



HOW OBESITY INCREASES THE RISK OF DISABLING WORKPLACE INJURIES

The incidence of obesity is growing globally. In the United States, the incidence of obesity is the highest of all reporting countries and the trend continues unabated. Intuitively, the implications of this trend for workers compensation are disturbing.

Recent research confirms anecdotal data—work-related injuries are far more costly if the injured worker is obese.^{1,2} The dramatically higher medical costs suggest that the types and nature of injuries sustained by obese workers, especially the “morbidly obese,” are more likely to result in permanent disabilities.

This study advances previous research by analyzing the differences in outcomes between workplace injuries with “obese” and “non-obese” claims. The paper reports on differences in injury types and treatment patterns between a sample of more than 7,000 claims with “obesity” as a secondary diagnosis and another 20,000 claims with virtually identical characteristics—primary diagnosis, gender, industry group, year of injury, state, and approximate age—but no obesity diagnosis.³

Key Findings

The study concludes that there are systematic differences in the outcomes for obese and non-obese claimants with comparable demographic characteristics. The study also concludes that there is greater risk that injuries will create permanent disabilities if the injured worker is obese.

Case studies examined in the appendix indicate that, in general, even when both the obese claim and non-obese claim are the same injury type, the range of medical treatments and costs, as well as duration, typically is greater for obese claimants. These examples, however, also indicate that there is considerable variation at the individual claim level and that in some cases the non-obese claim may be more costly. For the case studies examined, treatment categories that tended to be the primary cost drivers included physical therapy, complex surgery, and drugs and supplies.

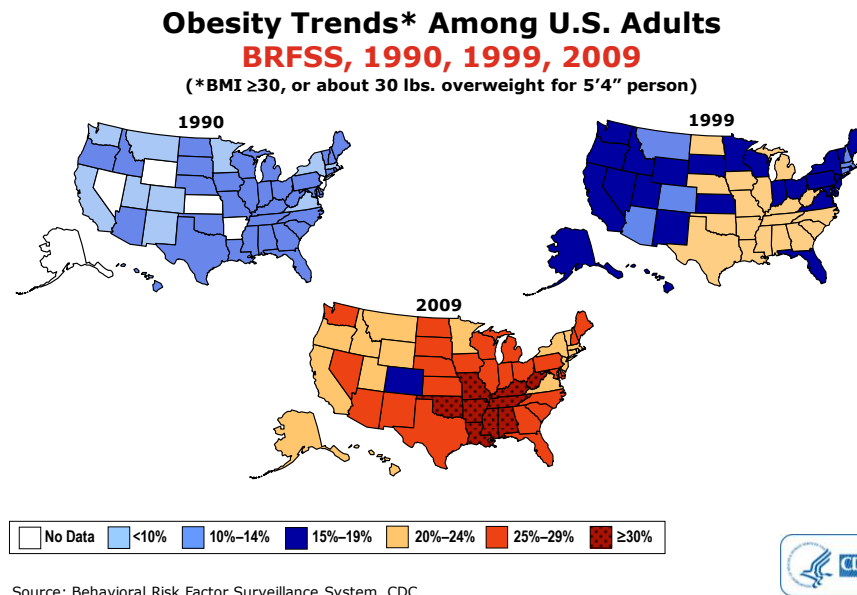
¹ Laws and Schmid, “Reserving in the Age of Obesity,” ncci.com, September, 2009.

² Ostbye, Dement, and Krause, “Obesity and Workers’ Compensation,” *Archives of Internal Medicine*, April 23, 2007.

³ This study is based on data licensed to NCCI for purposes of this study for the 10 accident years from 1998 to 2007. Obesity is generally defined as having a body mass index of 30 or more. Morbid obesity is generally defined as having a body mass index of 40 or more. However, in general, workers compensation claims data typically does not capture weight, height, or body mass index information. Therefore, in this study, claims are categorized as obese when a medical provider includes on the billed medical transaction a diagnosis code indicating obesity.

Background

A snapshot of the disturbing obesity trend in the United States can be seen in the following chart from the Centers for Disease Control (CDC).



In 1990, among states participating in the survey, 10 states had a prevalence of obesity less than 10%, and no states had prevalence equal to or greater than 15%.

By 1999, no state had prevalence less than 10%, 18 states had a prevalence of obesity between 20%–24%, and no state had prevalence equal to or greater than 25%.

In 2009, only one state (Colorado) and the District of Columbia had a prevalence of obesity less than 20%. Thirty-three states had prevalence equal to or greater than 25%; nine of these states had a prevalence of obesity equal to or greater than 30%.⁴

This trend to a higher prevalence of obesity undoubtedly will impact the workers compensation system since obesity is associated with a broad range of health problems. The CDC reports⁵ that being overweight or obese appears to increase the risk of incurring one or more diseases and adverse health conditions. Their list includes:

- Hypertension (high blood pressure)
- Dyslipidemia (for example, high total cholesterol or high levels of triglycerides)
- Type 2 diabetes
- Coronary heart disease
- Stroke
- Osteoarthritis (a degeneration of cartilage and its underlying bone within a joint)
- Gallbladder disease
- Sleep apnea and respiratory problems
- Some cancers (endometrial, breast, and colon)

⁴ www.cdc.gov/brfss/

⁵ www.cdc.gov/nccdphp/dnpa/obesity/

Previous Research on the Impact of Obesity on Medical Costs

Other research is consistent with the CDC's report that obesity is associated with a range of health issues. A recent study in the *Journal of Occupational and Environmental Medicine*⁶ reports that, in a survey of overweight and obese people, more than half indicated that they suffered from at least one of three leading, so-called "heart/circulatory"-related illnesses. And more than 30% suffered from two or more, so-called "co-morbidities."

Health-related costs of employers are also much greater for overweight and obese employees with comorbidities.⁷ This is true in terms of visits to medical providers, emergency room visits, and days of hospitalization.

A recent study published in the *Archives of Internal Medicine*⁸ confirms that the high costs associated with excess weight also characterize workplace injuries and workers compensation costs. "For instance, nearly six workers' comp claims were filed per 100 workers of normal BMI, compared with more than 11 claims filed per 100 of the heaviest workers."⁹ Similarly, medical and indemnity severity increase steadily with the injured worker's BMI, with costs of obese injured workers being more than double the average costs of workers of normal or "recommended" weight.

Research conducted by NCCI¹⁰ provides additional insight into the significance of obesity for claims costs. The study paired more than 4,500 claims with "obesity" as a secondary diagnosis with more than 10,000 claims with virtually identical characteristics: primary diagnosis, gender, industry group, year of injury, state, and approximate age. They conducted statistical analysis of claim costs to estimate the influence of covariates such as age, gender, and major diagnosis group in order to more closely isolate the unique contribution of obesity. Key findings include measuring the development of claim costs over time and on individual paired claims basis. Twelve months after the date of injury, the aggregate medical costs of obese claims were three times greater than the comparable costs of the matched non-obese claims. Medical costs of the obese claims continued to grow at a faster pace than the non-obese; at 36 months they were four times more costly, and by 60 months the difference was more than five times greater. These results reflect differences in total dollars. They also indicated that—on a pair-by-pair basis—it was not uncommon for the claim with the obese diagnosis to be 30 to 60 times more expensive than its non-obese counterpart. While no explanation was offered for the cases with such high ratios, it seems likely that the non-obese claims were relatively low-cost, medical-only injuries, whereas their obese counterparts must have received a much more extensive range of medical services.

The Data

The data used in this descriptive analysis is comparable to the matched claims data used in the NCCI study by Laws and Schmid.¹¹ The data is drawn from a database of detailed medical bills generated by more than 4 million workers compensation claims, and it was provided by several insurance companies of varying sizes. The data includes claims in 40 states for injuries that occurred from 1998 through 2007.

The first step was to identify claims that had at least one treatment that included the ICD9 diagnosis code 278, indicating a comorbidity of obesity.¹² This produced more than 7,000 individual claims where a medical provider determined that obesity was a factor in treating the injury. The database was then searched to identify claims that had identical characteristics—gender, state, industry group, year of

⁶ Kannan, Thompson, and Bolge, "Economic and Humanistic Outcomes Associated with Comorbid Type-2 Diabetes, High Cholesterol, and Hypertension Among Individuals Who Are Overweight or Obese," *Journal of Occupational and Environmental Medicine*, May 2008.

⁷ Actually they are higher in general—regardless of whether the employer provides health coverage or not.

⁸ Ostbye, Dement, and Krause, "Obesity and Workers' Compensation," *Archives of Internal Medicine*, April 23, 2007.

⁹ From a summary at MedicineNet.com:

www.medicinenet.com/script/main/art.asp?articlekey=80649&pf=3&page=1

¹⁰ Laws and Schmid, "Reserving in the Age of Obesity," ncci.com, September, 2009.

¹¹ For an extensive description of the data see pages 4–12, Laws and Schmid, "Reserving in the Age of Obesity," ncci.com, September, 2009.

¹² The claims data did not include any information on BMI or other indicators that could be used to identify or measure directly the degree of obesity.

injury, comparable primary diagnosis.¹³ Matching for age of the claimant was based on selecting the “nearest neighbor”; that is, selecting from the set of claims with matching characteristics the one (or more) with a date of birth that was closest in time to that of the “obese” claimant. This process generated more than 20,000 matching non-obese claims—on average, nearly three for each obese claim.

High-Level Results

In some cases, the ratio of paid medical costs—obese relative to non-obese for individual matched pairs—was quite large. It seems reasonable to expect that the large share of matched pairs with high ratios likely indicates that a material portion of the non-obese claims are low-cost, medical-only injuries. This expectation is confirmed in Chart 1, which tracks the share of claims that are medical only for detailed diagnoses with at least 50 matched pairs. See Table 1 for a list of the 23 diagnoses.

Table 1
23 Detailed Diagnoses With at Least 50 Matched Pairs

ICD9	ICD9 description
72273	LUMBAR DISC DISPLACEMENT WITH MYELOPATHY (WITH SPINAL CORD DISORDER)
7220	CERVICAL DISC DISPLACEMENT
7179	INTERNAL DERANGEMENT KNEE NOT OTHERWISE SPECIFIED
8360	TEAR MEDIAL CARTILAGE MENISCUS OF KNEE
8404	SPRAIN ROTATOR CUFF
72210	LUMBAR DISC DISPLACEMENT
7244	LUMBOSACRAL NEURITIS (INFLAMMATION OF NERVES) NOT OTHERWISE SPECIFIED
3540	CARPAL TUNNEL SYNDROME
72610	ROTATOR CUFF SYND NOT OTHERWISE SPECIFIED
72252	LUMB/LUMBOSACRAL DISC DEGENERATION
7231	CERVICALGIA (PAIN IN THE NECK)
9593	ELBOW/FOREARM/WRIST INJURY NOT OTHERWISE SPECIFIED
8460	SPRAIN LUMBOSACRAL
9597	LOWER LEG INJURY NOT OTHERWISE SPECIFIED
7242	LUMBAGO
7295	PAIN IN LIMB
8449	SPRAIN OF KNEE & LEG NOT OTHERWISE SPECIFIED
8409	SPRAIN SHOULDER/ARM NOT OTHERWISE SPECIFIED
55090	UNILAT INGUINAL HERNIA
8470	SPRAIN OF NECK
8472	SPRAIN LUMBAR REGION
84500	SPRAIN OF ANKLE NOT OTHERWISE SPECIFIED
8830	OPEN WOUND OF FINGER/S

¹³ Diagnoses were matched based on the first three digits of the primary diagnosis code, e.g., contusion of the lower leg.

Chart 1
Non-Obese Claims Are Much More Likely to Be Low Cost, Medical Only

Share of Total Matched Pairs by Detailed Diagnosis Group That Are Medical Only (at least 50 matched pairs of obese and non-obese claims)

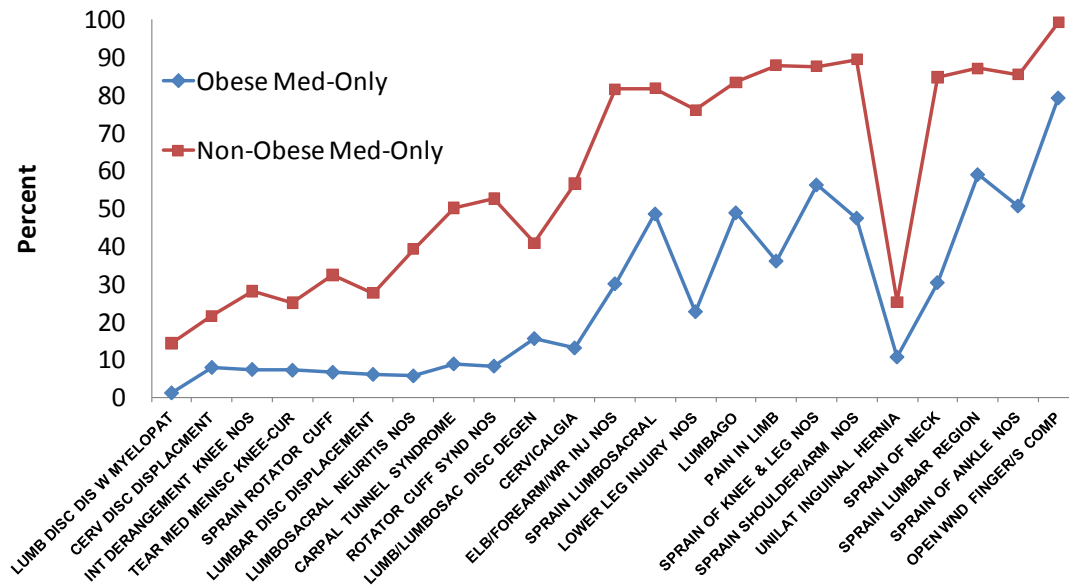
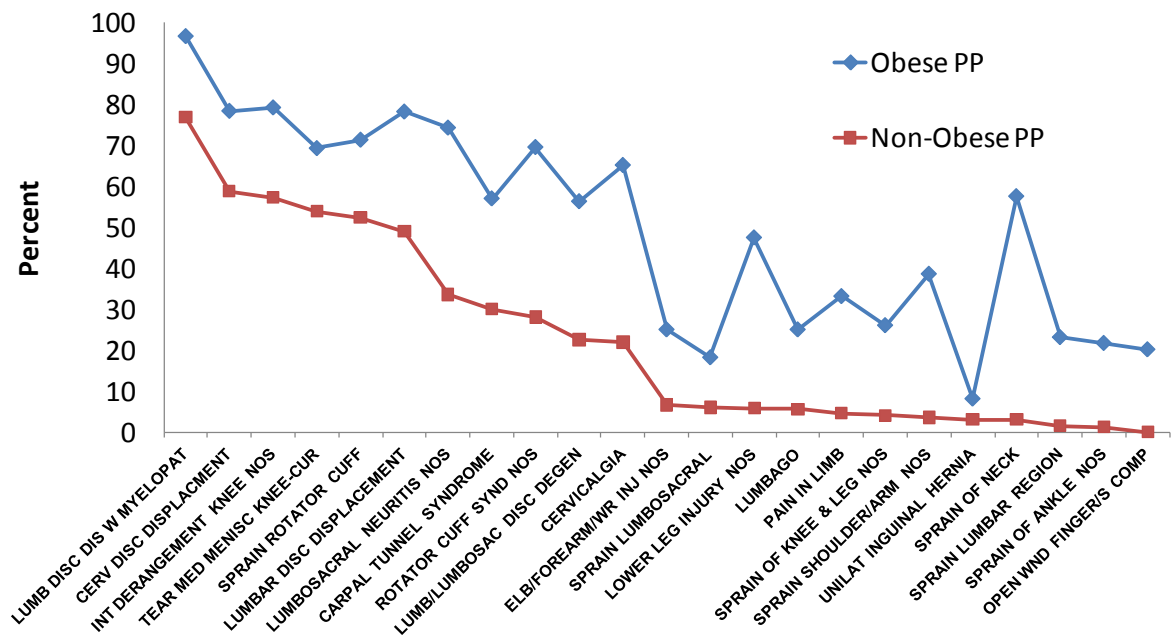


Chart 1 shows clearly that, over the range of diagnoses, an injury sustained by a non-obese worker is more likely—often much more likely—to be a short-term, medical-only claim. It also seems reasonable, therefore, to expect that if a materially higher share of the non-obese claims is medical only, that a significant portion of the matching obese claims involve permanent injuries. This is confirmed in Chart 2, which charts the share of the same group of claims that are permanent partial (PP) injury types.

Chart 2
Obese Claims Are More Likely to Be High Cost Permanent Partial

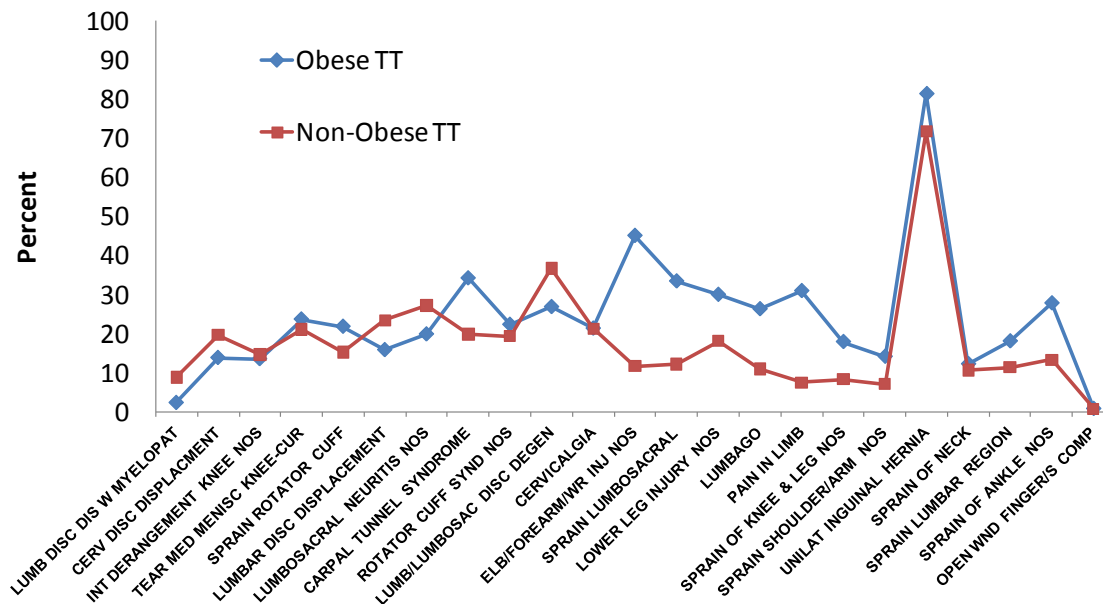
Share of Total Matched Pairs by Detailed Diagnosis Group That Are Permanent Partial (at least 50 matched pairs of obese and non-obese claims)



As can be seen in Chart 2, the diagnoses are ranked from high to low based on the share of non-obese claims that are permanent partial injuries. It is interesting to note that the ranking pattern is roughly comparable for the obese claims—most diagnoses with a high share of PP injuries for non-obese claims also have a higher share of PP injuries for obese claims. Similarly, most diagnoses with relatively lower shares of medical only for non-obese claims also have relatively lower shares of medical-only injuries for the matching obese claims (see Chart 1). This highlights the observation that the type of injury is a key factor in determining the ultimate outcome; disc and knee injuries clearly are more likely to have unfavorable outcomes than sprains.

Chart 3

Share of Total Matched Pairs by Detailed Diagnosis Group That Are Temporary Total (at least 50 matched pairs of obese and non-obese claims)



It is also interesting to note in Chart 3 that, for more than half of the diagnoses, the share of temporary total injuries is approximately the same for both the obese and the non-obese. This suggests that the distributions of individual obese claims relative to non-obese claims shifts so that the decline in medical only typically is matched by an increase in permanent partial injuries.

Chart 3 also highlights the unique nature of injuries diagnosed as unilateral inguinal hernia. The vast majority of these result in temporary total injury types; in most cases, there is a standard surgical procedure that requires lost time but that typically avoids the risk of permanent injury.

How Do the Distributions Differ? Medical Costs per Claim

Charts 4 through 6 indicate that for each injury type, claims of injured obese workers, on average, cost more than claims of matched injured non-obese workers. Moreover, the spreads typically appear to be greater for those diagnoses with higher shares of permanent partial injuries; that is, obese workers tend to require more costly medical treatment than do matched non-obese workers across virtually all diagnoses and injury types. Unlike the charts above, where claims may appear more than once because of the matched pairing, Charts 4 through 6 include each claim only once.

Chart 4

Average Medical Cost by Detailed Diagnosis Group—Claims That Are Permanent Partial (at least 50 matched pairs of claims, excludes duplicates)

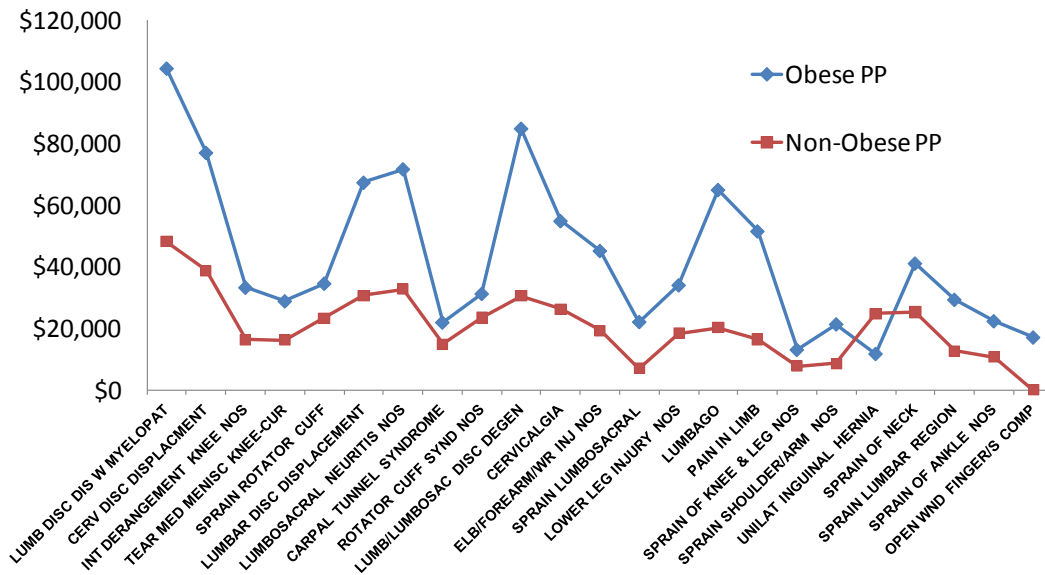


Chart 5

Average Medical Cost by Detailed Diagnosis Group—Claims That Are Medical Only (at least 50 matched pairs of claims, excludes duplicates)

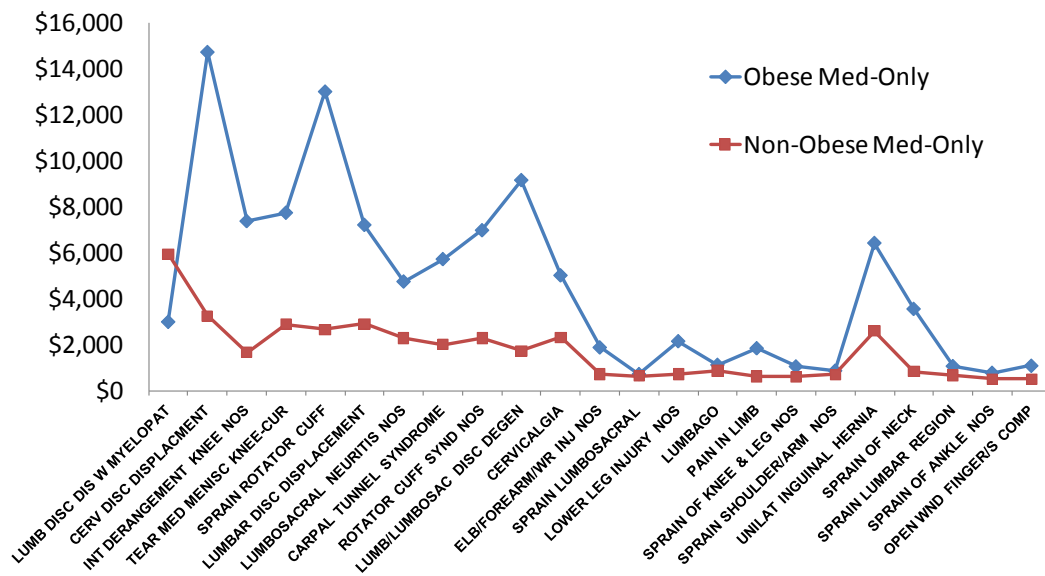
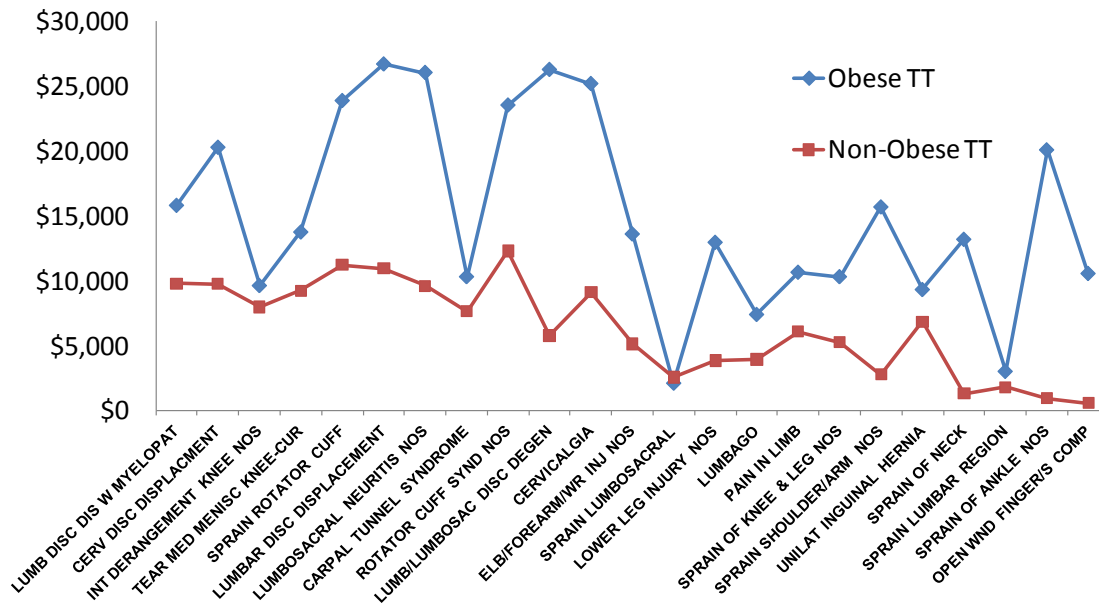


Chart 6

Average Medical Cost by Detailed Diagnosis Group—Claims That Are Temporary Total (at least 50 matched pairs of claims, excludes duplicates)



High-Level Observations

The summary charts clearly indicate that there are systematic differences in the outcomes for obese and non-obese claimants with comparable demographic characteristics: gender, state, industry group, year, primary diagnosis, and age. In particular, there is greater risk that injuries will create permanent disabilities if the injured worker is obese.

The appendix contains detailed comparisons for 15 of the more than 15,000 matched pairs. These indicate that, in general, even when both the obese claim and non-obese claim are the same injury type (either both medical only or both PP), the range of medical treatments and costs as well as duration typically is greater for obese claimants. These examples, however, also indicate that there is considerable variation at the individual claim level and that in some cases the non-obese claim may be more costly.

Given the findings of this study that obese claimants have more permanent disabilities and longer duration of medical treatments, it is highly likely that obese claimants would also have higher indemnity costs than comparable non-obese claimants.¹⁴

What Can Be Done?

Insurers can be aware of this in their claims management activities. Given past experience that obesity claims are more likely to be permanent disabilities and have higher costs, one way to manage this for the benefit of injured workers and to control costs is to collect data on claims for height and weight. One example where this is being done is in British Columbia, Canada, where WorkSafeBC¹⁵ collects data on height and weight on the application for workers compensation benefits. If the data is available, insurers could be aware up front if obesity is likely to be an issue and try to improve the

¹⁴ NCCI is in the process of examining this.

¹⁵ WorkSafeBC covers all work-related injuries for 93% of the employed labor force in British Columbia. The height and weight data are based on self-reports and not a diagnosis code.

outcome for the injured worker and their family by keeping the claim from becoming a permanent injury and, in turn, reducing duration. Depending on the added costs in terms of managing these claims, it may also reduce overall claims costs.

In terms of prevention, insurers could offer incentives similar to those already in place for drug-free workplaces. Employers can also play a role in prevention by putting programs in place to try to improve lifestyle choices in terms of nutrition and fitness. However, ultimately, it is up to the individual to take responsibility for their own health.

The appendix contains only a small subset of the total matched pairs so they are case studies rather than representative. However, a quick review suggests the following high-level observations:

- For this set of obese claims, treatment categories that tended to be the primary cost drivers are complex surgery, physical therapy, and drugs and supplies. These are categories that insurers could watch for during the case management process.
- The fact that some non-obese claims are more costly indicates that treatment patterns really matter. When the non-obese claims were more costly, they also tended to be driven by complex surgery, physical therapy, and drugs and supplies.

Appendix: How Do the Distributions Differ? Medical Treatments per Claim

What follows are case studies of individual matched pairs comparing the costs per claim, types of treatments, and timing of treatments between the obese claim and its non-obese match. We looked at three different groups of diagnosis types:

- GROUP 1:** Diagnoses where the share of PP claims was high for both obese and non-obese claims.
- GROUP 2:** Diagnoses where the share of PP claims was relatively low for non-obese claims and high for obese claims.
- GROUP 3:** Diagnoses with the highest share of medical-only claims for both obese and non-obese claims.

In order to obtain matches where the claims were the most similar for these case studies, we also limited the matches just to those where the part of body and the nature of injury also were the same. Five matched pairs were then randomly selected within each of the three groups. Each of the following 15 case studies contains a set of four graphs comparing aspects of the treatment patterns for the obese claim and its non-obese match. The first five are from GROUP 1, the second five are from GROUP 2, and the third five are from GROUP 3.

It is worth noting that there is considerable variation at the individual claim level and, of the 15 matched pairs randomly selected for further study, there are three where the non-obese match is more costly than the obese claim. Two of these are from GROUP 1, where the diagnoses have a high share of PP claims for both obese and non-obese claims. However, for most of the case studies below, the range of medical treatments and costs are typically greater for the obese claimants.

GROUP 1: Relatively High Shares of PP Claims for Both Obese and Non-Obese

Case Study 1: Lumbar Disc Displacement With Myelopathy

Lumbar disc displacement with myelopathy (i.e., with a spinal cord disorder) has the largest share of PP injuries for obese claimants. This can be seen in Chart 1-1A¹⁶, which shows the distribution of medical costs for each of the lumbar disc displacement with myelopathy claims identified in the study. The chart also indicates that these PP injuries typically are more costly than PP injuries of matched non-obese claimants. The black bars appearing in the permanent partial (PP) columns in Chart 1-1A indicate the medical costs of the matched pair selected for this case study.

¹⁶ The chart numbering in this section refers to the group number and case study number within that group. For example, Chart 1-1A is the first of four graphs for GROUP 1, case study 1.

The details for the individual pair are presented in Charts 1-1B through 1-1D. In Chart 1-1B, each individual symbol in the vertical columns denotes a treatment while the scale on the y-axis measures the number of days from the date of injury that each treatment occurred. Chart 1-1B gives a good representation of the timing of treatments. However, because multiple treatments can occur on the same day or within just a few days of each other, it may be difficult to see the exact number of treatments from this chart since the symbols can overlap, but the density of the vertical column of symbols can give a general idea. Chart 1-1C contains a clearer picture of the number of treatments in total and by service group, while Chart 1-1D shows medical paid dollars in total and by service group.

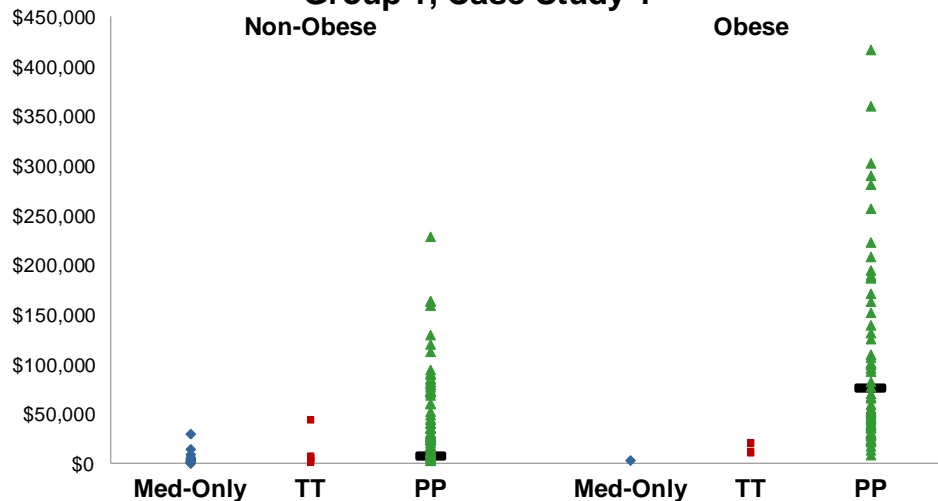
Chart 1-1B shows the number and timing of treatments by service group for both the obese claim and its non-obese match. While the final treatment for the non-obese claim occurred roughly one year after the date of injury, the obese claim continued to have treatments more than four years after the injury date. The obese claim also had complex surgeries and hospital charges, while the non-obese claim had none. Chart 1-1C indicates that overall, the non-obese claim had about 100 treatments in total compared to almost 400 treatments for the obese claim. Key differences in costs are due to physical therapy, complex surgery, drugs and supplies, and “other.”¹⁷

Chart 1-1A

Distribution of Medical Costs per Claim

Lumbar Disc Displacement With Myelopathy

Group 1, Case Study 1



¹⁷ Common procedures in the “other” category include electrocardiograms, nerve studies, injections, psychiatric exams, range of motion measurements, and work-related disability exams. The “other” category also contains codes that are not actual medical treatments but reflect the additional effort on the part of medical providers to service these claims through filling out special reports or forms with more than the information conveyed in the standard reporting form.

Chart 1-1B

Number and Timing of Treatments

Lumbar Disc Displacement With Myelopathy

Group 1, Case Study 1

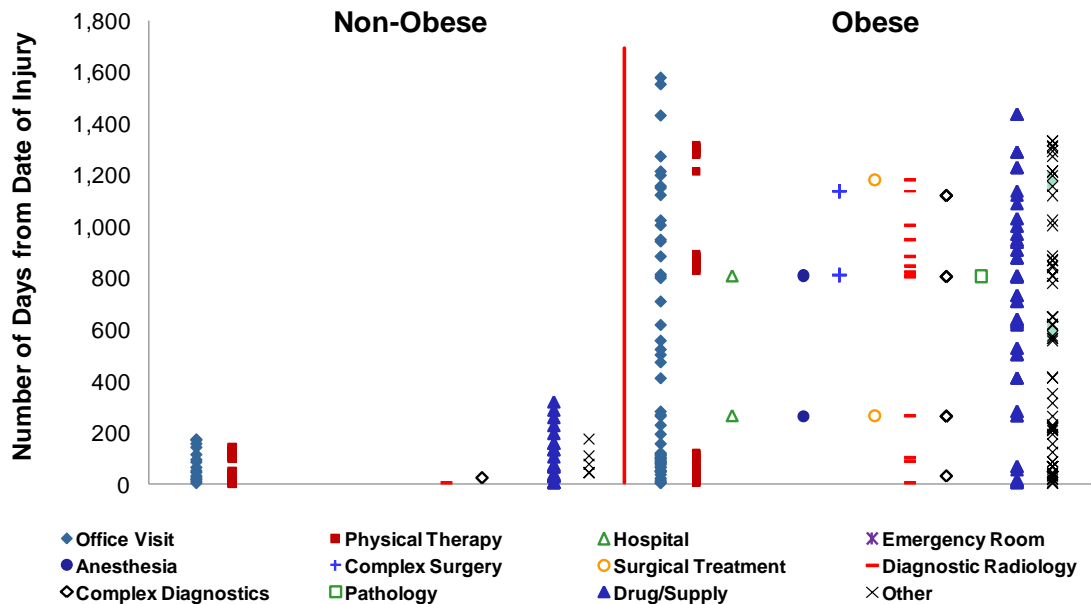


Chart 1-1C

Treatment Counts by Service Group

Lumbar Disc Displacement With Myelopathy

Group 1, Case Study 1

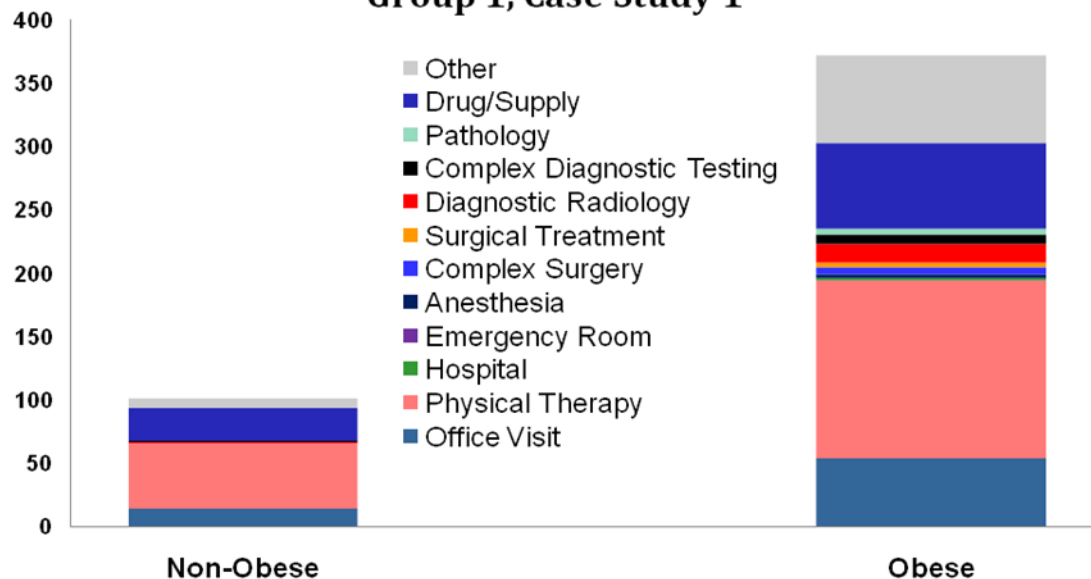
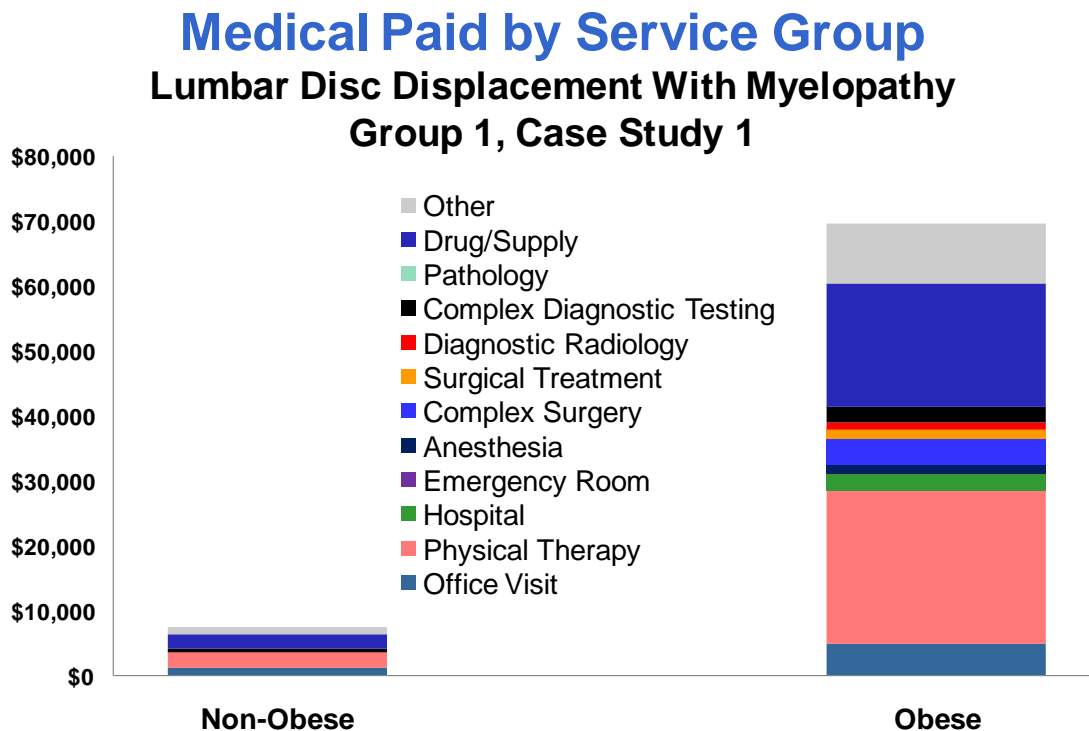


Chart 1-1D



Case Study 2: Lumbar Disc Displacement With Myelopathy

The matched pair selected for case study 2 is also one where lumbar disc displacement with myelopathy is the primary diagnosis. However, the non-obese claim in this pair is actually the more costly. Even though Chart 1-2B shows that treatments for the non-obese claim lasted for more than eight years after the injury date, Chart 1-2C indicates that the non-obese claim had fewer billed medical treatments. The difference primarily reflects the large number of physical therapy treatments received by the obese claimant. Chart 1-2D indicates that the key cost drivers for the non-obese were due to complex surgery and drugs and supplies.

Chart 1-2A

Distribution of Medical Costs per Claim

Lumbar Disc Displacement With Myelopathy

Group 1, Case Study 2

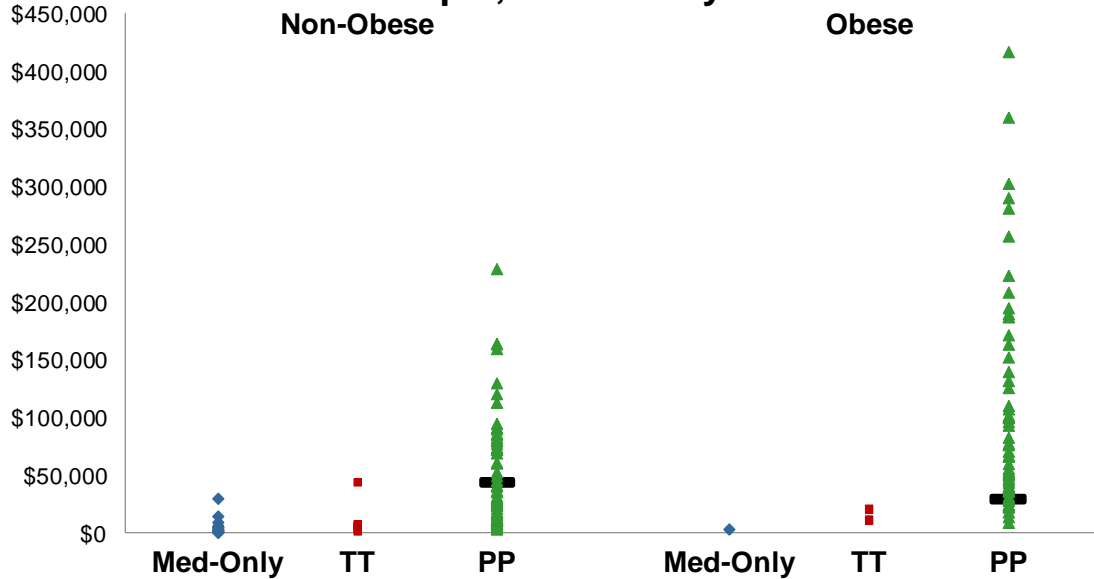


Chart 1-2B

Number and Timing of Treatments

Lumbar Disc Displacement With Myelopathy

Group 1, Case Study 2

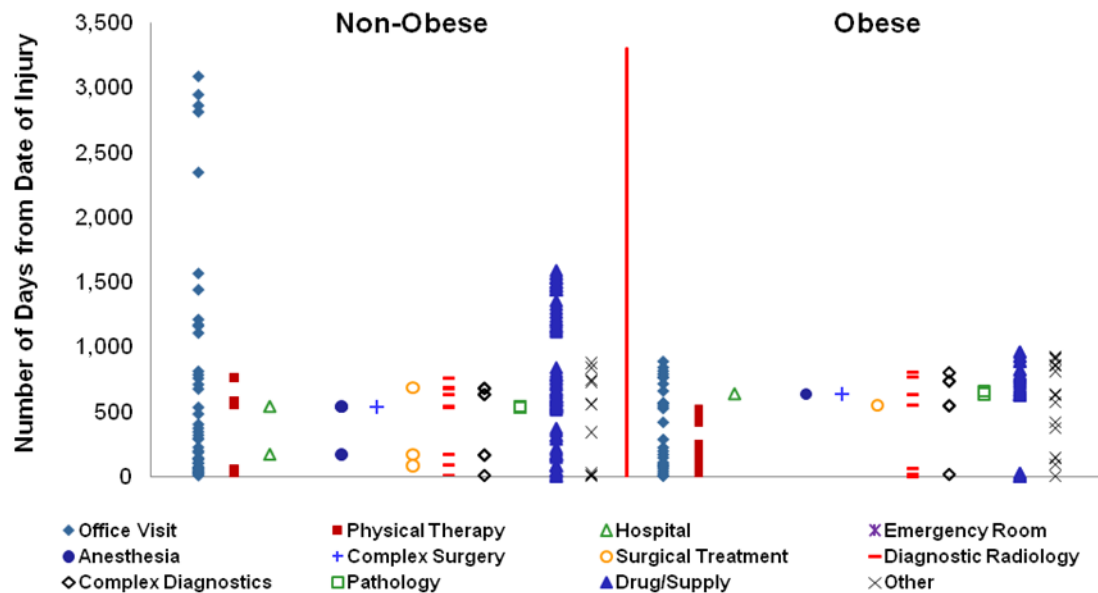


Chart 1-2C

Treatment Counts by Service Group

Lumbar Disc Displacement With Myelopathy

Group 1, Case Study 2

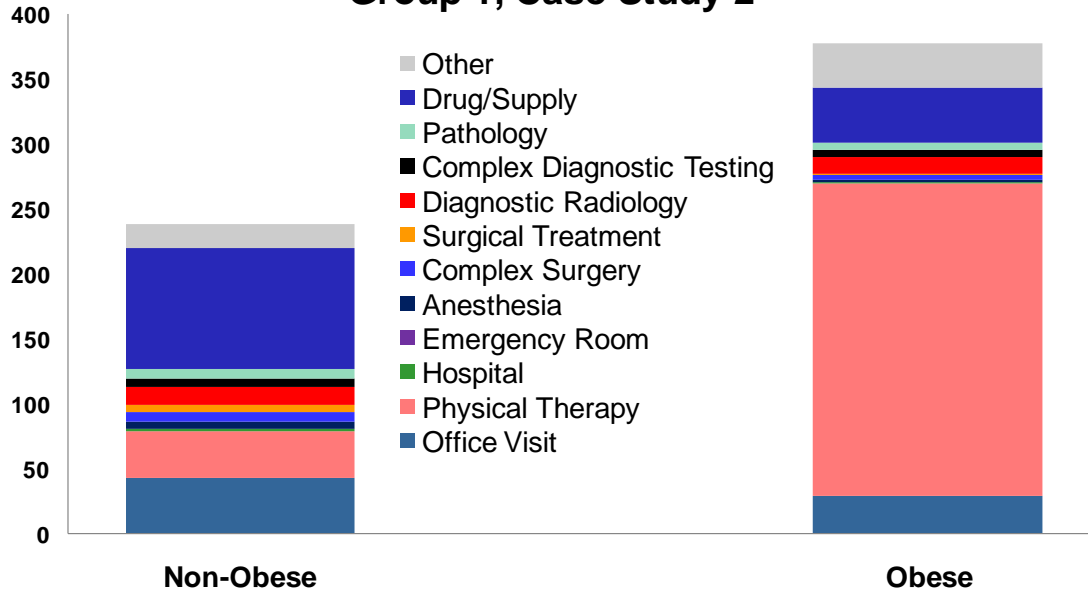
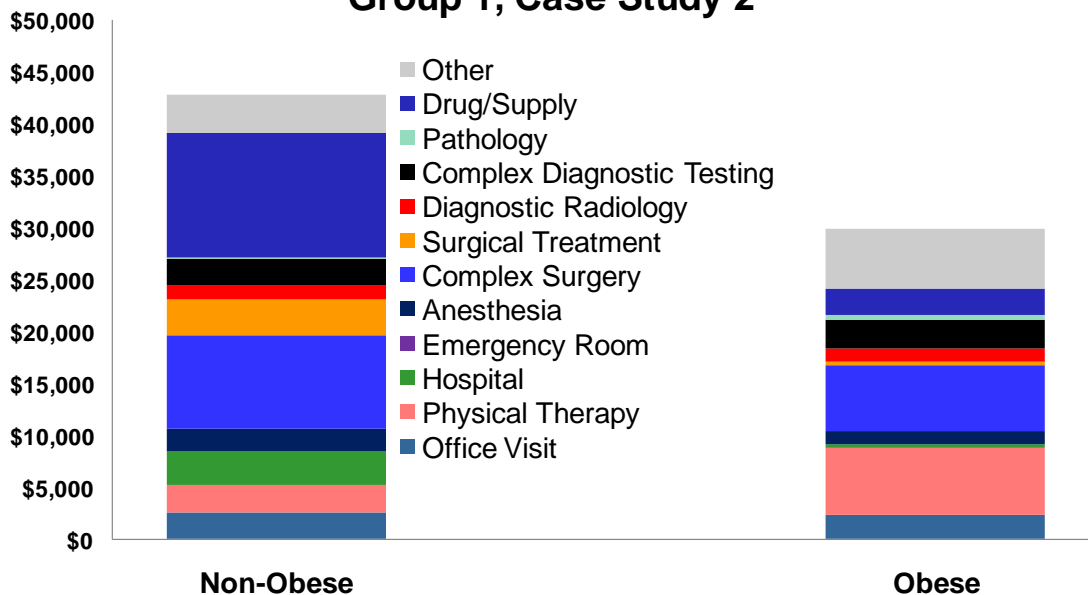


Chart 1-2D

Medical Paid by Service Group

Lumbar Disc Displacement With Myelopathy

Group 1, Case Study 2



Case Study 3: Tear Medial Cartilage Meniscus of Knee

The primary diagnosis for case study 3 is tear of the medial cartilage meniscus of knee. Again, treatments for the non-obese claim occurred for a longer period of time after the date of injury than for the obese claim. The non-obese claim had more treatments in total, but the obese claim was more costly due to complex surgery and drugs and supplies.

Chart 1-3A

Distribution of Medical Costs per Claim

Tear Medial Cartilage Meniscus of Knee

Group 1, Case Study 3

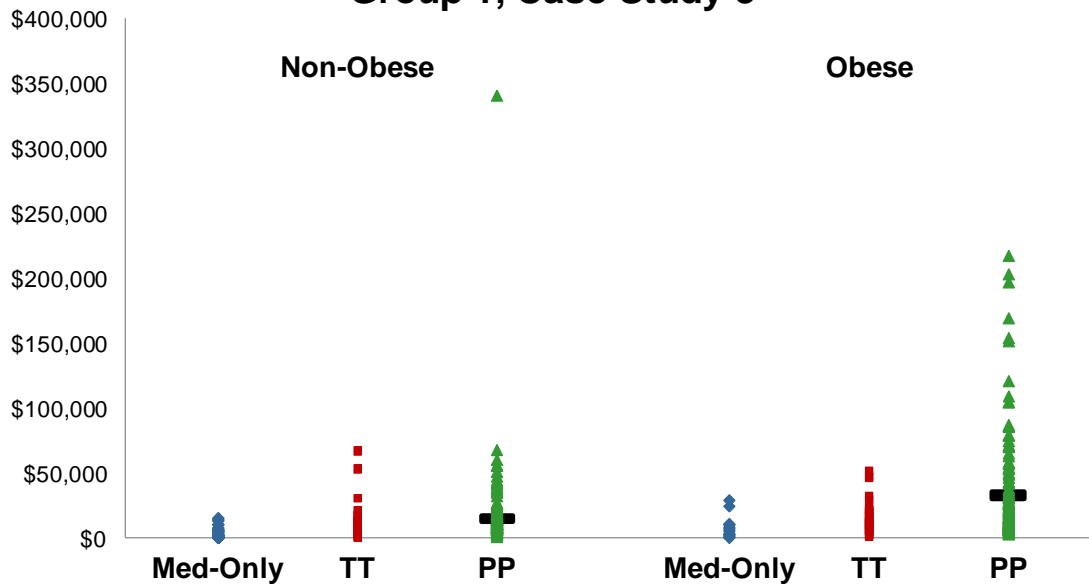


Chart 1-3B

Number and Timing of Treatments

Tear Medial Cartilage Meniscus of Knee

Group 1, Case Study 3

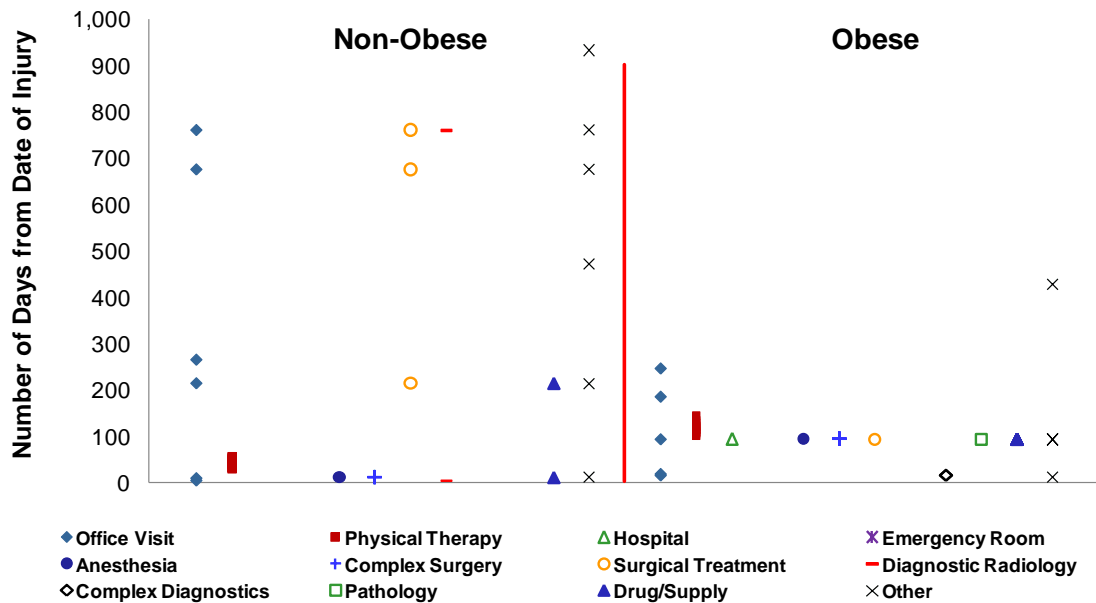


Chart 1-3C

Treatment Counts by Service Group

Tear Medial Cartilage Meniscus of Knee

Group 1, Case Study 3

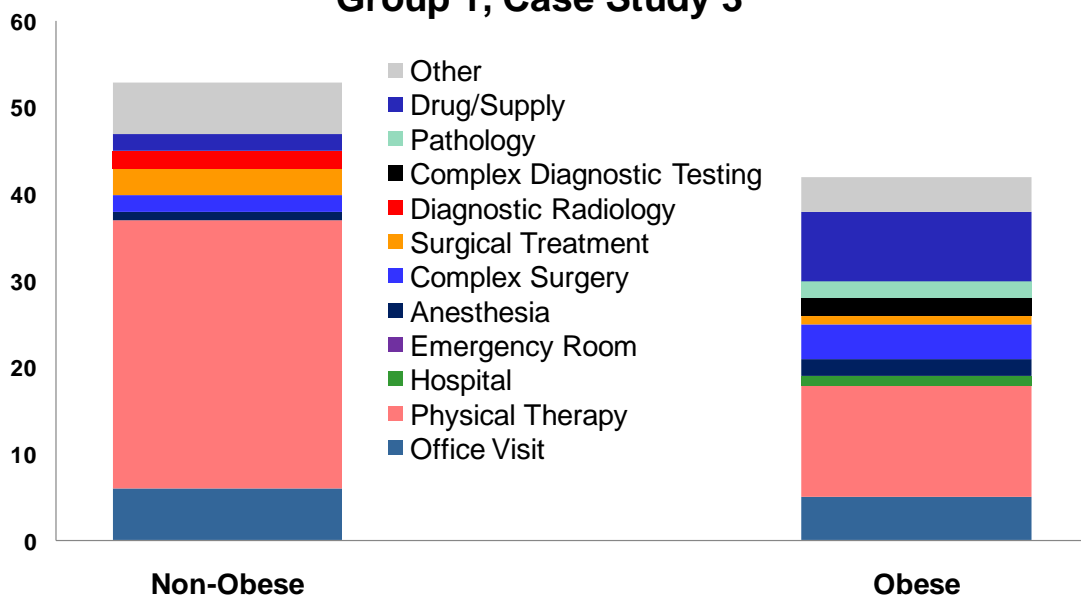
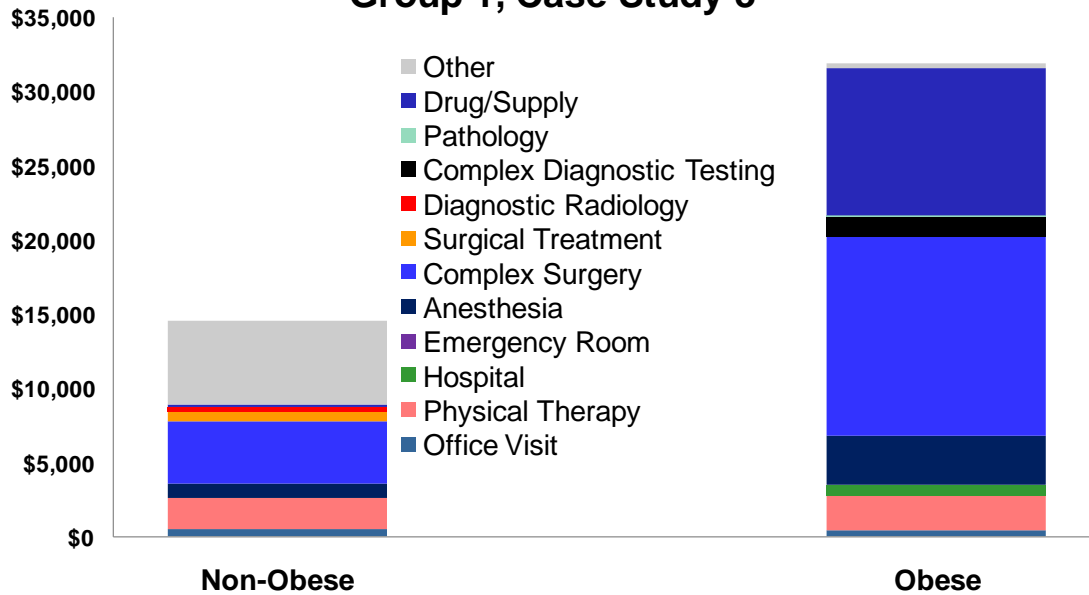


Chart 1-3D

Medical Paid by Service Group

Tear Medial Cartilage Meniscus of Knee

Group 1, Case Study 3



Case Study 4: Tear Medial Cartilage Meniscus of Knee

In this second pair with tear of the medial cartilage meniscus of knee as the primary diagnosis, the non-obese claim is slightly more expensive even though it had roughly 60 total treatments compared with 75 total treatments for the obese claim. Treatments for the non-obese claim also occurred over a longer period of time. The cost differences are largely due to a larger share for drugs and supplies and “other.”

Chart 1-4A

Distribution of Medical Costs per Claim

Tear Medial Cartilage Meniscus of Knee

Group 1, Case Study 4

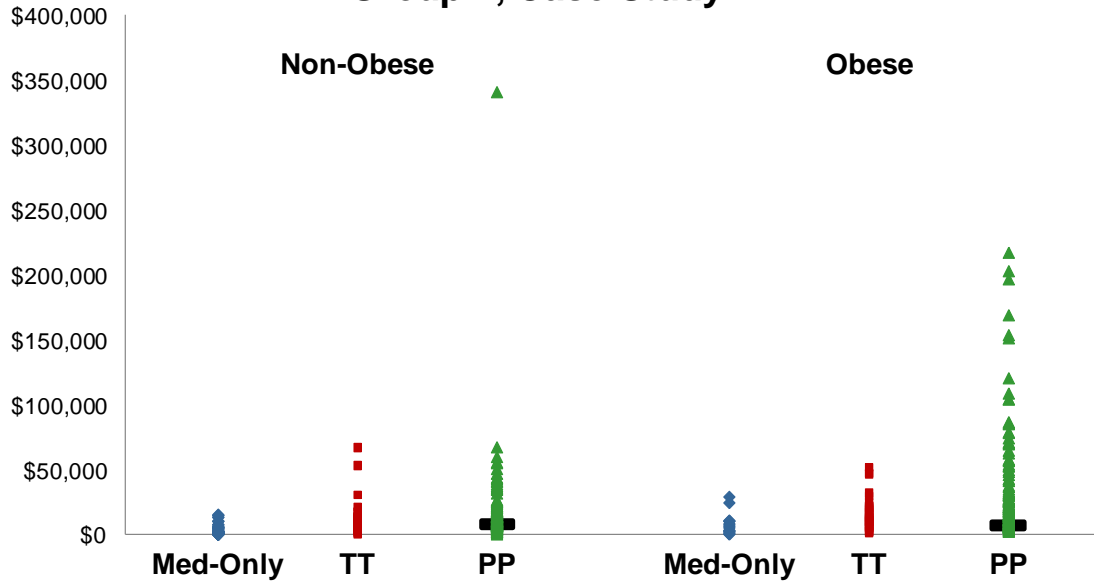


Chart 1-4B

Number and Timing of Treatments

Tear Medial Cartilage Meniscus of Knee

Group 1, Case Study 4

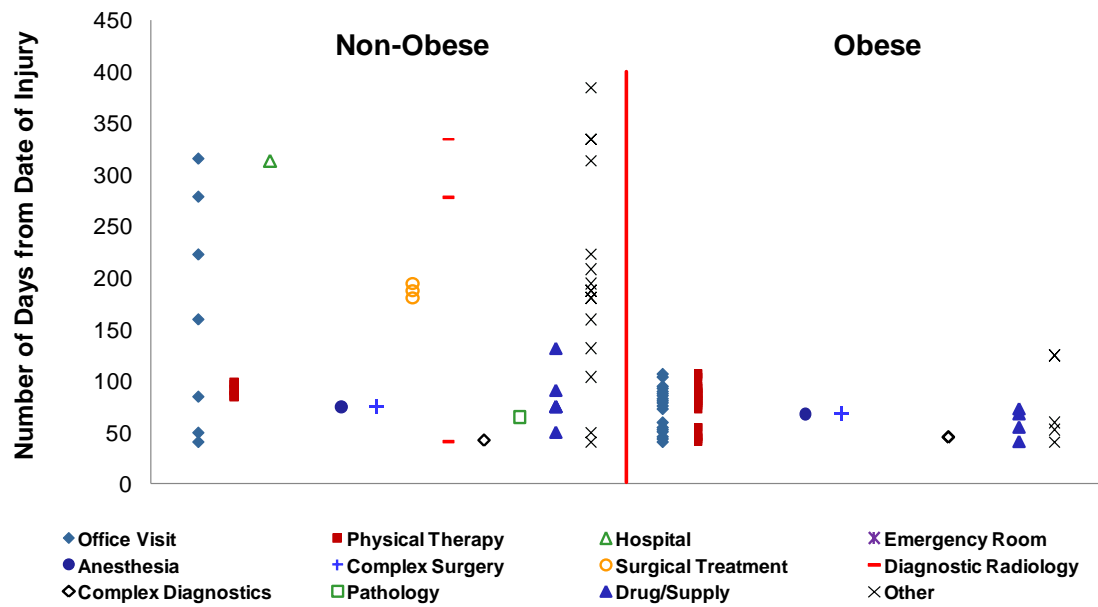


Chart 1-4C

Treatment Counts by Service Group

Tear Medial Cartilage Meniscus of Knee

Group 1, Case Study 4

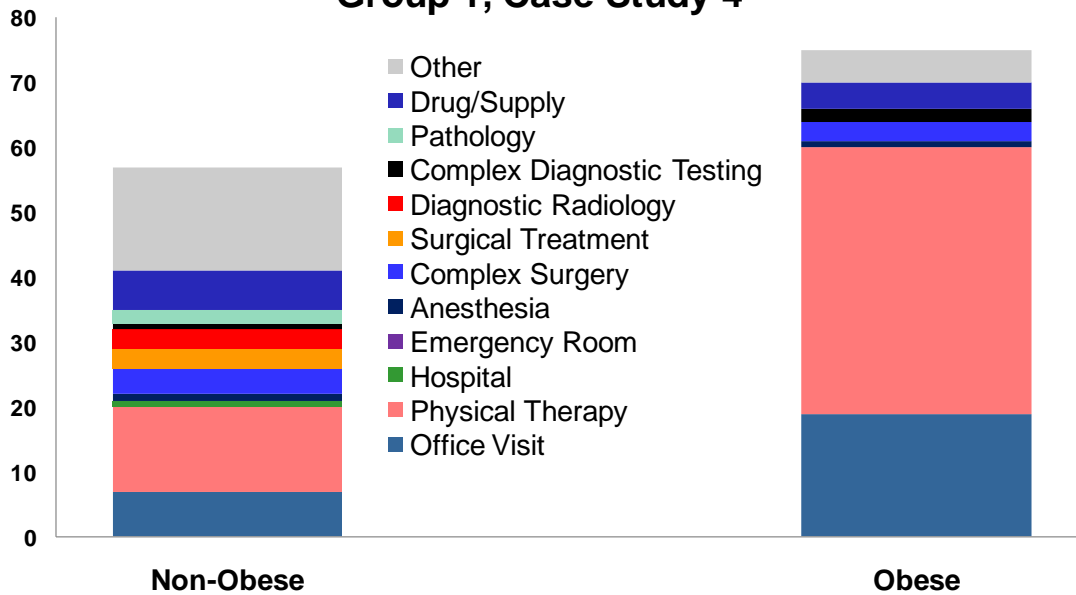
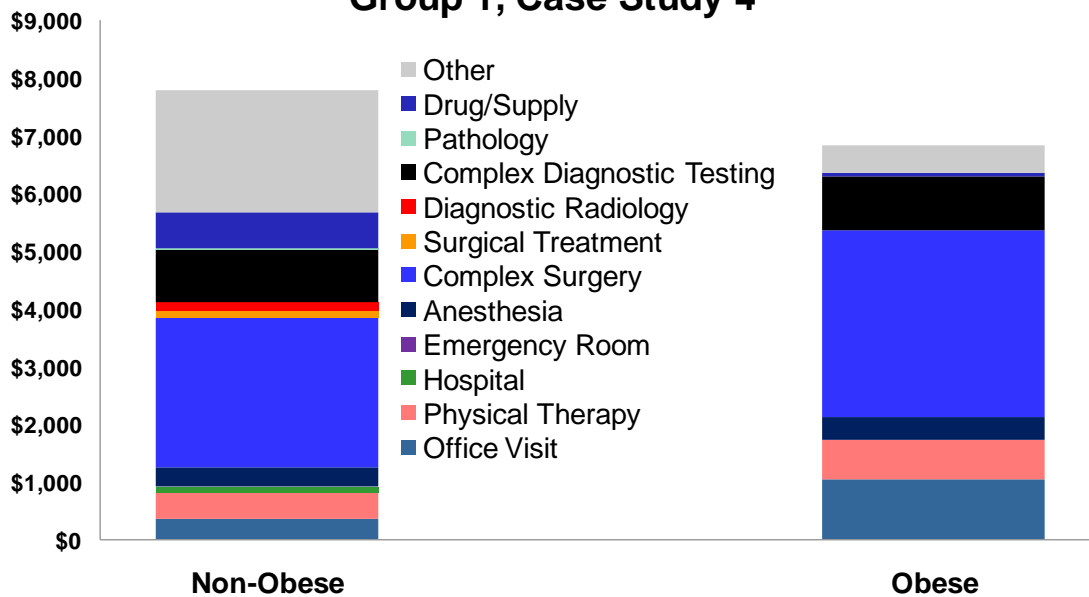


Chart 1-4D

Medical Paid by Service Group

Tear Medial Cartilage Meniscus of Knee

Group 1, Case Study 4



Case Study 5: Lumbar Disc Displacement

In this case, costs for treatments for the obese claim were roughly double those for the non-obese claim. Key differences were due to physical therapy, hospital, and complex surgery.

Chart 1-5A

Distribution of Medical Costs per Claim

Lumbar Disc Displacement

Group 1, Case Study 5



Chart 1-5B

Number and Timing of Treatments

Lumbar Disc Displacement Group 1, Case Study 5

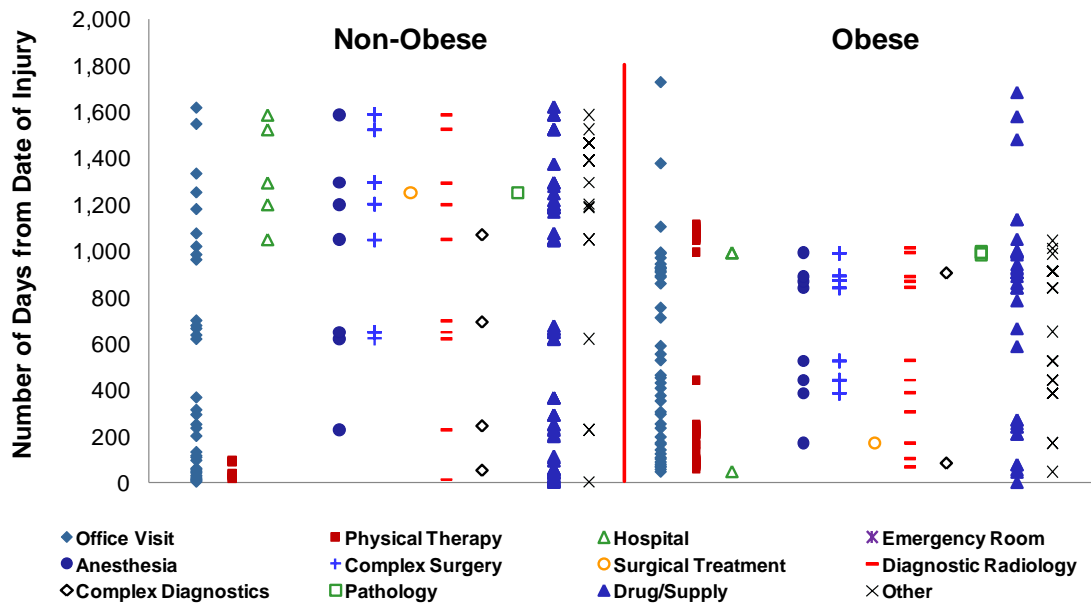


Chart 1-5C

Treatment Counts by Service Group

Lumbar Disc Displacement Group 1, Case Study 5

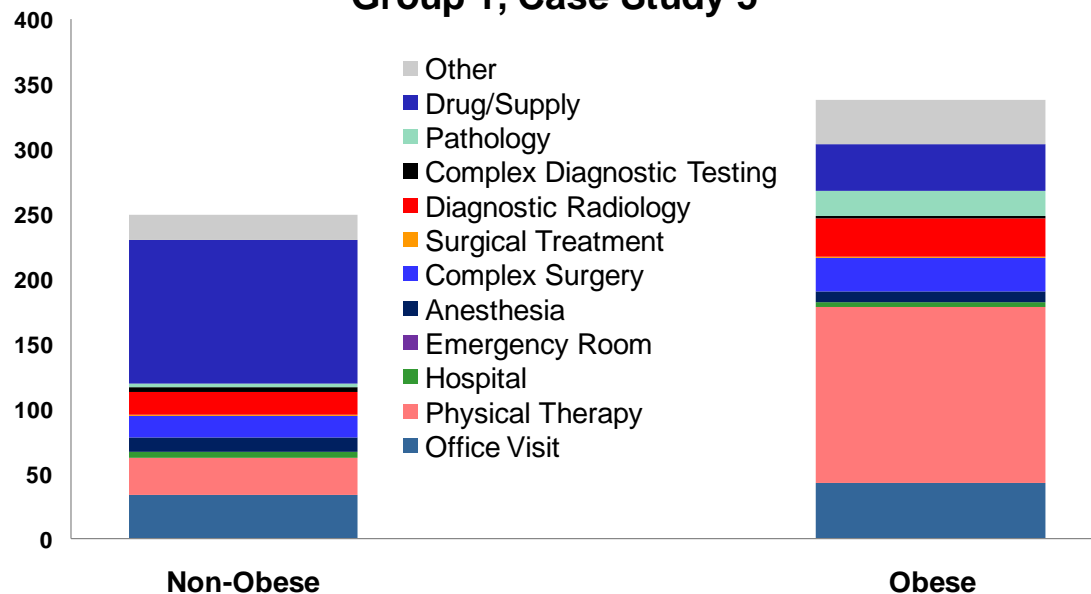
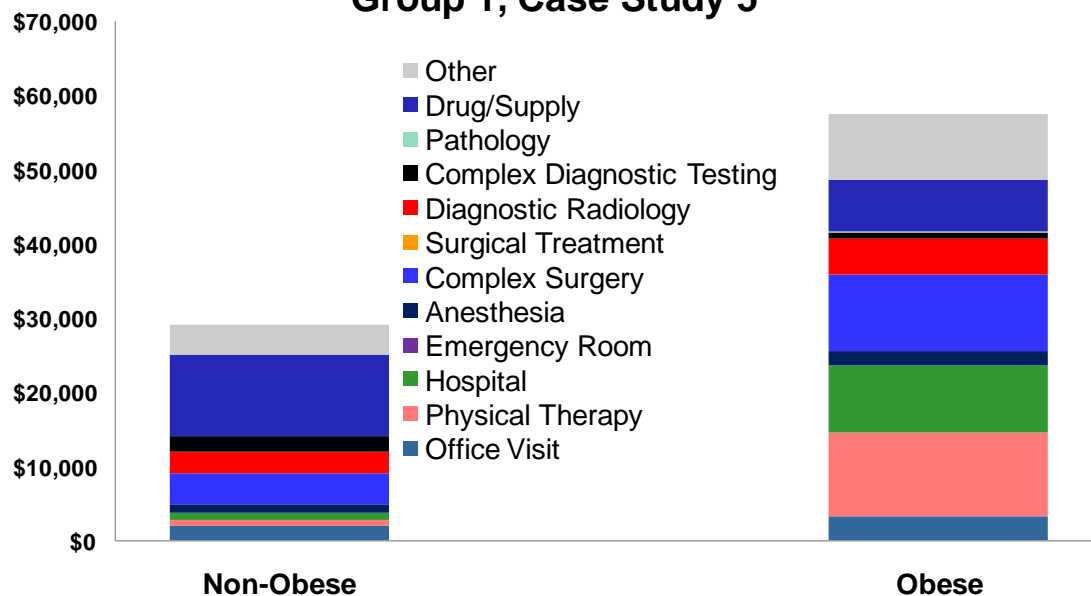


Chart 1-5D

Medical Paid by Service Group

Lumbar Disc Displacement

Group 1, Case Study 5



GROUP 2: Diagnoses Where the Non-Obese Claims Have a Low Share of PP Claims and the Obese Have a High Share of PP Claims

Case Study 1: Cervicalgia

Even though cervicalgia is a diagnosis where obese claims tend to have a high share of PP injuries, in this case, both the obese and non-obese claims are medical only. This is the third case study where the non-obese costs were higher than the obese. The difference was due to physical therapy and complex diagnostic testing.

Chart 2-1A

Distribution of Medical Costs per Claim

Cervicalgia

Group 2, Case Study 1

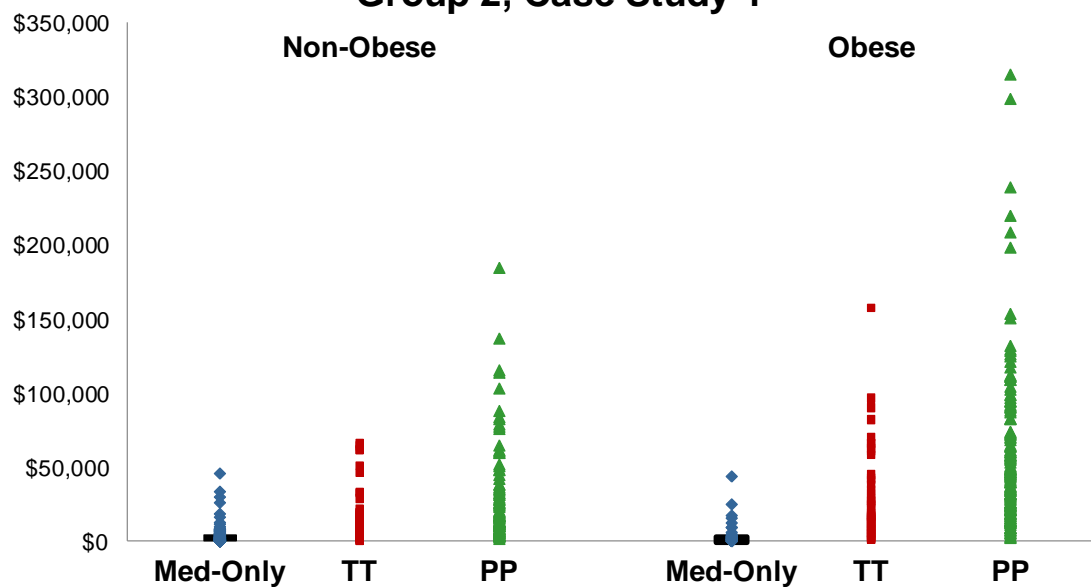


Chart 2-1B

Number and Timing of Treatments Cervicalgia Group 2, Case Study 1

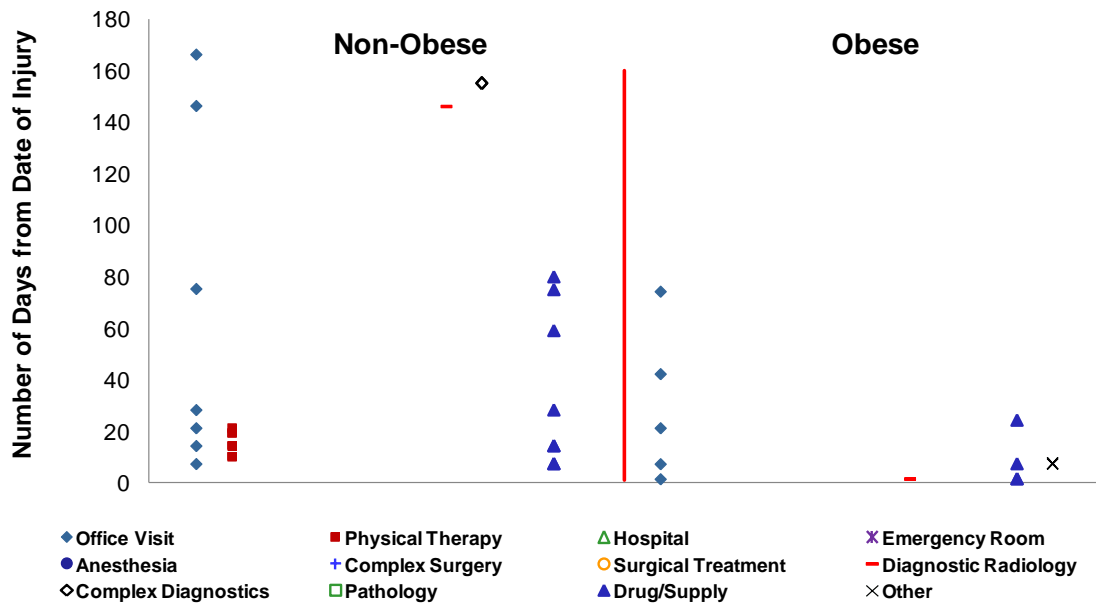


Chart 2-1C

Treatment Counts by Service Group Cervicalgia Group 2, Case Study 1

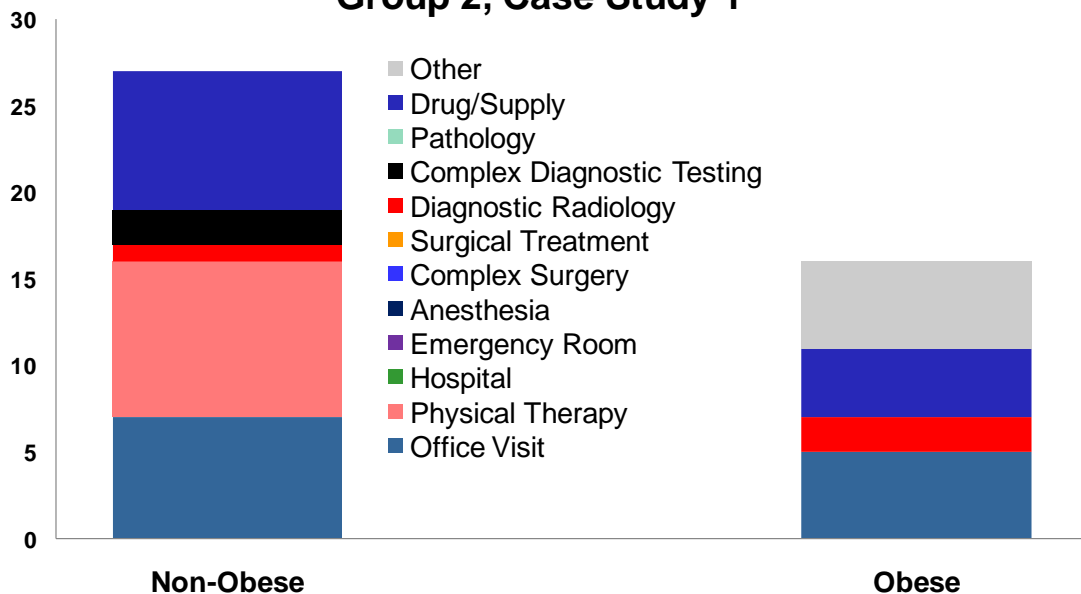
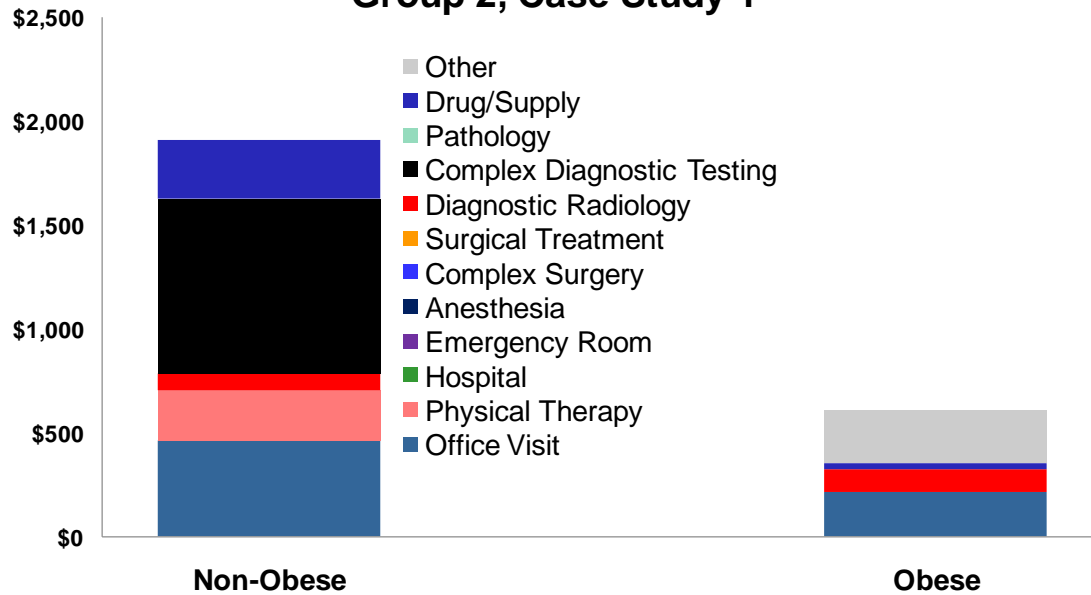


Chart 2-1D

Medical Paid by Service Group

Cervicalgia

Group 2, Case Study 1



Case Study 2: Lower Leg Injury Not Otherwise Specified (NOS)

In this example, the non-obese claim is medical only and the obese claim is permanent partial. The obese claim had over four times the number of treatments including complex surgery, hospital, and significant physical therapy.

Chart 2-2A

Distribution of Medical Costs per Claim

Lower Leg Injury NOS
Group 2, Case Study 2

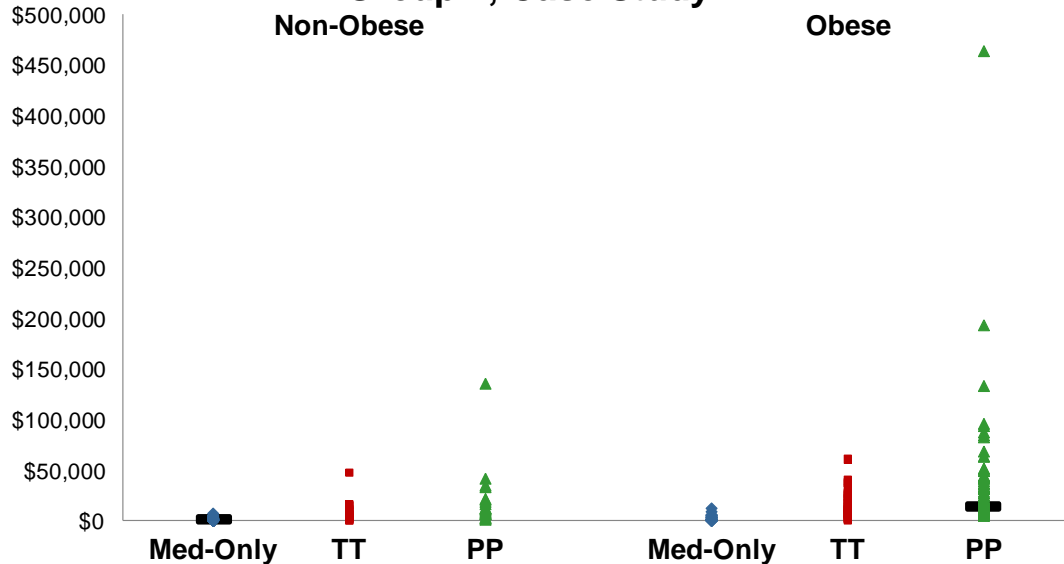


Chart 2-2B

Number and Timing of Treatments

Lower Leg Injury NOS
Group 2, Case Study 2

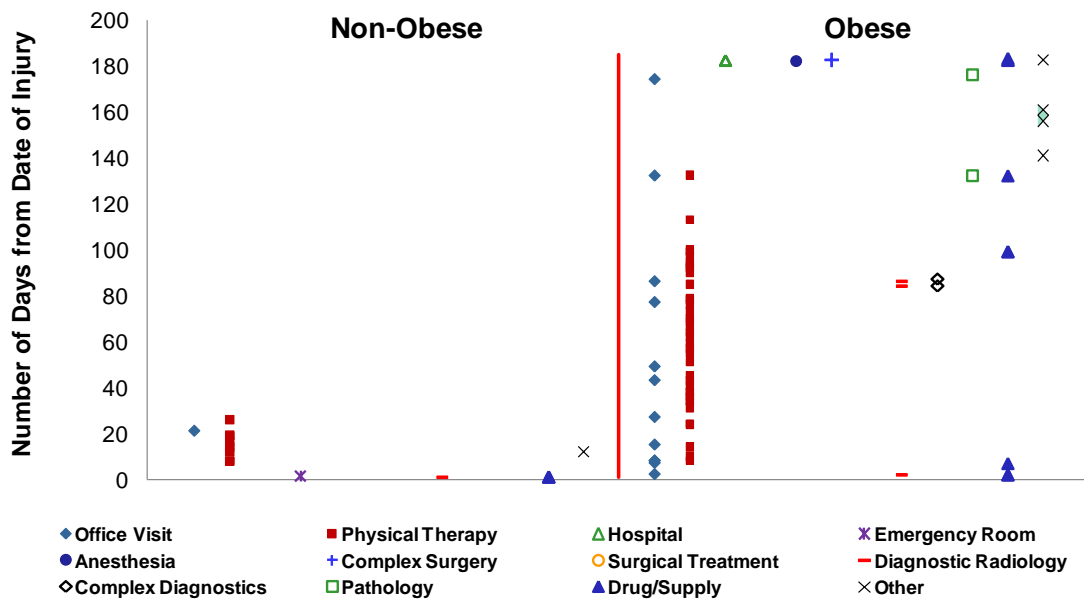


Chart 2-2C

Treatment Counts by Service Group

Lower Leg Injury NOS
Group 2, Case Study 2

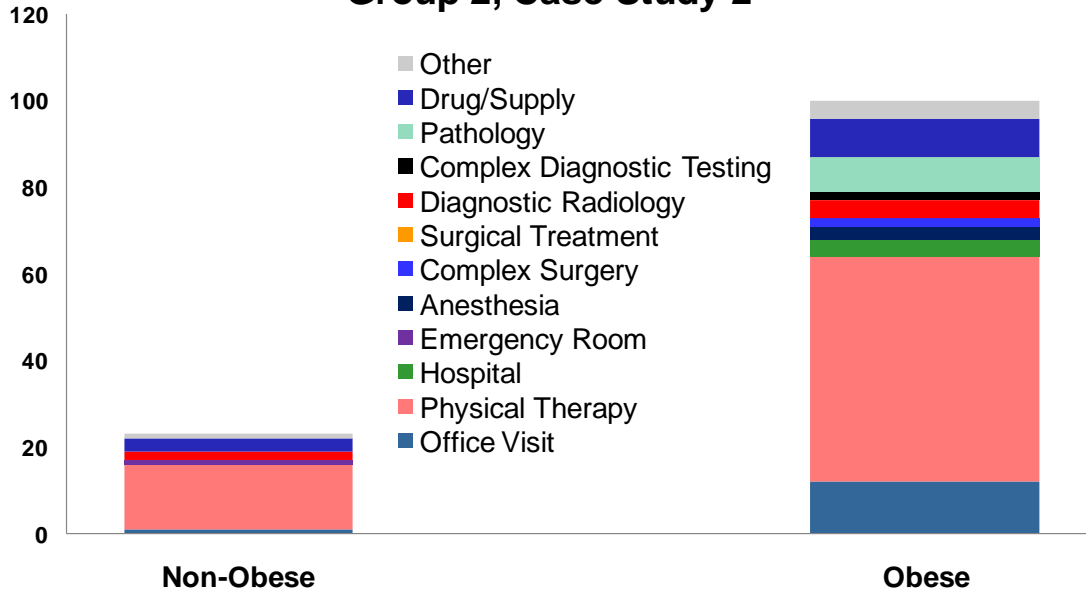
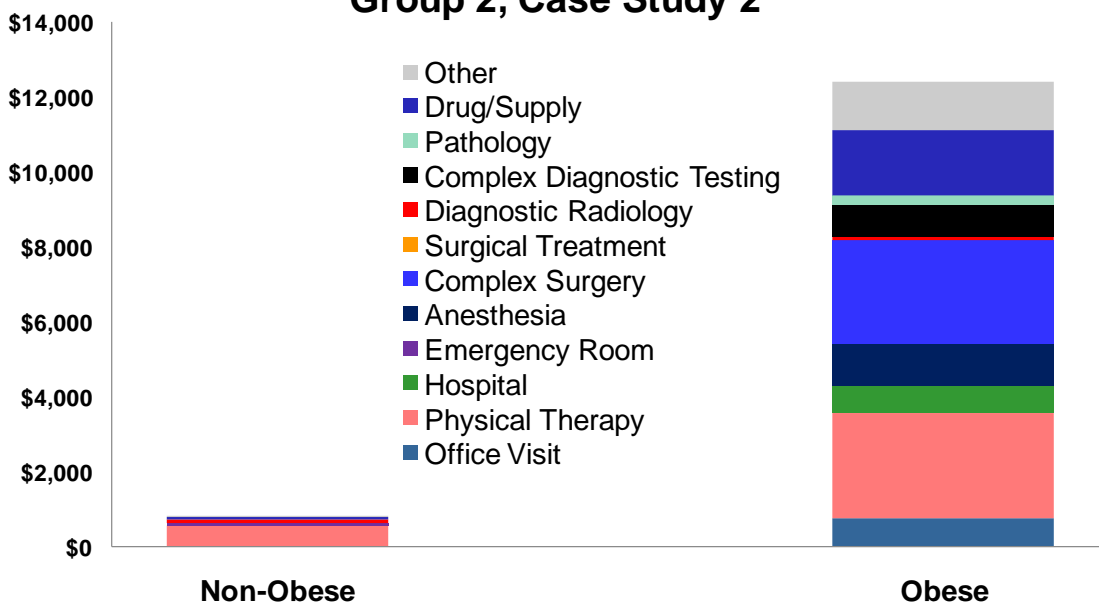


Chart 2-2D

Medical Paid by Service Group

Lower Leg Injury NOS
Group 2, Case Study 2



Case Study 3: Lower Leg Injury Not Otherwise Specified (NOS)

In this case, both claims were medical only. The obese had more treatments and higher costs due to physical therapy.

Chart 2-3A

Distribution of Medical Costs per Claim

Lower Leg Injury NOS Group 2, Case Study 3

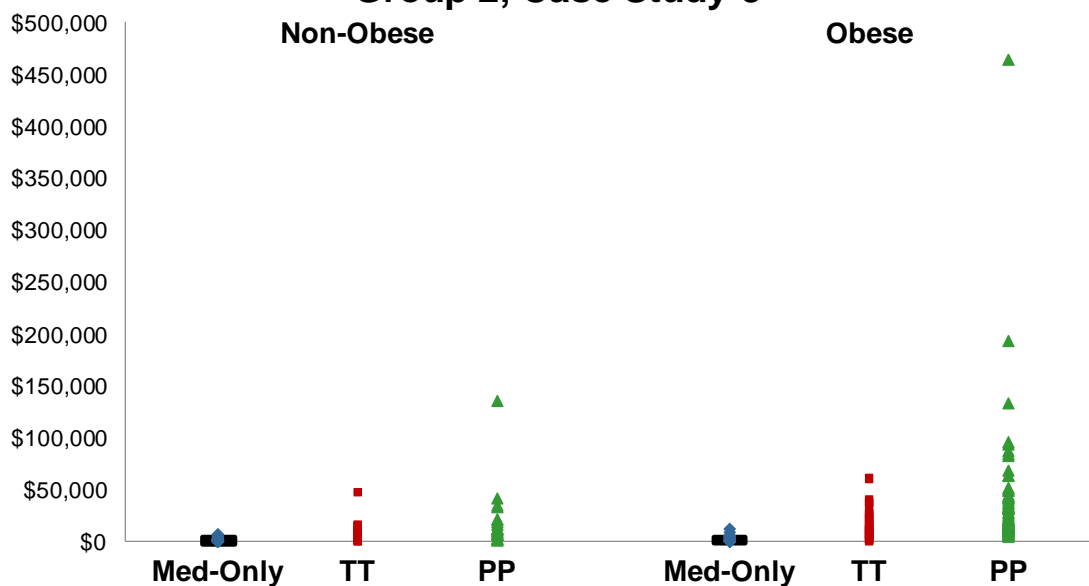


Chart 2-3B

Number and Timing of Treatments

Lower Leg Injury NOS Group 2, Case Study 3

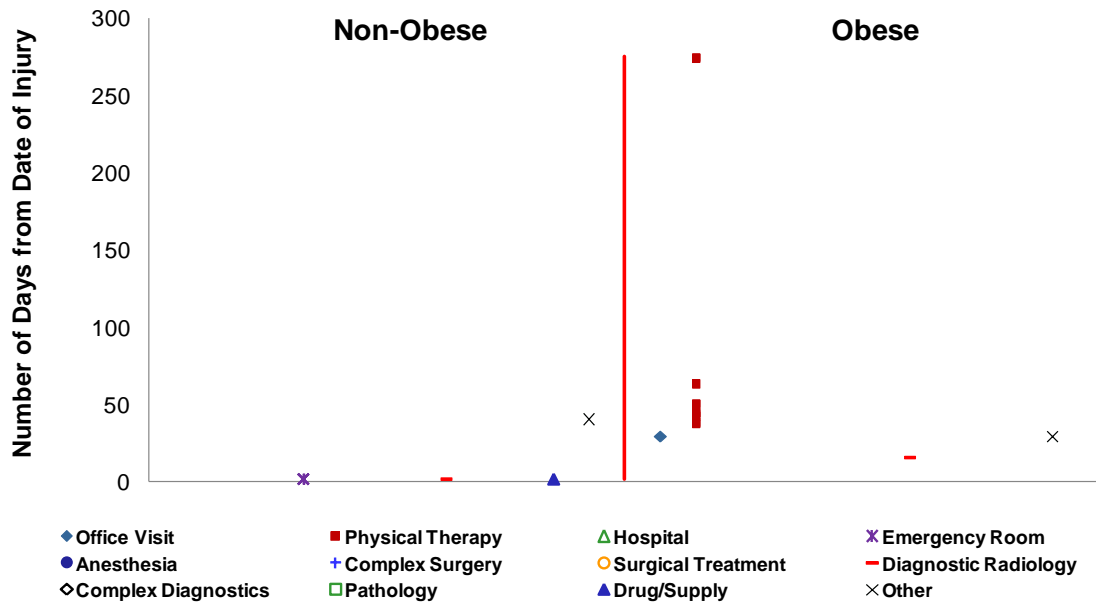


Chart 2-3C

Treatment Counts by Service Group

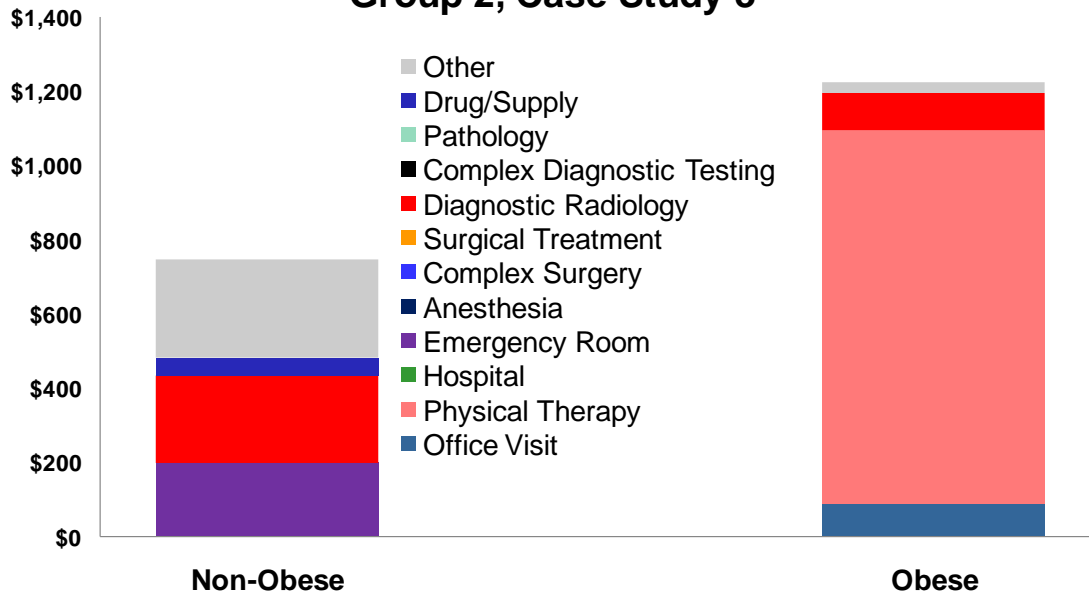
Lower Leg Injury NOS Group 2, Case Study 3



Chart 2-3D

Medical Paid by Service Group

Lower Leg Injury NOS Group 2, Case Study 3



Case Study 4: Lower Leg Injury Not Otherwise Specified (NOS)

In this example, both claims were medical only and the obese had significantly more treatments and costs. The non-obese claim was treated only with an office visit, two X-rays, and a drug or supply the day after the injury, while treatments for the obese claim occurred over a period of more than 200 days after the injury. In total, the obese claim had more than 10 times the number of treatments than the non-obese claim had.

Chart 2-4A

Distribution of Medical Costs per Claim

Lower Leg Injury NOS
Group 2, Case Study 4

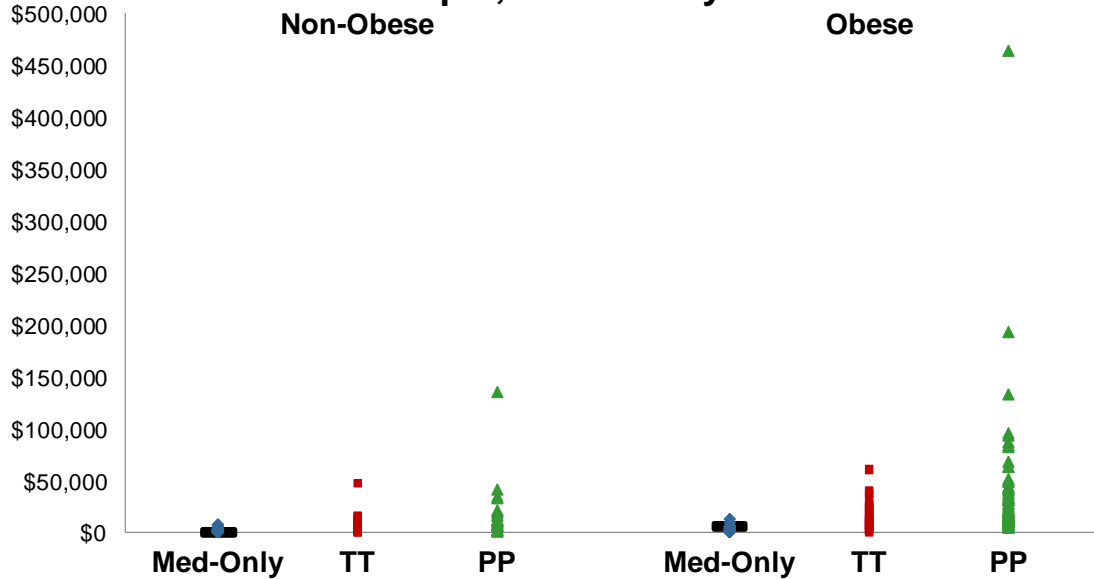


Chart 2-4B

Number and Timing of Treatments

Lower Leg Injury NOS
Group 2, Case Study 4

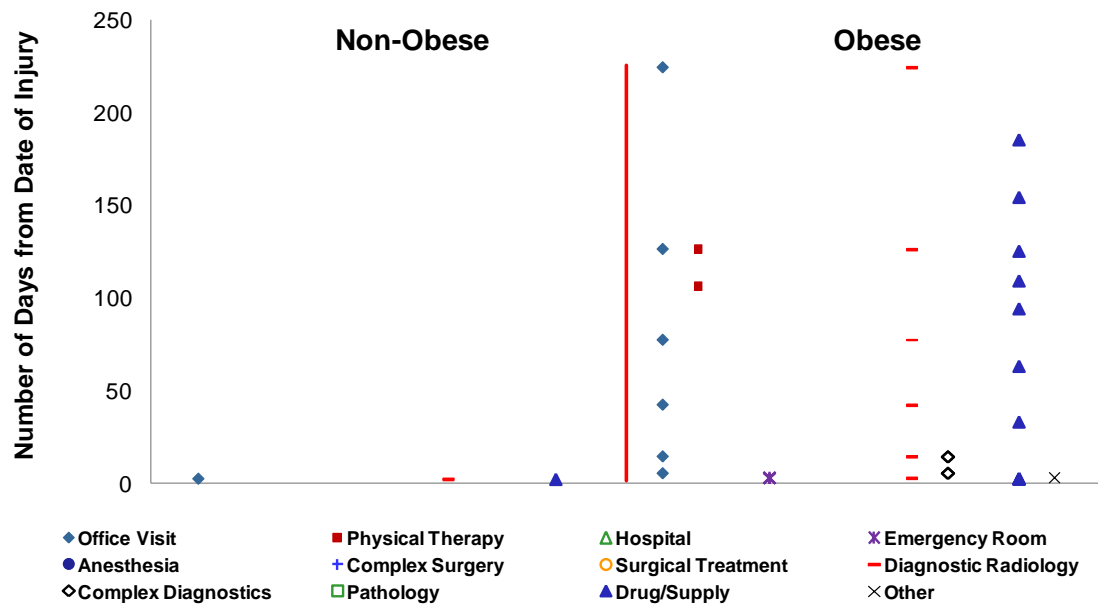


Chart 2-4C

Treatment Counts by Service Group

Lower Leg Injury NOS
Group 2, Case Study 4

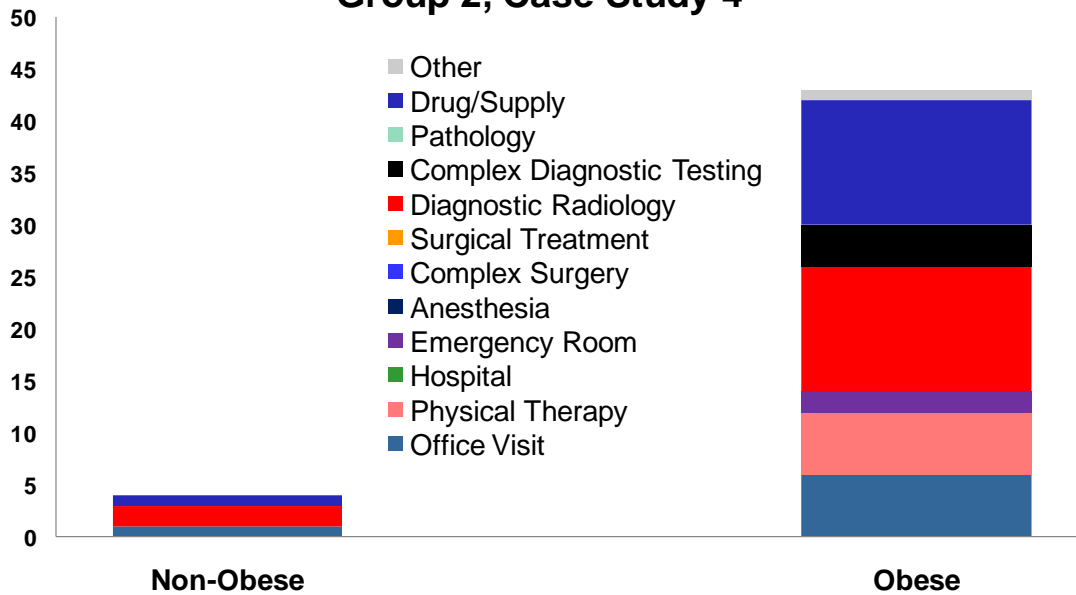
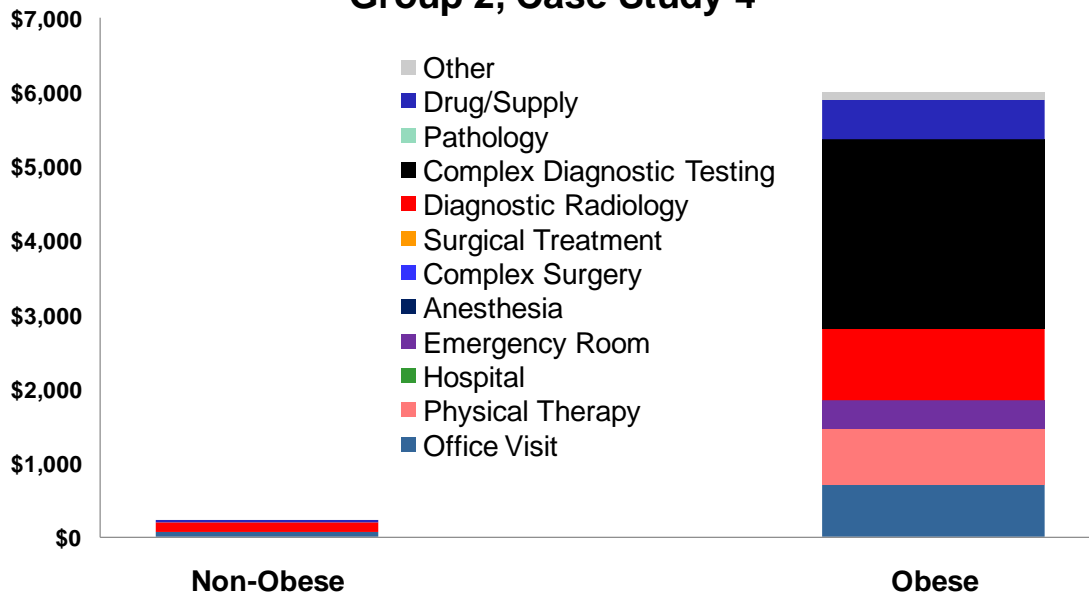


Chart 2-4D

Medical Paid by Service Group

Lower Leg Injury NOS
Group 2, Case Study 4



Case Study 5: Sprain of Shoulder/Arm Not Otherwise Specified (NOS)

This pair has a non-obese medical-only claim and an obese permanent partial claim. The obese claim is significantly more costly due to an entire range of treatments including physical therapy and complex surgery that the non-obese claim did not incur. Essentially, the non-obese claim had only an office visit, X-ray, and drug treatment the day of the injury and a follow-up office visit the next day. In total, the non-obese claim had four treatments, while the obese claim had more than 75. A major cost driver for the obese claim was complex surgery.

Chart 2-5A

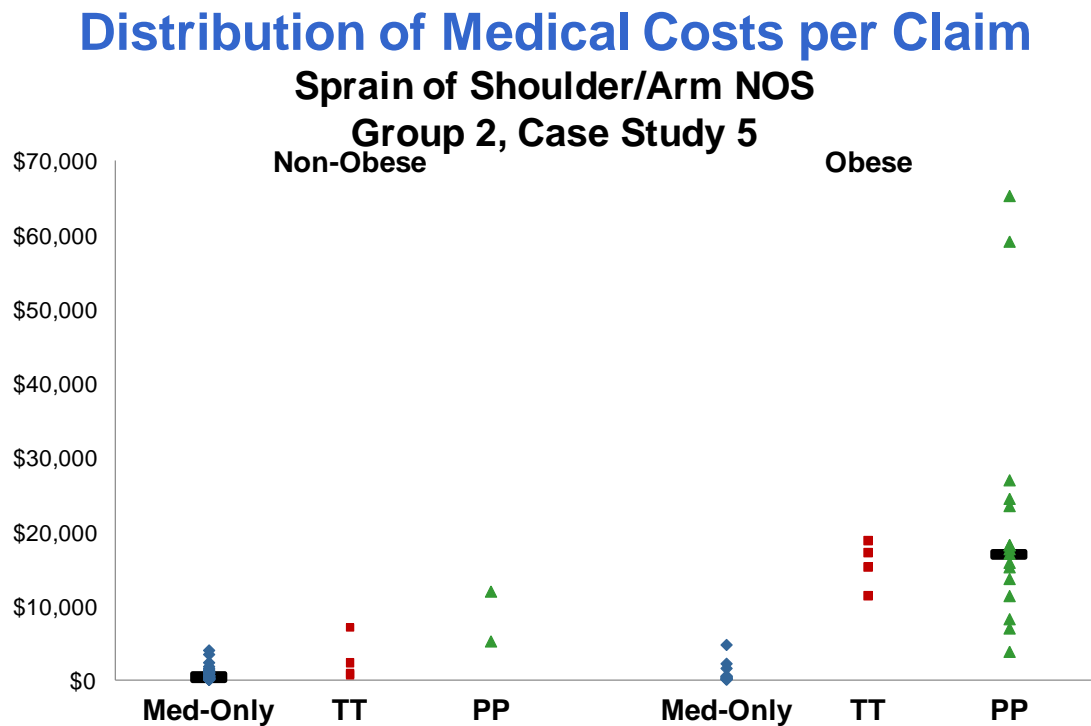


Chart 2-5B

Number and Timing of Treatments

Sprain of Shoulder/Arm NOS

Group 2, Case Study 5

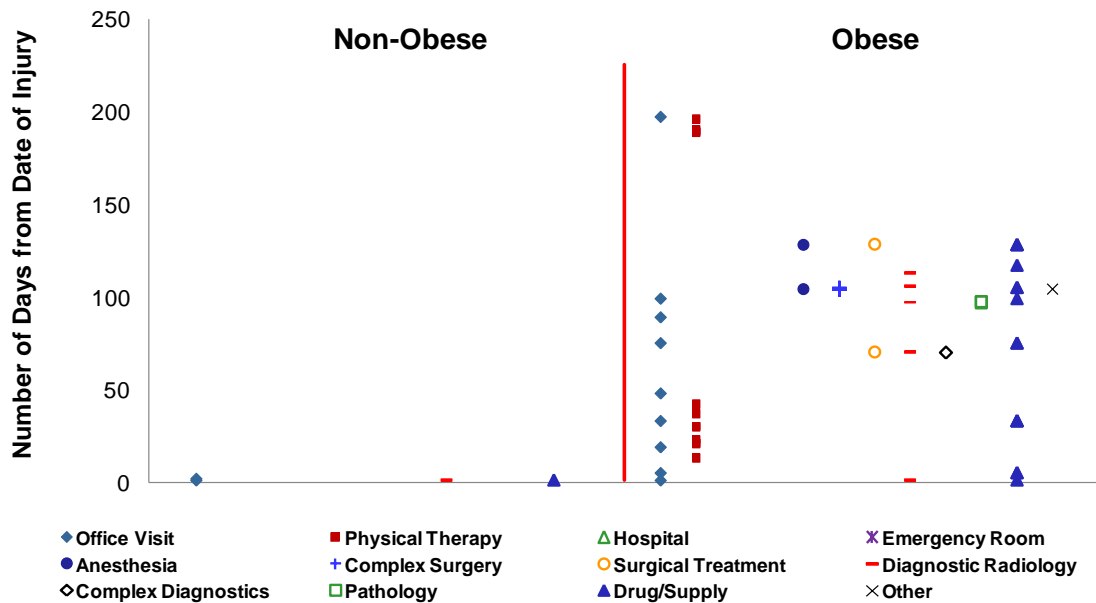


Chart 2-5C

Treatment Counts by Service Group

Sprain of Shoulder/Arm NOS

Group 2, Case Study 5

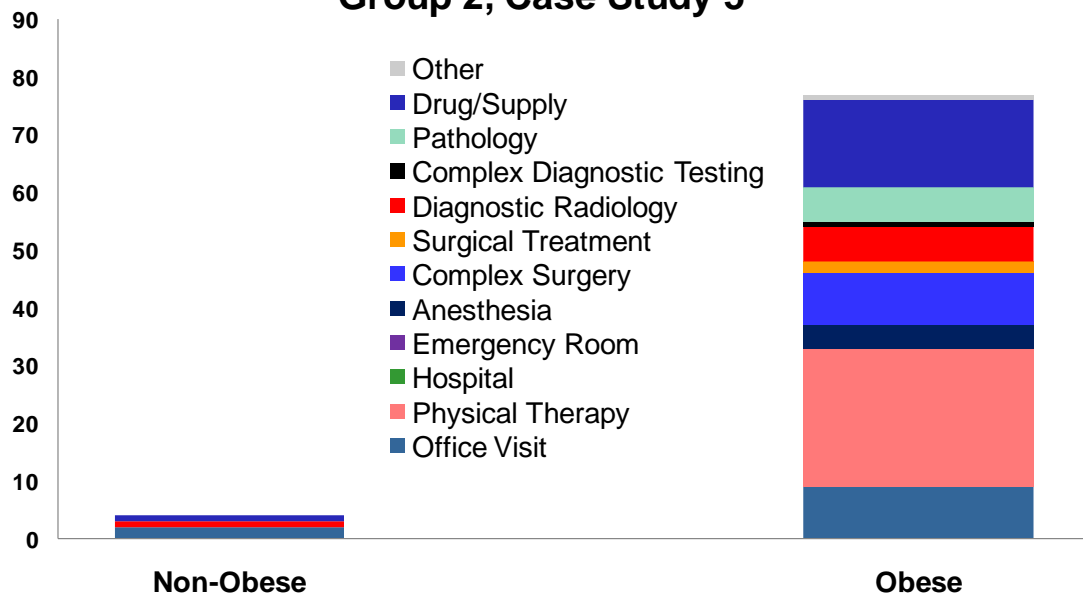


Chart 2-5D

Medical Paid by Service Group

Sprain of Shoulder/Arm NOS

Group 2, Case Study 5



GROUP 3: Diagnoses Where Both Obese and Non-Obese Claims Have High Shares of Medical Only

Case Study 1: Lumbago

Both claims here are medical only, but the obese claim has more treatments than the non-obese claim. Key cost drivers are physical therapy and complex diagnostic testing.

Chart 3-1A

Distribution of Medical Costs per Claim

Lumbago

Group 3, Case Study 1

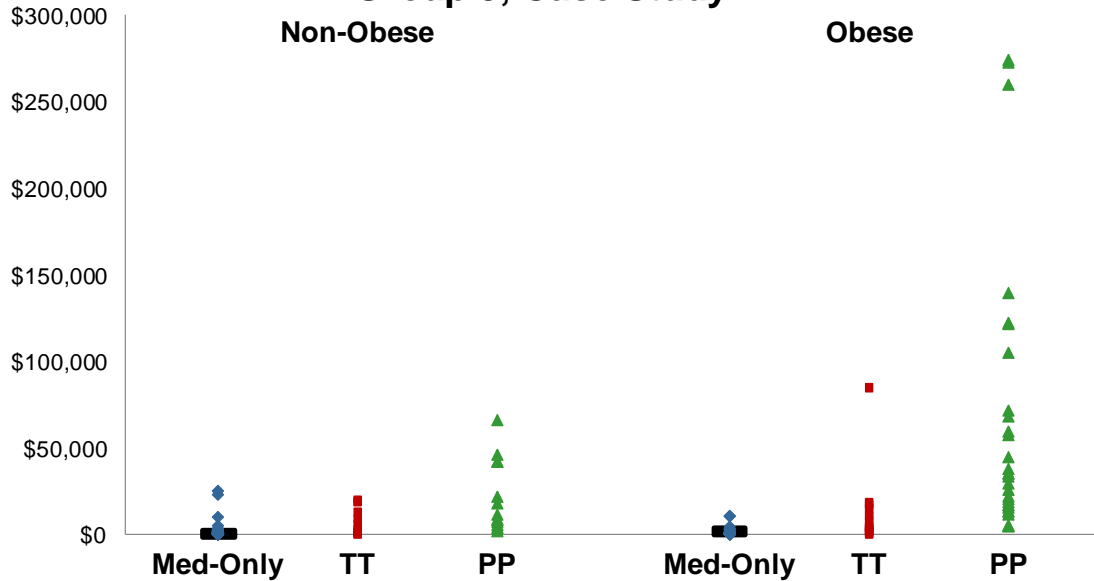


Chart 3-1B

Number and Timing of Treatments

Lumbago

Group 3, Case Study 1

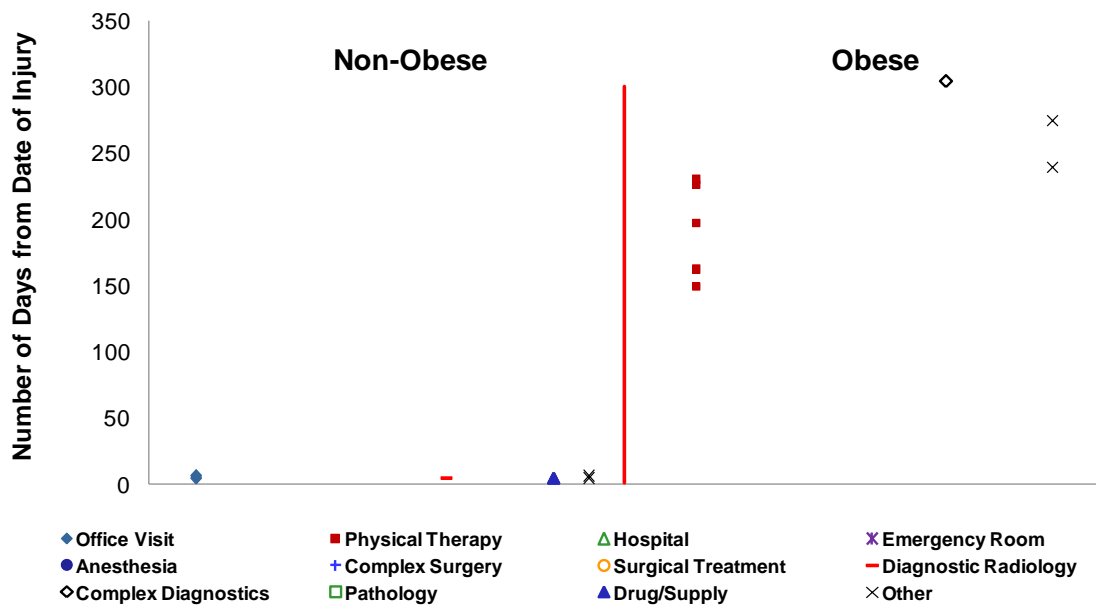


Chart 3-1C

Treatment Counts by Service Group

Lumbago

Group 3, Case Study 1

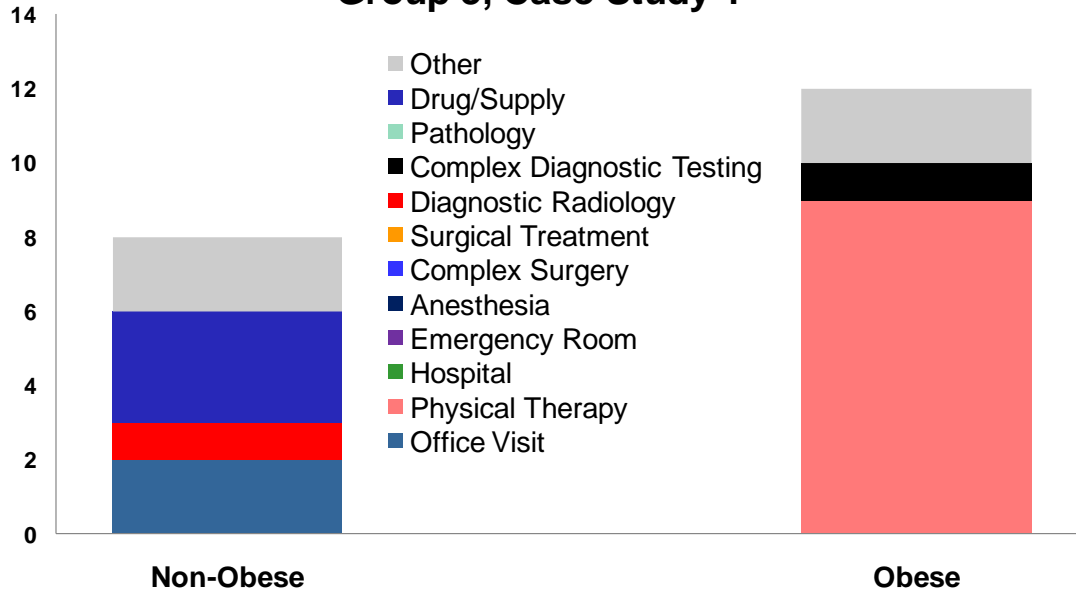
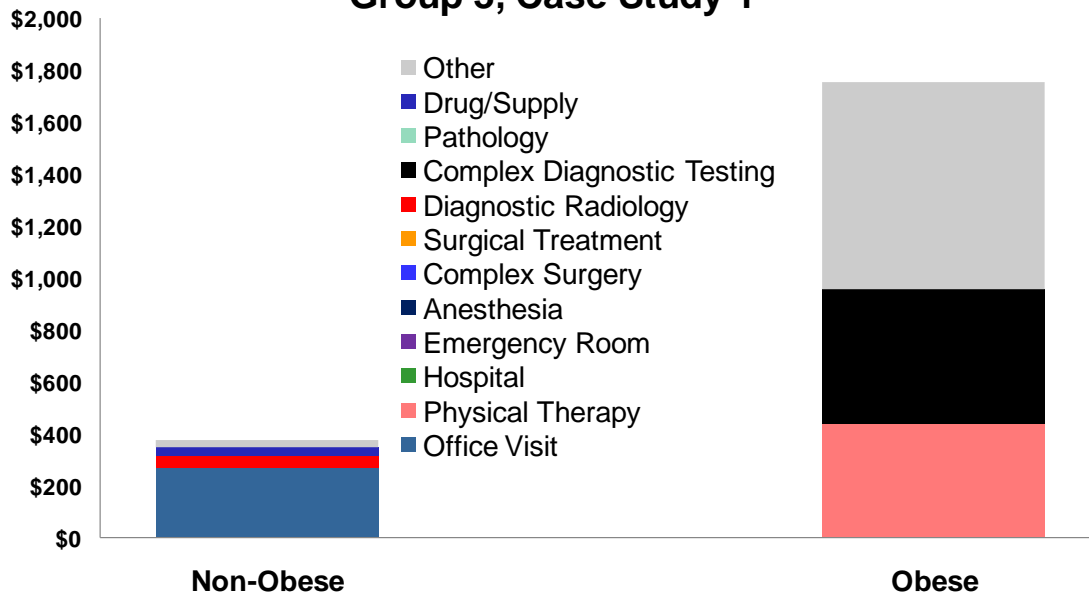


Chart 3-1D

Medical Paid by Service Group

Lumbago

Group 3, Case Study 1



Case Study 2: Sprain Lumbar Region

The non-obese claim incurred just one treatment, an office visit, while the obese claim had 14. Significant costs for the obese claim came from complex diagnostic testing and diagnostic radiology.

Chart 3-2A

Distribution of Medical Costs per Claim

Sprain Lumbar Region Group 3, Case Study 2

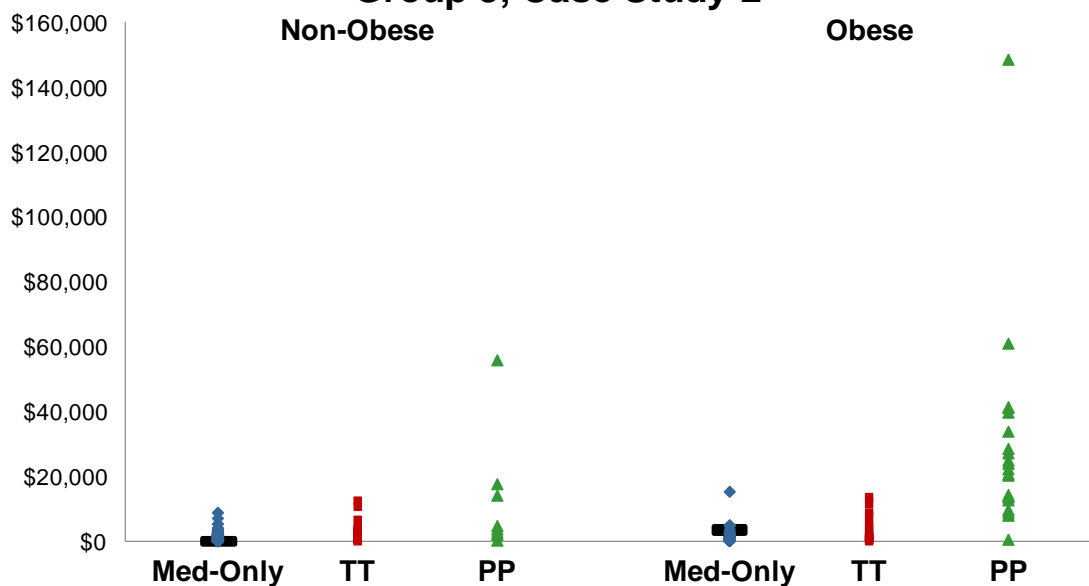


Chart 3-2B

Number and Timing of Treatments

Sprain Lumbar Region Group 3, Case Study 2

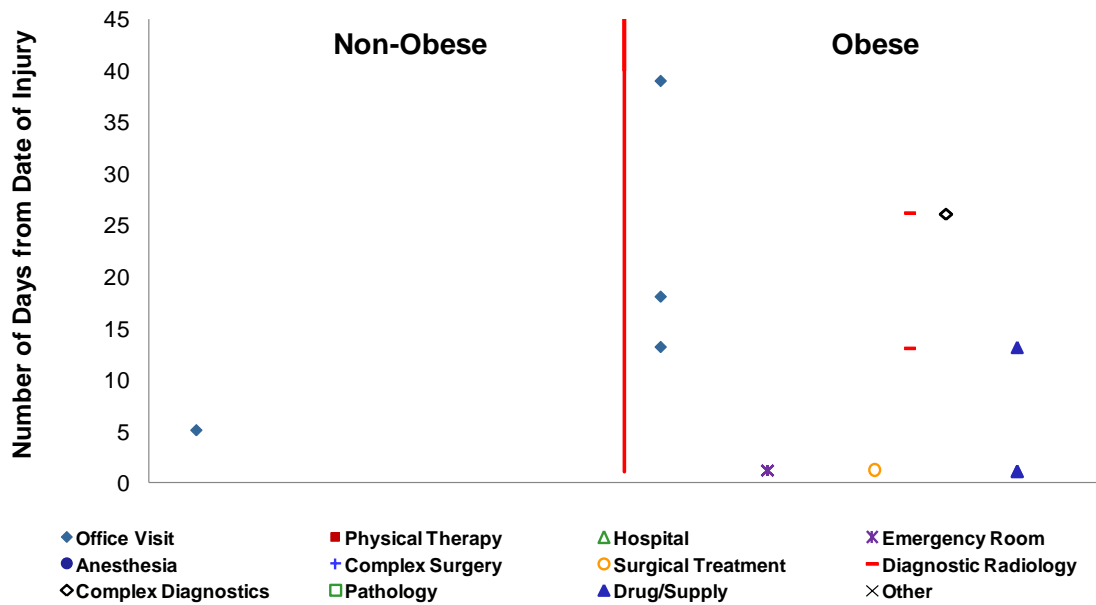


Chart 3-2C

Treatment Counts by Service Group

Sprain Lumbar Region Group 3, Case Study 2

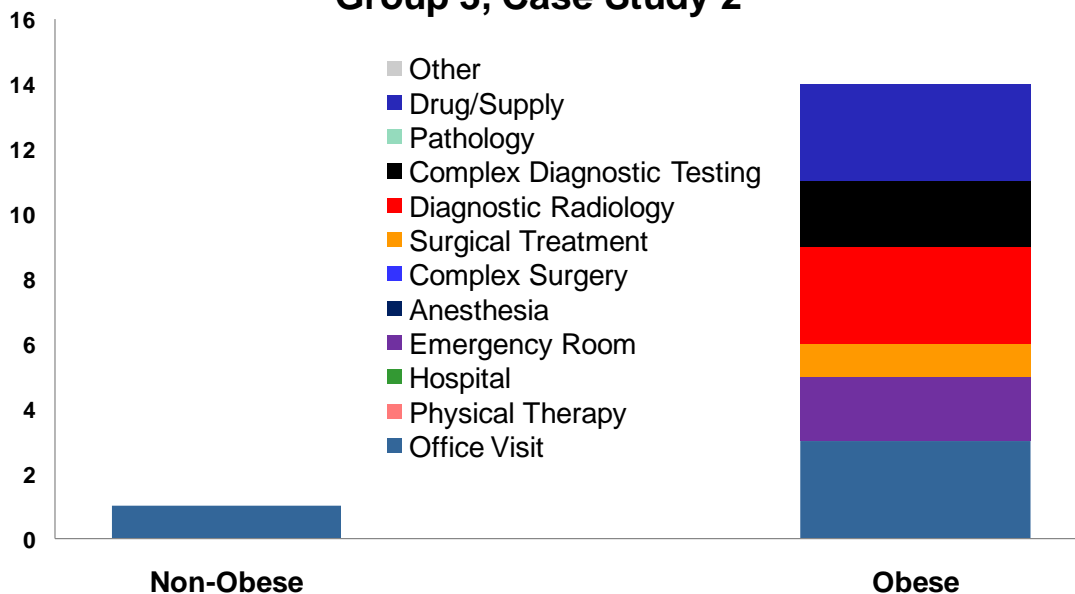
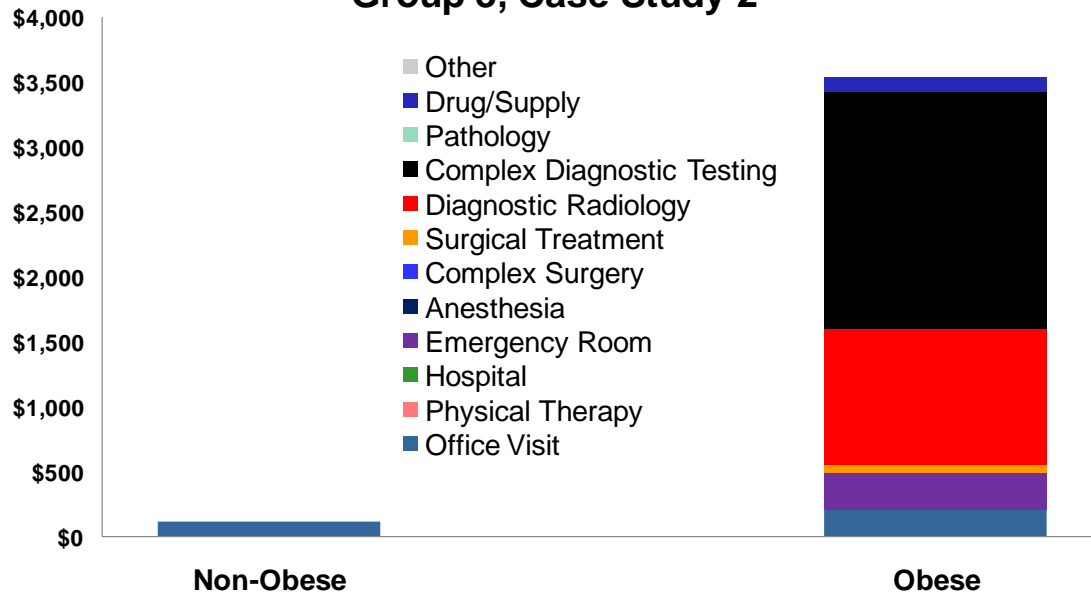


Chart 3-2D

Medical Paid by Service Group

Sprain Lumbar Region

Group 3, Case Study 2



Case Study 3: Sprain Lumbar Region

The obese claim was more expensive due to higher costs for physical therapy and office visits.

Chart 3-3A

Distribution of Medical Costs per Claim

Sprain Lumbar Region
Group 3, Case Study 3

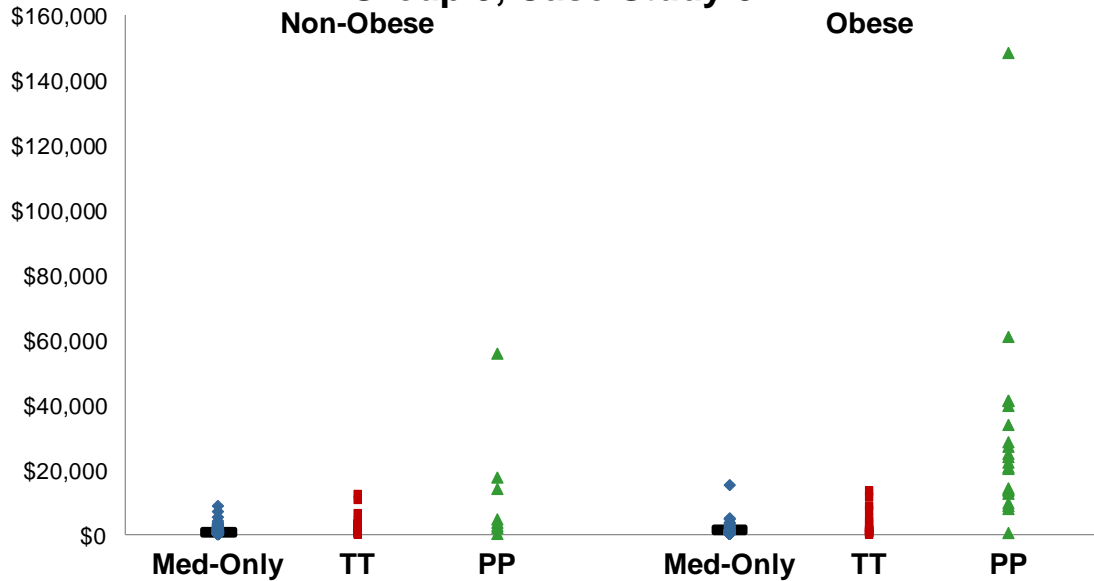


Chart 3-3B

Number and Timing of Treatments

Sprain Lumbar Region
Group 3, Case Study 3

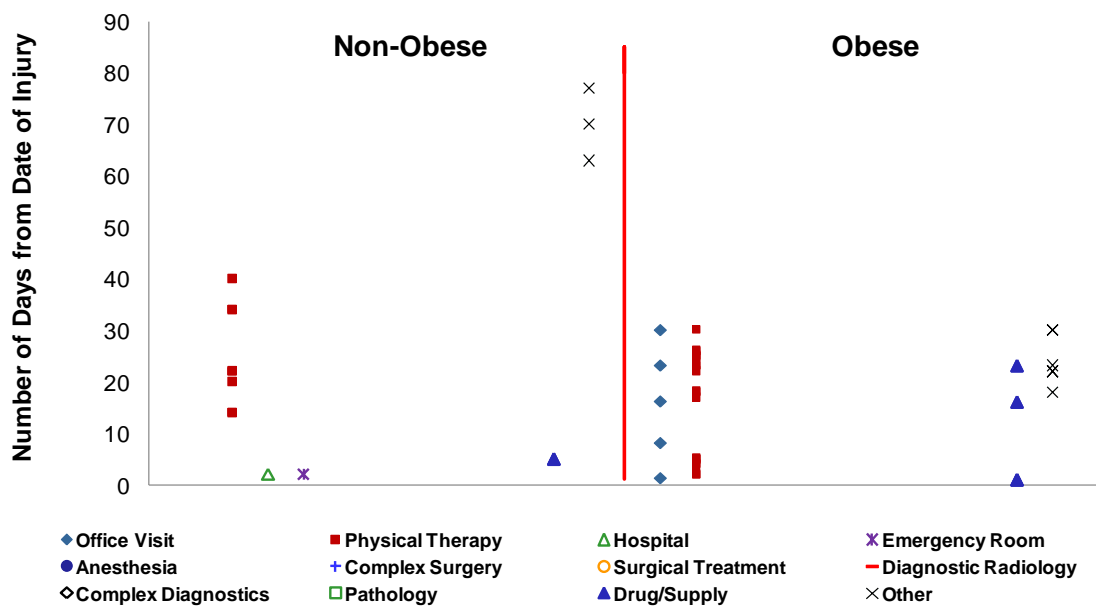


Chart 3-3C

Treatment Counts by Service Group

**Sprain Lumbar Region
Group 3, Case Study 3**

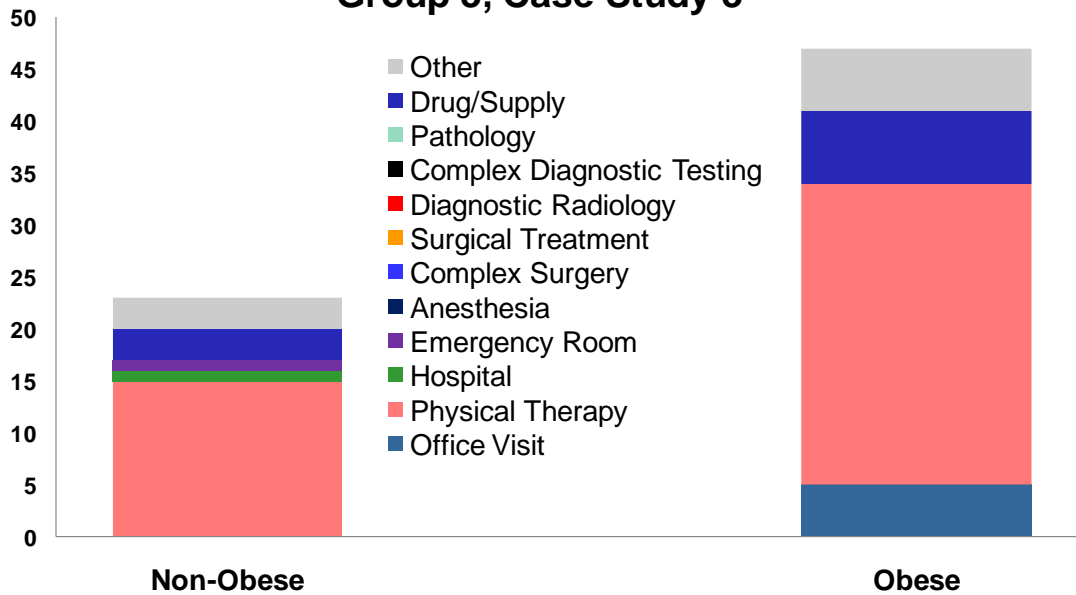
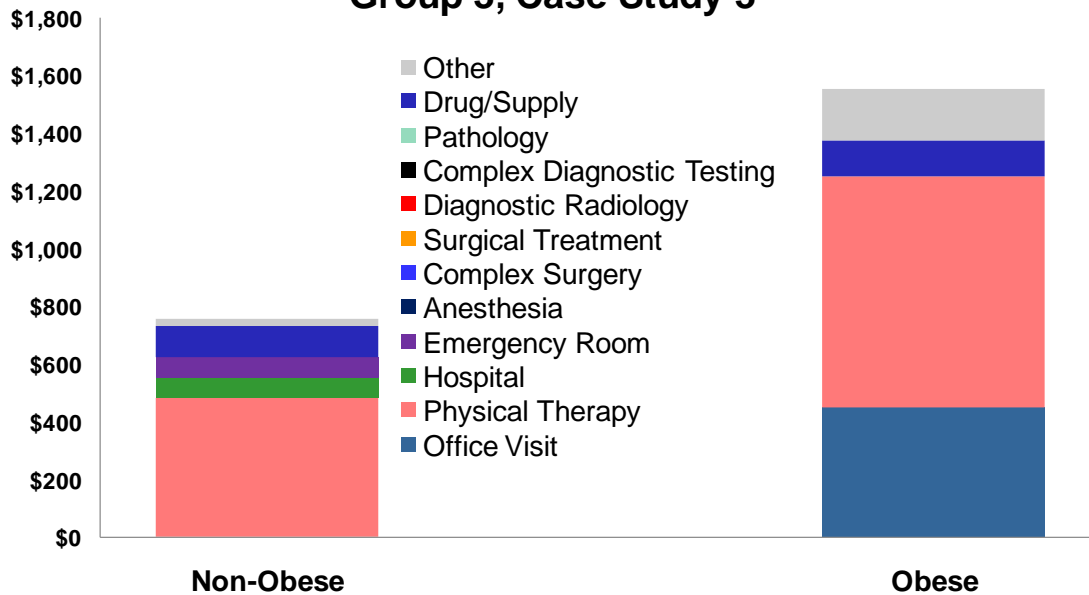


Chart 3-3D

Medical Paid by Service Group

**Sprain Lumbar Region
Group 3, Case Study 3**



Case Study 4: Sprain Lumbar Region

Treatment counts are the same for these two claims, but the obese is slightly more expensive due to higher costs for diagnostic radiology and physical therapy.

Chart 3-4A

Distribution of Medical Costs per Claim

Sprain Lumbar Region

Group 3, Case Study 4

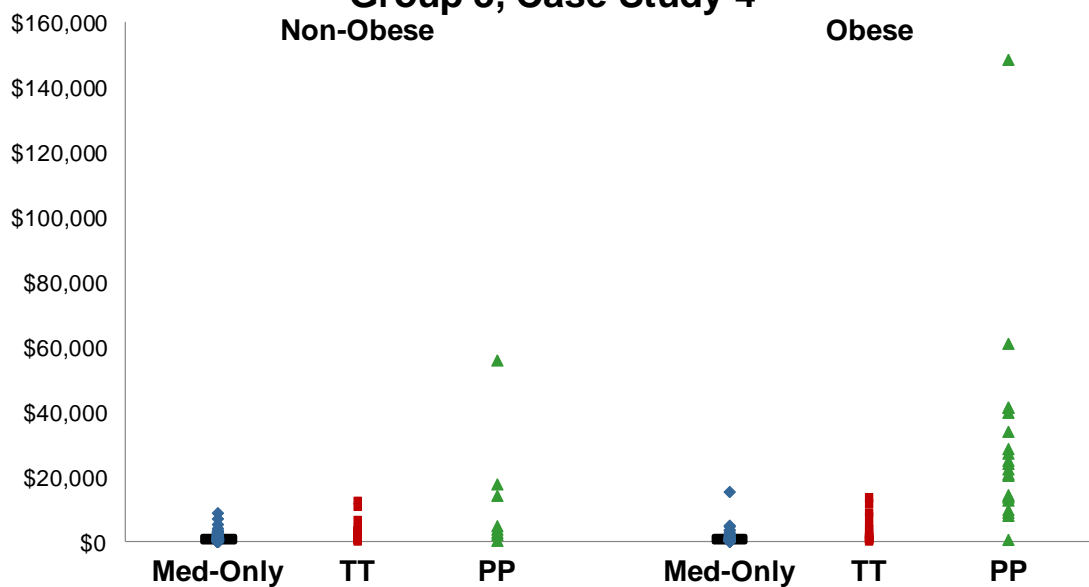


Chart 3-4B

Number and Timing of Treatments

Sprain Lumbar Region Group 3, Case Study 4

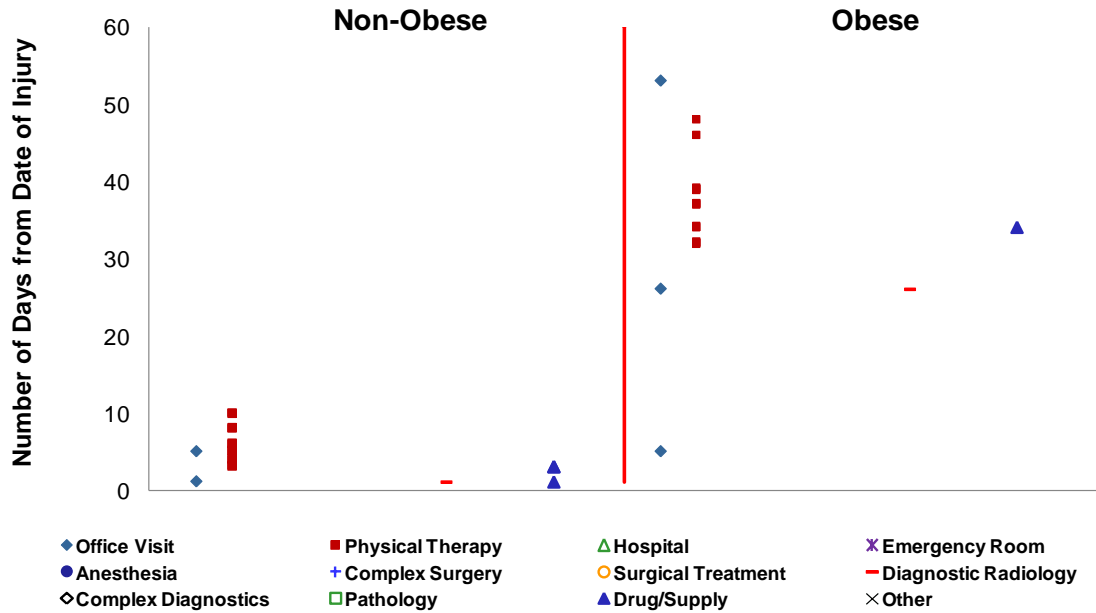


Chart 3-4C

Treatment Counts by Service Group

Sprain Lumbar Region Group 3, Case Study 4

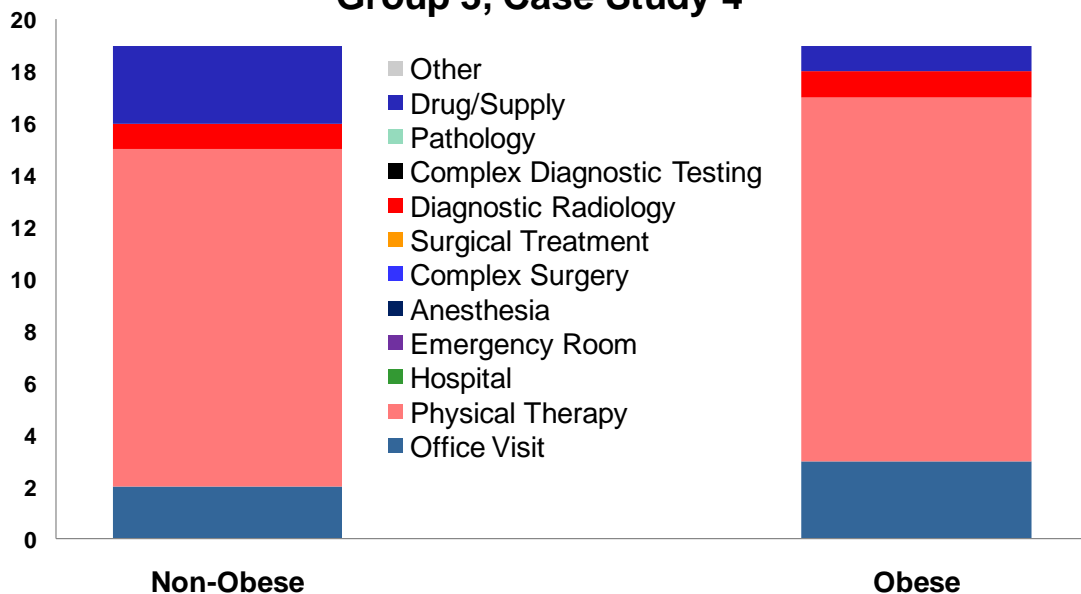
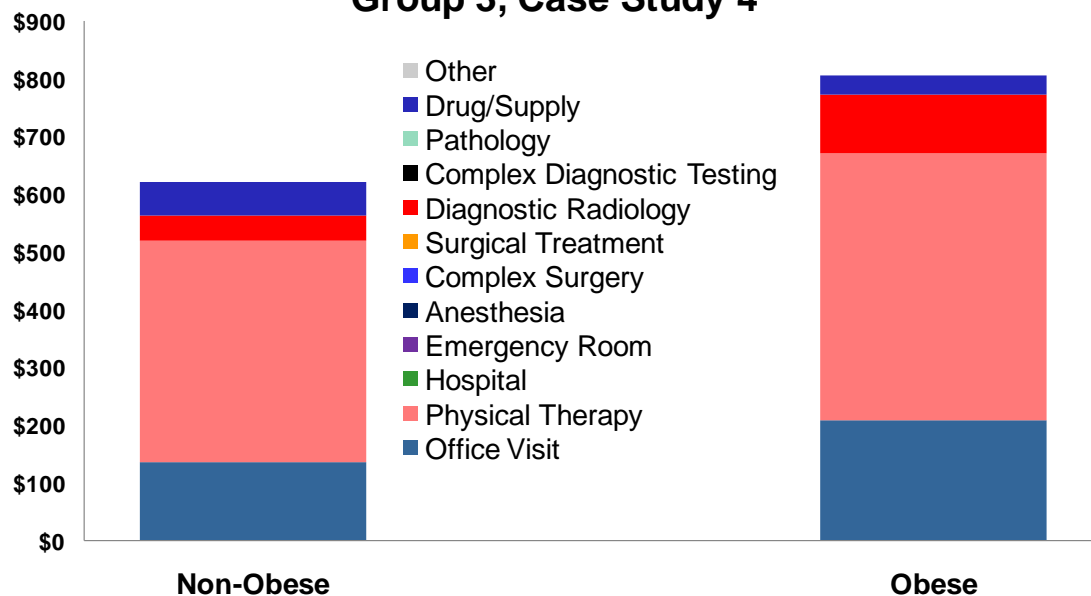


Chart 3-4D

Medical Paid by Service Group

Sprain Lumbar Region Group 3, Case Study 4



Case Study 5: Sprain Lumbar Region

Treatments and costs are almost the same for this pair.

Chart 3-5A

Distribution of Medical Costs per Claim

Sprain Lumbar Region
Group 3, Case Study 5

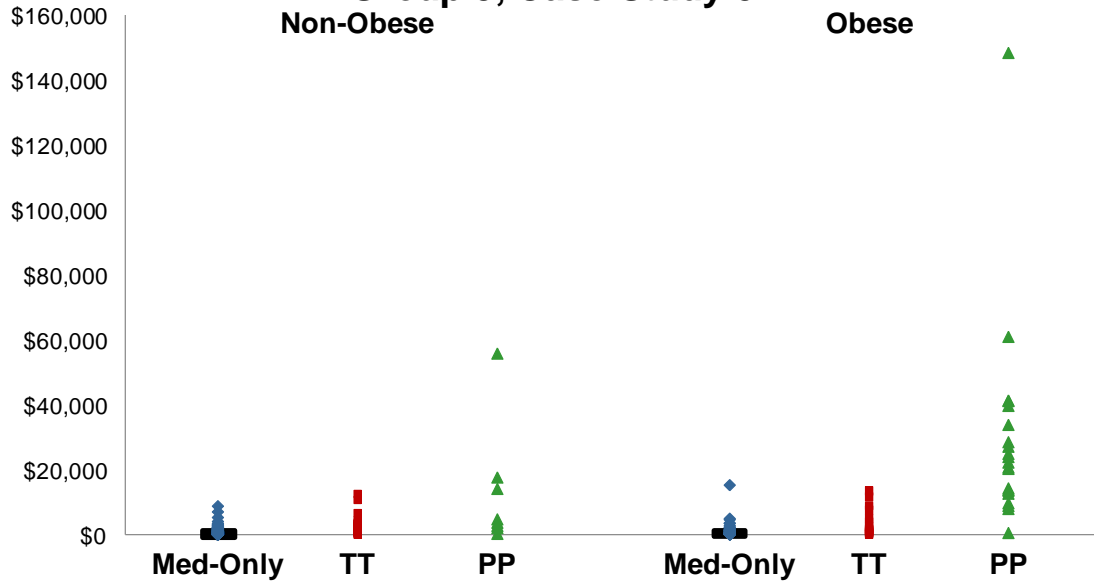


Chart 3-5B

Number and Timing of Treatments

Sprain Lumbar Region
Group 3, Case Study 5

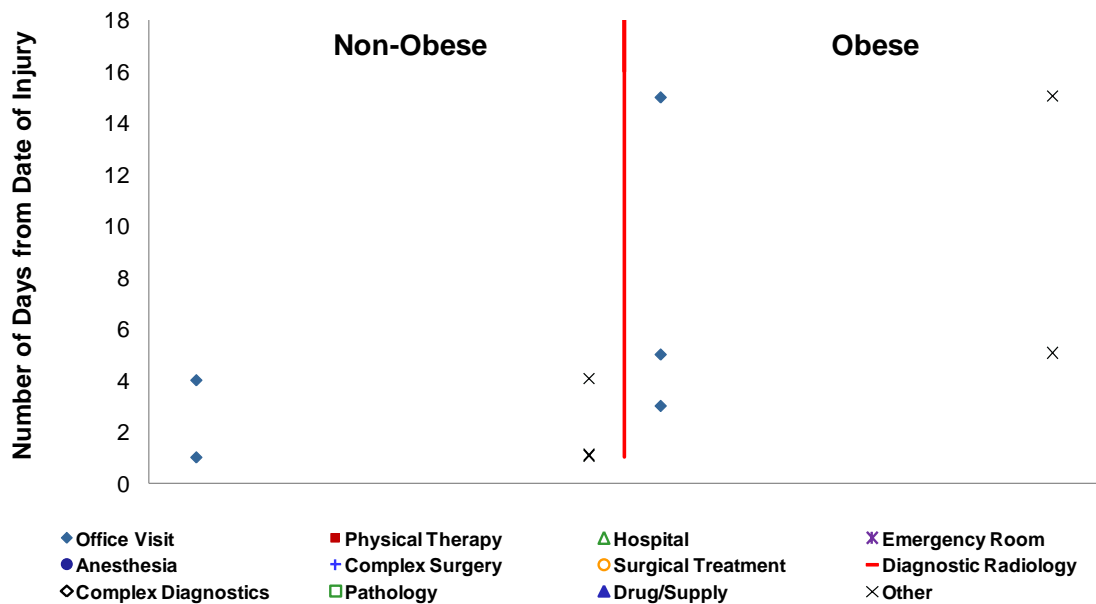


Chart 3-5C

Treatment Counts by Service Group

**Sprain Lumbar Region
Group 3, Case Study 5**

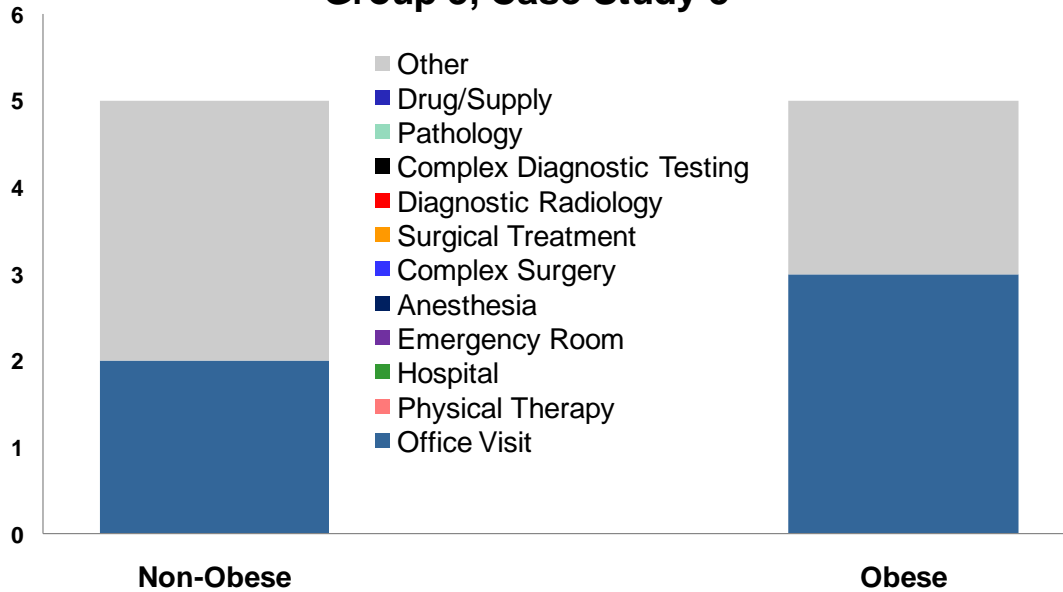
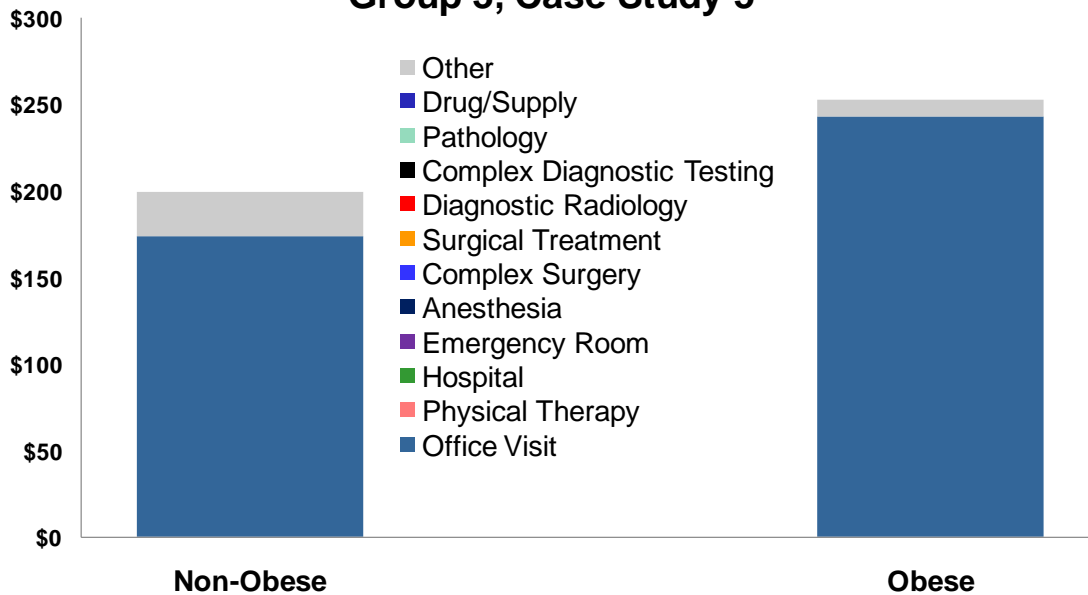


Chart 3-5D

Medical Paid by Service Group

**Sprain Lumbar Region
Group 3, Case Study 5**



Conclusion

This study has shown that there are marked differences in outcomes for obese and non-obese workers who sustain injuries with comparable primary diagnoses. In particular, injuries sustained by obese workers are more likely to be permanent disabilities.

The case studies indicate that, while there is considerable variation at the individual claim level, the range of medical treatments and costs typically are greater for obese claimants even when the injury types are the same (both either permanent partial or both medical only).

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