OUTCOME COMPARISONS OF RETURN TO WORK REHABILITATION PROGRAMS BY ACCREDITATION STATUS

TEXAS DEPARTMENT OF INSURANCE
WORKERS' COMPENSATION
RESEARCH AND EVALUATION GROUP

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- insurance rates and rate-making procedures;
- rehabilitation and reemployment of injured employees;
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- other matters relevant to the cost, quality, and operational effectiveness of the workers' compensation system.

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Executive Summary

One of the goals of the workers' compensation system is to expedite injured employee's recovery and return to work. In some cases, injured employees may require advanced work rehabilitation services such as work hardening (WH), work conditioning (WC), and chronic pain (CP) management programs providing intensive, occupation-specific physical therapy services to help injured employees restore physical capacity and function to return to work.

This report analyzes work conditioning, work hardening, and chronic pain management programs. WC is a general occupational rehabilitation program, and WH is a comprehensive occupational rehabilitation program. WH is more individualized and occupation specific. Generally, WH programs last longer and cost more than WC programs. CP management programs, or interdisciplinary pain rehabilitation programs (IPRP), provide rehabilitation services for those with disability due to persistent pain.

CARF Accreditation

One effort to increase the quality of services and outcomes of the occupational rehabilitation programs is to encourage facilities and service providers to obtain accreditation from the Commission on Accreditation of Rehabilitation Facilities (CARF). For work hardening and work conditioning services, CARF-accredited programs are eligible for exemption from preauthorization and concurrent review requirements if the services are provided within the recommendations of the treatment guidelines adopted by the Texas Department of Insurance, Division of Workers' Compensation (DWC), and the facility is on the DWC current exemption list. In addition, Medical Fee Guidelines specify that CARF-accredited facilities are to be reimbursed at 100 percent of the maximum allowable reimbursement (MAR) amount while non-accredited facilities are reimbursed at 80 percent of the MAR.

The preferential status of the CARF-accredited programs in terms of preauthorization requirement and reimbursement amount is based on the assumption that CARF accreditation may result in better outcomes such as higher cost effectiveness and/or shorter disability duration and faster return to work. To evaluate the effectiveness of the CARF accreditation, this report attempts to compare the differences in utilization, cost, and outcome measurements associated with return to work (RTW) rehabilitation programs by accreditation status.

Outcome Measurements

If the status of accreditation signals better quality of service, we expect better outcomes from accredited programs in terms of functional improvement and return to work than non-

accredited programs. Given available data, measurable outcomes include utilization and cost of services, and the duration of disability.

Utilization measurements are the number of service hours per visit (intensity), the number of visits per claim (frequency), and the overall utilization measure of total service hours per claim. Similarly, cost measurements are the cost per service hour, the cost per visit, and the total cost per claim. For disability duration measurements, the best indicator would be the actual RTW date. However, for various reasons, RTW dates are reported in only a third of the claims. As a proxy for RTW date, we use the date that temporary income benefits (TIBs) end. A second outcome measurement is the total length of disability—the number of days from the date of injury to the last date of rehabilitation service. In addition, we compare the length of rehabilitation services as one of the duration measurements.

Data and Methodology

The analysis of this report is based on the medical 837 data collected and maintained by the DWC. This data contains all medical bills paid by workers' compensation insurance carriers for work-related injuries in Texas. Claims analyzed in this report consist of new injury claims from 2010 to 2013 with paid services in WH, WC, or CP programs. Service dates cover the period from January 1, 2010 to December 31, 2016, with each claim's services evaluated for up to 36 months. Demographic and other control data came from various tables detailing income benefits, injury incidents, and the network status.

We used linear regression models to measure the differences in utilization, cost, and disability duration outcomes between claims who received services from CARF-accredited programs and those who received from non-accredited programs. Differences in the claims' characteristics such as age, gender, and injury type may affect utilization patterns and disability duration. Therefore, the outcome effects of accreditation were measured after controlling for the effects of these external factors. Given available data, selected control variables were age, gender, injury type, injury severity, and network status.

Key Findings: Work Hardening Programs

- Service Utilization: Non-CARF claims received significantly higher number of service hours than CARF claims. On average, claims receiving work hardening services from non-accredited programs had about 108 total hours of service compared to 98 hours of CARF claims.
- Costs: Costs were found to be significantly different between CARF and non-CARF claims. On average, accredited programs were paid $63 per hour while non-accredited

programs were paid $52 per hour. For non-accredited programs, total cost per claim per program ($5,457) was about 11 percent less than that of accredited programs.

- Disability Duration: Using the end date of the TIB payment as a proxy for return to work, analysis results indicate that the CARF accreditation was not associated with any statistically significant difference in disability duration.

Key Findings: Work Conditioning Programs

- Service Utilization: Service utilization in WC services was significantly higher (40 percent) among CARF claims.
- Costs: With a higher reimbursement rate ($35 per hour), the total cost of WC programs for CARF claims was 66 percent higher than that for non-CARF claims ($1,832 vs. $1,099)
- Disability Duration: There was no statistically significant difference in the average TIB duration, the average service duration, or the average duration between the injury and the end of service between CARF and non-CARF claims.

Key Findings: Chronic Pain Management Programs

- Service Utilization: CARF claims received significantly more visits per claim than non-CARF claims, but the average service hour per visit and the total service hours per claim were not statistically different.
- Costs: Average costs per service and the total cost per claim were significantly higher for CARF claims. The total cost per claim was $15,884 for CARF claims, and $12,758 for non-CARF claims (20 percent lower).
- Disability Duration: There was no significant difference in the TIB duration outcome between CARF and non-CARF claims. The overall disability duration (the number of weeks between the injury date and the end of CP program) was slightly longer for non-CARF programs.

Discussions

The results of regression analyses showed that there was no statistically significant difference in the disability duration measured by the length of TIB benefits between accredited and non-accredited programs.

The significant differences in costs were primarily related to the Medical Fee Guidelines that specified a 20 percent reduction in reimbursement for non-accredited programs. As a result of combined effects of different reimbursement rates and utilization, the average per claim cost of

CARF-accredited programs was higher than non-accredited programs by 12 percent ($667) in WH programs, by 67 percent ($733) in WC programs, and by 25 percent ($3,126) in CP programs. On the other hand, there was no significant difference in the TIB duration and the total amount of TIB benefits.

1. INTRODUCTION

Most injured employees are able to remain in the workplace with minimal changes in the work environment while receiving medical care. But in one out of every four cases, the injury is serious enough that the injured employee is taken off regular duty for a period of time. One of the goals of the workers' compensation system is to expedite the injured employee's recovery and return to work. It is in everyone's interest to facilitate the injured employee's return to work as soon as he or she is medically stable. In some cases, however, injured employees may require more advanced work rehabilitation services such as work hardening and work conditioning programs. These occupational rehabilitation programs provide intensive, occupation-specific physical therapy services to help injured employees restore physical capacity and function to return to work. These programs are more involved and expensive than supplemental physical therapy services, and various stakeholders maintain guidelines and requirements for these rehabilitation programs. The Texas Department of Insurance, Division of Workers' Compensation (DWC) continue to monitor these programs' utilization, cost, and effectiveness to improve the quality and timeliness of these services.[1]

One effort to increase the quality of services and outcomes of the occupational rehabilitation programs is to encourage facilities and service providers to obtain accreditation from the Commission on Accreditation of Rehabilitation Facilities (CARF). For work hardening and work conditioning services, CARF-accredited programs are eligible for exemption from preauthorization and concurrent review requirements if the services are provided within the recommendations of the DWC adopted treatment guidelines (ODG guidelines) and the facility is on the DWC current exemption list (*Texas Administrative Code*, Title 28, Chapter 134, Rule §134.600). In addition, Medical Fee Guidelines specify that CARF-accredited facilities are to be reimbursed at 100 percent of the maximum allowable reimbursement (MAR) amount while non-accredited facilities are reimbursed at 80 percent of the MAR (*Texas Administrative Code*, Title 28, Chapter 134, Rule §134.230).

The preferential status of the CARF-accredited programs in terms of preauthorization requirement and reimbursement amount is based on the assumption that CARF accreditation may result in better outcomes such as higher cost effectiveness and/or shorter disability duration and faster return to work. Some system stakeholders, however, raise questions about the effects of CARF accreditation. Previously, the 2003 analysis by *Research and Oversight*

[1] See a 2003 report by Research and Oversight Council, "Outcome Comparisons for Work Hardening and Chronic Pain Management Services" in *Texas Monitor*, 8(3), 2003, pp. 18-24, available at https://www.tdi.texas.gov/pubs/wcreg/mon8-3.pdf.

Council reported that "despite the higher per claim costs, CARF-accredited work hardening programs did not result in a lower level of utilization of work hardening services and were not statistically associated with lower Temporary Income Benefit durations or service duration."

The report also concluded that CARF-accredited chronic pain management programs resulted in shorter disability duration and faster return to work than non-accredited programs, but these benefits might not be enough to justify higher costs associated with CARF-accredited programs. The DWC's 2007 report on the issue of accreditation of interdisciplinary pain rehabilitation programs concluded that there existed a lack of program standard verification and enforcement after an initial CARF accreditation, and that other approaches, such as early interventions or better disability management processes, might bring about performance improvements similar to CARF accreditation.[2]

To answer some of the concerns regarding the effectiveness of the CARF accreditation, this report attempts to measure the difference in utilization, cost, and outcome measurements associated with return to work (RTW) rehabilitation programs by accreditation status. Since 2007, DWC has implemented major system changes including the adoption of evidence-based treatment guidelines and workers' compensation health care networks. Given these changes, it is of primary interest to see if there are significant differences in the performance and outcome measurements between accredited and non-accredited rehabilitation programs.

In the following section, we present a brief description of RTW rehabilitation programs and related DWC rules and regulations regarding accreditation. We then describe the medical 837 data used for our analysis, and the regression methodology used to estimate the effect of CARF accreditation. Section 4 presents the results of our analysis, and Section 5 concludes with some discussions of the results.

[2] See "A Report on Accreditation of Interdisciplinary Pain Management Programs/Treatment Facilities" available at https://www.tdi.texas.gov/wc/hcprovider/documents/painmgtrpt07.pdf.

2. RTW Rehabilitation Programs

The ODG treatment guidelines suggest that "the best way to get an injured employee back to work is with a modified duty RTW program, rather than a work hardening/conditioning program, but when an employer cannot provide this, a work hardening program specific to the work goal may be helpful."[3] Work conditioning aims to restore injured employee's physical capacity and function and it amounts to "an additional series of intensive physical therapy visits required beyond a normal course of PT, primarily for exercise training/supervision." Work hardening is an interdisciplinary, individualized, job specific program of activity with the goal of return to work.

DWC recognizes four RTW Rehabilitation Programs: work conditioning, work hardening, chronic pain management, and outpatient medical rehabilitation (MR) programs. However, data indicates that few providers are billing for outpatient MR services as a part of RTW rehabilitation programs. As a result, this report analyzes work conditioning, work hardening, and chronic pain management programs.

- Work conditioning (WC) is a general occupational rehabilitation program, defined as "an intensive, work-related, goal-oriented conditioning program designed specifically to restore systemic neuromusculoskeletal functions" by the American Physical Therapy Association (APTA).[4]
- Work hardening (WH) is a comprehensive occupational rehabilitation program. WH is more individualized and occupation specific. Generally, work hardening programs last longer and cost more than work conditioning programs.
- Chronic pain (CP) management programs, or interdisciplinary pain rehabilitation programs (IPRP), provide rehabilitation services for those with disability due to persistent pain. These programs can benefit persons who have limitations that interfere with their physical, psychological, social, and/or vocational functioning.

CARF Standards and Accreditation

To qualify as a Division RTW Rehabilitation Program, a program must meet the program standards established by the CARF, which include active participation in recovery and return to

[3] See the Work Conditioning, Work Hardening guide in the Procedure Summary section, Low Back chapter of the ODG treatment guidelines.

[4] Work rehabilitation definitions and guidelines are provided by the Orthopaedic Section of the APTA (http://www.orthopt.org/content/special-interest-groups/occupational-health/occupational-health-guidelines).

work planning by the injured employee, employer, and payor or carrier.[5] However, there are no DWC enforcement or oversight activities verifying whether facilities do meet CARF standards in their program.

As a way to signal quality of service, the CARF offers a voluntary process for accreditation, which assures that accredited facilities or programs meet the required program standards. Facilities must incur substantial cost, time, and effort to obtain accreditation. DWC does not require programs to obtain CARF accreditation in order to qualify as a Division RTW Rehabilitation Program. However, once accredited, accredited WH and WC programs benefit from a DWC exemption from preauthorization and concurrent review requirements for their services,[6] and they are reimbursed at 100 percent of the reimbursement amount set by the Medical Fee Guidelines.[7] In contrast, non-accredited programs are subject to preauthorization rules and are paid at 80 percent of the reimbursement rate (see Table 1).

Table 1: Maximum reimbursement amounts by program type by CARF accreditation status

Program Type	Maximum Allowable Reimbursement per hour	
	CARF-accredited	Non-accredited
Work Conditioning	$36.00	$28.80
Work Hardening	$64.00	$51.20
Chronic Pain Management	$125.00	$100.00

Source: Medical Fee Guidelines (28 TAC §134.230).

ODG Treatment Guidelines

To be eligible for the exemption from preauthorization and concurrent review requirements, CARF-accredited WH and WC programs are also required to provide services within the ODG treatment guidelines. Although rehabilitation programs are highly variable by individual, ODG's general timelines suggest a maximum of 160 hours of WH services, treatment days ranging 4-8 hours a day, 3-5 visits per week, not to exceed 20 full-day visits over 4 weeks. For WC services, a general timeline is 10 visits over 4 weeks, equivalent to up to 30 hours of service. Although an

[5] CARF program standards are described in the *Medical Rehabilitation Standards Manual* published annually (available at http://www.carf.org). Facilities must follow the manual's guidelines to be surveyed and accredited by CARF personnel. For a rough estimate of costs associated with CARF accreditation, as of April 2017, the manual was $185.00, application fee was $995, and the survey charge was $1,670 per surveyor per day. A typical survey is for two surveyors for two days. See "Behavioral Health Accreditation: CARF, COJ, TJC" from Brown Consulting available at http://www.danbrownconsulting.com/2017/04/12/example-one-5-3-4/. In addition, facilities would incur personnel and equipment expenses for several months to a year of preparation before the survey and for renewal.

[6] All chronic pain management/interdisciplinary pain rehabilitation programs are subject to preauthorization requirement regardless of accreditation status (28 TAC §134.600 (p)(10)).

[7] The current Medical Fee Guidelines regarding rehabilitation programs, effective since 2008, is not substantively different from earlier 2002 or 1996 Medical Fee Guidelines.

exception from preauthorization does not apply to CP services, ODG states that the total treatment duration should not exceed 20 full-day sessions or 160 hours.

Outcome Measurements

CARF-accredited programs are treated preferentially because they are assumed to maintain quality service standards through accreditation and to provide better service. However, the DWC does not review or substantiate these facilities in terms of program standards other than maintaining an exemption list. The main requirement to be included in the exemption list is a dated CARF accreditation letter that describes the accreditation granted and the dates of the accreditation period. Nonetheless, if the status of accreditation signals better quality of service, we expect better outcomes from accredited programs in terms of functional improvement and return to work than non-accredited programs. Given available data, measurable outcomes include utilization and cost of services, and the duration of disability.

- Utilization measurements are the number of service hours per visit (intensity), the number of visits per claim (frequency), and the overall utilization measure of total service hours per claim.
- Similarly, cost measurements include the cost per service hour, the cost per visit, and the total cost per claim. Because the unit prices per service hour are largely set and determined by the Medical Fee Guidelines, the level of utilization (the number of service hours) mostly determines cost measurements.
- For disability duration measurements, the best indicator would be the actual RTW date. However, for various reasons, RTW dates are reported in only a third of the claims. As a proxy for RTW date, we use the date that temporary income benefits (TIBs) end. A second outcome measurement is the total length of disability—the number of days from the date of injury to the last date of rehabilitation service. In addition, we compare the length of rehabilitation services as one of the duration measurements.

The use of TIBs end date as a proxy for RTW date, albeit unavoidable because of the limitations in the available data, poses some issues because TIBs may end without actual return to work. TIBs end when an injured employee (1) reaches maximum medical improvement (MMI—the point that one's work-related injury or illness is not expected to improve with additional medical services), (2) earns an average weekly wage equal to the pre-injury wage, or (3) at the end of 104 weeks after the 8th day of disability (about 105 weeks from injury), whichever is earlier. The end of rehabilitation services tends to coincide with one's MMI date, which may or may not be the RTW date. Once TIBs end and if the injured employee receives an impairment

rating greater than zero, he or she may receive impairment income benefits (IIBs) depending on one's impairment rating.

Another issue with these outcome measurements is the lack of patient-derived satisfaction and quality of service measurements. This is a limitation in using administrative data. Unlike cost effectiveness or duration metrics, qualitative outcomes require patient surveys or detailed interviews with service providers and participants. Time and cost requirements preclude access to such data.

Regardless of these issues, the nine outcome measurements discussed above are sufficient indicators in comparing outcomes between CARF-accredited and non-accredited programs. The expectation is that CARF-accredited programs produce better outcomes such as faster return to work, shorter disability duration, and higher cost effectiveness than non-accredited programs.

3. Data and Methodology

Data Selection

The analyses in this report are based on the medical 837 data collected and maintained by the DWC. This data contains all medical and pharmacy bills paid by workers' compensation insurance carriers for work-related injuries in Texas. Claims analyzed in this report consist of new injury claims from 2010 to 2013 with paid services in WH, WC, or CP programs. Service dates cover the period from January 1, 2010 to December 31, 2016, with each claim's services evaluated for up to 36 months. Demographic and other control data came from various tables detailing income benefits, injury incidents, and the network status.

Some claims were excluded from analysis to remove effects from extreme values and potential billing errors. Claims whose rehabilitation services began after more than 2 years from the injury date were excluded. For CARF accreditation status, we relied on the bills having a "CA" modifier as required by the Medical Fee Guidelines. There may be cases when the existence or absence of "CA" modifier may not correspond to the true status of CARF accreditation and reimbursement rates, but there was no verifiable way to adjust the data. To distinguish CARF-only facilities, cases are deleted if a claim received services from both CARF-accredited and non-accredited programs.

Claims for analysis were identified using paid bills in CPT codes 97545 and 97546 for WH and WC programs, and 97799 for CP programs, with appropriate modifiers. Although the majority of the claims received only one type of program, we excluded those claims with multiple programs. Selected claims had 80 percent or more of services as WH, WC, or CP, respectively, and had less than five bills that were not classified as WH, WC, or CP.

Billing guidelines and practices resulted in some discrepancies in the unit service hours specified in the bills. Some bills used hours as a unit while others used minutes. To evaluate service utilization using a uniform unit of service, service hours were calculated for all bills, and some extreme values were excluded.

The number of visits was calculated based on the unique provider's license number, the service begin date, and the service end date. By definition, a visit occurs in a day and the service begin and end dates are the same. However, some providers—mostly non-accredited facilities—specified the program's begin and end dates for all associated bills. Because of the difficulty in assigning correct number of visits, claims with these bills were excluded. These claims accounted for less than two percent of the cases.

The final analysis dataset contained 3,013 claims for WH, among which 50 percent received services from CARF-accredited programs. There were 3,107 claims for WC programs, 20 percent of which were CARF cases, and 3,023 claims for CP program with 53 percent CARF cases.

Control for External Factors

Differences in the claims' characteristics such as age, gender, and injury type may affect utilization patterns and disability duration. Therefore, the outcome effects of accreditation were measured after the effects of these external factors were controlled. Given available data, selected control variables were age, gender, injury type, injury severity, and network status. The injury type was assigned based on the body part affected using a claim's primary diagnostic (ICD-9) code, consisting of back, knee, lower extremity, upper extremity, neck, shoulder, and all others. One's impairment rating was used as a proxy for the injury severity. Tables 2, 3, and 4 present descriptive statistics of the dataset by accreditation status.

The average claim with CP services had a higher average impairment rating than those with WH and WC programs. About 93 to 95 percent of the claims received TIB benefits in all three programs. The remaining claims received income benefits of different type such as employer-paid benefits. Notably, a significant number of claims had back injuries, whose share was highest for CP programs and lowest for WC programs. The share of network claims was higher for accredited programs in all three programs. Networks generally paid a lower rate than non-networks. Thus, a higher share of non-network claims would increase average pay rate. This effect was controlled by including the network status as a control variable.

Table 2: Descriptive statistics, work hardening

		CARF	Non-CARF
Number of Claims		1,492	1,521
Average Age		43.5	43.2
Average Impairment Rating		5.7	5.9
Claims with TIB Benefits		93.3%	94.0%
Share of Male		67.5%	72.5%
Share of Network Claims		49.3%	37.4%
Distribution of Claims by Injury Type	Back	35.1%	31.5%
	Knee	8.8%	10.1%
	Lower Extremity	11.0%	11.8%
	Upper Extremity	12.7%	13.7%
	Neck	6.4%	9.1%
	Shoulder	16.3%	14.5%
	Others	9.9%	9.4%

Source: Texas Department of Insurance, Workers' Compensation Research and Evaluation Group, 2017.

Table 3: Descriptive statistics, work conditioning

		CARF	Non-CARF
Number of Claims		609	2,498
Average Age		44.5	45.0
Average Impairment Rating		5.1	5.4
Claims with TIB Benefits		94.8%	93.1%
Share of Male		71.5%	74.0%
Share of Network Claims		57.6%	43.7%
Distribution of Claims by Injury Type	Back	21.0%	22.3%
	Knee	14.8%	11.8%
	Lower Extremity	14.1%	14.3%
	Upper Extremity	15.3%	14.0%
	Neck	5.1%	5.7%
	Shoulder	23.0%	22.5%
	Others	3.9%	9.5%

Source: Texas Department of Insurance, Workers' Compensation Research and Evaluation Group, 2017.

Table 4: Descriptive statistics, chronic pain management

		CARF	Non-CARF
Number of Claims		1,578	1,387
Average Age		44.6	45.3
Average Impairment Rating		7.4	7.6
Claims with TIB Benefits		94.6%	95.4%
Share of Male		62.9%	66.5%
Share of Network Claims		51.2%	22.7%
Distribution of Claims by Injury Type	Back	44.4%	38.4%
	Knee	3.5%	6.1%
	Lower Extremity	10.6%	8.9%
	Upper Extremity	10.0%	11.8%
	Neck	9.3%	10.2%
	Shoulder	10.1%	11.5%
	Others	12.3%	13.0%

Source: Texas Department of Insurance, Workers' Compensation Research and Evaluation Group, 2017.

Models for Regression Analysis

We used linear regression models to measure the differences in utilization, cost, and disability duration outcomes between claims who received services from CARF-accredited programs and those who received from non-accredited programs. Statistical tests were conducted to see if

non-linear model specification was necessary, but results indicated that the linear model was appropriate.

The outcome variables were the nine measurements discussed in Section 2. Regression analyses were conducted for each of the nine variables separately for WH, WC, and CP programs. The main variable of interest was the estimated effect of CARF accreditation on the utilization, cost, and disability duration outcomes. Parameters for non-CARF claims were estimated as the reference group, and the additional contribution of being a CARF claim was estimated. When this additional contribution is statistically significant, the CARF accreditation is found to be a significant factor in the difference in utilization, cost, or disability duration outcomes.

Each model contained a list of control (or independent) variables. The variable for gender was set as '0' for males, and '1' for females.[8] For age, the claim's age at the time of injury was calculated. For network status and CARF accreditation status, non-network and non-CARF categories were set as the reference group.

For injury severity, we used the injured employee's impairment rating. In general, the impairment rating would be assigned after the RTW rehabilitation program was over and a claim's maximum medical improvement (MMI) was reached. This information was added from a different data table that contained data regarding MMI examination and impairment rating. For injury type differences, seven groups of body part affected were used, as shown in Tables 2, 3, and 4. In the regression model, the 'back' injury was used as the reference group and a dummy variable for each of the remaining six groups was added.

Reference Group Characteristics

Regression results (presented in Tables 4, 5, and 6) show the averages for the reference group, who were male with back injury, received services from non-CARF program, and were non-network claims. For non-categorical variables (age and IR), averages of this group were used. For WH programs, age and IR for the reference group were 42 and 5.7, respectively. For WC programs, they were 43 for age and 5.8 for IR. For CP programs, the reference age was 43 and IR was 6.7. Then, CARF claim averages were calculated by adding the parameter estimated for the accreditation effect. Therefore, the differences in the averages shown in result tables measure the difference uniquely due to the accreditation effect.

[8] Such a variable with only ones and zeros is called a dummy variable. The category with '0' value becomes the reference group because all control variables for the reference group will have zeros and are not used in estimating the outcome variable. Then, the added effect of any control variable is the parameter estimated for the dummy variable.

4. RESULTS

Results of the regression analyses are presented in Tables 5, 6, and 7. Average values for the nine outcome variables are shown for the "CARF" and "Non-CARF" groups of claims. The difference between the two is the estimated variation due to CARF accreditation. Statistical tests were done to determine whether these differences were statistically significant or not. Asterisks in the last column indicate that the difference is statistically significant at .05 significance level (or at 95 percent confidence interval).

WORK HARDENING

On average, claims receiving work hardening services from non-accredited programs ("non-CARF" claims) had about 108 total hours of service compared to 98 hours of "CARF" claims (see Table 5). The difference was statistically significant. The higher utilization of non-CARF claims was due to their higher number of service hours per visit (intensity) as well as more visits per claim (frequency) than CARF claims.

Table 5: Regression analysis results for work hardening programs

	CARF	Non-CARF	Statistical significance at .05 level
Utilization			
Average number of service hours per visit	7.2	7.5	*
Average number of visits per claim	14.0	14.5	*
Average number of service hours per claim	98.1	107.9	*
Cost			
Average cost per service	$63	$52	*
Average cost per visit	$450	$384	*
Average cost per claim	$6,124	$5,457	*
Disability Duration			
Average TIB duration	37.1	37.8	
Average service duration	4.9	6.5	*
Average weeks from injury to service end	46.2	46.7	

Note: An asterisk denotes a statistically significant difference.

Source: Texas Department of Insurance, Workers' Compensation Research and Evaluation Group, 2017.

Costs were found to be significantly different between CARF and non-CARF claims, but the difference was expected because the cost difference was largely due to the rule that non-accredited programs were to be reimbursed at 80 percent of the MAR ($51.20 per hour) while accredited programs were reimbursed at 100 percent of the MAR ($64 per hour). Paid bills showed that, on average, accredited programs were paid $63 per hour while non-accredited programs were paid $52 per hour (see Table 5). For non-accredited programs, total cost per claim per program ($5,457) was about 11 percent less than that of accredited programs

($6,124). Even though the per-hour reimbursement rate was to be 20 percent less, the per-claim cost for non-CARF programs was only 11 percent less than CARF programs because of the higher utilization by non-CARF programs. This higher utilization was not related to a difference in injury type, injury severity, or the share of network claims, since these factors were controlled in the regression analysis.

One of the major goals of RTW rehabilitation programs is faster return to work. Using the end date of the TIB benefits as a proxy for return to work, analysis results shown in Table 5 indicate that the CARF accreditation was not associated with any statistically significant difference in disability duration. The average TIB benefit duration was 37.1 weeks for CARF claims and 37.8 weeks for non-CARF claims.

The overall duration of disability was measured by the number of weeks from the injury date and the end date of the WH program. There was no statistically significant difference in this measure between CARF and non-CARF programs.[9] However, non-CARF programs lasted for 6.5 weeks, somewhat longer than the 4.9 weeks for CARF programs.

Work Conditioning

Unlike WH services for which utilization was higher among non-CARF claims, service utilization in WC services was significantly higher (40 percent) among CARF claims (see Table 6). Non-CARF claims received an average of 37.6 hours of WC services while CARF claims received 52.7 hours. Both the intensity of service (hours per visit) and the frequency (visits per claim) were higher for CARF claims and they were statistically significant. With a higher reimbursement rate ($35 per hour), the total cost of WC programs for CARF claims ($1,832) was 66 percent higher than that for non-CARF claims ($1,099).

But there was no statistically significant difference in the average TIB duration, the average service duration, or the average duration between the injury and the end of service between CARF and non-CARF claims. The average TIB duration as a proxy for return to work was 35.5 weeks for CARF claims and 35.9 weeks for non-CARF claims.

[9] The median value of TIBs begin date was about one week after injury, but its average was about 10 weeks from injury because of some claims beginning income benefit several weeks after injury. With this 10-week delay on average, the length from injury to service end is about the same as the length from injury to TIB end.

Table 6: Regression analysis results for work conditioning programs

	CARF	Non-CARF	Statistical significance at .05 level
Utilization			
Average number of service hours per visit	5.1	4.1	*
Average number of visits per claim	10.6	9.4	*
Average number of service hours per claim	52.7	37.6	*
Cost			
Average cost per service	$35	$29	*
Average cost per visit	$176	$119	*
Average cost per claim	$1,832	$1,099	*
Disability Duration			
Average TIB duration	35.5	35.9	
Average service duration	3.3	3.9	
Average weeks from injury to service end	39.1	39.4	

Note: An asterisk denotes a statistically significant difference.

Source: Texas Department of Insurance, Workers' Compensation Research and Evaluation Group, 2017.

Chronic Pain Management/Interdisciplinary Pain Rehabilitation Program

CARF claims received significantly more visits per claim for chronic pain management than non-CARF claims, but the average service hour per visit for CARF claims was slightly less than that for non-CARF claims (see Table 7). In total service hours per claim, CARF claims received 2.5 more hours of CP services than non-CARF claims, but the difference was not statistically significant.

Average costs per service for both CARF and non-CARF claims were in line with the reimbursement guideline of the MFG. The total cost per claim was $15,884 for CARF claims, and for non-CARF claims, it was 20 percent less at $12,758 per claim.

There was no significant difference in the TIBs duration outcome between CARF and non-CARF claims. The average TIBs duration was 44.9 and 44.6 weeks for CARF and non-CARF claims, respectively. The average length of non-CARF programs was 9.1 weeks, which was slightly longer than 8.3 weeks of CARF programs. The overall disability duration (the number of weeks between the injury date and the end of CP program) was also slightly longer for non-CARF programs.

The overall disability duration was comparatively longer for CP programs than WH or WC programs. This may be due to the fact that injuries of the claims with CP services were more severe than other claims, and chronic pain management services occurred much later than other physical medicine services. Also, data analysis indicated that about half of the claims began their CP program after the end date of TIBs benefits. Many claims received chronic pain

rehabilitation services after their MMI date. In this sense, the TIB duration may not be a reliable indicator for the CP program's effect on return to work. Nonetheless, the length of TIB benefits was about the same for CARF and non-CARF claims.

Table 7: Regression analysis results for chronic pain management programs

	CARF	Non-CARF	Statistical significance at .05 level
Utilization			
Average number of service hours per visit	7.8	8.0	
Average number of visits per claim	17.6	16.9	*
Average number of service hours per claim	129.9	127.4	
Cost			
Average cost per service	$123	$102	*
Average cost per visit	$947	$800	*
Average cost per claim	$15,884	$12,758	*
Disability Duration			
Average TIB duration	44.9	44.6	
Average service duration	8.3	9.1	*
Average weeks from injury to service end	61.5	64.4	*

Note: An asterisk denotes a statistically significant difference.

Source: Texas Department of Insurance, Workers' Compensation Research and Evaluation Group, 2017.

5. DISCUSSIONS

Examining new injury claims from 2010 to 2013, we measured the effect of CARF accreditation on utilization, cost, and disability duration outcomes in RTW rehabilitation services. Using regression analysis, we controlled the effects of external factors such as age, gender, network status, injury type, and injury severity. The results showed that there was no statistically significant difference in the disability duration measured by the length of TIB benefits between accredited and non-accredited programs.

There were significant differences in costs and utilization. For WH services, CARF-accredited programs had lower utilization and higher costs than non-accredited programs. For WC and CP services, CARF-accredited programs had higher utilization and higher costs than non-CARF programs.

The significant differences in costs were primarily related to the Medical Fee Guidelines that specified a 20 percent reduction in reimbursement for non-accredited programs. As a result of combined effects of different reimbursement rates and utilization, the average per claim cost of CARF-accredited programs was higher than non-accredited programs by 12 percent ($667) in WH programs, by 67 percent ($733) in WC programs, and by 25 percent ($3,126) in CP programs. On the other hand, there was no significant difference in the duration and, as a result, the total amount of TIBs benefits.

These results are similar to those in the 2003 study by the Research and Oversight Council.[10] That study examined new claims of 1997 and 1998 injury years, covering services up to 2002, to evaluate the effects of CARF accreditation in WH and CP programs. It found significant differences in utilization and costs, but no difference in disability duration outcomes in WH programs. In CP programs, CARF-accredited programs had significantly shorter TIBs durations than non-accredited programs, but the cost savings because of reduced TIBs benefits were estimated to be significantly less than the added CP program cost due to CARF accreditation. We also found that the total disability duration from injury to the end of CP service was found to be significantly shorter for CARF-accredited programs. But this did not imply a shorter TIBs duration. Claims receiving CP services from non-accredited programs tended to begin income benefits and rehabilitation services later (after longer weeks from the injury date) than CARF claims.

It should be noted that, as in the 2003 study, currently available data did not contain actual RTW dates. As a result, the length of disability was estimated using the TIBs duration as a proxy

[10] See the aforementioned "Outcome Comparisons for Work Hardening and Chronic Pain Management Services" in *Texas Monitor*, 8(3), 2003, pp. 18-24, available at https://www.tdi.texas.gov/pubs/wcreg/mon8-3.pdf.

for return to work. In addition, any qualitative differences in these rehabilitation services could not be measured. But despite these limitations, available data indicated that the CARF-accredited programs did not result in any significant difference in the length of TIB benefits or the total length of disability while costs were higher than non-accredited programs.

TECHNICAL APPENDIX: ESTIMATED EFFECTS OF CONTROL VARIABLES

The regression models used to evaluate the effect of CARF accreditation on outcome variables also estimated the effects of other control variables such as age, gender, injury severity (impairment rating), network status, and injury type. In this Technical Appendix, we present these results and discuss statistically significant effects of the factors other than CARF accreditation.

Our models followed the standard linear regression specification:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \cdots \beta_k X_{ki} + \varepsilon_i$$

where Y_i denotes outcome (dependent) variables such as utilization and cost metrics, and X_i denotes control (independent) variables such as age, CARF status, and injury severity for each claim i. β_0 denotes the intercept and β_k are the parameters (coefficients) to be measured. These parameters show us how each of the control variables relates to the outcome variable. Therefore, these parameters are of the primary concern to us and reported in the tables below. Finally, ε_i is the residual that is not explained by any of the control variables. The residuals were used to evaluate whether a linear specification was reasonable or not. From the residual plot, it was determined that variable transformations or non-linear specifications were not necessary.

In our analysis, we ran a separate regression model on each of the nine outcome variables using the same 11 control variables. For CARF status, gender, and network status, binary variables such as 'CARF', 'Female', 'Network' were used where the value of '0' denoted a claim being non-CARF, male, and non-network, and the value of '1' denoted CARF, female, and network claims. Age was an interval variable ranging from 17 to 99. IR was also an interval variable ranging from 0 to 99. For injury type, six dummy variables were used for each of knee, lower extremity, upper extremity, neck, shoulder, and 'all other' injuries. The reference category was the 'back' injury.

WORK HARDENING PROGRAMS

The average service hour per visit of claims that received WH services from CARF-accredited programs was 0.3 hour less than that of non-CARF claims, as reported in Table 5. This estimated difference is seen as the parameter -0.32 for the CARF control variable in Table A1 (see the third row in the second column), which is statistically significant at .05 level.

None of the other control variables for the outcome variable (the average service hours per visit) was statistically significant. Nevertheless, the estimated parameters indicate that female

claims received 0.11 hour less per visit than male claims while keeping the effects of all other factors controlled. And claims with knee, upper extremity and neck injuries received less service hours than those with back injuries. Claims with shoulder and low extremity injuries tended to receive more service hours.

Table A1: Estimated parameters in regression models for work hardening services

Control Variables	Dependent (Outcome) Variables								
	Service hours per visit	Visits per claim	Total service hours per claim	Pay per service hour	Pay per visit	Total pay per claim	TIB benefit duration	Service duration	Injury date to service end
Intercept	7.40	12.37	90.54	52.33	383.48	4616.33	32.72	6.37	39.88
CARF	**-0.32**	**-0.56**	**-9.74**	**11.11**	**66.01**	**666.71**	-0.75	**-1.52**	-0.54
Impairment Rating	0.01	**0.08**	**0.67**	0.01	0.63	**34.87**	**1.08**	**0.10**	**0.74**
Female	-0.11	0.09	-1.50	-0.48	-9.79	-130.97	-2.32	**0.88**	1.57
Age	0.00	**0.04**	**0.32**	-0.02	-0.07	**15.48**	-0.02	-0.01	0.06
Network	0.00	0.27	**4.77**	**-2.89**	**-20.47**	-47.91	0.11	-0.22	0.49
Knee	-0.05	0.27	0.94	-0.12	-3.37	92.81	**5.27**	0.26	**4.78**
Lower Extremity	0.25	0.25	3.55	-0.57	13.14	210.90	**8.74**	0.70	3.87
Upper Extremity	-0.07	-0.03	-1.05	0.15	-3.63	-18.36	2.74	0.57	2.47
Neck	-0.06	-0.96	**-8.60**	-0.75	-7.73	**-530.25**	1.31	-0.76	-1.37
Shoulder	0.10	-0.52	-1.41	-0.27	2.99	-99.05	**7.15**	-0.14	**5.57**
Other injury	0.27	0.40	3.91	0.40	16.01	289.54	0.99	0.19	0.58

Note: Parameters in bold are statistically significant.

Source: Texas Department of Insurance, Workers' Compensation Research and Evaluation Group, 2017.

For the second outcome variable (the average number of visits per claim), one's impairment rating and age had statistically significant effects of 0.08 and 0.04 hour per one unit of IR and age. In other words, higher IR or age resulted in a higher number of visit. For total service hours per claim, IR, age, and network status had a positive effect of increasing total service hours, and neck injury was associated with a statistically significant negative effect. Network claims received 4.77 hours more than non-network claims while claims with neck injury received 8.6 hours less than those with back injury.

In terms of pay per service hour and pay per visit, significant negative effects were associated with the network status. Network pay rates were lower than non-network rates. However, in terms of total cost per claim, significant factors were IR, age, and neck injury. It may indicate that the total cost was influenced more by utilization levels than by hourly pay rates.

The difference in disability duration (TIB duration) was not associated with CARF status. But the disability duration was significantly different by IR and injury type: those with more severe injury received TIBs longer, and claims with injuries in lower extremity, knee, and shoulder

tended to receive TIBs longer than those with back injury. For shoulder injuries, the longer TIBs duration is partially explained by the fact that claims with shoulder injury had higher IR than claims with back injury. For knee and lower extremity injuries, their injury severity was lower than back injuries, but the data indicate that their average MMI date was later than those with back injury. Claims with knee and shoulder injuries also had longer total disability duration than those with back injury.

Work Conditioning Programs

In WC services, CARF-accredited programs provided one more service hour per visit than non-CARF programs (see Table A2, and as reported in Table 6). Also, the number of hours varied significantly by the type of injury. Claims with knee, lower and upper extremities, and shoulder injury received 0.3 to 0.5 hour less per visit than those with back injury. However, the number of visits per claim did not vary by injury type. Total service hours were lower for knee and upper extremity injuries by about 4 and half hours.

Table A2: Estimated parameters in regression models for work conditioning services

Control Variables	Dependent (Outcome) Variables								
	Service hours per visit	Visits per claim	Total service hours per claim	Pay per service hour	Pay per visit	Total pay per claim	TIB benefit duration	Service duration	Injury date to service end
Intercept	4.19	9.10	38.49	28.84	120.13	1116.83	33.43	4.10	32.09
CARF	**1.00**	**1.20**	**15.14**	**5.87**	**56.59**	**732.70**	-0.45	-0.60	0.31
Impairment Rating	0.00	**0.05**	**0.22**	0.02	0.17	**6.96**	**1.16**	0.09	**0.86**
Female	-0.03	-0.13	-0.39	-0.47	-3.76	-36.79	**-3.98**	-0.29	0.33
Age	0.00	0.00	-0.05	0.01	-0.04	-1.37	**-0.10**	-0.02	0.05
Network	-0.10	-0.20	-1.72	**-1.42**	**-9.02**	**-108.46**	0.12	-0.52	-0.01
Knee	**-0.46**	-0.29	**-4.73**	0.48	**-12.60**	**-137.64**	0.49	0.86	**3.12**
Lower Extremity	**-0.43**	0.20	-2.15	-0.29	**-13.86**	-84.19	0.68	0.61	2.11
Upper Extremity	**-0.30**	-0.54	**-4.32**	-0.22	**-10.90**	**-141.76**	2.67	0.20	**3.49**
Neck	0.23	-0.18	2.82	-0.38	5.76	93.54	-4.03	0.82	-1.31
Shoulder	**-0.50**	0.43	-2.51	0.10	**-14.47**	-72.66	**3.31**	**-0.14**	**8.79**
Other Injury	-0.06	-0.17	-1.06	0.38	-1.96	-31.43	3.00	0.56	1.94

Note: Parameters in bold are statistically significant.

Source: Texas Department of Insurance, Workers' Compensation Research and Evaluation Group, 2017.

Pay rates were influenced by the network status where networks paid less than non-networks (less by $108.46 per claim). However, pay rates were not different by injury type. Nevertheless, the average total pay per claim was less for knee and upper extremity injuries, mainly because of lower utilization by claims with those injuries.

The average TIBs duration of CARF claims was 0.45 week shorter than that of non-CARF claims although this difference was not statistically significant. On the other hand, other factors were statistically significant: the TIBs duration was longer for claims with higher IR and shoulder injury, and shorter for female and younger claims. Similar to WH programs, the overall disability duration was longer for claims with knee and shoulder injuries.

Chronic Pain Management Programs

Total CP service hours for CARF claims was 2.59 hours more than non-CARF claims, but the difference was not statistically significant (see Table A3). CARF claims received a slightly higher number of visits per claim (by 0.69 visit), which was statistically significant. Injury type was also a significant factor in determining service hours per visit and the number of visits per claim: claims with upper extremity and shoulder injuries received less service hours per visit (lower service intensity) but more visits per claim (higher service frequency) than claims with back injury. But these effects seemed to have offset each other so that there was no significant difference in the total service hours per claim by injury type. Total service hours per claim were influenced more by IR and age.

Table A3: Estimated parameters in regression models for chronic pain management services

Control Variables	Dependent (Outcome) Variables								
	Service hours per visit	Visits per claim	Total service hours per claim	Pay per service hour	Pay per visit	Total pay per claim	TIB benefit duration	Service duration	Injury date to service end
Intercept	7.51	16.42	116.08	101.37	753.91	11635.62	42.47	8.22	59.07
CARF	-0.18	**0.69**	2.59	**21.31**	**146.61**	**3125.54**	0.28	**-0.82**	**-2.88**
Impairment Rating	0.01	0.02	**0.35**	-0.03	0.74	**40.25**	**0.89**	**0.06**	**0.52**
Female	-0.06	0.48	2.80	**-1.18**	-12.22	191.51	**-4.62**	0.54	1.29
Age	0.01	0.01	**0.21**	0.01	0.95	19.68	-0.09	0.01	0.04
Network	-0.13	-0.06	-0.08	**-4.73**	**-48.19**	**-505.11**	2.08	-0.46	-0.07
Knee	0.30	-0.67	-0.10	-0.37	28.74	-49.97	3.88	1.69	**6.60**
Lower Extremity	-0.19	0.55	0.48	0.70	-19.27	125.19	**5.48**	-0.40	0.01
Upper Extremity	**-0.37**	**1.57**	6.13	1.31	-32.57	704.25	2.70	0.22	0.29
Neck	-0.10	0.54	3.37	0.73	-9.74	292.87	-0.52	-0.15	-1.74
Shoulder	**-0.43**	**1.27**	4.31	-0.45	**-51.51**	449.93	**4.54**	-0.14	2.71
Other Injury	-0.25	0.82	1.52	-0.58	-32.22	86.28	4.03	0.08	-0.30

Note: Parameters in bold are statistically significant.

Source: Texas Department of Insurance, Workers' Compensation Research and Evaluation Group, 2017.

Similar to WH and WC programs, pay rates were significantly lower for chronic pain management in network claims. In terms of total pay per claim, the pay for network claims was

lower by $505.11 than non-network claims. Claims with higher IR costed more because of higher utilization.

TIBs duration was not different between CARF and non-CARF claims, but female claims had a shorter duration than male claims while claims with lower extremity and shoulder injuries had longer duration than those with back injury. In terms of the overall disability duration, the most significant difference was for claims with knee injury. Claims with knee injuries had 6.6 weeks longer duration in disability than those with back injury. As in WH and WC programs, a higher IR resulted in a longer disability duration, as expected.

Outcome Comparisons of Return to Work Rehabilitation Programs by Accreditation Status, 2017

Texas Department of Insurance, Workers' Compensation Research and Evaluation Group