

**Department of Consumer
and
Business Services**

**Workers Compensation Division
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Information Management Division**

**Effects of physical therapy on workers' compensation claim
outcomes in three common diagnoses**

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Executive Summary

This study examined billing data for workers' compensation claims with one of three diagnoses to determine the effects of various levels of physical therapy (PT) on measurable outcomes. Findings indicate that increasing the duration or number of services of PT:

- Lowers the final impairment rating on disabling claims.
- Administered prior to surgery, lowers medical costs relative to claims with PT administered only after surgery.
- Has little or no effect on the amount spent for medical services other than PT.
- Has no effect on number of days an injured worker is off work or on the time from injury to first claim closure date.
- Increases the total amount spent on medical services per claim.

Introduction

There have been a fair number of studies on the effectiveness of physical therapy with mixed findings. Some reports (e.g., Di Fabio, Mackey and Holte) find consistently improved outcomes as a result of PT treatment. Others (e.g., Beard and Safranek) find limited effects. No studies were found that looked specifically at treatment of occupational injuries or the use of PT in workers' compensation systems. All the studies reviewed used a variety of measures to assess outcomes and most looked at multiple patient populations and limited their scopes to selected diagnoses.

There are a variety of ways to measure the effectiveness of PT. Some are readily available to us, like the total cost of medical treatment and the disability rating of permanent partial disability (PPD) awards. Others are available but require some manipulation of the data and assumptions about the course of treatment. Examples of this are the amount of time between the beginning of treatment and a claim closure, or utilization measures like the number of different types of treatment received and level of pharmaceutical intervention required. Other measures are not readily available to us. Examples of these are worker satisfaction, quality of life and the cost of employee absence.

Some effectiveness measures from the literature and adapted for our purposes are:

- Medical costs
- Impairment rating
- Indemnity costs
- Claim duration
- Disability award type (Temporary or Permanent)
- Duration of temporary disability

The literature also discusses a number of factors of PT treatment that may help reveal the nature of PT effectiveness. Some of these factors are more readily available than others. Claims can be readily analyzed and assigned to groups based on the length of time they received PT or the number of PT treatments they received. Below is a partial list of potential factors that may influence PT effectiveness. These factors should be useful as independent variables in a study of PT in Oregon's WC system.

- Duration of PT
- Number of PT services administered
- Timing of PT relative to surgery

Studies presented in the literature on PT typically limit their scope to one or a small handful of diagnoses, types of injuries or affected body parts. Diagnoses are readily available in WC medical data. Types of injury and affected body part are also available but require complicated and burdensome manipulation of the data to extract.

Methods

The study used Medical billing data submitted to the department according to OAR 436-009-0030. Insurers and self-insured employers with 100 or more accepted disabling claims (ADCs) in the prior year are required to report data on all payments for medical treatment of injured workers. These submissions are estimated to account for approximately 80% of the total dollars spent on medical care in a given year. In 2010, 54% of reported medical dollars were spent by SAIF, 36% by private insurers, 9% by self-insured employers, and 0.4% by the fund for non-complying employers.

Physical Medicine refers to a set of services listed in the AMA CPT2010 Standard Edition under the codes 97000 through 97799. These codes refer to services; such as application of hot or cold packs, electrical stimulation, manual manipulation, and work hardening or conditioning, that are within the domain of various provider types. For the diagnoses considered in this study, 59% of these services were performed by physical therapists, 25% by chiropractors and 16% by other types of providers. For this study, only these services when performed by a physical therapist were considered to be physical therapy.

PT is typically prescribed in courses that consist of multiple visits extending over a period of weeks or months. Each visit may include administration of one or several services and specific types of services often vary from visit to visit. However, each visit is billed separately and appears in the billing data without reference to other bills for services in the same course. The billing data do not indicate the beginning or end of a course of PT. Therefore, we had to determine some method for estimating the extent of PT courses.

A course of physical therapy was thus defined as a set of, at minimum, 4 bills for visits containing one or more of the aforementioned physical medicine codes with at least 1 day but not more than 1 week separating any two consecutive visits. A small number of claims (<1%) that had fewer than 4 PT visits were excluded from the analysis.

Diagnoses are indicated in the billing data with a standardized code listed in the International Classification of Diseases-9th Revision-Clinical Modification (ICD-9-CM). Each bill for service contains an ICD-9-CM code indicating the condition that the services are intended to treat. We used the first 3-digits of the ICD-9-CM code. Three diagnoses were

chosen for inclusion in the study based on (1) their presence among the most frequent diagnoses treated in injured workers in Oregon and (2) the desire to include a variety of injuries and body parts. These were: sprains and strains of other and unspecified parts of the back (847), peripheral enthesopathies and allied syndromes (726, including rotator cuff syndrome, tennis elbow, patellar tendinitis, Achilles tendinitis, and other diagnoses) hereafter referred to as tendon and ligament injuries, and mononeuritis of upper limb and mononeuritis complex (354, including carpal tunnel syndrome and other diagnoses). Only claims on which the modal ICD-9-CM code was one of the three chosen were included in this study and, of these, any PT services that were indicated as treating another condition were excluded from the analysis.

Data were limited to those claims for which time-loss benefits were paid. Additional data on these accepted disabling claims (ADCs) is collected by WCD, including the duration of the claim, the amount of time away from work and the return-to-work status of the worker. Excluded from the study were open claims, claims that were settled by a claim disposition agreement, and claims with dates of injury prior to 2001 or subsequent to 2008. Claim duration was defined as the number of days between the date of injury and the first closure date, plus 1.

For the analysis of impairment ratings, claims were further limited to those with injury dates prior to 2005 for which there was an unscheduled finding of permanent partial disability (PPD).

Duration of Physical Therapy: Claims were divided into 4 groups based on the duration of the first course of physical therapy. Table 1 describes the levels of the duration variable.

Table 1: Number of claims by duration of group

Duration of PT	Length of course	Number of ADCs	Number of claims with PPD
None	0 days	7557	2530
Short	4 - 30 days	2902	1207
Medium	31 - 60 days	817	322
Long	> 60 days	363	147

Number of services: Because multiple services are sometimes provided at a single visit and because of the uncertain nature in which a course of PT was defined, in another set of analyses claims were divided based on the total number of PT services on the claim. Table 2 describes the levels of the service count variable.

Table 2: Count of claims by service count group

Group	Number of services	Number of ADCs	Number of claims with PPD
None	0	7557	2530
Few	4-15	1019	399
Medium	16-40	1450	631
Many	> 40	1613	646

Surgery: Claims were divided into two surgery groups, present (N=2802) or absent (N=8129). Surgical services were limited to the group of surgeries that includes the 90-day global follow-up period in order to exclude services categorized as surgery according to CPT

classification system but that are not surgery in the traditional sense (such as application and removal of splints and casts).

Claims were evaluated on the basis of the total payments for medical services on the claim, total payments for services other than PT, duration of the claim in days, number of days of time-loss benefits paid and, for PPD claims, the final percentage of physical impairment awarded to the claimant. Analysis of each diagnosis was conducted separately.

Results

Chart 1 shows the total medical costs per claim by duration group and surgery for each of the 3 diagnoses. In each case, claims with surgeries have a higher average cost than claims without surgeries. Additionally, claims with no PT have the lowest total medical costs and claims with longer durations of PT have higher total medical costs.

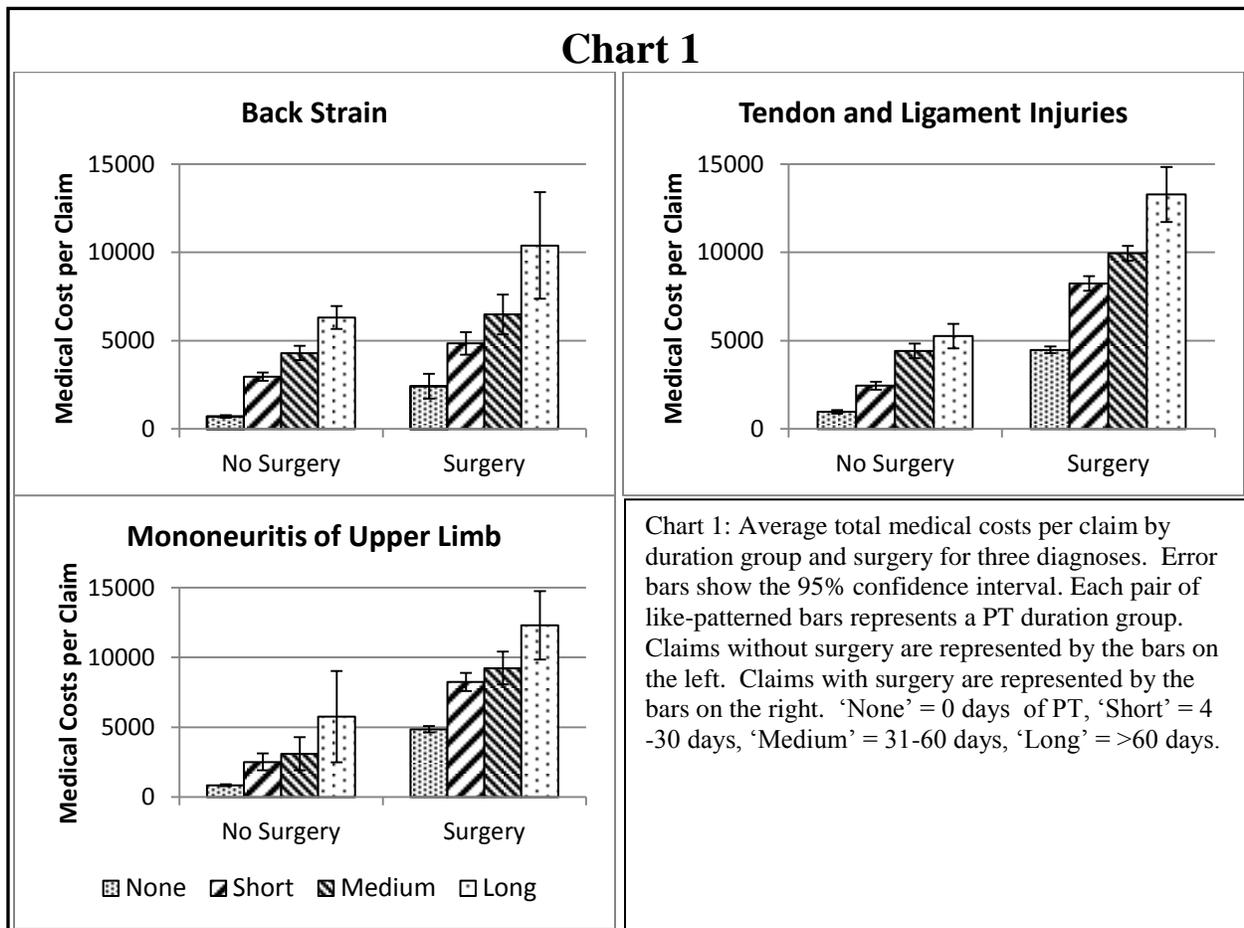


Chart 2 shows total medical costs per claim by service count group and surgery for each diagnosis. Results for the main effect of surgery do not differ from chart 1. The presence of surgery services on the claim is associated with higher costs per claim. As in chart 1, claims with no PT have the lowest total medical costs and claims with more PT services have increasingly higher total medical costs. There is also a significant interaction effect in these data, as well. The effect of more PT is greater on claims that had surgery than those that did not.

It is not surprising that claims with longer courses of PT and more PT services have higher medical costs than those with fewer. More severely injured people require more intensive treatment. We are unable to reliably determine the extent or severity of injury from the billing data. However, we can assume that the increase in treatment intensity increases in all treatment modalities more or less equally, at least in the aggregate, with increasing severity of injury. To examine this, we compared the total costs of all medical services other than PT among the duration groups and service count groups.

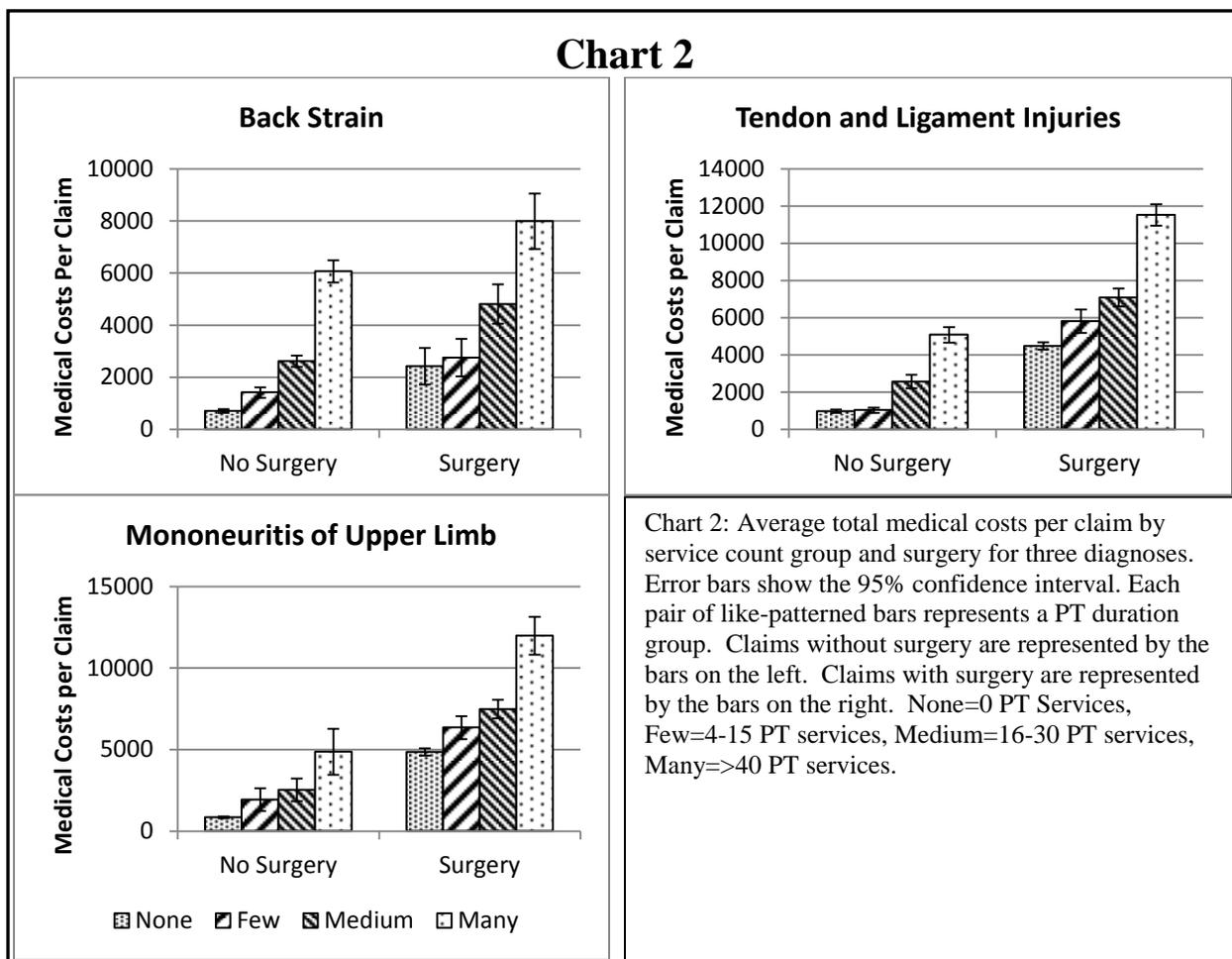


Chart 3 shows the average total cost of medical services other than PT by duration group. As shown previously, claims with surgery cost more than those without. More importantly, the cost of services other than PT increases with increasing amounts of PT.

Chart 3

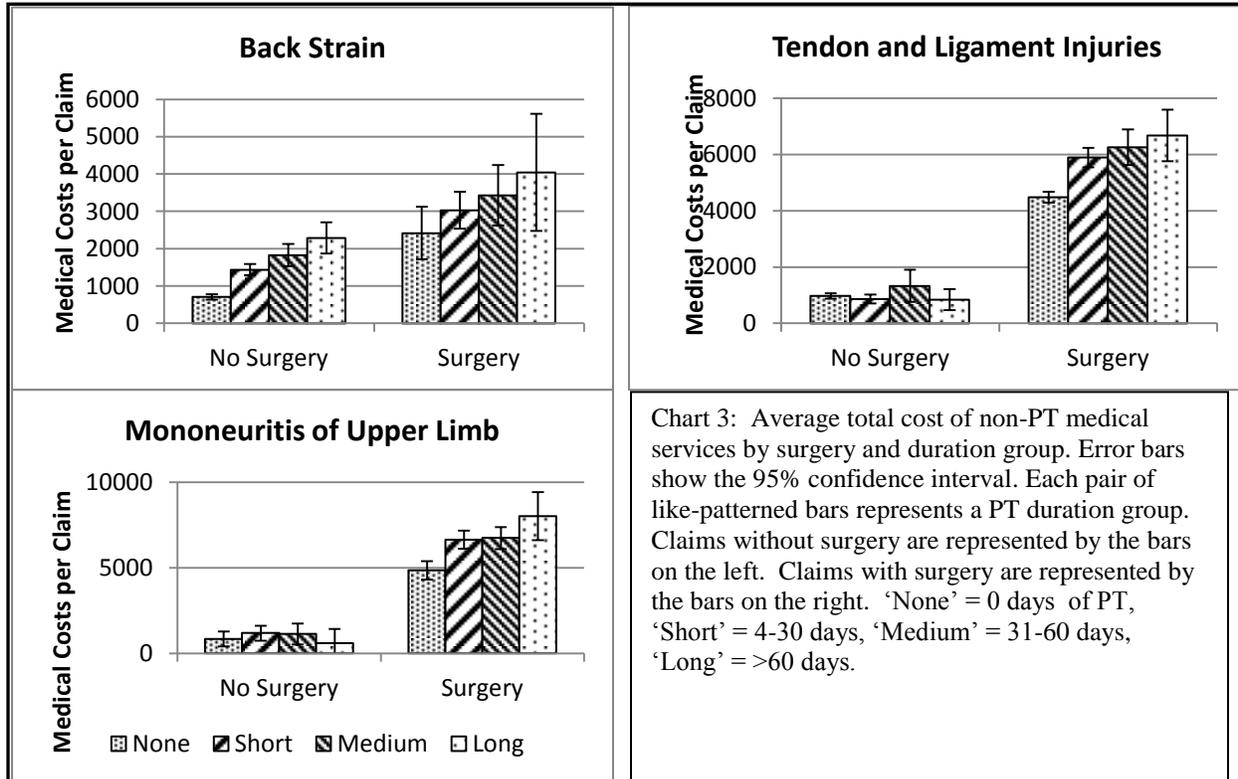


Chart 4 shows average medical costs for services other than PT by number of PT services and surgery. As in chart 3, medical costs per claim increase for non-PT services with increasing amounts of PT and with the presence of surgery. The increase in other medical costs with increasing PT indicates that patients undergoing longer courses of PT and more PT services are more severely injured or in need of more extensive treatment than those who received less PT. The interaction between the surgery variable and PT variables is significant for tendon and ligament injuries and mononeuritis of the upper limb. For claims with surgery, average medical costs per claim are greatest on claims with long durations of PT and least on claims with no PT services. For claims without surgery, there are no differences among the groups with tendon and ligament injuries and mononeuritis of the upper limb. Although claimants in the longer duration groups received more PT they did not receive more of other services.

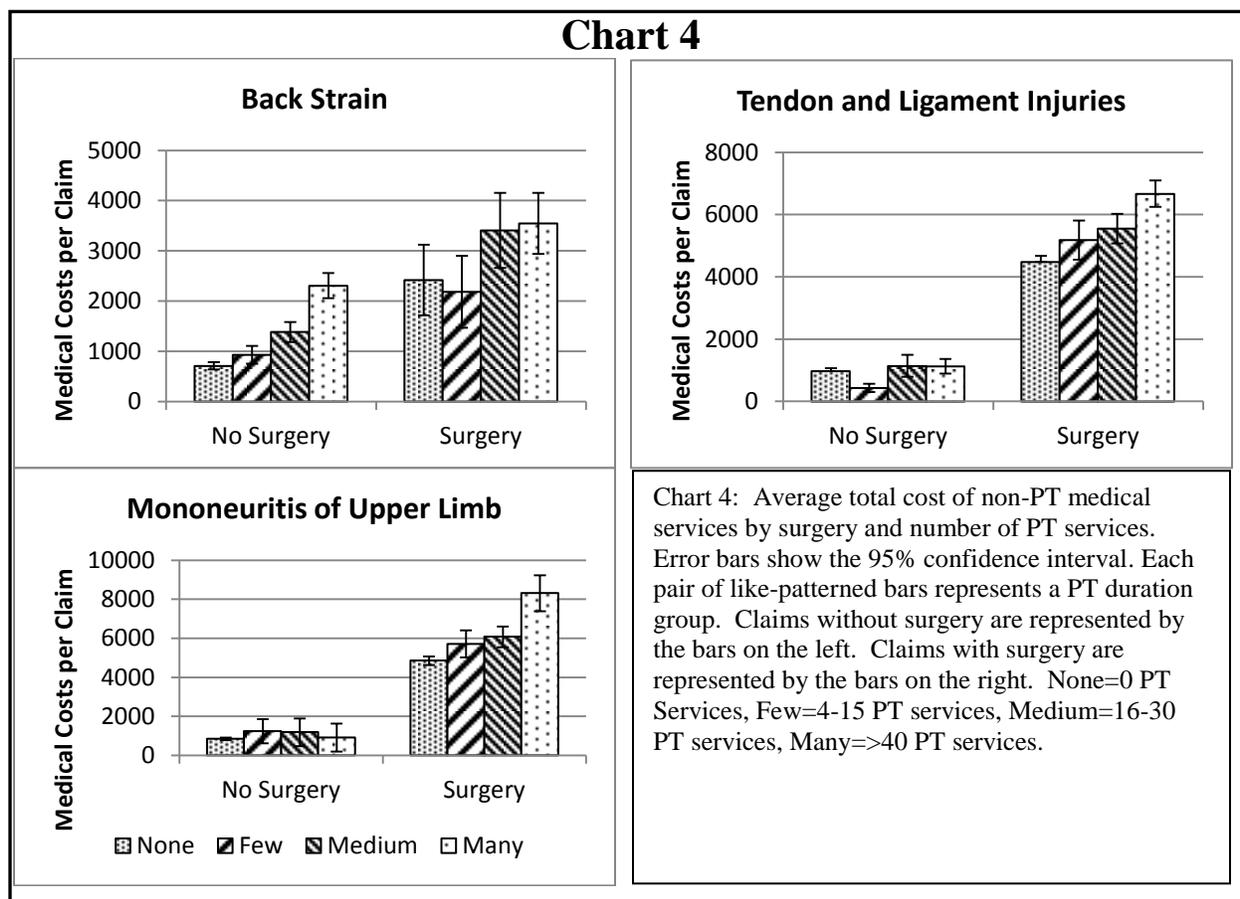


Chart 5 shows the time from the date of injury to the first closure date by duration group. There is a small but statistically significant effect for the surgery variable for back strains and sprains and tendon and ligament injuries. Claims that require surgery have longer durations than those that don't. In the case of mononeuritis of the upper limb, the data do not indicate an effect of surgery on duration. There is no effect on claim duration that can be attributed to the duration of PT that is apparent from our data.

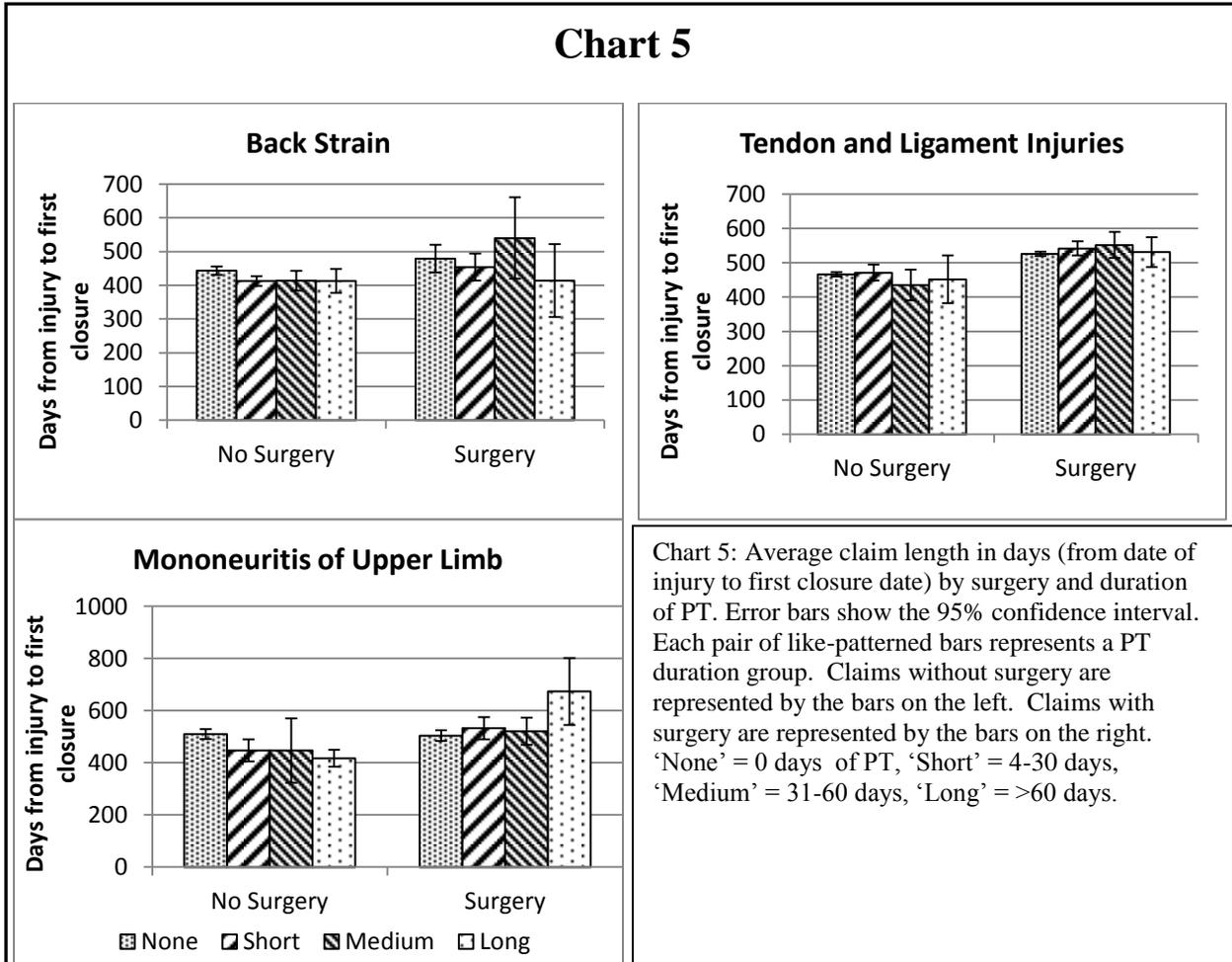


Chart 6 shows the time from the date of injury to the first closure date by service count group. As in Chart 5, claims that require surgery have longer durations than those that don't for back strain and tendon and ligament injuries but not for mononeuritis of the upper limb. The amount of PT that a patient receives does not appear to affect the duration of the claim. Claims with surgery and claims without are essentially the same duration regardless of the amount of PT.

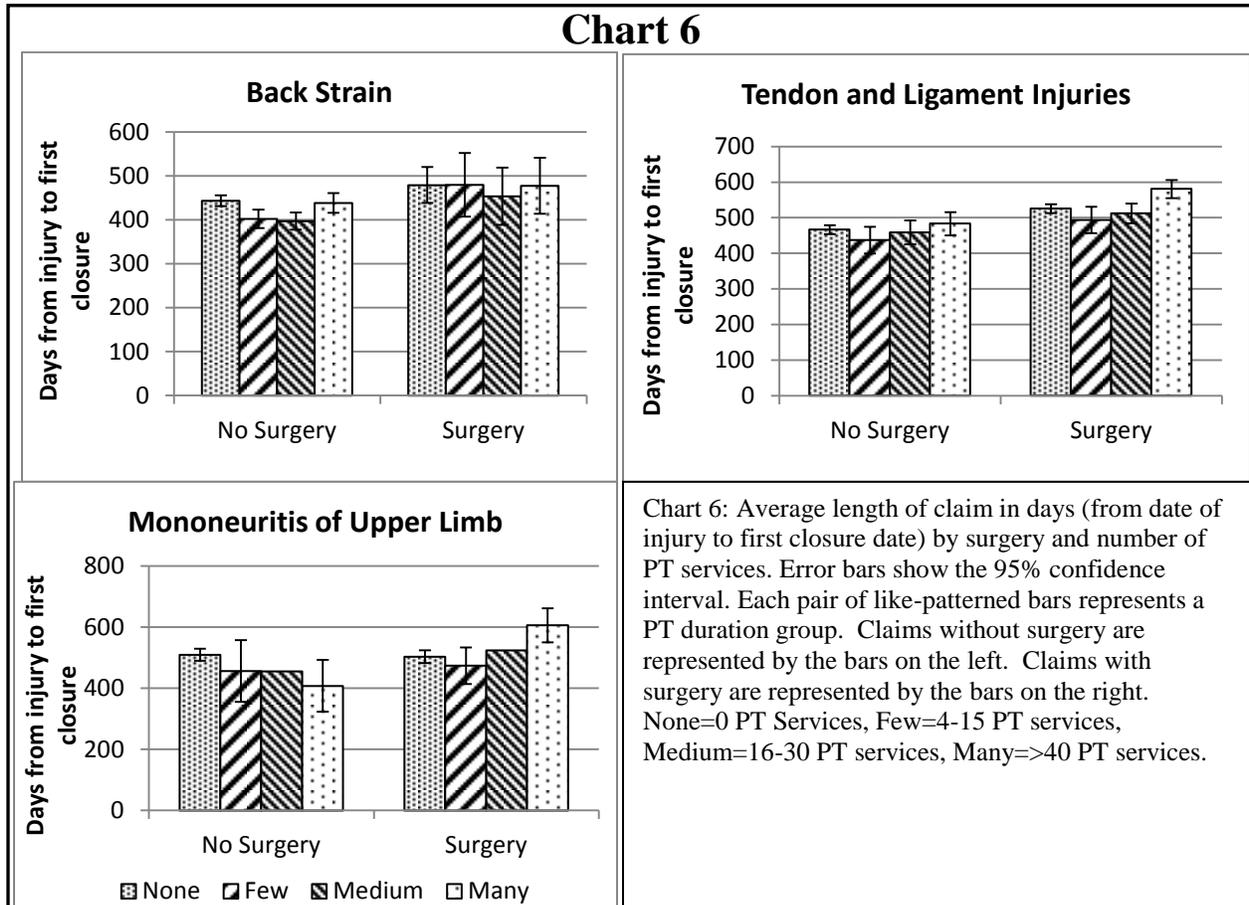


Chart 7 shows the average number of days for which the injured worker received temporary disability compensation (time-loss) as a function of the duration of PT and the presence or absence of surgery services. Time-loss begins on the date of injury and continues until the worker returns to work, unless the total days of time-loss are 14 or fewer, in which case time-loss begins 3 days following the date of injury. For each diagnosis the presence of surgery increases the number of days of time-loss paid. There is no effect of the amount of PT on the number of days of time-loss, however. Claims with long durations of PT have statistically equivalent numbers of time-loss days.

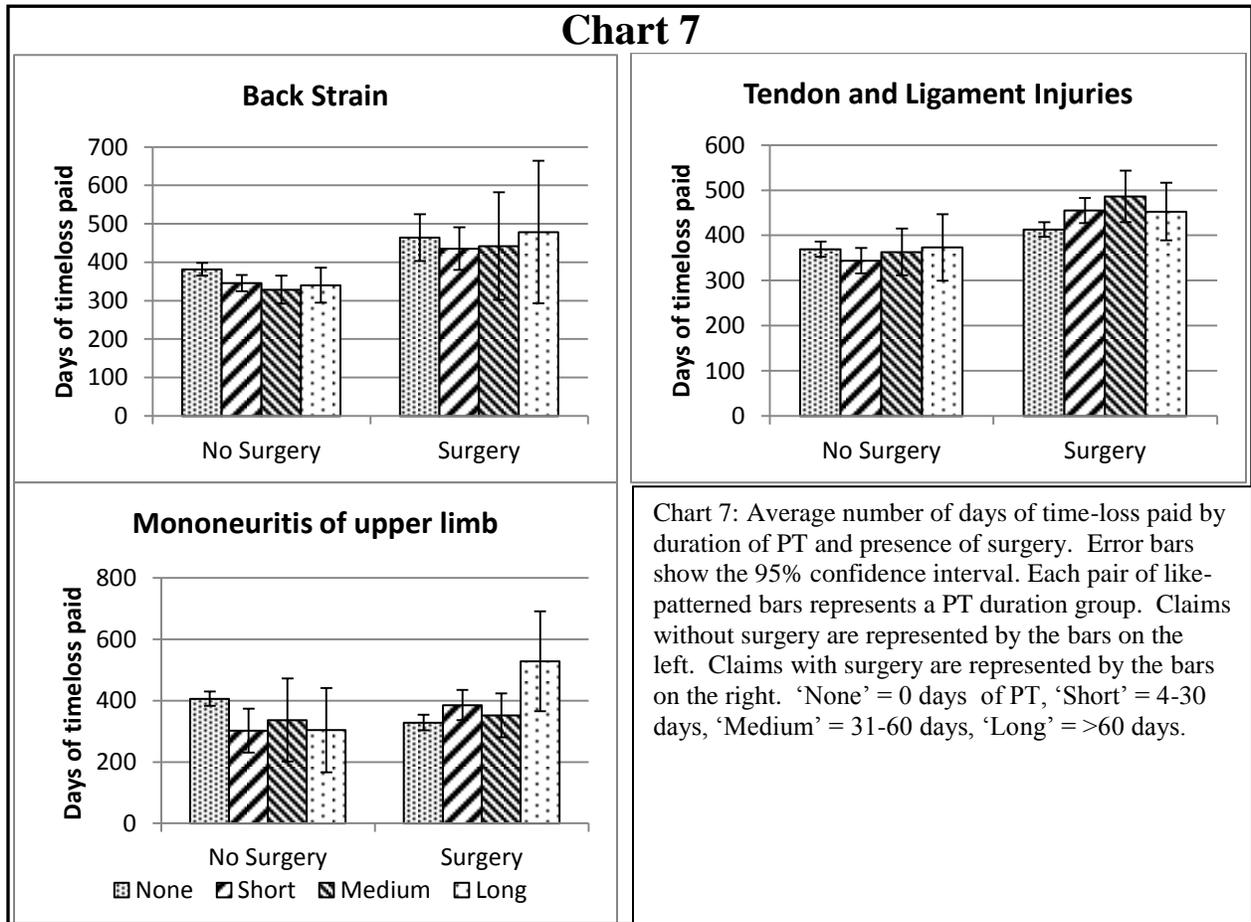
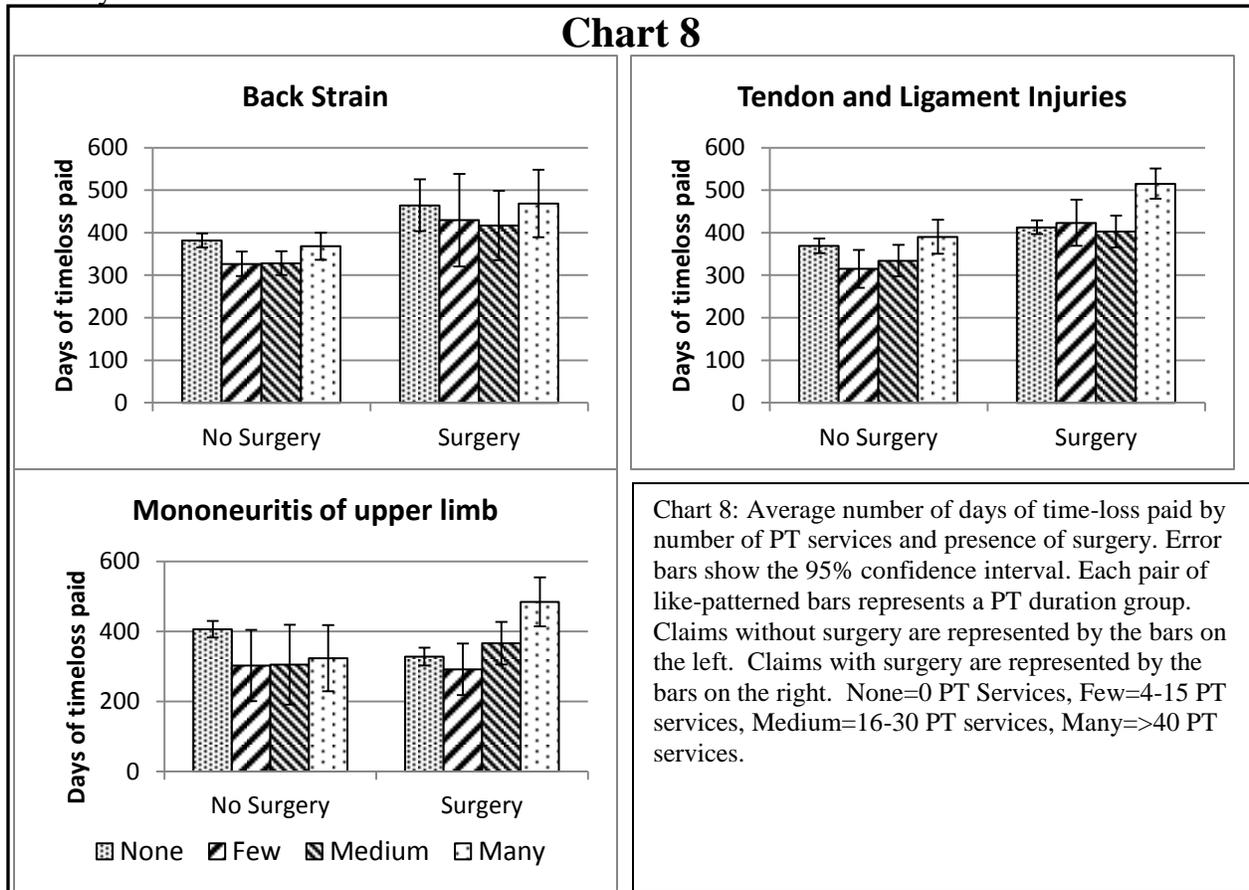


Chart 8 shows the average number of days of time-loss as a function of the number of PT services and the presence or absence of surgery. As in Chart 7, the presence of surgery increases the number of days of time-loss paid but there is no effect of the amount of PT on the number of days of time-loss. Claims with many PT services have statistically equivalent numbers of time-loss days.



For claims with permanent disability ratings, we examined the effects of the duration and amount of PT on the percent of disability awarded at closure. Because permanent disability is a comparatively rare occurrence, only a subset of the claims from the previous studies was available for this analysis. Because of the reduced sample size, the surgery variable was eliminated to increase the number of cases in each group. In addition, there were not enough cases of mononeuritis of the upper limb which resulted in permanent disability to make statistically reliable estimates, so this diagnosis was not analyzed.

Chart 9 shows the average impairment rating for each PT duration group. For the back strain and sprain claims, there is a significant reduction in the rated impairment as the duration and the count of services of physical therapy increase. For tendon and ligament injuries there were no statistically significant differences.

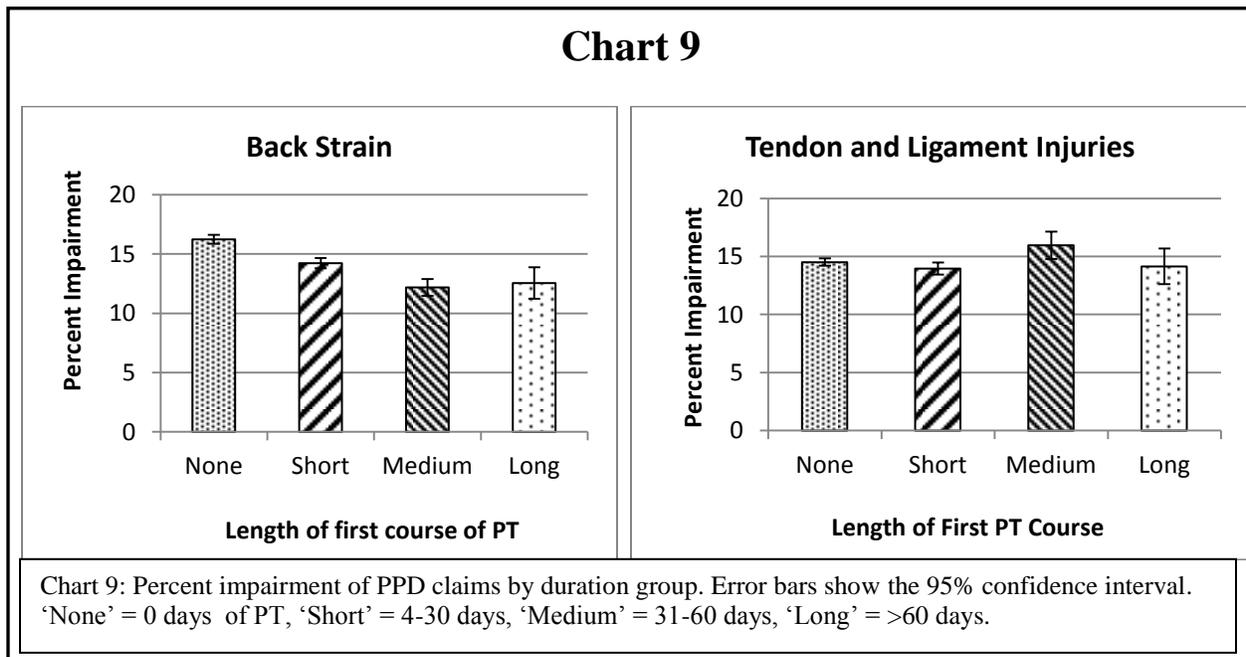
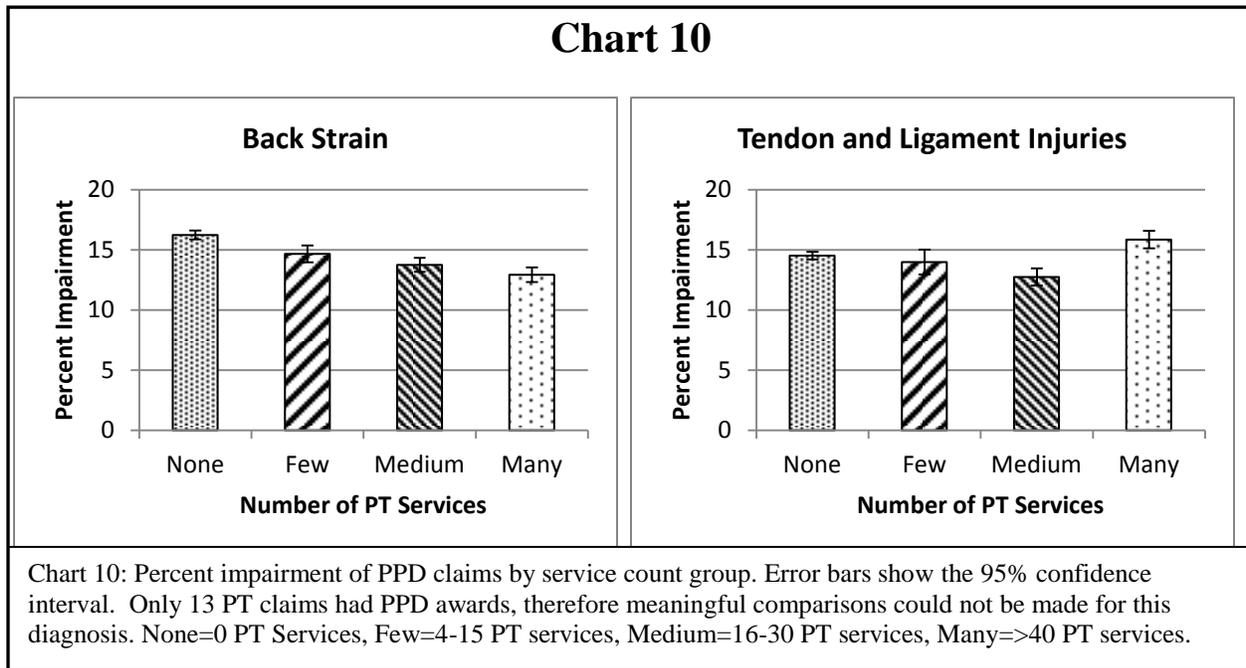


Chart 10 shows the average impairment rating by the number of PT services. For the back strain and sprain claims, there is a significant reduction in the rated impairment as the duration and the count of services of physical therapy increase. For tendon and ligament injuries there is also a statistically significant difference among the groups, however the claims which had the most PT services also had the highest impairment ratings which is contrary to the other findings. One explanation is that the claims in this group were so much more severely injured than those in the other groups that no amount of PT was effective in further reducing their impairment ratings.



Finally, for those claims that had surgery, we examined the effects of the timing of PT relative to surgery on the average total cost of medical services. Claims were grouped according to whether the first course of PT came prior to or post-surgery as compared to claims that had no PT services.

Chart 11 shows the average total medical payments of claims in each of the 3 groups. The non-PT group had no PT services, the Prior group had a first course of PT prior to surgery, and the Post group had a first course of PT following surgery. For back strain and mononeuritis of the upper limb, claims with a first course of PT prior to surgery had significantly lower costs than those with a first course of PT following surgery. It is worth noting that many of the claims in the Prior group also had subsequent PT following surgery and still had lower total medical costs. There was no statistically significant difference in the medical costs for the tendon and ligament injuries claims that had PT, although both groups had significantly higher costs than the nonPT group.

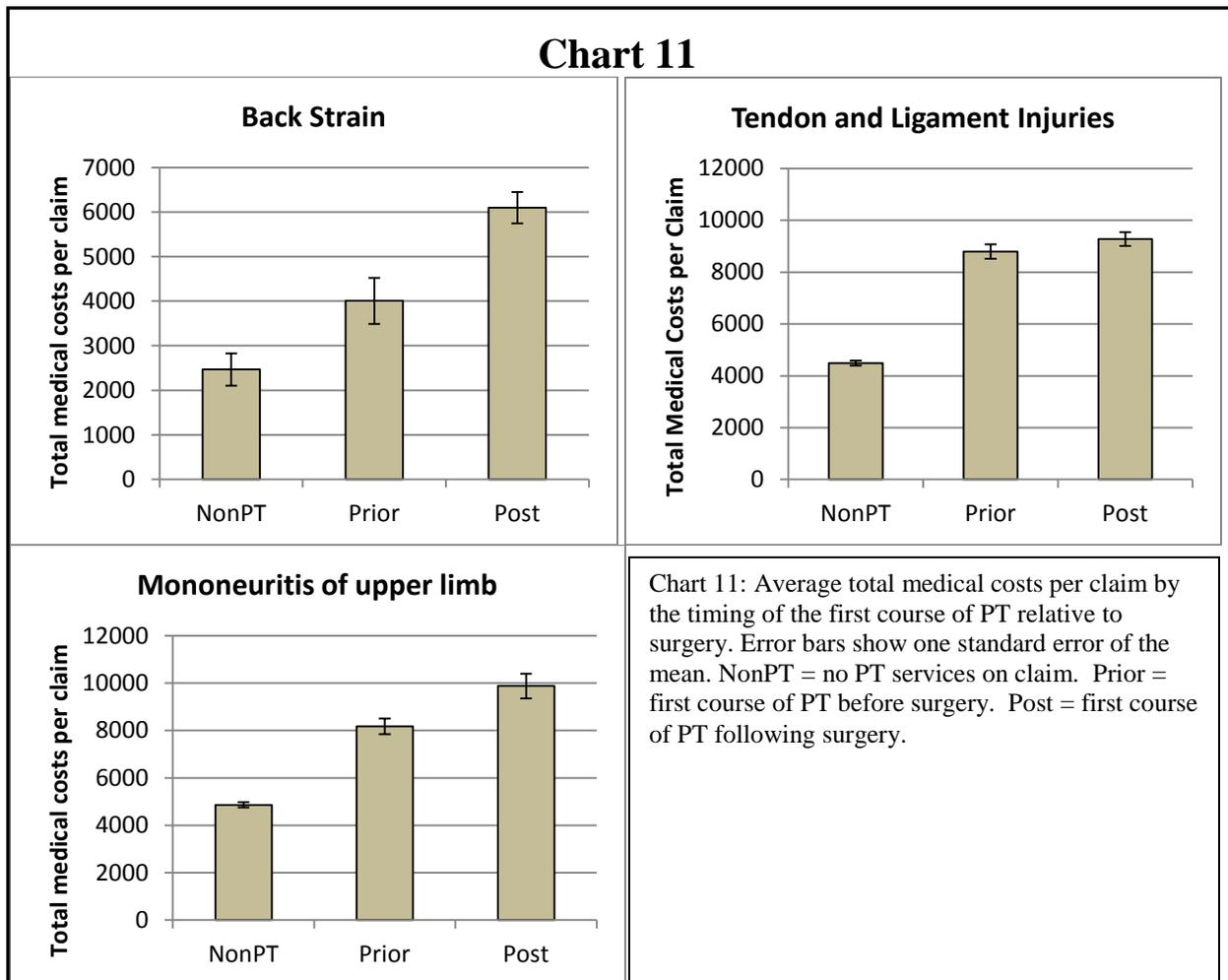
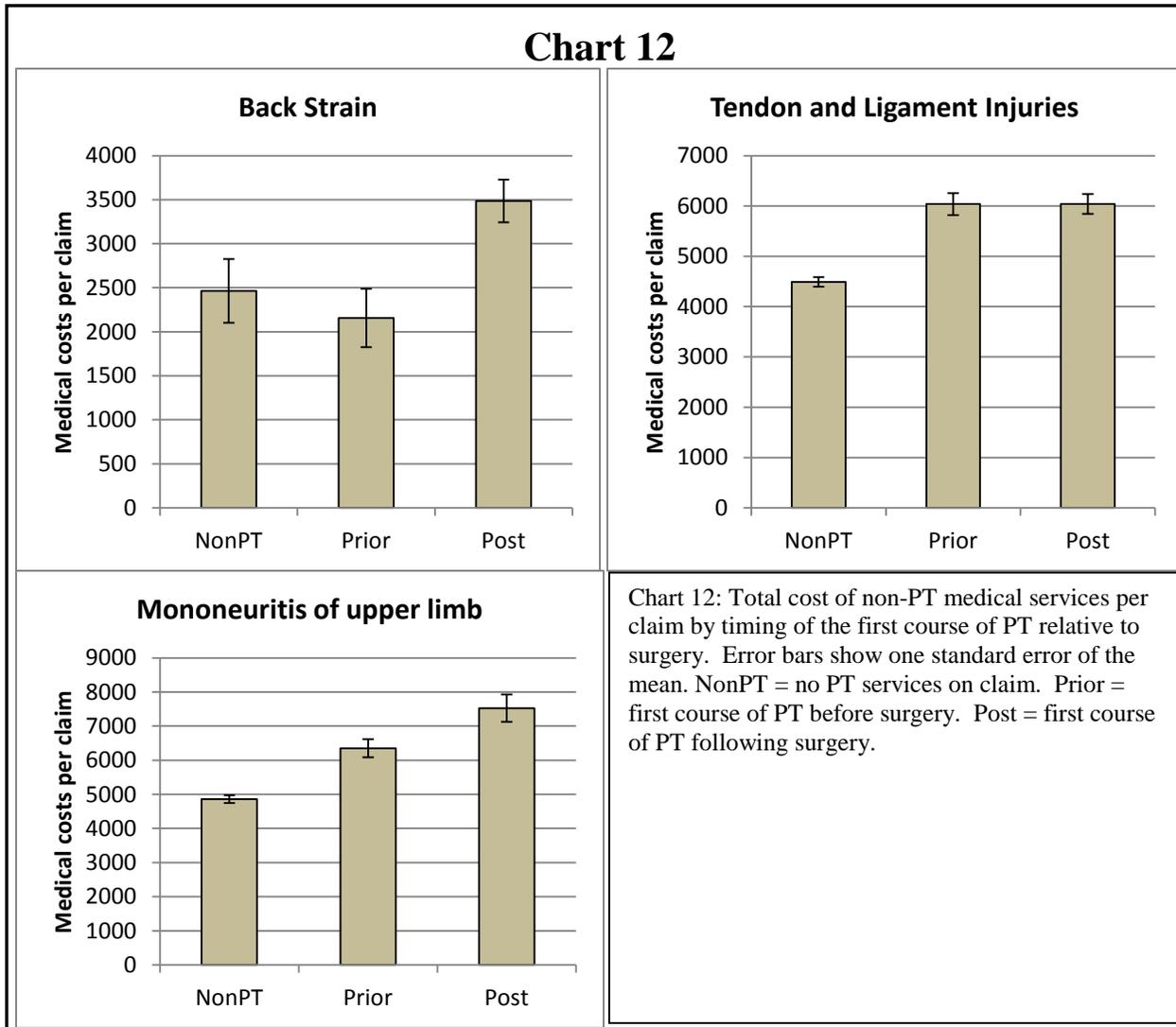


Chart 12 shows the average medical payments for services other than PT on claims in each of the 3 groups. As in the previous analysis, for back strain and mononeuritis of the upper limb, claims with a first course of PT prior to surgery had significantly lower costs than those with a first course of PT following surgery. There was no statistically significant difference in the medical costs for the tendon and ligament injuries claims that had PT, although both groups had significantly higher costs than the nonPT group.

One explanation is that the presence of a course of PT prior to surgery enables a faster recovery post-surgery, reducing the workers' dependence on other services such as pharmaceuticals.



We also examined the effects of the timing of the first course of PT relative to surgery on claim duration and days of time-loss paid and found no statistically significant differences.

Conclusions

Physical therapy has limited but measurable effects on claims that are detectable in the billing data submitted to WCD by insurers. Longer durations of PT and more PT services were

associated with higher costs per claim. When the costs for the PT services themselves were removed, costs for other medical services were very nearly the same irrespective of the duration or amount of PT. Longer courses of PT and more PT services were associated with lower disability ratings which potentially lower indemnity costs. Claims with a course of PT prior to surgery had lower medical costs per claim than those that had PT only after surgery for two of the three diagnoses studied.

References

These publications were particularly useful in planning the study but are not necessarily cited in the text. Many other studies were reviewed and useful to a lesser extent.

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