

Chapter 2

Spine: Low Back and Neck Pain

Lumbar/low back pain and cervical/neck pain are among the most common physical conditions requiring medical care and affecting an individual's ability to work and manage the daily activities of life. Back pain is also the most common physical condition for which patients visit their doctor. In a given year, between 12% and 15% of the United States population will visit their physician with a complaint of back pain. Over the past decade, this rate has shown a slow, but steady, increase. In 2006, more than 44.4 million patients visited a physician with a complaint of back pain.

Joint pain, also called musculoskeletal pain, from mild strains to severe disabling conditions, affects many. In the United States, two major annual health care surveys are conducted by the National Center for Health Statistics to identify the incidence and prevalence of select health conditions. One of the conditions included is referred to as "joint pain." In reality it is not pain arising from a joint, but rather a musculoskeletal pain in a defined body area. Joint pain is among the most frequently reported conditions in both surveys.

Back pain, including cervical/neck pain and lumbar/low back pain, is more common than severe headaches or allergies resulting from hay fever or sinus conditions. In recent years, between 48%¹ and 60%² of adult persons in the United States reported experiencing neck or low back pain in the previous 3 months, while severe headache or migraine was reported by 13% in the most recent survey. Hay fever or sinusitis was reported by 8% and 14%, respectively, in a previous 12-month period. Back pain is also reported more frequently than other musculoskeletal pain, including pain in the arm, shoulder, hip, or knee. Low back pain prevalence increases with age, while neck pain tends to peak in the 45 to 64 age range.

Eleven percent (11%) of the population aged 18 or older report they have a physical, mental, or emotional problem or illness that precludes work; 20% of persons with either low back or neck pain report they cannot work, while 33% of persons with multiple back pain sites are unable to work.² Back pain also greatly limits the type and duration of work a person can do. Three of four persons with multiple back pain sites report work limitations.

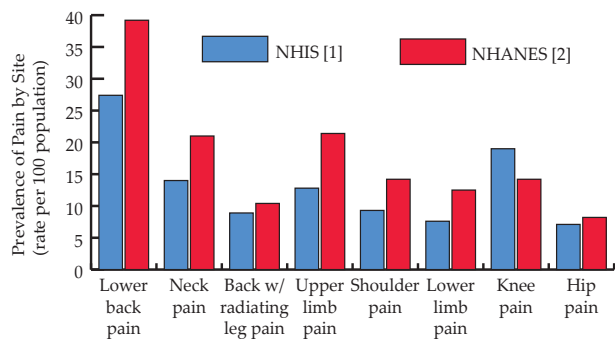
Estimated annual direct medical costs for all spine related conditions for the years 2002-2004 were \$193.9 billion, with \$30.3 billion estimated as the incremental cost directly related to spine pain. (Chapter 9: Health Care Utilization and Economic Cost of Musculoskeletal Diseases.) In addition, annual indirect costs of \$14.0 billion in lost wages were incurred as a result of spine disorders.

Back pain often results from complex conditions that are not easily understood. Many are probably related to degeneration, but the actual underlying cause of a back pain episode is often uncertain. Thus, in reviewing administrative data sets for prevalence of conditions, it is important to realize that diagnostic categories may be inaccurate, reflecting the probable diagnosis rather than the definitive diagnosis.

Section 2.1: Low Back and Joint Pain

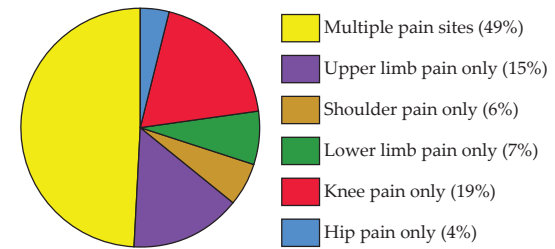
Between 2004 and 2008, 28% to 40% of people in the United States report they experienced low back pain in a previous 3-month period in the two self-reported health condition national health surveys. (Tables 2.1 and 2.2 and Graph 2.1.1) Among those persons reporting low back pain, one-fourth to one-third (26% to 33%) also experienced pain radiating into the leg. An additional 14% to 21% of persons reported

Graph 2.1.1: Prevalence of Self-Reported Joint Pain by Site for Persons Aged 18 and Over in Two National Health Surveys, United States 1999-2007



[1] Source: National Center for Health Statistics, National Health Interview Survey, Adult Sample Level File, 2007
 [2] Source: National Center for Health Statistics, National Health and Nutrition Examination Survey Data, 1999-2004

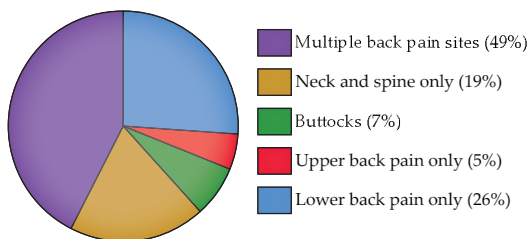
Graph 2.1.3: Distribution of Joint Pain Other than Back Pain by Site for Persons Aged 18 and Over, United States 1999-2004



Source: National Center for Health Statistics, National Health and Nutrition Examination Survey, 1999-2004.

experiencing neck pain. Overall, about one in two persons report experiencing back pain at least once a year. This is a greater rate of pain than is reported for hips, knees, legs, shoulders, and the upper limb (arm, elbow, wrist, and hands). Approximately one-half of all persons reporting joint pain experience it in more than one site. This is true for persons reporting back pain and for persons reporting joint pain other than back pain. The most frequently reported single site of joint pain is in the lower back. (Graph 2.1.2)

Graph 2.1.2: Distribution of Back Pain by Site for Persons Aged 18 and Over, United States 1999-2004



Source: National Center for Health Statistics, National Health and Nutrition Examination Survey, 1999-2004.

Back pain is reported by slightly higher rates among females than among males. Back pain is reported in the highest rate by persons over the age of 65 and lowest by those aged 18 to 44. Among racial groups, back pain is reported at the highest rate by those reporting an Other race, and lowest by those of the Asian race. (Tables 2.1, 2.2, 2.3 and 2.4) Back pain is not selective, but is a major health concern for persons of all ages and ethnic

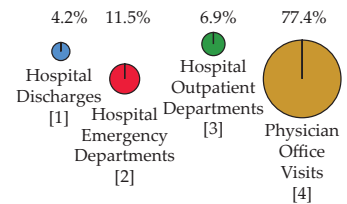
backgrounds in the United States. On average, 4% to 5% of all annual health care visits to physicians, emergency departments, outpatient clinics, and hospitals are for treatment of back pain.

The epidemiology of low back pain is not well understood and the overall prevalence, as supported by health care assessment databases, remains unclear. In 2006, 45.1 million patient visits to hospitals and physician offices had low back pain as the first diagnosis. More than 3 out of 4 visits were to a physician's office, but 4% entailed hospitalization. (Tables 2.5 and 2.5a and Graph 2.1.4) The two major diagnostic categories in patients with low back pain are disc degeneration and "back injury."

The most common diagnosis in patients with low back pain is disc degeneration.

Until recently, degenerative back pain was thought to be primarily the result of use or wear and tear. Recent studies, however, have shown a strong genetic link.³ Intervertebral disc degeneration is a common and natural process of the human spine.

Graph 2.1.4: Distribution of Health Care Visits for Low Back Pain, United States 2006/2007



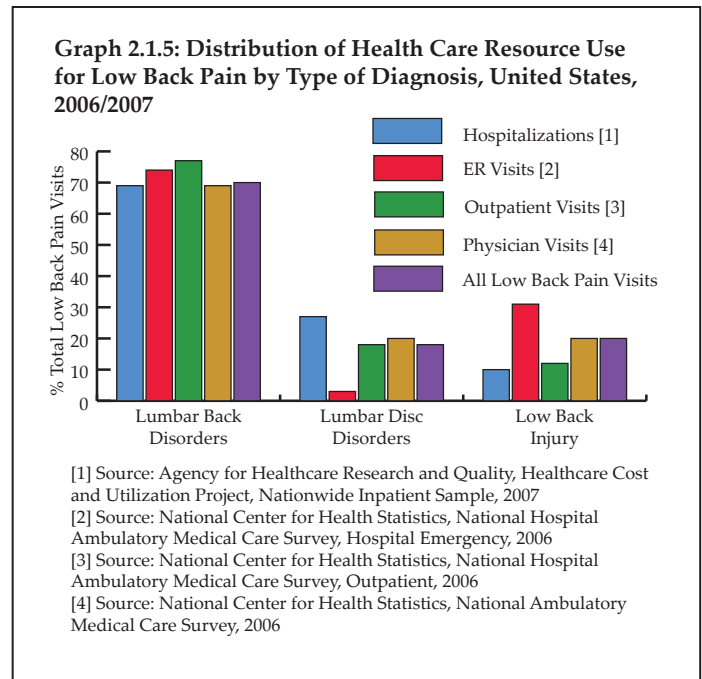
[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007
 [2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006
 [3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006
 [4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Degeneration occurs gradually with aging and can alter the biomechanics and function of the spine. Although these changes go unnoticed in many persons, in others they manifest in back pain and sometimes even neurological compromise.

In this discussion we are dividing the diagnostic codes into three groups: back disorders, disc disorders, and back injuries. This approach was chosen to allow comparison to earlier editions of this text. Back disorders include inflammatory spine conditions, spondylosis, spinal stenosis, lumbago, sciatica, backache, and disorders of the sacrum (ICD-9-CM codes 720, 721, and 724). Disc disorders include herniations, disc degeneration, and post laminectomy syndromes (ICD-9-CM code 722). Back injuries include fractures, dislocation, and sprains (ICD-9-CM codes 805, 806, 839, 846, and 847). This division, while useful in analyzing the databases, may not always accurately reflect the primary diagnosis. Further there is some overlap. For example, a patient with back pain of unknown origin could be given a diagnosis of lumbago, placing him or her in the back disorder category; a diagnosis of disc degeneration, falling into the disc disorder category; or a diagnosis of back strain, falling into the back injury category. Unfortunately, databases do not permit diagnostic verification, and sometimes a diagnosis is provided primarily for reimbursement purposes.

Back disorders accounted for 70% of 2006 low back pain health care resource visits. Hospital emergency room and outpatient hospital visits for back disorders accounted for more than three-quarters of back pain visits in 2006, and 69% of hospitalizations were for back disorders.

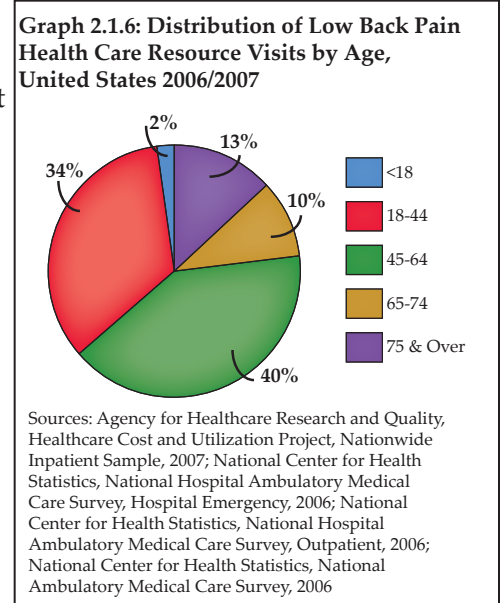
Disc disorders, which include disc displacement (herniation) and degeneration, were diagnosed in about one-half (18%) of the remaining low back pain resource visits. Disc disorders comprised 27% of the hospitalizations in 2006, but only 3% of emergency room visits.



Back injury, which includes fractures, sprains, and strains, often reported as caused by over-exertion or overuse, accounted for 20% of low back pain resource visits in 2006. Note that diagnoses equate to more than 100%, indicating multiple diagnoses for some patients. Back injuries accounted for 32% of emergency room visits in 2006, but only 10% of hospitalizations. (Table 2.5a and Graph 2.1.5)

The incidence of low back pain is greatest in persons of young adult and middle age. In 2006, 74% of all health care visits for low back pain were made by persons between the ages of 18 and 64.

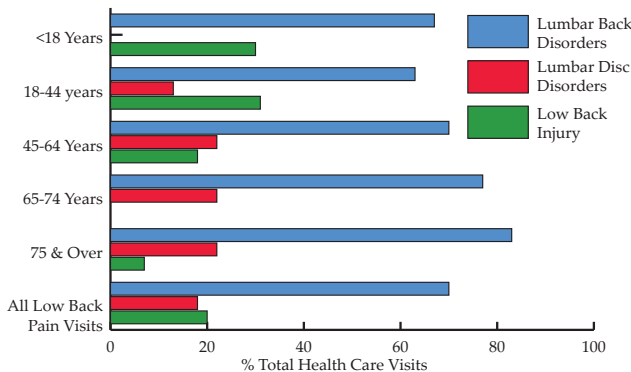
(Table 2.5 and Graph 2.1.6) Low back pain in this group is



often accompanied by reduced ability to work or inability to work at all. The socioeconomic impact of low back pain, including both direct and indirect costs of health care and disability attendant to the disorder, has been estimated to exceed \$100 billion each year.⁴

Back disorders are found more frequently among persons aged 75 and over than in any other age group, accounting for 83% of health care visits in this age group in 2006. (Table 2.5a and Graph 2.1.7) This is probably a reflection of the prevalence of spinal stenosis in elderly patients. Among the small percentage of persons with low back pain who are younger than 18, back disorders represented 67% of their visits; the balance of visits for low back pain among the young were due to back injuries. Disc herniations and disc degeneration are rare in this age group. Lumbar back injuries accounted for 31% of the health care visits among persons aged 18 to 44, the highest proportion of all age groups. Disc disorders were seen in 22% of persons over the age of 45 in 2006.

Graph 2.1.7: Distribution of Health Care Resource Use for Low Back Pain by Type and Age, United States 2006/2007

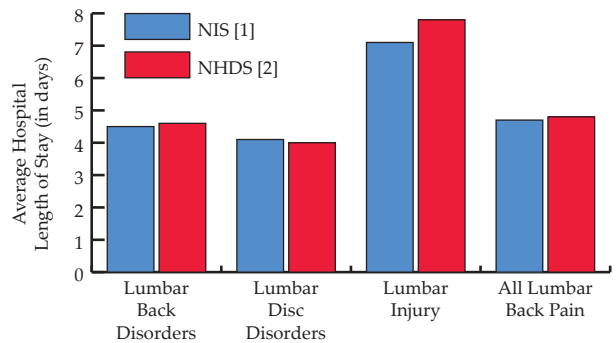


Sources: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006; National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

The average age of persons hospitalized in 2007 for low back pain was 60.5 years. This compares to an average age of 42.1 years for persons visiting an emergency department, 48.8 years for visits to an outpatient department, and 51.4 years for visits to a physician. (Table 2.5)

Persons hospitalized for low back pain in 2007 spent an average of nearly 5 days in the hospital. (Table 2.8 and Graph 2.1.8) Persons hospitalized for lumbar back injuries were hospitalized for the longest period of time, an average of more than 7 days.

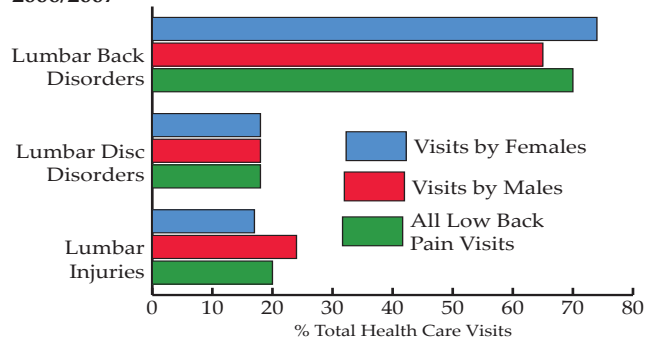
Graph 2.1.8: Average Length of Hospital Stay for Lumbar Spine Diagnosis, United States 2006/2007



[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007
 [2] Source: National Center for Health Statistics, National Hospital Discharge Survey, 2006

Low back pain is found more frequently among females than males, with females representing 56% of the health care visits in 2006. Males were seen more often for low back injuries (24% of visits) while 18% of both males and females were diagnosed with disc disorders; 74% of the female visits for low back pain were diagnosed as back

Graph 2.1.9: Distribution of Health Care Resource Use for Low Back Pain by Type and Gender, United States, 2006/2007



Sources: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006; National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

disorders. Again, this is probably a reflection of the prevalence of spinal stenosis. (Table 2.5 and Graph 2.1.9)

Overall, lumbar/low back pain accounted for 1 in 25 health care resource visits in 2006, a proportion that has been steady for the past several years. The staggering impact of low back pain on both the health care resources in the United States and the disability inflicted on the individual is difficult to fully quantify.

Section 2.2: Cervical/Neck Pain

Cervical/neck pain is a very common reason for visiting a doctor. In 2006, 13.2 million patient visits, or more than 1% of all health care visits to hospitals and physician offices, were for neck pain. Three out of four (75%) of the visits were to physician offices, while only 4% of patients with cervical/neck pain were hospitalized. (Table 2.6a

and Graph 2.2.1)

In presenting health care resource utilization for cervical pain, three categories of cervical pain are addressed. One is labeled cervical disc disorders, and includes disc displacements, herniations,

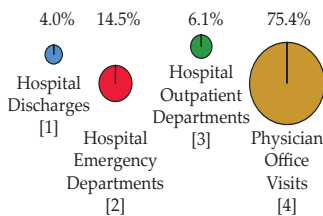
and disc degeneration (ICD-9-CM code 722). A second group is cervical injuries, and includes sprains, strains, and fractures (ICD-9-CM codes 805, 806, 839, and 847). A third group, referred to as cervical disorders, includes pain caused by other disease entities, including cervical spondylosis and stenosis (ICD-9-CM codes 721 and 723).

Cervical disorders accounted for 58% of health care visits for upper back pain in 2006. (Table 2.6a) Patients with cervical disorders are treated primarily in outpatient settings, accounting for 67% of cervical pain patient visits in hospital outpatient settings and 65% of physician office visits.

Cervical disc disorders accounted for only 14% of all neck pain health care visits in 2006, and were seen primarily in physicians' offices and hospital outpatient clinics. (Table 2.6a and Graph 2.2.2) Neck injuries accounted for 28% of all neck pain. This is a higher percentage than found in low back pain injuries. The majority of patients with cervical injuries were treated in an outpatient setting, and accounted for 69% of all emergency department visits for cervical/ neck pain.

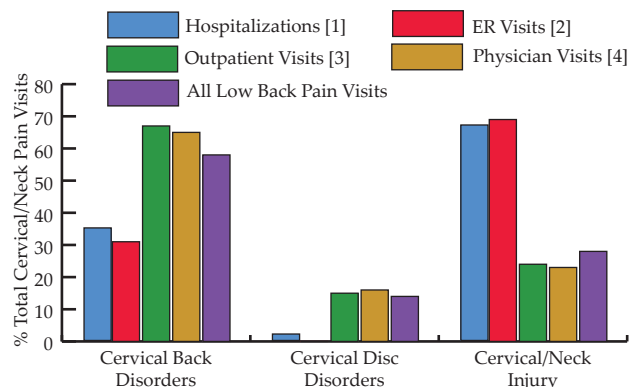
Inpatient care for cervical/neck pain is, on average, utilized primarily by older persons. The average age for persons hospitalized for cervical/neck pain in 2007 was 57.0 years, with persons having a neck injury being somewhat younger at 52.0 years. (Table 2.6) The average age of persons treated in an emergency department for neck injury was 37.0 years. The overall average age of emergency

Graph 2.2.1: Distribution of Health Care Visits for Cervical/Neck Pain, United States 2006/2007



[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007
 [2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006
 [3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006
 [4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Graph 2.2.2: Distribution of Health Care Resource Use for Cervical/Neck Pain by Type of Diagnosis, United States, 2006/2007

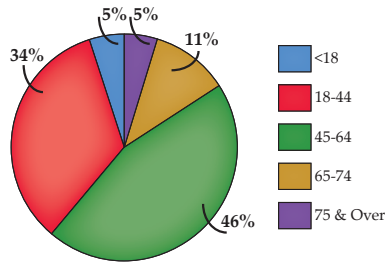


[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007
 [2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006
 [3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006
 [4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

room patients with a neck pain diagnosis was 38.0 years. Hospital outpatient and physician office patients were, on average, 47.3 and 49.5 years old, respectively.

Four out of five neck pain diagnoses (80%) in 2006 were for persons between the ages of 18 and 64.

Graph 2.2.3: Distribution of Cervical/Neck Pain Health Care Resource Visits by Age, United States 2006/2007

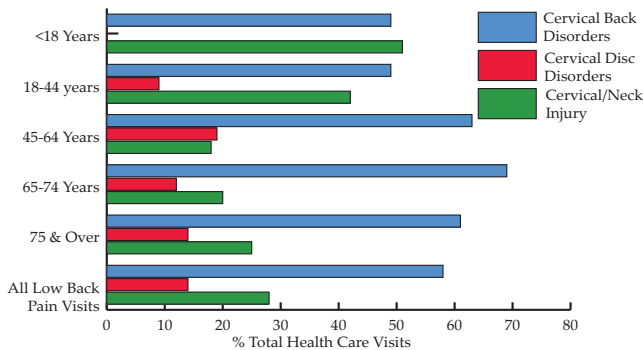


Sources: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006; National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

(Table 2.6a and Graph 2.2.3) Only 5% of patients were over the age of 75, with 5% also younger than 18 years of age. Among persons aged 18 to 44 years, cervical injuries (42%) and cervical disorders

(49%) accounted for nearly all health care visits for upper back pain. (Table 2.6a and Graph 2.2.4) Health care visits for neck injuries by persons under the age of 18 accounted for a larger share of total visits than was found in any other age group (51%). Cervical disc disorders, as the first diagnosis for neck pain, was found most frequently in persons aged 45 to 64 years.

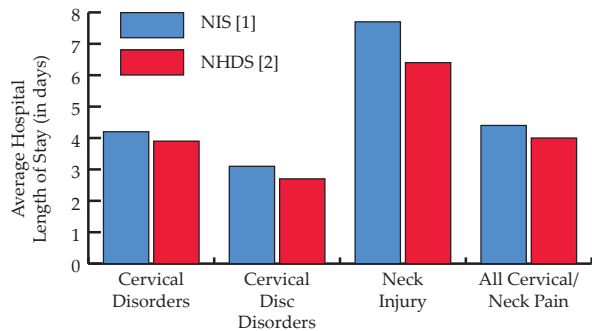
Graph 2.2.4: Distribution of Health Care Resource Use for Cervical/Neck Pain by Type and Age, United States 2006/2007



Sources: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006; National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Persons hospitalized for neck pain in 2007 spent an average of just under 5 days in the hospital. (Table 2.8 and Graph 2.2.5) Persons hospitalized for neck injuries were hospitalized for the longest period of time, an average of 8 days.

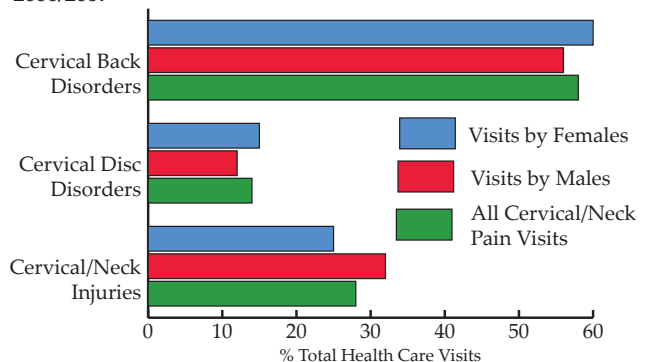
Graph 2.2.5: Average Length of Hospital Stay for Cervical Spine Diagnosis, United States 2006/2007



[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007
 [2] Source: National Center for Health Statistics, National Hospital Discharge Survey, 2006

Females accounted for 58% of the health care visits for neck pain in 2006, a slightly higher proportion than was found with low back pain. (Table 2.6a and Graph 2.2.6) Cervical disorders accounted for 60% of visits by females, with injuries accounting for 25%. Among males, 32% of health care visits for cervical/neck pain were the result of neck injuries, with cervical neck disorders accounting for 56% of the visits.

Graph 2.2.6: Distribution of Health Care Resource Use for Cervical/Neck Pain by Type and Gender, United States, 2006/2007



Sources: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006; National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Section 2.3: Burden of Back Pain

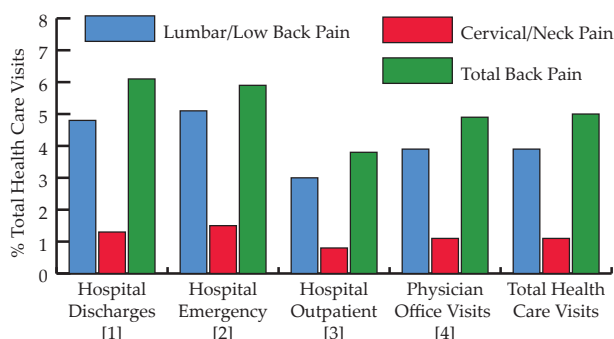
While lumbar/low back pain is more common than cervical/neck pain, together they accounted for 5%, or 1 in 20, health care visits in 2006. (Tables 2.7 and 2.7a and Graph 2.3.1) The majority of visits (77%) were physician office visits. Over the past 9 years, physician office visits for back pain have increased steadily. In 1998, 12% of the population aged 18 and over visited a physician for back pain, accounting for 32 million visits. In 2006, the proportion of the population visiting their physician for back pain had increased to 15%, and the total number of visits increased to nearly 45 million. (Table 2.9 and Graph 2.3.2)

The financial cost associated with back pain is obviously enormous and, unfortunately, rising. Greater understanding of the causes of back pain and its resultant disability is needed to thwart and reduce this rising trend. Understanding why disc degeneration causes pain in some, yet not in others, is needed to address the burden of pain and disability and the significant economic impact low back pain treatment creates on health care resources each year.

Section 2.3.1: Limitations Resulting from Back Pain

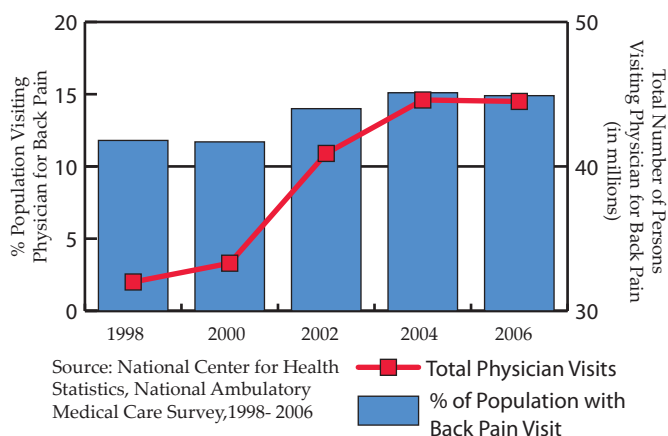
More than 1 in 10 persons (11%) over the age of 18 in the United States report health care problems limit their ability to work, and one in three (32%) report their health limits the amount or type of work they can perform. An additional 8% of the population report that their ability to walk is impacted by their health. Pain is a major cause of these limitations. Back pain is cited more frequently than any other pain entity (e.g., head, shoulder, leg, foot) by persons reporting work or walking limitations. (Table 2.10 and Graph 2.3.3)

Graph 2.3.1: Spine Diagnosis Visits as a Proportion of All Health Care Visits, United States 2006/2007



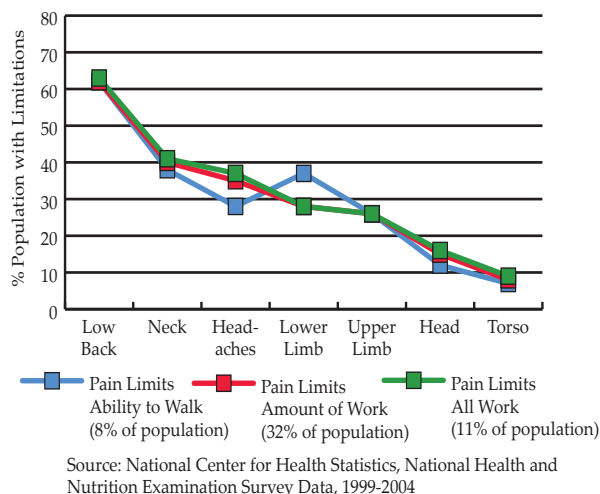
[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007
 [2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006
 [3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006
 [4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Graph 2.3.2: Trend in Number and Proportion of Population with Physician Visit for Back Pain, United States 1998-2006



Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 1998-2006

Graph 2.3.3: Proportion of Persons Aged 18 and Over Reporting Pain Limits Ability to Walk or Work by Pain Site, United States 1999-2004



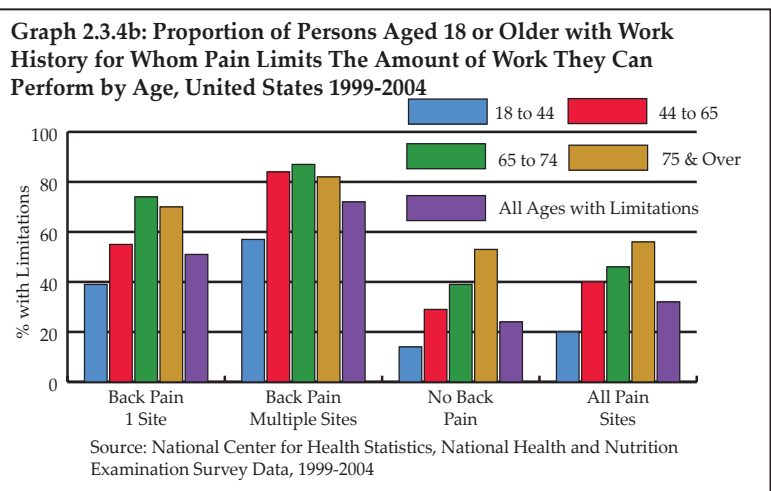
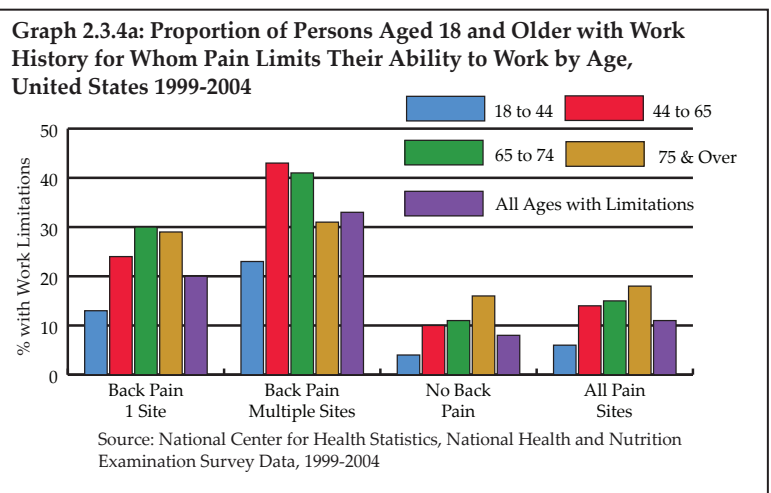
Between 1999 and 2004, an average of 62% of the population who reported work or walking limitations also reported they had low back pain.

During this same time period, 38% to 41% reported they had neck pain. Low back pain was reported nearly twice as often as headaches or lower limb joint pain (hip, leg, foot) as the cause of work or walking limitations.

Work limitations due to back pain are reported in similar proportion by males and females. The presence of back pain in more than one site (e.g., low back, upper back, buttocks, neck, and spine) is more likely to be the cause of work limitations than back pain that is localized.

Back pain severe enough to keep people from working at any occupation is most likely to be reported by individuals aged 65 to 74, and may be the cause of involuntary early retirement. However, individuals in the prime working ages of 45 to 64 frequently report back pain as the cause of their inability to work at all; they also report that the pain places limitations on the amount or type of work they can do in nearly the same proportion as those aged 65 and older. Overall, 14% of the population aged 45 to 64 reports they cannot work at all due to health limitations; among this group, 24% to 43% report back pain as the cause. This compares to only 10% of persons in this age group with total work restrictions who report they have no back pain. Among the 32% of the population reporting limitations in the amount or type of work they can perform, the differences are even greater. Between 55% and 84% report back pain, while only 29% of those with no back pain report work restrictions. (Table 2.11 and Graphs 2.3.4a-b)

In another national study in 2008, bed days and lost work days were reported for persons self-reporting back pain in the previous 3 months. Of the total 74.3 million persons reporting back pain, approximately one in two (35.0 million) reported they spent one or more days in bed due to back pain. With an average of 19.2 bed days reported, persons in the United States spent a total of 671.1 million days in bed due to back pain in 2008. In addition, 27.1 million persons reporting

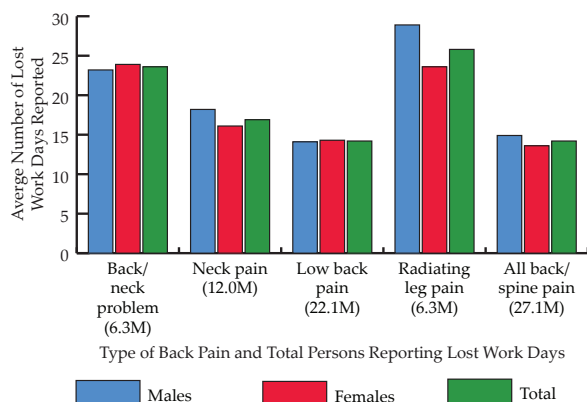


back pain also reported losing an average of 14.2 work days. (Table 2.12 and Graphs 2.3.5a-b) Hence, in 2008, an estimated 385.0 million work days were lost due to back pain.

The most severe pain, resulting in the highest average number of bed and lost work days, was reported by persons with low back pain and radiating leg pain. This group of 10.5 million persons spent an average of 34.1 days in bed and lost an average of 25.8 work days. They probably include most patients with disc herniation and symptomatic spinal stenosis.

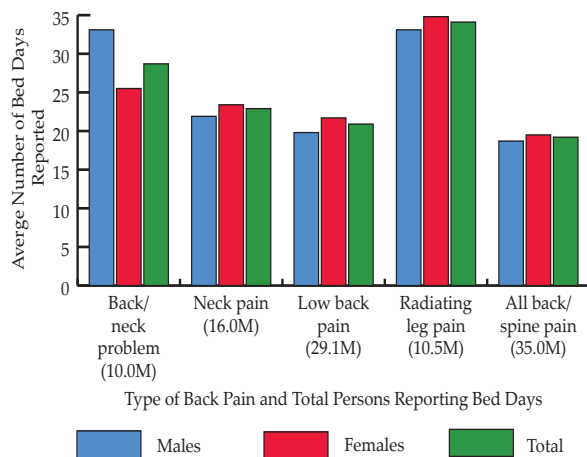
Females reported higher levels of back pain and slightly more bed days than did males, but in 2008 males reported the higher number of lost work days (14.9 vs. 13.6, respectively).

Graph 2.3.5a: Average Lost Work Days for Persons Aged 18 and Over with Work History Reporting Back Pain by Pain Site, United States 2008



Source: National Center for Health Statistics, National Health Interview Survey, 2008

Graph 2.3.5b: Average Bed Days for Persons Aged 18 and Over Reporting Back Pain by Pain Site, United States 2008



Source: National Center for Health Statistics, National Health Interview Survey, 2008

Section 2.4: Spine Procedures

While nonsurgical treatment for back pain is the treatment of choice, when back pain becomes so disabling that patients can no longer function in the activities of daily living, spine surgery may be performed.

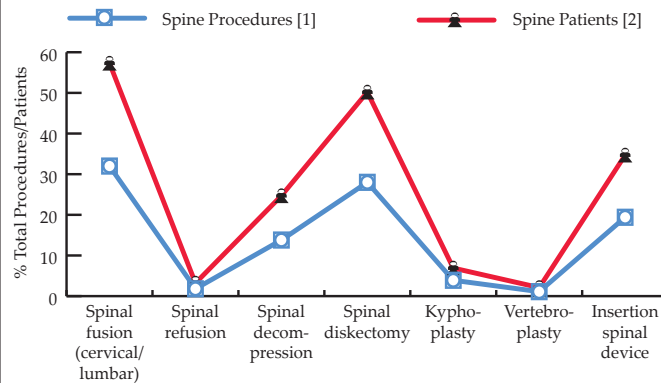
Four procedures accounted for 93% of spine procedures reported in 2007. The most frequently performed spine procedure in 2007 was a spinal fusion, accounting for 32% of spine procedures performed in an inpatient setting. Spinal diskectomy accounted for 28% of all

spine procedures performed in 2007. Both were performed on more than one-half (57% and 50%, respectively) of spine pain patients hospitalized. The remaining two top procedures performed in 2007 were spinal decompression and the insertion of a spinal device. Decompression, which may or may not be performed in conjunction with a spinal fusion, accounted for 14% of all spine procedures and was performed on one-fourth (25%) of all hospitalized spine patients. The insertion of a spinal device, which includes replacement spinal disc procedures, accounted for 19% of all procedures and was performed on one-third (34%) of all hospitalized spine patients. (Table 2.13 and Graph 2.4.1).

Section 2.4.1: Spinal Fusion

The rate of spinal fusion procedures has risen rapidly over the past several decades. Spinal fusion is performed either alone or in conjunction with decompression and/or reduction of a spine deformity. Fusion is performed on the cervical, thoracic, and lumbar regions of the spine. The increase in spinal fusion rates has been documented by several authors, with increased rates of 55% between 1979 and 1990⁵; 220% between 1990 and 2001⁶; and 250% between 1990 and 2003⁷ cited. Revision fusion rates have been reported at increased rates of 180% between 1990 and 2003.⁷

Graph 2.4.1: Spine Procedures as Proportion of Total Spine Procedures and of Spine Patients, United States 2007



[1] Total number of procedures in 2007=1.19 million.
 [2] Total number of spine procedure patients in 2007=0.66 million; multiple procedures for some patients possible.
 Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

Increased rates of spinal fusion have been noted since the 1980s. Likely explanations for these increases are advances in technology, including the development of new diagnostic techniques and new implant devices that allow for better surgical management; increased training in spinal surgery; and the aging of the population with inherent medical problems.

Lumbar spinal fusion rates have increased more rapidly than the rates for cervical or thoracic fusion and are increasingly being performed on an older population. Rates of lumbar fusion vary dramatically among geographic regions, hospitals, and even among surgeons in the same hospital, indicating that the outcomes and indications for lumbar fusion vary.⁸ The primary diagnosis for several conditions have shown increased rates of fusion, with disc degeneration outpacing those of spondylolysis/ spondylolisthesis and spinal stenosis.⁶

Since the mid-1980s, cervical spinal fusion rates have been reported at 25% of the rates of lumbar fusion. Wide geographic variation is found in the rates of both cervical and lumbar fusion.⁹ However, cervical rates may have been affected by reporting procedures, because it was not until 1995 that multilevel spinal procedures were reported with more than one procedural code. Between 1985 and 1996, cervical spinal fusion procedures were reported at an increased rate of 310%, and the same author reports increased rates of 286% in lumbar and 358% in thoracic fusion rates.⁹

by 73%. (Table 2.14 and Graph 2.4.2) This growth reflects a primary fusion procedure rate per 100,000 persons aged 18 and over of 115.5 in 1998 and 178.5 in 2006. Although data from 2004 showed a slight decline from 2002 in this growth curve, the rate spiked again in 2006. Whether the decline is an indication of a slowing of the spinal fusion procedures rate or an anomaly in the 2004 data is unknown.

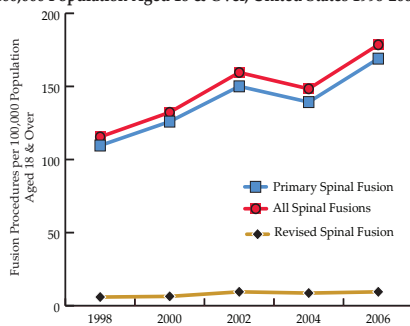
Between 1998 and 2006, the rate of revision fusion procedures increased by 69%. The revision rate over this 9-year period fluctuated, but showed overall continued growth. In 1998, revision spinal fusions were performed at a rate of 5.9 per 100,000 persons aged 18 and over. By 2006, the rate had increased to 9.5 per 100,000 persons.

During this 1998 to 2006 period, the cost of performing spinal fusion procedures increased by 191% for a primary spinal fusion and 272% for a revision spinal fusion procedure. In 2006, the mean hospital cost, as reported in the National Inpatient Sample, for a primary spinal fusion was \$77,000 and a revision spinal fusion was \$96,000. Significant cost increases were seen between 2004 and 2006, an indication of the rising cost of medical care.

Combining the increased rate of procedures with the increasing cost of performing them, the estimated cost of primary spinal fusion procedures increased by 408% between 1998 and 2006, totaling \$27.2 billion in 2006. An additional \$1.9 billion was spent on revision spinal procedures, an increase of 535% between 1998 and 2006. (Table 2.14 and Graph 2.4.3)

Mean charges for lumbar spinal fusion procedures in 2007 were \$87,100, based on an average hospital stay of 4.4 days. The average cost of a cervical spinal fusion procedure was nearly 40% less, \$54,500, based on an average hospital stay of 3.2 days. (Table 2.16)

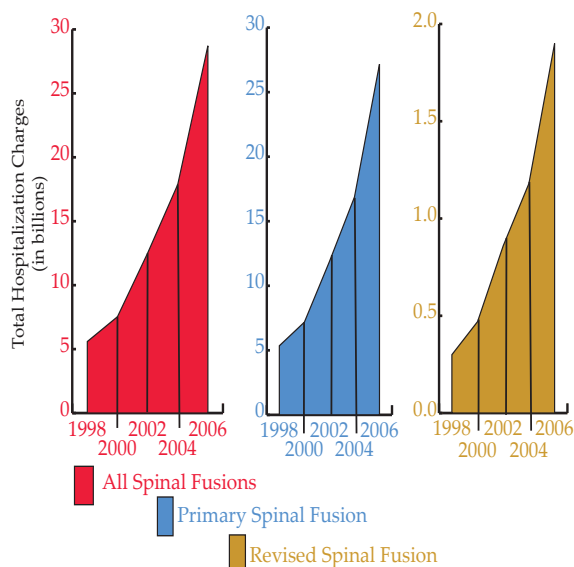
Graph 2.4.2: Nine-Year Trend in Spinal Fusion Procedures per 100,000 Population Aged 18 & Over, United States 1998-2006



Sources: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1998-2006, and U.S. Census population estimates published July 1st of each year.

In more recent years, 1998 to 2006, primary spinal fusion rates based on the Nationwide Inpatient Sample (NIS) have shown a continued rise, increasing

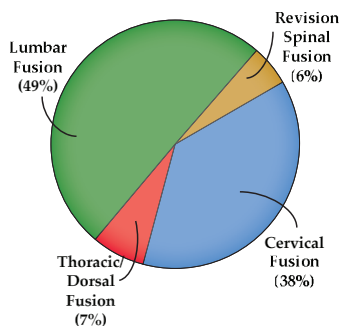
Graph 2.4.3: Nine-Year Trend in Total Hospitalization Charges for Spinal Fusion Procedures, United States 1998-2006



Sources: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1998-2006.

In 2007, 380,000 spinal fusion procedures were performed on patients with lumbar/low back pain or cervical/neck pain. The number of primary lumbar fusion procedures was slightly higher than cervical procedures (197,000 versus 152,000, respectively), accounting for 49% versus 38% of all fusion procedures. (Table 2.15 and Graph 2.4.4) Because many more patients are operated on for low back pain problems requiring decompression only (e.g., disc herniations, some spinal stenosis), the percentage of patients who were fused in the low back group was lower (10.4%) than in the neck group (30.2%). Spinal fusion procedures were performed about equally on males and females;

Graph 2.4.4: Distribution of Spine Fusion Procedures by Spine Section, United States 2007



Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

however, patients between the ages of 18 and 64 were significantly more likely to have the procedure than those under age 18 and those 65 years and older. (Table 2.16)

Spinal fusion is most frequently performed following a diagnosis

of cervical disc displacement, accounting for 14.3% of first diagnosis of spinal fusion patients in 2007. (Table 2.17) Lumbar disc degeneration and lumbar disc displacement were the second and third most frequent first diagnosis, accounting for 12% and 10% of first diagnoses, respectively.

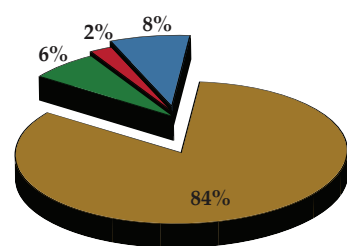
The introduction of motion preservation options in the past few years is predicted to have an impact on spinal fusion as the preferred treatment option.

Section 2.4.2: Ruptured Spine Diagnosis and Discectomy Procedures

A discectomy was the second most frequent inpatient spine procedure performed in 2006, accounting for nearly 331,300 procedures. Nine out of 10 (90%) of discectomy procedures were performed on patients with a ruptured disc diagnosis, primarily for a lumbar disc. (Tables 2.18 and 2.19) The average age at which a discectomy was performed in 2006 was 51.7 years. Patients with a discectomy performed spent a mean of 2.8 days in the hospital, at a mean cost of \$50,890 per patient. Total health care cost for inpatient discectomy procedures in 2006 was \$16.8 billion.

Although the majority of persons with a ruptured disc diagnosis undergoing surgery were hospitalized in 2006, the health care impact and cost of a ruptured,

Graph 2.4.5: Health Care Visits for Ruptured Spine by Location, United States 2006/2007



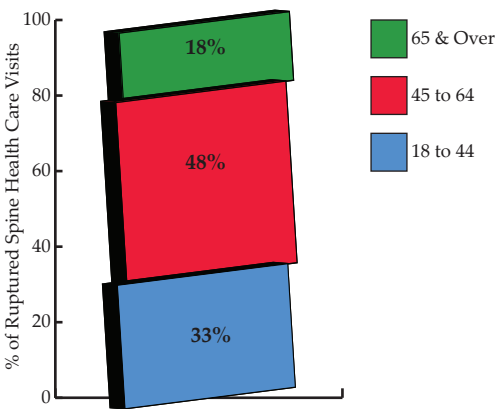
- [1] Hospital discharges [1]
- [2] Hospital Emergency Departments [2]
- [3] Hospital Outpatient Departments [3]
- [4] Physician Office Visits [4]

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007
 [2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006
 [3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006
 [4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

or herniated, disc is much more severe due to only 8% of patients with this diagnosis being hospitalized. The majority (84%) of the total 4.8 million persons diagnosed with a ruptured disc in 2006 were seen in a physician's office. (Table 2.18 and Graph 2.4.5) A ruptured disk occurs primarily between the ages of 18 and 64 (81% of diagnoses); rarely does it occur in persons under the age of 18 or over the age of 65. (Graph 2.4.6)

The mean number of diskectomy procedures

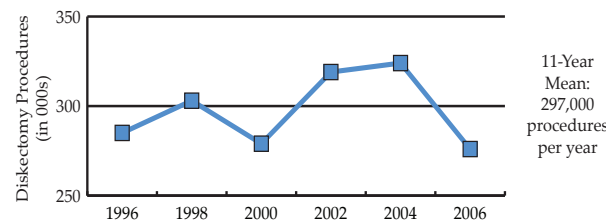
Graph 2.4.6: Health Care Visits for Ruptured Spine by Age, United States 2006



Sources: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006; National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006; National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

reported by the National Hospital Discharge Survey over the past 11 years is 297,000 per year, with a range of 279,000 to 324,000 fluctuating around this mean. (Table 2.20 and Graph 2.4.7)

Graph 2.4.7: Ten Year Trend in Spinal Diskectomy Procedures, United States 1996-2006



Source: National Center for Health Statistics, National Hospital Discharge Survey, 1996-2006

Section 2.5: Neuromusculoskeletal Conditions

The spinal column is an extremely complex biomechanical structure with intimate neurological, muscular, and ligamentous interfaces. Functional and structural disorders of the spine often produce symptomatology affecting contiguous structures and regions. The resultant types of disorders affecting multiple domains have been referred to as neuromusculoskeletal or spine-related disorders. Included in this group are spinal subluxations, spinal sprains and strains, cervical, thoracic, lumbar, and pelvic symptoms and ill-defined conditions; and spine-related (cervicogenic) headaches. These types of conditions are prevalent, disturbing, and compromising to patients' functional abilities. In 2007, over 152.7 million patient visits had a diagnosis of a neuromusculoskeletal condition, either as a primary diagnosis or secondary diagnosis. In part, the reason for the ill-defined nature of some of these conditions may lie in the intrinsic complexity of the spinal column and the multiple structures and systems with which it interfaces. For example, individuals with chronic lumbar or pelvic pain may also complain of depression, digestive problems, and sexual dysfunction. Many patients with chronic cervical symptoms suffer from headaches as well.

Since 1999, neuromusculoskeletal complaints have shown a steady increase in incidence. This increase may be associated with the increasingly sedentary lifestyle of Americans and the marked increase in occupational and recreational use of computers with attendant ergonomic risks. The proportionate rise in cervical and thoracic and lumbar spine symptoms and ill-defined conditions has been similar in distribution since 1999. In 2007, the number of patient visits with a diagnosis related to cervical spine symptoms and ill-defined conditions (64.3 million) were approximately equal in number to visits with a diagnosis for similar lumbar spine disorders (64.1 million). In 2007, thoracic symptoms and ill-defined disorders

diagnoses numbered 49.0 million, while pelvic disorders diagnoses numbered 26.6 million. Neuromusculoskeletal diagnoses related to the head and headaches numbered 22.1 million. Females are more prone than males to these spine-related disorders across a range of categories.

Section 2.6: Economic Cost of Spine Conditions

Chapter 9 summarizes the cost of musculoskeletal conditions based on analysis of the Medical Expenditures Panel Survey (MEPS) from 1996 to 2006. The MEPS, which began in 1996, is a set of large-scale surveys of families and individuals, their medical providers (doctors, hospitals, pharmacies, etc.) and their employers. MEPS collects data on the specific health services that Americans use, how frequently they use them, the cost of these services, and how they are paid for, as well as data on the cost, scope, and breadth of health insurance held by and available to U.S. workers. Currently MEPS collects data from two major components: households and insurance companies. The Household Component (MEPS-HC) provides data from individual households and their members, which is supplemented by data from their medical providers. The Insurance Component (MEPS-IC) is a separate survey of employers that provides data on employer-based health insurance. MEPS also includes a Medical Provider Component (MEPS-MPC), that covers hospitals, physicians, home health care providers, and pharmacies identified by MEPS-HC respondents. Its purpose is to supplement and/or replace information received from the MEPS-HC respondents.¹⁰

As with the National Health Interview Survey (NHIS), data in the household component is self-reported. Self-reported data from available databases indicate a range in the prevalence of all specific conditions. As noted earlier in this chapter, more than 58.4 million persons visited their physician, an emergency room, hospital outpatient center, or were hospitalized with a

complaint of back pain in 2006, while 74.3 persons self-reported low back or neck pain in 2008 in the NHIS. Economic projections are based on the MEPS self-reported spine conditions, or 32.7 million incidences.

The estimated annual cost for medical care of spine conditions, discussed in Chapter 9, both as a primary condition and secondary to another condition, in 2004 was \$193.9 billion or an average of \$5,923 for each of the 32.7 million persons who reported having a spine condition. Of this total, \$30.3 billion is estimated as the incremental cost directly related to spine conditions. A breakdown of the \$193.9 billion cost due to spine conditions shows 34% for ambulatory care, 32% for emergency room or inpatient care, 20% for prescription drugs, and 14% for other expenses. The cost of spine conditions, in 2004 dollars, rose from \$130.2 billion in 1996 to \$193.9 billion in 2004, an increase of 49%. The increasing cost of prescription drugs accounts for the largest percentage of this total cost increase, rising from 13% of total cost to 20% over the 9-year period. Earnings loss, or indirect costs, due to spine conditions for persons between the ages of 18 to 64 years with a work history was estimated at \$22.4 billion per year between 2000 and 2004.

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Section 2.7: Spine: Low Back and Neck Pain Data Tables

Table 2.1: Self-Reported Prevalence of Joint Pain by Site of Joint and Selected Demographic Characteristics for Persons Aged 18 and Over, National Health Interview Survey, United States 2008

		Prevalence of Pain by Site (rate per 100 persons)							
		Lower Back [1]	Neck [2]	Back w/ Radiating Leg Pain [3]	Upper Limb [4]	Shoulder [5]	Lower Limb [6]	Knee [7]	Hip [8]
Gender	Male	25.1	11.4	7.8	10.7	9.4	6.4	17.6	5.1
	Female	29.5	16.4	10.0	14.7	9.2	8.7	20.3	9.0
Age	18-44 years	24.5	12.7	5.9	7.5	5.2	4.8	12.1	3.5
	45-64 years	29.4	16.5	11.8	16.7	12.2	10.1	24.5	9.2
	65-74 years	32.0	13.2	13.2	21.0	15.4	10.7	28.1	13.8
	75 & over	31.4	11.9	10.2	19.7	15.5	10.2	27.7	13.2
Race	White	28.4	14.6	9.3	13.6	9.8	8.0	19.6	7.8
	Black	23.4	10.4	7.3	8.3	7.3	6.2	18.9	4.6
	Asian	17.3	8.8	4.4	6.3	4.7	2.8	8.4	1.6
	Other	34.5	19.2	12.8	20.1	12.2	10.0	20.0	8.5
Total		27.4	14.0	8.9	12.8	9.3	7.6	19.0	7.1

[1] "During the PAST THREE MONTHS, did you have ...Low back pain?"

[2] "During the PAST THREE MONTHS, did you have ...Neck pain?"

[3] If low back pain, "Did this pain spread down either leg to areas below the knees?"

"DURING THE PAST 30 DAYS, have you had any symptoms of pain, aching, or stiffness in or around a joint?"

[4] Hand, wrist, fingers

[5] Shoulder

[6] Ankle, foot

[7] Knee, right/left

[8] Hip, right/left

Source: National Center for Health Statistics, National Health Interview Survey, Adult Sample Level File, 2008

Table 2.2: Self-Reported Prevalence of Joint or Back Pain by Site and Selected Demographic Characteristics for Persons Aged 18 and Over, United States 1999-2004

		Prevalence of Pain by Site (rate per 100 persons)							
		Lower		Back w/ Radiating		Upper		Lower	
		Back [1]	Neck [2]	Leg Pain [3]	Limb [4]	Shoulder [5]	Limb [6]	Knee [7]	Hip [8]
Gender	Male	36.7	18.8	9.0	19.4	14.4	10.4	14.4	6.1
	Female	41.4	23.0	11.7	23.3	14.0	14.5	14.0	10.2
Age	18-44 years	38.0	19.8	8.0	15.6	10.2	9.1	10.2	4.8
	45-64 years	41.5	24.0	13.8	28.5	19.4	16.3	19.4	11.5
	65-74 years	37.0	19.9	12.1	26.6	16.7	16.5	16.7	12.2
	75 & over	39.7	17.0	10.3	26.8	17.9	16.4	17.9	14.6
Race	White	40.2	21.9	10.3	23.2	15.1	13.3	15.1	9.4
	Black/African American	36.6	16.5	11.3	14.3	11.8	11.9	11.8	6.4
	Mexican American	33.3	18.2	9.1	17.6	9.6	8.6	9.6	4.2
	Other Hispanic	31.6	16.4	9.2	18.6	11.8	8.5	11.8	4.2
	Other	43.8	25.2	12.5	20.3	15.0	11.8	15.0	5.9
Total		39.2	21.0	10.4	21.4	14.2	12.5	14.2	8.2

[1] "During the PAST THREE MONTHS, did you have ...Low back pain?"

[2] "During the PAST THREE MONTHS, did you have ...Neck pain?"

[3] If low back pain, "Did this pain spread down either leg to areas below the knees?"

"DURING THE PAST 30 DAYS, have you had any symptoms of pain, aching, or stiffness in or around a joint?"

[4] Hand, wrist, fingers

[5] Shoulder

[6] Ankle, foot

[7] Knee, right/left

[8] Hip, right/left

Source: National Center for Health Statistics, National Health and Nutrition Examination Survey, 1999-2004

Table 2.3: Distribution of Back Pain by Site and Selected Demographic Characteristics for Persons Aged 18 and Over, United States 1999-2004

		Proportion of Persons Reporting Back Pain				
		<u>Lower Back</u>	<u>Upper Back</u>		<u>Neck and</u>	<u>Multiple Back</u>
		<u>Pain Only [1]</u>	<u>Pain Only [2]</u>	<u>Buttocks [3]</u>	<u>Spine Only [4]</u>	<u>Pain Sites [5]</u>
Gender	Male	28%	5%	6%	22%	40%
	Female	25%	5%	9%	17%	44%
<hr/>						
Age	18-44 years	28%	6%	4%	20%	42%
	45-64 years	23%	5%	10%	18%	44%
	65-74 years	26%	4%	12%	21%	38%
	75 & over	33%	6%	11%	14%	36%
<hr/>						
Race	White	25%	5%	7%	20%	43%
	Black/African American	39%	3%	7%	15%	36%
	Mexican American	27%	3%	8%	23%	40%
	Other Hispanic	25%	8%	8%	17%	43%
	Other	28%	3%	4%	23%	42%
<hr/>						
Total		26%	5%	7%	19%	42%

[1] "With respect to pain problem, located in ...low back pain?"

[2] "With respect to pain problem, located in ...upper back pain?"

[3] "With respect to pain problem, located in ...buttocks?"

[4] "With respect to pain problem, located in ...neck and spine?"

[5]"With respect to pain problem, located in ...multiple sites of back"

Source: National Center for Health Statistics. National Health and Nutrition Examination Survey Data, 1999-2004.

Table 2.4: Distribution of Joint Pain by Site and Selected Demographic Characteristics for Persons Aged 18 and Over, United States 1999-2004

		Proportion of Persons Reporting Joint Pain (excluding back pain)					
		<u>Hip Pain Only [1]</u>	<u>Knee Pain Only [2]</u>	<u>Lower Limb Pain Only [3]</u>	<u>Shoulder Pain Only [4]</u>	<u>Upper Limb Pain Only [5]</u>	<u>Multiple Pain Sites [6]</u>
Gender	Male	3%	21%	7%	8%	16%	45%
	Female	5%	18%	7%	5%	14%	52%
Age	18-44 years	3%	22%	8%	8%	17%	42%
	45-64 years	4%	18%	6%	5%	13%	53%
	65-74 years	5%	16%	8%	5%	13%	54%
	75 & over	6%	15%	6%	5%	13%	54%
Race	White	4%	18%	7%	6%	15%	49%
	Black/African American	5%	26%	10%	7%	10%	43%
	Mexican American	3%	17%	5%	5%	19%	50%
	Other Hispanic	5%	21%	4%	9%	20%	41%
	Other	4%	15%	5%	10%	13%	52%
Total		4%	19%	7%	6%	15%	49%

[1] "With respect to pain problem, located in ...hip pain?"

[2] "With respect to pain problem, located in ...knee pain?"

[3] "With respect to pain problem, located in ...leg, foot pain?"

[4] "With respect to pain problem, located in ...shoulder pain?"

[5] "With respect to pain problem, located in ...elbow, wrist or finger pain"

[6] "With respect to pain problem, located in ...multiple joint pain sites"

Source: National Center for Health Statistics. National Health and Nutrition Examination Survey Data, 1999-2004.

Table 2.5: Prevalence of Lumbar/Low Back Disorders by Gender and Age, United States 2006/2007

	Total	Gender		Age in Years					Ave Age for Dx
		Male	Female	<18	18-44	45-64	65-74	75 & over	
Hospital Discharges [1]									
Total Number of Hospital Discharges for Low Back Disorders (in 000s)									
Back Disorders	1,312	535	777	*	224	446	236	276	62.0
Disc Disorders	521	236	283	*	127	207	85	77	57.5
Back Injury	191	87	104	*	47	41	23	46	60.6
All Lumbar/Low Back Pain (N)	1,898	805	1,091	14	379	660	321	370	60.5
Hospital Emergency Room Visits [2]									
Total Number of Emergency Room Visits for Low Back Disorders (in 000s)									
Back Disorders	3,830	1,724	2,106	124	2,029	1,195	197	285	43.5
Disc Disorders	164	69	95	*	53	55	18	29	52.6
Back Injury	1,641	738	903	97	1,011	426	52	55	38.6
All Lumbar/Low Back Pain (N)	5,199	2,355	2,844	221	2,867	1,515	261	335	42.1
Hospital Outpatient Visits [3]									
Total Number of Outpatient Department Visits for Low Back Disorders (in 000s)									
Back Disorders	2,380	958	1,421	71	860	968	219	263	50.2
Disc Disorders	556	242	314	*	165	286	42	63	52.7
Back Injury	384	189	196	33	219	102	*	*	37.6
All Lumbar/Low Back Pain (N)	3,107	1,295	1,812	103	1,165	1,278	261	300	48.8
Physician Office Visits [4]									
Total Number of Physician Visits for Low Back Disorders (in 000s)									
Back Disorders	24,067	9,820	14,258	501	6,551	10,175	2,807	4,034	53.2
Disc Disorders	6,978	3,084	3,894	23	1,599	3,383	842	1,130	54.7
Back Injury	6,889	3,769	3,120	182	3,452	2,674	272	309	43.4
All Lumbar/Low Back Pain (N)	34,945	15,529	19,416	705	10,970	14,768	3,676	4,825	51.4
Total Health Care Visits for Lumbar/Low Back Pain, 2006/2007									
Total Number of Health Care Visits for Low Back Disorders (in 000s)									
Back Disorders	31,589	13,037	18,562	703	9,664	12,784	3,459	4,858	
Disc Disorders	8,219	3,631	4,586	33	1,944	3,931	987	1,299	
Back Injury	9,105	4,783	4,323	318	4,729	3,243	364	423	
All Lumbar/Low Back Pain (N)	45,149	19,984	25,163	1,043	15,381	18,221	4,519	5,830	
Percent of Total		44%	56%	2%	34%	40%	10%	13%	
Hospital Discharges [1]	1,898	805	1,091	14	379	660	321	370	60.5
Hospital Emergency Room Visits [2]	5,199	2,355	2,844	221	2,867	1,515	261	335	42.1
Hospital Outpatient Visits [3]	3,107	1,295	1,812	103	1,165	1,278	261	300	48.8
Physician Office Visits [4]	34,945	15,529	19,416	705	10,970	14,768	3,676	4,825	51.4
All Lumbar/Low Back Pain (N)	45,149	19,984	25,163	1,043	15,381	18,221	4,519	5,830	
Percent of Total		44%	56%	2%	34%	40%	10%	13%	

* Estimate does not meet standards for reliability

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

[2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006

[3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006

[4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Table 2.5a: Prevalence Rate of Lumbar and Low Back Disorders by Gender and Age, United States 2006/2007

	Total	Gender		Age in Years				
		Male	Female	<18	18-44	45-64	65-74	75 & over
Hospital Discharges [1]								
	Proportion of Hospital Discharges for Low Back Disorders							
Back Disorders	69%	66%	71%	*	59%	68%	74%	75%
Disc Disorders	27%	29%	26%	*	34%	31%	26%	21%
Back Injury	10%	11%	10%	*	12%	6%	7%	12%
All Lumbar and Low Back Pain (in 000s)	1,898	805	1,091	14	379	660	321	370
Hospital Emergency Room Visits [2]								
	Proportion of Emergency Room Visits for Low Back Disorders							
Back Disorders	74%	73%	74%	56%	71%	79%	75%	85%
Disc Disorders	3%	3%	3%	*	2%	4%	0	0
Back Injury	32%	31%	32%	44%	35%	28%	20%	16%
All Lumbar and Low Back Pain (in 000s)	5,199	2,355	2,844	221	2,867	1,515	261	335
Hospital Outpatient Visits [3]								
	Proportion of Hospital Outpatient Department Visits for Low Back Disorders							
Back Disorders	77%	74%	78%	69%	74%	76%	84%	88%
Disc Disorders	18%	19%	17%	*	14%	22%	16%	0
Back Injury	12%	15%	11%	0	19%	8% *		*
All Lumbar and Low Back Pain (in 000s)	3,107	1,295	1,812	103	1,165	1,278	261	300
Physician Office Visits [4]								
	Proportion of Physician Office Visits for Low Back Disorders							
Back Disorders	69%	63%	73%	71%	60%	69%	76%	84%
Disc Disorders	20%	20%	20%	0	15%	23%	23%	23%
Back Injury	20%	24%	16%	26%	31%	18%	7%	6%
All Lumbar and Low Back Pain (in 000s)	34,945	15,529	19,416	705	10,970	14,768	3,676	4,825
Total Health Care Visits for Lumbar and Low Back Pain, 2006/2007								
	Proportion of Health Care Visits for Low Back Disorders							
Back Disorders	70%	65%	74%	67%	63%	70%	77%	83%
Disc Disorders	18%	18%	18%	0	13%	22%	22%	22%
Back Injury	20%	24%	17%	30%	31%	18%	8%	7%
All Lumbar and Low Back Pain (in 000s)	45,149	19,984	25,163	1,043	15,381	18,221	4,519	5,830
% by Resource								
	Total Diagnoses (in 000s)	Low Back Disorders as % of Total Diagnoses		Low Back Disorders Distribution by Resource		All Medical Conditions Distribution by Resource		
Hospital Discharges [1]	39,434	4.8%		4.2%		3.4%		
Hospital Emergency Room Visits [2]	119,192	5.1%		11.5%		10.3%		
Hospital Outpatient Visits [3]	102,208	3.0%		6.9%		8.8%		
Physician Office Visits [4]	901,954	3.9%		77.4%		77.6%		
All Lumbar/Low Back Pain Diagnoses (in 000s)	1,162,788	3.9%		45,149		1,162,788		

* Estimate does not meet standards for reliability

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

[2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006

[3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006

[4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Table 2.6: Prevalence of Neck and Cervical Spine Disorders by Gender and Age, United States 2006/2007

	Total	Gender		Age in Years					Ave Age for Dx
		Male	Female	<18	18-44	45-64	65-74	75 & over	
Hospital Discharges [1]									
Total Number of Hospital Discharges for Cervical Pain Disorders (in 000s)									
Cervical Disorders	301	137	164	*	51	128	51	50	59.4
Cervical Disc Disorders	177	81	96	*	44	90	22	*	54.8
Neck Injury	71	41	30	*	26	18	*	11	52.0
All Cervical/Neck Pain	503	237	266	*	111	212	73	72	57.0
Hospital Emergency Room Visits [2]									
Total Number of Emergency Room Visits for Cervical Pain Disorders (in 000s)									
Cervical Disorders	645	274	372	59	366	164	34	23	38.9
Cervical Disc Disorders	36	17	19	*	24	*	*	*	42.8
Neck Injury	1,222	488	734	154	698	223	94	53	37.0
All Cervical/Neck Pain	1,831	754	1,076	196	1,048	380	133	74	38.0
Hospital Outpatient Visits [3]									
Total Number of Outpatient Department Visits for Cervical Pain Disorders (in 000s)									
Cervical Disorders	517	165	351	*	166	218	86	33	50.4
Cervical Disc Disorders	117	43	74	*	27	74	*	*	51.4
Neck Injury	186	42	144	34	95	43	*	*	36.2
All Cervical/Neck Pain	774	240	534	47	263	317	97	50	47.3
Physician Office Visits [4]									
Total Number of Physician Visits for Cervical Pain Disorders (in 000s)									
Cervical Disorders	6,222	2,565	3,657	166	1,613	3,277	826	285	50.8
Cervical Disc Disorders	1,529	537	991	*	319	1,000	139	71	52.0
Neck Injury	2,211	1,219	992	116	1,078	794	138	86	43.3
All Cervical/Neck Pain	9,513	4,105	5,408	282	2,903	4,817	1,070	442	49.5
Total Health Care Visits for Cervical and Neck Pain, 2006/2007									
Total Number of Health Care Visits for Cervical Pain Disorders (in 000s)									
Cervical Disorders	7,685	3,141	4,544	242	2,196	3,787	997	391	
Cervical Disc Disorders	1,859	678	1,180	0	414	1,169	180	91	
Neck Injury	3,690	1,790	1,900	308	1,897	1,078	293	164	
All Cervical/Neck Pain	13,234	5,609	7,624	550	4,507	6,034	1,470	646	
Percent of Total		42%	58%	4%	34%	46%	11%	5%	
Hospital Discharges [1]	503	237	266	*	111	212	73	72	55.2
Hospital Emergency Room Visits [2]	1,831	754	1,076	196	1,048	380	133	74	35.0
Hospital Outpatient Visits [3]	774	240	534	47	263	317	97	50	46.0
Physician Office Visits [4]	9,513	4,105	5,408	282	2,903	4,817	1,070	442	48.4
All Cervical/Neck Pain Diagnoses	12,621	5,336	7,284	525	4,325	5,726	1,373	638	
Percent of Total		42%	58%	4%	34%	45%	11%	5%	

* Estimate does not meet standards for reliability

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

[2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006

[3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006

[4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Table 2.6a: Prevalence Rate of Neck and Cervical Spine Disorders by Gender and Age, United States 2006/2007

	Total	Gender		Age in Years				
		Male	Female	<18	18-44	45-64	65-74	75 & over
Hospital Discharges [1]								
Proportion of Hospital Discharges for Cervical Pain Disorders								
Cervical Disorders	35%	36%	35%	0	35%	43%	26%	31%
Cervical Disc Disorders	2%	2%	2%	*	2%	*	*	*
Neck Injury	67%	65%	68%	79%	67%	59%	71%	72%
All Cervical/Neck Pain (N)	503	237	266	*	111	212	73	72
Hospital Emergency Room Visits [2]								
Proportion of Emergency Room Visits for Cervical Pain Disorders								
Cervical Disorders	31%	30%	31%	26%	28%	39%	*	*
Cervical Disc Disorders	*	*	*	*	*	*	*	*
Neck Injury	69%	70%	69%	74%	72%	61%	100%	100%
All Cervical/Neck Pain (N)	1,831	754	1,076	196	1,048	380	133	74
Hospital Outpatient Visits [3]								
Proportion of Outpatient Department Visits for Cervical Pain Disorders								
Cervical Disorders	67%	69%	66%	*	63%	69%	89%	1
Cervical Disc Disorders	15%	18%	14%	*	10%	23%	*	*
Neck Injury	24%	18%	27%	1	36%	14%	*	*
All Cervical/Neck Pain (N)	774	240	534	47	263	317	97	50
Physician Office Visits [4]								
Proportion of Physician Visits for Cervical Pain Disorders								
Cervical Disorders	65%	62%	68%	59%	56%	68%	77%	64%
Cervical Disc Disorders	16%	13%	18%	*	11%	21%	13%	16%
Neck Injury	23%	30%	18%	41%	37%	16%	13%	19%
All Cervical/Neck Pain	9,513	4,105	5,408	282	2,903	4,817	1,070	442
Total Health Care Visits for Neck and Cervical Pain, 2006/2007								
Proportion of Health Care Visits for Cervical Pain Disorders								
Cervical Disorders	58%	56%	60%	49%	49%	63%	68%	61%
Cervical Disc Disorders	14%	12%	15%	0	9%	19%	12%	14%
Neck Injury	28%	32%	25%	51%	42%	18%	20%	25%
All Cervical/Neck Pain (N)	12,621	5,336	7,284	525	4,325	5,726	1,373	638
% by Resource								
	Total Diagnoses (in 000s)	Cervical Disorders as % of Total Diagnoses		Cervical Disorders Distribution by Resource			All Medical Conditions Distribution by Resource	
Hospital Discharges [1]	39,434	1.3%		4.0%			3.4%	
Hospital Emergency Room Visits [2]	119,192	1.5%		14.5%			10.3%	
Hospital Outpatient Visits [3]	102,208	0.8%		6.1%			8.8%	
Physician Office Visits [4]	901,954	1.1%		75.4%			77.6%	
All Cervical/Neck Pain (in 000s)	1,162,788	1.1%		13,234			1,162,788	

* Estimate does not meet standards for reliability

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

[2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006

[3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006

[4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Table 2.7: Summary of Resource Allocation of Total Health Care Occurrences for Back Pain and Related Conditions by Gender and Age, United States 2006/2007

	Gender		Age in Years					Ave Age at Dx	Diagnoses All Conditions (in 000s)	Lumbar/Low Back Pain as % of Total Diagnoses	
	Total	Male	Female	<18	18-44	45-64	65-74				75 & over
Lumbar/Low Back Pain											
	Total Number of Spinal Diagnoses (in 000s)										
Hospital Discharges [1]	1,898	805	1,091	14	379	660	321	370	60.5	39,434 4.8%	
Hospital Emergency Room Visits [2]	5,199	2,355	2,844	221	2,867	1,515	261	335	42.1	119,192 5.1%	
Hospital Outpatient Visits [3]	3,107	1,295	1,812	103	1,165	1,278	261	300	48.8	102,208 3.0%	
Physician Office Visits [4]	34,945	15,529	19,416	705	10,970	14,768	3,676	4,825	51.4	901,954 3.9%	
All Lumbar/Low Back Pain Diagnoses	45,149	19,984	25,163	1,043	15,381	18,221	4,519	5,830		1,162,788 3.9%	
Percent of Total		44%	56%	2%	34%	40%	10%	13%			
Cervical/Neck Pain											
	Total Number of Spinal Diagnoses (in 000s)										
Hospital Discharges [1]	503	237	266	*	111	212	73	72	55.2	39,434 1.3%	
Hospital Emergency Room Visits [2]	1,831	754	1,076	196	1,048	380	133	74	35.0	119,192 1.5%	
Hospital Outpatient Visits [3]	774	240	534	47	263	317	97	50	46.0	102,208 0.8%	
Physician Office Visits [4]	9,513	4,105	5,408	282	2,903	4,817	1,070	442	48.4	901,954 1.1%	
All Cervical/Neck Pain Diagnoses	12,621	5,336	7,284	525	4,325	5,726	1,373	638		1,162,788 1.1%	
Percent of Total		42%	58%	4%	34%	45%	11%	5%			
Total Back Pain (Lumbar and Cervical) Diagnoses [5]											
	Total Number of Spinal Diagnoses (in 000s)										
	Total	Male	Female	<18	18-44	45-64	65-74	75 & over	Ave Age at Dx	Diagnoses All Conditions (in 000s)	Spine/Back Pain as % of Total Diagnoses
Hospital Discharges [1]	2,401	1,042	1,357	14	490	872	394	442	59.9	39,434	6.1%
Hospital Emergency Room Visits [2]	7,030	3,109	3,920	417	3,915	1,895	394	409	41.5	119,192	5.9%
Hospital Outpatient Visits [3]	3,881	1,535	2,346	150	1,428	1,595	358	350	48.8	102,208	3.8%
Physician Office Visits [4]	44,458	19,634	24,824	987	13,873	19,585	4,746	5,267	51.9	901,954	4.9%
All Back Pain Diagnoses	57,770	25,320	32,447	1,568	19,706	23,947	5,892	6,468		1,162,788	5.0%
Percent of Total		44%	56%	3%	34%	41%	10%	11%			

* Estimate does not meet standards for reliability

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

[2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006

[3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006

[4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

[5] Diagnosis with both lumbar and cervical pain possible.

Table 2.7a: Summary of Resource Allocation as a Proportion of Total Health Care Occurrences for Back Pain and Related Conditions by Gender and Age, United States 2006/2007

Lumbar/Low Back Pain	Proportion of Total Lumbar/Low Back Pain Diagnoses by Resource								Ave Age at Dx	Diagnoses All Conditions (in 000s)	Lumbar/Low Back Pain as % of Total Diagnoses
	Total	Gender		Age in Years							
		Male	Female	<18	18-44	45-64	65-74	75 & over			
Hospital Discharges [1]	4.2%	4.0%	4.3%	*	2.5%	3.6%	7.1%	6.3%	60.5	39,434	4.8%
Hospital Emergency Room Visits [2]	11.5%	11.8%	11.3%	21.2%	18.6%	8.3%	5.8%	5.7%	42.1	119,192	5.1%
Hospital Outpatient Visits [3]	6.9%	6.5%	7.2%	9.9%	7.6%	7.0%	5.8%	5.1%	48.8	102,208	3.0%
Physician Office Visits [4]	77.4%	77.7%	77.2%	67.6%	71.3%	81.0%	81.3%	82.8%	51.4	901,954	3.9%
All Lumbar and Low Back Pain Diagnoses (in 000s)	45,149	19,984	25,163	1,029	15,381	18,221	4,519	5,830		1,162,788	3.9%
Percent of Total		44%	56%	2%	34%	40%	10%	13%			

Cervical/Neck Pain	Proportion of Total Cervical/Neck Pain Diagnoses by Resource								Ave Age at Dx	Diagnoses All Conditions (in 000s)	Cervical/Neck Pain as % of Total Diagnoses
	Total	Gender		Age in Years							
		Male	Female	<18	18-44	45-64	65-74	75 & over			
Hospital Discharges [1]	3.8%	4.2%	3.5%	*	2.5%	3.5%	5.0%	11.1%	55.2	39,434	1.3%
Hospital Emergency Room Visits [2]	13.8%	13.4%	14.1%	32.4%	23.3%	6.3%	9.0%	11.5%	35.0	119,192	1.5%
Hospital Outpatient Visits [3]	5.8%	4.3%	7.0%	7.8%	5.8%	5.3%	6.6%	7.7%	46.0	102,208	0.8%
Physician Office Visits [4]	71.9%	73.2%	70.9%	46.6%	64.4%	79.8%	72.8%	68.4%	48.4	901,954	1.1%
All Cervical (Neck) Back Pain Diagnoses	12,621	5,336	7,284	525	4,325	5,726	1,373	638		1,162,788	1.1%
Percent of Total		42%	58%	4%	34%	45%	11%	5%			

Total Back Pain (Lumbar and Cervical) Diagnoses	Proportion of Total Back Pain Diagnoses by Resource								Ave Age at Dx	Diagnoses All Conditions (in 000s)	Spine/Back Pain as % of Total Diagnoses
	Total	Gender		Age in Years							
		Male	Female	<18	18-44	45-64	65-74	75 & over			
Hospital Discharges [1]	4.2%	4.1%	4.1%	0.8%	2.5%	3.6%	6.6%	6.8%	59.9	39,434	6.1%
Hospital Emergency Room Visits [2]	12.2%	12.1%	12.0%	25.3%	19.7%	7.8%	6.6%	6.3%	41.5	119,192	5.7%
Hospital Outpatient Visits [3]	6.7%	6.0%	7.2%	9.1%	7.2%	6.6%	6.0%	5.4%	48.8	102,208	3.8%
Physician Office Visits [4]	77.0%	76.7%	75.7%	59.9%	69.8%	80.7%	79.2%	81.3%	51.9	901,954	4.8%
All Back Pain Diagnoses (in 000s)	57,770	25,320	32,447	1,554	19,706	23,947	5,892	6,468		1,162,788	4.8%
Percent of Total		44%	56%	3%	34%	41%	10%	11%			

* Estimate does not meet standards for reliability

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

[2] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006

[3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006

[4] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006

Table 2.8: Average Length of Hospital Stay for Spine Diagnoses, United States 2004 & 2006/2007

	Average LOS (in days), 2004		Average LOS (in days), 2006/2007	
	NIS [1]	NHDS [2]	NIS [3]	NHDS [4]
Spinal Deformity & Related Conditions	5.5	5.1	5.3	5.3
Lumbar/Low Back Pain				
Back Disorders	4.7	4.3	4.5	4.6
Disc Disorders	4.1	3.6	4.1	4.0
Back Injury	7.3	7.9	7.1	7.8
All Lumbar and Low Back Pain	4.8	4.5	4.7	4.8
Cervical/Neck Pain				
Neck Disorders	4.3	3.6	4.2	3.9
Cervical Disc Disorders	3.1	2.8	3.1	2.7
Neck Injury	8.2	10.2	7.7	6.4
All Cervical Back Pain	4.7	4.6	4.4	4.0
Total	4.8	4.6	4.6	4.7

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004

[2] Source: National Center for Health Statistics, National Hospital Discharge Survey, 2004

[3] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

[4] Source: National Center for Health Statistics, National Hospital Discharge Survey, 2006

Table 2.9: Trends in Physician Visits for Back Pain, United States 1998-2006**Physician Visits for Back Pain**

	Total Number of Patients (in 000s)				
	<u>1998</u>	<u>2000</u>	<u>2002</u>	<u>2004</u>	<u>2006</u>
Physician Visits for Lumbar/Low Back Pain					
Back Disorders	15,885	16,151	20,040	21,813	24,067
Disc Disorders	3,004	3,727	4,997	6,497	6,977
Back Injury	5,252	6,835	7,351	5,454	6,888
Total, Back Pain	24,141	25,018	29,145	31,539	37,932
Physician Visits for Cervical/Neck Pain					
Neck Disorders	4,337	4,806	6,691	8,637	6,221
Disk Disorders	567	867	1,266	1,689	1,528
Neck Injury	4,324	2,936	4,776	3,444	2,211
Total, Cervical Back Pain	8,922	8,266	11,726	13,104	9,961
Physician Visits for Back Pain (Lumbar and Cervical)					
Total Visits	33,063	33,284	40,871	44,643	47,893

Physician Visits for Back Pain as Proportion of Total Population

	Proportion of Total U.S. Population [1]				
	<u>1998</u>	<u>2000</u>	<u>2002</u>	<u>2004</u>	<u>2006</u>
Physician Visits for Lumbar/Low Back Pain					
Back Disorders	5.9%	5.7%	6.9%	7.4%	0.0%
Disc Disorders	1.1%	1.3%	1.7%	2.2%	0.0%
Back Injury	1.9%	2.4%	2.5%	1.8%	0.0%
Total, Back Pain	8.5%	8.8%	10.0%	10.6%	0.0%
Physician Visits for Cervical/Neck Pain					
Cervical Disorders	1.6%	1.7%	2.3%	2.9%	0.0%
Disk Disorders	0.2%	0.3%	0.4%	0.6%	0.0%
Neck Injury	1.6%	1.0%	1.6%	1.2%	0.0%
Total, Cervical Back Pain	3.3%	2.9%	4.0%	4.4%	0.0%
Physician Visits for Back Pain (Lumbar and Cervical)					
Total Visits	11.8%	11.7%	14.0%	15.1%	0.0%

[1] Proportion of total population based on U.S. Census Population Estimates as of July 1 for each year.

Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 1998-2006

Table 2.10: Work Limitations with Reported Joint or Back Pain for Persons Aged 18 and Over, United States 1999-2004

Pain in Site Reported	% Reporting Site Pain		
	<u>Pain Limits</u>	<u>Pain Limits</u>	<u>Pain Limits</u>
	<u>All Work</u> <u>(11% of</u> <u>population)</u>	<u>Amount of Work</u> <u>(32% of</u> <u>population)</u>	<u>Ability to Walk</u> <u>(8% of</u> <u>population)</u>
Low Back Pain	63%	62%	62%
Neck Pain	41%	40%	38%
Headaches	37%	35%	28%
Lower Limb (Leg, Foot)	28%	28%	37%
Upper limb (Shoulder, Girdle, Arm, Hand)	26%	26%	26%
Head	16%	15%	12%
Torso (Sternum, Chest, Abdomen)	9%	8%	7%

Source: National Center for Health Statistics. National Health and Nutrition Examination Survey Data, 1999-2004.

Table 2.11: Limitation in Work Due to Back Pain by Gender and Age for Persons Age 18 and Over, United States 1999-2004

Status of Back Pain		Proportion of Persons Reporting Work Limitations							
		Pain Keeps from Working [1]				Back Pain Limits Amount of Work Can Do [2]			
		<u>With Back Pain in One Site [3]</u>	<u>With Back Pain in Multiple Sites [4]</u>	<u>No Back Pain Reported</u>	<u>All Pain Sites</u>	<u>With Back Pain in One Site [3]</u>	<u>With Back Pain in Multiple Sites [4]</u>	<u>No Back Pain Reported</u>	<u>All Pain Sites</u>
Gender	Male	18%	33%	8%	10%	51%	69%	25%	31%
	Female	21%	33%	8%	11%	51%	75%	31%	34%
Age	18-44 years	13%	23%	4%	6%	39%	57%	14%	20%
	45-64 years	24%	43%	10%	14%	55%	84%	29%	40%
	65-74 years	30%	41%	11%	15%	74%	87%	39%	46%
	75 & over	29%	31%	16%	18%	70%	82%	53%	56%
Total		20%	33%	8%	11%	51%	72%	25%	32%

[1] 11% of the population reports a long-term physical, mental or emotional problem keeps them from working.

[2] 32% of the population reports a long-term physical, mental or emotional problem limits the kind or amount of work they can do.

[3] "With respect to pain problem, located in ...Low back pain, upper back pain, buttocks, neck and spine?"

[4] "With respect to pain problem, located in ...multiple sites of back"

Source: National Center for Health Statistics. National Health and Nutrition Examination Survey Data, 1999-2004.

Table 2.12: Bed and Lost Work Days Associated with Back Pain for Persons Aged 18 and Over, United States 2008

	Incidence of Reported Condition (N in 000s)	% of Total Population	Incidence of Bed Days (in 000s)	% of Total Population	Average Number of Bed Days	Total Bed Days (in 000s)	Incidence of Lost Work Days (in 000s)	% of Total Population	Average Number of Work Days Lost	Total Lost Work Days (in 000s)
Back/Neck Problem Causes Difficulty with Activity										
Male	8,408	7.7%	4,156	3.8%	33.1	137,564	2,826	2.6%	23.2	65,563
Female	10,640	9.1%	5,865	5.0%	25.5	149,558	3,511	3.0%	23.9	83,913
Total	19,048	8.5%	10,021	4.4%	28.7	287,603	6,338	2.8%	23.6	149,577
Neck Pain in Past 3 Months										
Male	12,368	11.4%	5,610	5.2%	21.9	122,859	4,543	4.2%	18.2	82,683
Female	19,062	16.4%	10,350	8.9%	23.4	242,190	7,475	6.4%	16.1	120,348
Total	31,430	14.0%	15,960	7.1%	22.9	365,484	12,019	5.3%	16.9	203,121
Low Back Pain in Past 3 Months										
Male	27,334	25.1%	11,858	10.9%	19.8	234,788	10,004	9.2%	14.1	141,056
Female	34,381	29.5%	17,239	14.8%	21.7	374,086	12,090	10.4%	14.3	172,887
Total	61,715	27.4%	29,097	12.9%	20.9	608,127	22,093	9.8%	14.2	313,721
Radiating Leg Pain (with Low Back Pain)										
Male	8,498	7.8%	3,963	3.6%	33.1	131,175	2,670	2.5%	28.9	77,163
Female	11,606	10.0%	6,561	5.6%	34.8	228,323	3,613	3.1%	23.6	85,267
Total	20,104	8.9%	10,525	4.7%	34.1	358,903	6,283	2.8%	25.8	162,101
All Spine Pain or Problems										
Male	32,135	29.5%	13,776	12.7%	18.7	257,611	11,761	10.8%	14.9	175,239
Female	42,182	36.2%	21,188	18.2%	19.5	413,166	15,353	13.2%	13.6	208,801
Total	74,317	33.0%	34,954	15.5%	19.2	671,117	27,113	12.0%	14.2	385,005

Source: National Center for Health Statistics, National Health Interview Survey, 2008

Table 2.13: Select Spine Procedures as a Proportion of All Spine Procedures and Spine Patients, United States 2007

Procedure	All Spine Procedures, 2007 [1]		
	<u>Number of</u>	<u>% of Total</u>	<u>% of Total</u>
	<u>Patients</u>	<u>Spine</u>	<u>Spine</u>
	<u>w/Procedure</u>	<u>Procedures</u>	<u>Patients [2]</u>
Spinal fusion (cervical, lumbar, dorsal, other)	379,912	32.0%	57.3%
Spinal disectomy	332,525	28.0%	50.2%
Insertion of spinal device	224,522	18.9%	33.9%
Spinal decompression	163,385	13.8%	24.7%
Kyphoplasty	45,878	3.9%	6.9%
Spinal refusion	21,279	1.8%	3.2%
Vertebroplasty	13,646	1.1%	2.1%
Replacement spinal disc procedure	5,557	0.5%	0.8%
All select spine procedures	1,186,704	100.0%	179.1%
Total spine procedure patients	662,446		

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

[2] Multiple procedures performed on some patients

Table 2.14: Trends in Spinal Fusion Procedures, United States 1998-2006

ICD-9-CM Description	Year	Number of Patients	Rate of Two Year-to-Year Cycle Increase in Patients	Number of Procedures [1]	Rate of Two Year-to-Year Cycle Increase in Procedures	Rate Per 100,000 Population Aged 18 & Over [2]	Mean Age of Patient	Mean Length of Stay	Mean Hospitalization Charge [3]	Rate of Two Year-to-Year Cycle Increase in Mean Charge	Total Hospitalization Charges (in Billions)	Rate of Two Year-to-Year Cycle Increase in Total Hospital Charges
81.00-81.08 Spinal Fusion	1998	204,000		220,000		109.57	49.0	4.7	\$26,000		\$5.35	
	2000	242,000	18%	263,000	20%	125.93	49.4	4.3	\$32,000	21%	\$7.18	34%
	2002	289,000	20%	323,000	23%	150.07	50.2	4.4	\$42,000	29%	\$11.87	65%
	2004	307,000	6%	307,000	-5%	139.29	51.8	4.5	\$56,000	34%	\$16.87	42%
	2006	354,000	15%	380,000	24%	169.02	53.2	4.2	\$77,000	38%	\$27.17	61%
9-Year Change			73%		73%					191%		408%
81.30-81.393 Spinal Refusion [4]	1998	12,000		12,000		5.90	47.1	4.6	\$26,000		\$0.30	
	2000	13,000	12%	13,000	12%	6.36	49.0	5.4	\$39,000	49%	\$0.47	57%
	2002	19,000	43%	20,000	53%	9.47	50.0	4.4	\$46,000	20%	\$0.86	83%
	2004	19,000	1%	19,000	-7%	8.62	52.7	4.8	\$63,000	37%	\$1.18	37%
	2006	20,000	4%	21,000	12%	9.47	53.8	5.0	\$96,000	52%	\$1.90	62%
9-Year Change			69%		80%					272%		535%
81.00-81.08 + 81.30-81.393 Total	1998	214,000		231,000		115.48	48.9	4.7	\$26,000		\$5.59	
	2000	253,000	18%	277,000	20%	132.28	49.4	4.3	\$32,000	22%	\$7.53	35%
	2002	304,000	20%	343,000	24%	159.54	50.2	4.3	\$42,000	29%	\$12.50	66%
	2004	321,000	5%	327,000	-5%	148.37	51.8	4.5	\$56,000	34%	\$17.87	43%
	2006	373,000	16%	401,000	23%	178.49	53.2	4.2	\$77,000	38%	\$28.72	61%
9-Year Change			74%		73%					193%		414%

[1] Up to 15 diagnosis per patient were included; multiple spine procedures per patient can be coded

[2] Computed from U.S. Census population estimates released July 1st of each year (www.census.gov).

[3] "Charge" refers to hospitalization charges and does not include professional (i.e., physician fees), drugs or non-covered charges

[4] Prior to 2002, spinal refusion procedures were coded to the single code, 81.09. In 2002, this code was dropped and multiple codes implemented.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1998-2006

Table 2.15: Distribution of Spine Fusion Procedures by Spine Section, United States 2004 and 2007

	2007 Spine Fusion Procedures [1]				2004 Spine Fusion Procedures [2]			
	<u>Number</u>	<u>% of Total</u>	<u>% of Total</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>	<u>% of Total</u>	<u>% of Total</u>
		<u>Spine</u>	<u>Spine</u>	<u>Spine</u>		<u>Spine</u>	<u>Spine</u>	<u>Spine</u>
		<u>Fusion</u>	<u>Fusion</u>	<u>Spine</u>		<u>Fusion</u>	<u>Fusion</u>	<u>Spine</u>
	<u>Procedures</u>	<u>Patients [3]</u>	<u>Patients</u>		<u>Procedures</u>	<u>Patients [3]</u>	<u>Patients</u>	
Cervical Fusion	152,360	38.0%	43.1%	6.3%	134,761	41.2%	44.3%	6.6%
Thoracic or Dorsal Fusion	26,735	6.7%	7.6%	1.1%	23,601	7.2%	7.8%	1.2%
Lumbar Fusion	196,867	49.1%	55.7%	8.1%	149,516	45.7%	49.2%	7.3%
Other or Unspecified Fusion	3,950	1.0%	1.1%	0.2%				
Spine Refusion Procedures	21,279	5.3%	6.0%	0.9%	18,935	5.8%	6.2%	0.9%
Total Spinal Fusion or Refusion Procedures	401,191	100.0%	113.4%		326,813	100.0%	107.5%	
Total Spine Fusion Patients	353,694			14.6%	303,904			14.9%
All Spine Diagnosed Patients	2,428,956				2,036,165			

[1] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

[2] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004

[3] Multiple procedures performed on some patients

Table 2.16: Proportion of Back Pain Diagnoses with Spinal Fusion Procedure by Gender and Age, United States 2007

	Total Number of Spinal Diagnosis (in 000s)								Ave Age for Fusion	Mean Length of Stay (in days)	Mean Charges
	Gender		Age in Years					75 & over			
	Total	Male	Female	<18	18-44	45-64	65-74				
Lumbar/Low Back Pain											
All Lumbar/Low Back Pain Diagnoses	1,898	805	1,091	14	379	660	321	370	60.5	4.7	\$ 32,775
Total Lumbar Spine Fusion Procedures (ICD-9-CM=8106)	197	79	101	*	43	81	34	19	55.2	4.4	\$ 87,073
% Diagnoses with Spinal Fusion Procedure	10.4%	9.8%	9.3%	*	11.3%	12.3%	10.6%	5.1%			
Cervical/Neck Pain (Neck)											
All Cervical/Neck Pain Diagnoses	503	237	266	*	111	212	73	72	55.2	4.4	\$ 37,623
Total Cervical Spine Fusion Procedures (ICD-9-CM=8102)	152	75	76	*	39	83	19	81	52.6	3.2	\$ 54,510
% Diagnoses with Spinal Fusion Procedure	30.2%	31.6%	28.6%	*	35.1%	39.2%	26.0%	112.5%			
All Back Pain											
All Back Pain Diagnoses	2,401	1,042	1,357	14	490	872	394	442	56.2	4.6	\$ 33,714
Total Spine Fusion Procedures (ICD-9-CM= 810,813)	380	169	196	9	92	177	57	30	53.2	4.2	\$ 76,924
% Diagnoses with Spinal Fusion Procedure	15.8%	16.2%	14.4%	64.3%	18.8%	20.3%	14.5%	6.8%			

* Estimate does not meet standards for reliability

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

Table 2.17: Primary (1st) Diagnosis for Spinal Fusion Procedures, United States 2007

<u>Diagnosis</u>	<u>Number</u>	<u>% of Total Spine 1st Diagnosis w/Fusion Procedure</u>
722.00 Cervical Disc Displacement	50,038	14.3%
722.52 Lumbar Disc Degeneration	42,246	12.0%
722.10 Lumbar Disc Displacement	35,001	10.0%
724.02 Lumbar Spinal Stenosis	31,384	8.9%
738.40 Acquired Spondylolisthesis	22,698	6.5%
721.00 Cervical Spondylosis	21,024	6.0%
721.10 Cervical Spondylosis with Myelopathy	19,767	5.6%
722.71 Cervical Disk Disorder	17,522	5.0%
721.30 Lumbosacral Spondylosis	16,688	4.8%
722.40 Cervical Disc Degeneration	11,307	3.2%
723.00 Cervical Spinal Stenosis	10,274	2.9%
756.12 Spondylolisthesis	8,358	2.4%
737.30 Idiopathic Scoliosis	7,378	2.1%
996.49 Complication of Internal Orthopaedic Device	3,897	1.1%
805.40 FX Lumbar Vertebra-Closed	3,513	1.0%
All Other Diagnoses	49,710	14.2%
All Primary(1 st) Diagnosis for Fusion Procedure	350,806	100.0%

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

Table 2.18: Health Care Visits for Ruptured Spine and Spinal Discectomy Procedures, United States 2006/2007

Health Care Visits for Ruptured (Herniated) Spine Diagnosis [1]	Total Number of Spinal Diagnosis (in 000s)									Average Age	% of Total Visits	Mean Length of Stay (in days)	Mean Charges
	Total	Gender		Age (in years)									
		Male	Female	<18	18-44	45-64	65-74	75 & over					
Hospital Discharges [2]	366.4	180.3	184.0	0.8	122.8	163.4	45.3	28.5	52.0	7.6%	3.1	\$ 37,373	
Hospital Emergency Department Visits [3]	115.2	33.5	81.6	0.0	64.5	30.5	10.5	9.6	46.7	2.4%	NA	NA	
Hospital Outpatient Visits [4]	311.7	129.4	182.3	0.0	125.7	173.1	10.6	2.3	47.8	6.4%	NA	NA	
Physician Office Visits [5]	4,044.6	2,112.2	1,932.3	22.6	1,277.8	1,970.3	327.8	446.0	50.5	83.6%	NA	NA	
All Ruptured Spine Diagnoses	4,837.9	2,455.4	2,380.2	23.4	1,590.8	2,337.3	394.2	486.4		100.0%			
Percent of Total		50.8%	49.2%	0.5%	32.9%	48.4%	8.2%	10.1%					
Spinal Discectomy Procedure [6]													
Hospital Discharges [2]	330.7	166.6	164.0	1.40	105.4	159.7	43.4	20.4	51.7		2.8	\$ 50,884	
Percent of Total		50.4%	49.6%	0.4%	31.9%	48.3%	13.1%	6.2%					
Proportion of Inpatient [1] Discectomy Procedures with Ruptured Spine Diagnosis	90%	92%	89%	175%	86%	98%	96%	72%				Total Procedures Cost	
Total Hospital Charges for Discectomy Procedures (in billions)												\$ 16.8	

[1] ICD-9-CM diagnosis codes: 722.00, 722.10, 722.11, 722.20, 722.70, 722.71, 722.72, 722.73
 [2] Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007
 [3] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Hospital Emergency, 2006
 [4] Source: National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey, Outpatient, 2006
 [5] Source: National Center for Health Statistics, National Ambulatory Medical Care Survey, 2006
 [6] ICD-9-CM procedure codes: 805.00, 805.10

Table 2.19: Primary (1st) Diagnosis for Spine Diskectomy Procedures, United States 2007

<u>Diagnosis</u>	<u>Number</u>	<u>% of Total Spine 1st Diagnosis w/Diskectomy Procedure</u>
722.10 Lumbar Disc Displacement	124,576	37.5%
722.00 Cervical Disk Displacement	48,862	14.7%
722.52 Lumbar Disc Degeneration	26,149	7.9%
721.00 Cervical Spondylosis	18,015	5.4%
722.71 Cervical Disk Disorder	15,229	4.6%
724.02 Lumbar Spinal Stenosis	15,065	4.5%
721.10 Cervical Spondylosis with Myelopathy	12,938	3.9%
722.40 Cervical Disc Degeneration	10,071	3.0%
738.40 Acquired Spondylolisthesis	9,292	2.8%
721.30 Lumbosacral Spondylosis	8,560	2.6%
723.00 Cervical Spinal Stenosis	7,093	2.1%
722.73 Thoracic Disc Disorder with Myelopathy	5,234	1.6%
756.12 Spondylolisthesis	3,201	1.0%
All Other diagnoses	26,997	8.1%
All Primary (1 st) Diagnosis for Diskectomy Procedure	331,282	100.0%

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007

Table 2.20: Diskectomy Procedure Trends, United States 1996 to 2006

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	11 Year Mean
Procedures [1] (to nearest 000)	285,000	281,000	303,000	303,000	279,000	289,000	319,000	317,000	324,000	292,000	276,000	297,000

[1] ICD-9-CM Procedure Code: 805.00 or 805.10

Source: National Center for Health Statistics; Centers for Disease Control and Prevention, National Hospital Discharge Survey, 1996-2006