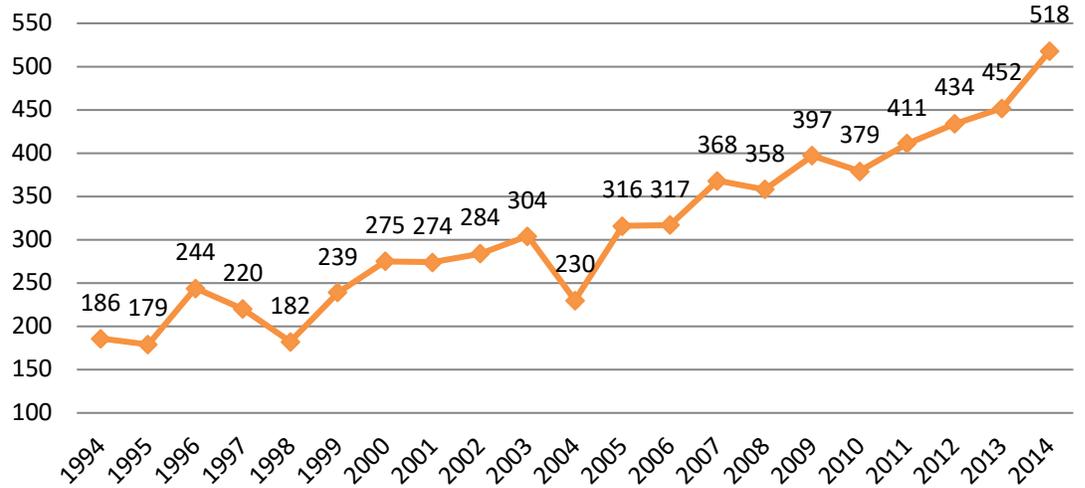
Source: Healthcare Cost and Utilization Project HCUPnet database
<http://hcupnet.ahrq.gov/>

* According to Census Bureau estimation data (<http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?sr=c=bkmk>) the population of Massachusetts in 2012 had 6,349,097 citizens and consisted of 6,267,286 white residents and 343,454 African American residents.

4. DIABETES TRENDS

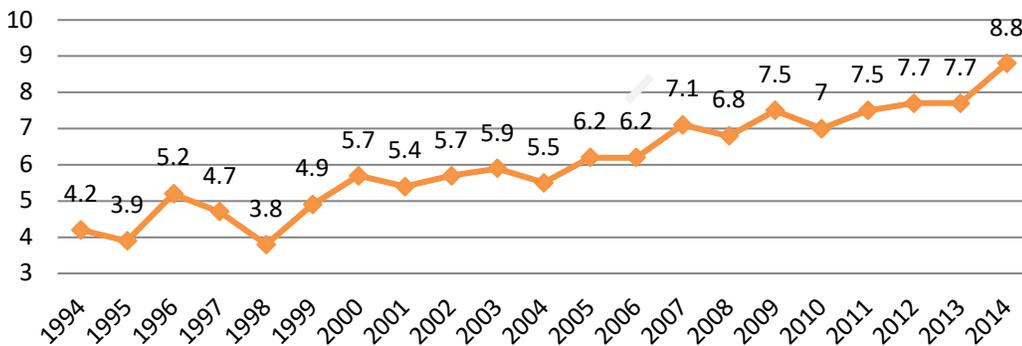
**4.1: Diabetes Trends (in thousands; 18+),
Massachusetts (1994-2014)**

In 2014, a total of 518,771 Massachusetts residents indicated that they had been diagnosed with diabetes at some point in their lives. The prevalence of diabetes in the population of Massachusetts increased 178.5% from 1994 to 2014. (See Graph 4.1)



Source: CDC Behavioral Risk Factor Surveillance System <https://gis.cdc.gov/grasp/diabetes/DiabetesAtlas.html>

**4.2: Existing Diabetes Cases per 100 Adults (18+),
Massachusetts (1994-2014)**



The annual rate of existing cases of diabetes among adults in Massachusetts increased 109.5% from 1994 to 2014. (See Graph 4.2)

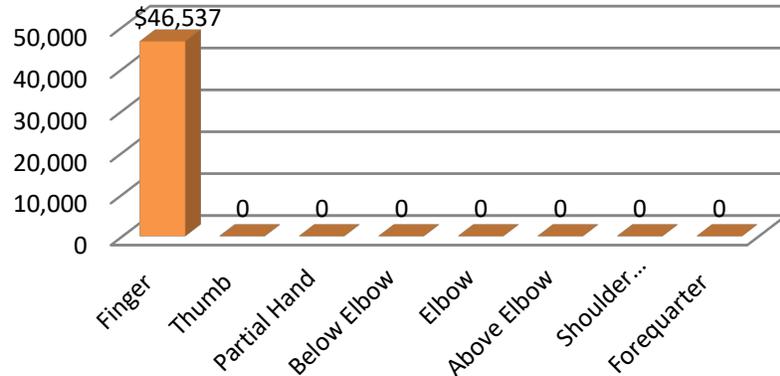
Source: CDC Behavioral Risk Factor Surveillance System <https://gis.cdc.gov/grasp/diabetes/DiabetesAtlas.html>

5. HEALTHCARE COSTS

For persons with a unilateral lower-extremity amputation, the two year healthcare costs, including initial hospitalization, inpatient rehabilitation, outpatient physical therapy, and purchase and maintenance of a prosthetic device, is estimated to be \$91,106. The lifetime healthcare cost for persons with a unilateral lower extremity amputation is estimated to be more than \$500,000 (5). It is anticipated that these healthcare costs would be higher for a person with a proximal amputation level and bilateral amputation status, due to higher prosthetic costs.

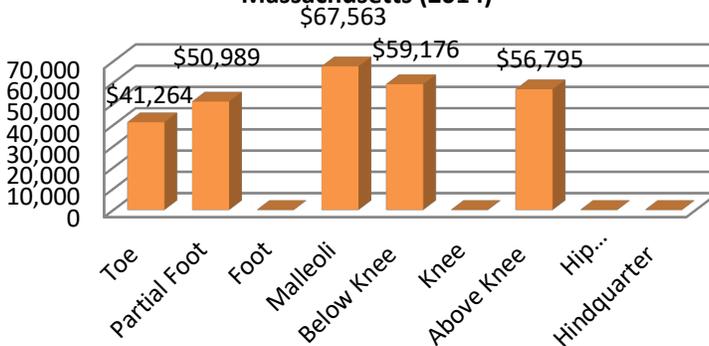
Charges represent what the hospital billed for the case, and may not represent all discharges for amputations. (See graph 5.1)

5.1: Overall Charges for Upper-Extremity Amputations, Massachusetts (2014)



Source: Healthcare Cost and Utilization Project HCUPnet database <http://hcupnet.ahrq.gov/>

5.2: Overall Charges for Lower-Extremity Amputations, Massachusetts (2014)



Charges represent what the hospital billed for the case, and may not represent all discharges for amputations. (See graph 5.2)

Source: Healthcare Cost and Utilization Project HCUPnet database <http://hcupnet.ahrq.gov/>

5. REFERENCES

1. Ziegler-Graham K, MacKenzie EJ, Ephraim PL, Travison TG, Brookmeyer R. Estimating the Prevalence of Limb Loss in the United States: 2005 to 2050. *Archives of Physical Medicine and Rehabilitation* 2008;89(3):422-9.
2. Coalition LLTFA. Recommendations from the 2012 Limb Loss Task Force: Roadmap for Preventing Limb Loss in America. [White Paper]. 2012 February 9-12.
3. Bryant PR, Pandian G. Acquired limb deficiencies. 1. Acquired limb deficiencies in children and young adults. *Archives of Physical Medicine and Rehabilitation* 2001;82(3B):00s3-s8.
4. Li Y, Burrows NR, Gregg EW, Albright A, Geiss LS. Declining Rates of Hospitalization for Nontraumatic Lower-Extremity Amputation in the Diabetic Population Aged 40 Years or Older: U.S., 1988-2008. *Diabetes Care* 2012;35(2):273-7.
5. MacKenzie EJ. Health-Care Costs Associated with Amputation or Reconstruction of a Limb-Threatening Injury. *The Journal of Bone and Joint Surgery (American)* 2007;89(8):1685.