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Updated Report on the Outcome Evaluation for the Western Washington COHE

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Updated Report on the Outcome Evaluation for the Western Washington COHE Executive Summary

This report updates an earlier report prepared in June 2005 by the University of Washington that presented the results of the outcome evaluation for the Western Washington Center of Occupational Health and Education (COHE). Subsequent to the preparation of that report, the University of Washington research team discovered some coding errors in the data that led to misclassification of injuries and types of providers for COHE cases (these coding errors affected the COHE cases only). We recoded the data to correct this problem and made a few other minor corrections to the data. This report updates the previous report and presents corrected results where the results changed. There was little meaningful change in the overall results.

As discussed in our previous report, the Department of Labor and Industries (L&I) is sponsoring an ongoing quality improvement system intervention, known as the Occupational Health Services (OHS) project, aimed at reducing worker disability and promoting improved treatment outcomes. This intervention is being tested in two pilot sites: (1) Valley Medical Center in Renton, Washington, and (2) St. Luke's Rehabilitation Institute in Spokane, Washington. The University of Washington is evaluating the OHS project implemented at these two pilot sites. The initial findings for Renton pilot evaluation were reported in June 2005; the findings for the Spokane pilot site were reported in June 2006.

Methods

System Intervention

Each of the two pilot sites developed a Center of Occupational Health and Education (COHE) to recruit providers (attending doctors) for the pilot, oversee care and conduct quality improvement activities. The Renton COHE began recruiting providers in March 2002 and started treating patients in July 2002.

Research Design

To conduct the evaluation, we assessed disability, satisfaction, employment, and cost outcomes of patients treated by COHE providers relative to outcomes of patients treated by a comparison-group of non-COHE providers working within the same Renton pilot area. We defined the 12-month period beginning July 2003 as the evaluation year and tracked patients, on average, for 15 months. We also gathered patient data from a baseline period representing July 2001 through June 2002. These data, along with other data representing patient age, gender, injury type, and provider type, were used to perform multivariate statistical analysis.

Data, Measures and Analysis

The updated evaluation is based upon analysis of 22,544 cases treated in the evaluation year, 10,725 COHE cases and 11,819 comparison-group cases. The COHE cases derive from 119 attending doctors recruited for the pilot who treated workers during the evaluation year. The comparison-group consists of all providers (N = 845) who were known to be attending doctors in the workers' compensation system in the pilot area.

The measures for the evaluation derived from L&I administrative data include:

- % of total cases that went on disability (time loss)
- % of cases on disability at different time points post claim receipt, e.g., 90 days, 180 days, or 360 days
- Duration of disability measured in days from claim receipt
- Disability costs
- Medical costs

- Total costs (sum of medical and disability costs)

As part of the evaluation, we analyzed other measures obtained from specially designed surveys. These measures include:

- Worker satisfaction with health care
- Worker employment outcomes
- Provider satisfaction

We conducted a series of analyses to assess the effects of the COHE. These analyses primarily involved comparison of measures for COHE cases and comparison-group cases for the evaluation year. All statistical tests were two-sided, with statistical differences defined by a maximum p-value of .05.

Results

The evaluation found important differences favoring the COHE in disability measures, employment outcomes, and medical and disability costs. At the same time, COHE patients were just as satisfied with their care as (comparison-group) patients treated by non-COHE providers. Further, the provider survey indicated that the majority of COHE providers were satisfied with the pilot, felt their ability to treat injured workers had improved, and reported greater willingness to treat more injured workers.

Major findings regarding disability and employment outcomes include:

- COHE patients had lower ($p < .01$) incidence of (time loss) disability: 16.0% versus 20.7%
- A smaller proportion of COHE compensable cases were on time loss at 180 days and 360 days: 16.8% versus 21.5% ($p < .01$) and 7.7% versus 10.8% ($p < .01$), respectively
- COHE patients on time loss, on average, had fewer days ($p < .01$) of disability: 85.7 days versus 104.6 days

- COHE patients with carpal tunnel syndrome on time loss had fewer days of disability: 69.1 days versus 126.2 days ($p < .01$).
- COHE patients and non-COHE patients were equally satisfied with regard to perceived quality of care, coordination of care, difficulty in obtaining care, and related satisfaction measures
- COHE patients were 55% more likely ($p < .05$) to return to work for the same employer they worked for at the time of their injury
- COHE patients were 65% more likely ($p < .05$) to be working at the time of the survey (approximately 6 months after claim receipt)

The favorable findings with regard to disability were partly responsible for reduced medical and disability costs¹ among COHE patients:

- Among all (22,544) cases treated in the evaluation year, COHE patients experienced lower medical cost per claim ($p < .01$) and lower disability cost per claim ($p < .01$): \$1,780 versus \$2,167 and \$710 and \$1,210, respectively.
- The evaluation's multivariate statistical analysis estimated savings in cost per claim associated with the COHE of approximately \$401.
- Aggregate net savings, based upon 10,700 patients treated in the evaluation year and administrative costs borne by L&I of \$190,000, are \$4,100,700, or \$383 per case.

Conclusion

Worker treatment through the Renton COHE led to a substantial reduction in disability incidence and duration, which was associated with improved employment outcomes. These improved disability and employment outcomes also led to significant cost savings. These outcomes were achieved without sacrificing provider choice or diminishing patient satisfaction with health care.

¹ COHE medical costs include additional costs (\$635,000) billed for activities such as telephone contact with employers, providing health services coordination, and submitting the report of accident form within 2 business days. The analysis incorporates these additional billings.

Updated Report on the Outcome Evaluation for the Western Washington COHE

Introduction

This report updates an earlier report prepared in June 2005 by the University of Washington that presented the results of the outcome evaluation for the Western Washington Center of Occupational Health and Education (COHE). Subsequent to the preparation of that report, the University of Washington research team discovered some coding errors in the data that led to misclassification of injuries and types of providers for COHE cases (these coding errors affected the COHE cases only). In addition, (1) a small number of duplicate claims were identified that led to the elimination of 12 cases (out of 22,544) originally analyzed; (2) the data regarding disability (time loss) incidence was updated resulting in a small percentage (< 5%) of cases changing disability status; and (3) the method of identifying cases treated in the hospital emergency department and of determining provider volume categories was updated. This report updates the previous report and presents corrected results. There was little meaningful change in the overall results. Results from analyses of individual injury categories changed the most. We note in the text where the updated analyses led to meaningful changes in results.

A major goal of the Department of Labor and Industries (L&I) has been to improve the quality of care and outcomes for injured workers treated through the workers' compensation system. In its effort to further this goal, L&I has undertaken a number of pilot studies and demonstrations to test system interventions. One of the important demonstrations was the Managed Care Pilot (MCP), which tested the effects on health outcomes, patient satisfaction and medical costs of delivering health care via provider networks organized through managed care arrangements. The MCP showed that using

managed care arrangements to organize care through an occupational medicine model^{1, 2} could save medical costs, and, more importantly, could reduce worker disability and improve return-to-work outcomes. Because workers in the MCP were limited to designated provider networks for their care, patient satisfaction was lower than it would have been otherwise.³

Building on the experience of this pilot and on other scientific information regarding the delivery of occupational health best practices,⁴ L&I sought to develop a system intervention aimed at achieving these same outcomes but without restricting in any way the worker's right to choose a provider. Working in collaboration with Business, Labor, and a research team at the University of Washington, L&I designed a quality improvement intervention known as the Occupational Health Services (OHS) Pilot Project.⁵

The OHS project was intended to be a community-wide quality-improvement intervention that would be implemented through centers of occupational health and education (COHEs). The COHEs were to recruit community providers, establish mechanisms to identify high-risk cases for long term disability, develop procedures for coordinating care, implement quality indicators, foster communication between providers and employers, offer training to participating providers, and feed back information to participating providers on their performance.

L&I developed a request for proposal (RFP) and invited health care organizations to apply for funding to implement COHEs on a pilot basis. Two contracts were awarded to

¹ Cheadle A, Wickizer TM, Franklin G et al. Evaluation of the Washington State Workers' Compensation Managed Care Pilot Project II: medical and disability costs. *Medical Care*, 1999 Oct;37(10):982-93.

² Wickizer TM, Franklin G, Plaeger-Brockway, et al. Improving the quality of workers' compensation health care delivery: the Washington State Occupational Health Services Project. *Milbank Quarterly*, 2001;79(1): 5-33.

³ Kyes K, Wickizer TM, Franklin G, et al. Evaluation of the Washington State Workers' Compensation Managed Care Pilot Project I: medical outcomes and patient satisfaction. *Medical Care*, 1999 Oct;37(10):972-81.

⁴ Loisel P, Abenheim L, Durand P. A population-based, randomized clinical trial on back pain management. *Spine*. 1997 Dec 15;22(24):2911-8.

⁵ Wickizer TM, Franklin G, Plaeger-Brockway, et al. Improving the quality of workers' compensation health care delivery: the Washington State Occupational Health Services Project. *Milbank Quarterly*, 2001;79(1): 5-33.

establish pilot COHEs, one at Valley Medical Center in Renton and the other at St. Luke's Rehabilitation Institute in Spokane. The Renton COHE was established over a six-month period beginning in December 2001. It began recruiting providers in March 2002, and started providing patient care in July 2002. The Spokane COHE began operations approximately a year later.

The University of Washington research team is evaluating the COHEs and is conducting both process and outcome assessments of each pilot site. In June 2003 we completed the process evaluation of the Renton COHE to assess development and early implementation of the pilot at that site. This report presents updated findings for the outcome evaluation for the Renton COHE. The outcome evaluation for the Spokane COHE was completed in June 2006.

Our outcome evaluation was guided by three principal aims:

- To assess the effect of the COHE on the incidence and duration of disability,
- To assess the effect of the COHE on patient satisfaction and employment outcomes,¹ and
- To evaluate the effect of the COHE on medical and disability (time loss) costs.

In addition to these three principal aims, our evaluation also addressed a secondary aim of examining COHE specific activities, such as health services coordination, and other related activities consistent with quality indicators, such as the submission of the report of accident within two business days.

In the sections that follow, we describe the methods used for the evaluation and present the results of analyses conducted to address these aims.

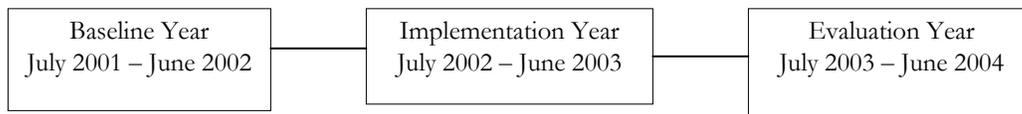
¹ To address this aim, we conducted a survey of COHE patients. The results of this survey have been previously reported, "Report on patient satisfaction surveys – Western Washington COHE," (December 2004). This report includes only a brief summary of the findings reported earlier.

Methods

Design

The design we used to conduct the evaluation of the Renton COHE is generally referred to as a “pre-post, comparison-group” design. This design allows the effects of an intervention to be evaluated relative to a comparison group and also allows differences in baseline factors that might affect the outcomes to be adjusted for, thereby strengthening the validity of the findings.

The “pre” and “post” periods covered by the evaluation are shown in the figure below. The pre-period corresponds to the baseline year in the figure and covers the 12-month period July 2001 through June 2002. Implementation of the COHE occurred over a 12-month period beginning in July 2002. During this time the COHE developed an organizational infrastructure and implemented different administrative systems. Insofar as the COHE was not fully implemented at this time, patients treated during this period are not included in this outcome evaluation. The “evaluation year” was defined as the 12-month period beginning in July 2003. Case accrual occurred over this 12-month period. In other words, all incident (new) claims occurring from July 2003 through June 2004 were included in the database constructed for the evaluation. These claims were then tracked through March 2005, providing a follow-up range from 9 to 21 months, with an average follow-up of 15 months.



Selection of Comparison Group

An important initial step in designing the evaluation was to identify a suitable comparison group. After considering a number of options, including the use of an external community as a comparator site, we decided to create a comparison group of attending doctors in the

pilot site who were not participating in the pilot.¹ One advantage of selecting attending doctors for the comparison group from the community in which the pilot was located is that it ensured to the extent possible that external factors, such as community health resources, degree of market competition, industrial mix of firms, and employment factors, would be similar for the intervention and comparison groups.

Based upon L&I claims data, we identified 1,065 attending doctors who had at least one claim in the baseline year or evaluation year: 766 attending doctors were listed as the provider on a claim filed in the baseline year and 845 were listed as the attending doctor on a claim filed in the evaluation year (see Table 1 below).

At the time our evaluation was initiated, the Renton COHE had enrolled 130 providers who were listed as the attending doctor on at least one L&I claim during the baseline year or evaluation year. Of these 130 providers, 111 treated at least one worker in the baseline year and 119 did so in the evaluation year. Though the number of providers recruited by the COHE was far less than the number of comparison-group providers, they accounted for roughly the same number of claims (Table 1).

Data and Measures

We obtained L&I administrative data representing all claims filed during the baseline year and evaluation year that listed a comparison-group attending doctor or a COHE attending doctor. The unit of analysis for our evaluation was the claim. The table below shows the claims for COHE attending doctors and comparison-group attending doctors for the baseline year and evaluation year. As shown, the 130 COHE attending doctors accounted for 20,223 claims, with roughly equal distribution across the baseline and evaluation years. The 1,065 comparison-group attending doctors accounted for 21,854 claims in the baseline

¹ For purposes of this report, we use the term attending doctor. Attending doctor includes physicians, chiropractic doctors, osteopathic physicians, and registered nurse practitioners. Occasionally the report refers to “physicians” or “community physicians.” This term has the same meaning as attending doctor and includes the same types of providers.

and evaluation years. All (1,195) attending doctors in the database accounted for 42,077 claims in the baseline and evaluation years combined.

Table 1. Distribution of Cases by Year for COHE group and Comparison Group

	COHE Group No. Doctors (No. Cases)	Comparison Group No. Doctors (No. Cases)	Total No. Doctors (No. Cases)
Baseline Year	111 (9,498)	766 (10,035)	877 (19,533)
Evaluation Year	119 (10,725)	845 (11,819)	964 (22,544)
Total	130 (20,223)	1,065 (21,854)	1,195 (42,077)

Note: The doctors shown in the table do not represent unduplicated counts.

The primary measures for the evaluation, all derived from L&I administrative data, include:

- % of total cases that went on disability (time loss)
- % of cases on disability at different time points post claim receipt, e.g., 90 days, 180 days, or 360 days
- Duration of disability measured in days from claim receipt
- Disability costs
- Medical costs
- Total costs (sum of medical and disability costs)

COHE attending doctors were reimbursed for performing selected activities consistent with quality indicators established for the pilot.¹ The medical cost data obtained for the evaluation incorporate the higher (differential) reimbursement rates given to COHE attending doctors.

¹ Wickizer TM, Franklin G, Mootz R, et al. A communitywide intervention to improve outcomes and reduce disability among injured workers in Washington State. *Milbank Q.* 2004;82(3):547-67.

In addition to the claims data described above, we collected administrative (billing) data that reflected the specific activities performed by COHE providers that were eligible for reimbursement under the pilot. These included health services coordinating activities, use of activity prescription forms, early submission of the report of accident, communication with employers to discuss return to work, and assessment to determine impediments to return to work. As part of our evaluation, we analyzed data pertaining to these activities and report the results below.

Analytical Approaches

We used bivariate (Chi-square and analysis of variance [ANOVA]) as well as multivariate (regression) statistical techniques to evaluate the effects of the COHE. The primary analysis involves a series of bivariate analyses to compare the COHE group with the comparison group on the measures described above for the evaluation year. These analyses provide information on the nature and magnitude of the differences in the outcome measures and whether these differences are statistically significant. All statistical tests are two-sided, with statistical significance defined by a maximum p-value of .05.

A number of factors beside the COHE could influence the outcome measures noted above. These factors include patient age and gender, type of provider, and type of injury, as well as baseline differences in provider-level costs and disability duration. To estimate the independent effect of the COHE on costs and incidence and duration of disability, we conducted statistical analyses involving the estimation of linear regression models and logistic regression models. This enabled us to assess the effect of the COHE on the outcomes of interest and at the same time to control for the influence of factors such as patient age and gender, injury type, provider type, and baseline differences in costs and disability. Additional information about the statistical analysis performed for the evaluation is provided later in the report.

Results

Descriptive Information on Study Groups

Tables 2 – 4 present descriptive information, based on data for the evaluation year,¹ showing the mix of patients, injuries and attending doctors for the COHE cases and comparison cases. As shown in Table 2, there were modest differences in the age-sex profiles of the COHE group and the comparison group. The COHE group had a slightly higher percentage of male workers and workers aged 25 to 34 but had a smaller percentage of workers aged 55 or older.

Table 3 shows the mix of injuries for the two groups. As indicated, COHE providers treated patients with a somewhat different mix of conditions and injuries. Back sprain was somewhat more common among workers in the comparison group, as was carpal tunnel syndrome, and “other/ill defined” injuries. In contrast, the COHE group included workers who were more likely to have upper extremity fractures and lacerations or contusions. The higher proportion of fractures and lacerations or contusions among COHE cases may result from a larger percentage of these cases being treated through hospital emergency departments.

Table 2. Age-Gender Profile of Study Population

Category	COHE Group (n = 10,725)	Comparison Group (n = 11,819)
% Male *	74.6%	71.2%
% 16-24 *	13.0%	12.4%
% 25-34	30.8%	25.3%
% 35-44	26.3%	25.8%
% 45-54	20.7%	22.4%
% 55+	9.2%	14.1%

* Differences in gender and age are statistically significant (p < .01).

¹ Unless otherwise indicated, the data presented in all tables is based upon the evaluation year.

Table 3. Distribution of Injuries

Injury/Condition	COHE Group (n = 10,725)	Comparison Group (n = 11,819)
Back sprain	14.1% *	16.6%
Carpal Tunnel Syndrome	0.8% *	2.5%
Upper Extremity Fractures	2.9% *	1.9%
Lower Extremity Fractures	1.6% *	1.2%
Lacerations/Contusions	38.5% *	27.9%
Other Sprains	22.0%	23.0%
Other/Ill Defined Injuries	20.1% *	27.1%

* Differences are statistically significant ($p < .01$).

Table 4 shows the distribution of first attending doctor, based upon the L&I billing data. As indicated, COHE patients were more likely to receive initial care from a hospital emergency room, but were less likely to receive care initially from a chiropractor or surgeon.

Table 4. Distribution of First Attending Doctor

Provider	COHE Group (n = 10,725)	Comparison Group (n = 11,819)
Hospital Emergency Department Physician	44.2% *	28.3%
Chiropractor	1.4% *	9.7%
Primary Care Physician	34.7% *	31.1%
Occupational Medicine Physician	17.3% *	11.7%
Surgeon	1.9% *	5.1%
Other Physician/Provider	0.5% *	13.9%

* Differences are statistically significant ($p < .01$).

Finally, Table 5 shows the incidence of disability (time loss) for cases treated during the baseline (pre-treatment) period. The table reveals selective differences in the incidence of disability. For back sprain cases and other sprain cases, the incidence of disability was lower for COHE cases; it was also lower for all injuries combined (19.3% versus 26.3%, $p < .01$). The data in the updated Table 5 differ from the data presented in the original report. Although there was no change in the incidence of time loss for all injuries combined, the time loss incidence for COHE cases increased for the four selected injury categories shown in the table, especially for COHE carpal tunnel cases and fracture cases. That the time-loss incidence values changed for specific injury categories but not for all injuries combined reflects the nature of the coding misclassification discussed earlier.

Table 5. Incidence of Disability (Time Loss) During Baseline Period

Injury/Condition	% of Patients on Disability (Time Loss)	
	COHE	Comp. Group
Back sprain (n = 3,045)	28.5% *	37.3%
Carpal Tunnel Syndrome (n = 360)	35.2%	40.8%
Fractures (n = 729)	48.2%	49.1%
Other Sprains (n = 4,546)	24.6% *	30.7%
All Injuries (n = 19,533)	19.3% *	26.3%

* Differences are statistically significant ($p < .01$).

Disability Incidence and Duration for Claims Filed in Evaluation Year

Table 6 presents information concerning the occurrence of disability (time loss) claims for four injury conditions, back sprain, carpal tunnel syndrome, fractures and other sprains, and for injuries overall. The data presented in Table 6 and the tables that follow are based upon claims filed in the evaluation year (July 2003 through June 2004). As shown in

Table 6, COHE cases exhibited a lower incidence of time loss overall (16.0% versus 20.7%, $p < .01$) and a lower incidence for back sprain claims and claims for other sprains. The data presented in the updated Table 6 differs from the data presented in the original report, especially in regard to carpal tunnel syndrome cases. The original report indicated that 13.2% of the COHE claims for carpal tunnel syndrome became time loss whereas the updated report indicates that 44.8% of these claims became time loss. Similarly, the time loss incidence for COHE claims for fractures increased substantially, from 17.2% (original report) to 35.8%. The reason why the incidence of disability increased for the selected injury groupings shown in Table 6 is that injuries representing cuts, lacerations and contusions, which have less time loss, were incorrectly coded as back injuries, carpal tunnel syndrome, fractures or other sprains.

Table 6. Incidence of Disability (Time Loss) Claims for Selected Conditions During the Evaluation Year

Injury/Condition	COHE Group	Comparison Group
Back sprain (n = 3,480)	23.2% *	29.3%
Carpal Tunnel Syndrome (n = 380)	44.8%	42.0%
Fractures (n = 837)	35.8%	38.7%
Other Sprains (n = 5,074)	21.1% *	26.2%
All Injuries (n = 22,544)	16.0% *	20.7%

* Differences are statistically significant ($p < .01$).

Another question of concern to the evaluation was whether among compensable cases the percentage of cases on long-term disability differed between the two groups. This question is addressed in Table 7. Among all compensable cases (all injuries combined), COHE cases had lower ($p < .01$) rates of 180-day and 360-day time loss than comparison-group cases. However, among specific injury categories the only statistically significant difference observed was for carpal tunnel cases on time loss at 360 days (COHE cases = 2.6% versus comparison-group cases = 19.5%, $p < .05$).

Table 7. Proportion of Patients on Disability at 180 Days and 360 Days among Compensable Cases on Time Loss

Injury/Condition	% on Time Loss at 180 Days		% on Time Loss at 360 Days	
	COHE	Comp. Group	COHE	Comp. Group
Back sprain (n = 927)	16.8%	19.8%	8.8%	10.1%
Carpal Tunnel Syndrome (n = 162)	25.6%	32.5%	2.6% *	19.5%
Fractures (n = 310)	14.0%	13.0%	4.1%	6.5%
Other Sprains (n = 1,207)	19.1%	21.3%	8.0%	10.8%
All Injuries (n = 4,157)	16.8% **	21.5%	7.7% **	10.8%

* p < .05; ** p < .01

Table 8 shows information on mean (average) and median disability days among compensable (time loss) cases. Consistent with the percentage figures shown in Table 7, COHE cases for all injuries combined had fewer average (mean) disability days and fewer median disability days (median represents the 50th percentile of the distribution) than comparison-group cases. Two of the injury categories, carpal tunnel syndrome and other sprains, exhibit similar patterns, with COHE cases having fewer mean days of time loss than comparison-group cases. The updated Table 8 shows some differences from the data reported in the original report. The most important difference concerns carpal tunnel syndrome. For this injury category, mean time loss days for COHE cases decreased from 87.1 (original report) to 69.1 (updated report), and this larger difference became statistically significant (p < .01). These findings are consistent with the updated findings shown in Table 7, which indicate significantly fewer COHE carpal tunnel syndrome cases on disability at 360 days compared with comparison-group cases.

Table 8. Mean and Median Disability Days among Compensable (Time Loss) Cases

Injury/Condition	Mean Days		Median Days	
	COHE	Comp. Group	COHE	Comp. Group
Back sprain (n = 927)	93.2	99.4	25	31
Carpal Tunnel Syndrome (n = 162)	69.1**	126.2	46	77
Fractures (n = 310)	85.7	86.9	49	46
Other Sprains (n = 1,207)	87.5*	103.0	36	44
All Injuries (n = 4,157)	85.7**	104.6	32	42

** p < .01; * p < .05

Tables 9 and 10 present information, based upon warrant data, on the incidence of disability (Table 9) and the proportion of cases on long-term disability among compensable cases (Table 10) by provider volume. The numbers shown below the provider categories represent cases treated during the evaluation year. This analysis is limited to two conditions that accounted for a large percentage of cases treated: back sprain and “other sprains.” The analysis includes two volume strata representing “high volume” providers and “low volume” providers, as well as providers who treated patients through the hospital emergency department. High-volume providers are defined as providers who treated, on average, 200 or more cases per year during the implementation year and evaluation year; low-volume providers treated 20 or fewer patients per year during this same period.

As shown in Table 9, there were few differences in the incidence of disability for patients with back sprain and other sprains between COHE cases and comparison-group cases. The one exception was for the group of high-volume providers, where COHE cases exhibited a

lower incidence of disability (19.3% versus 25.1%, $p < .01$). These updated findings show fewer differences between the COHE group and comparison group in the incidence of disability than were reported earlier. For example, the earlier report showed a significant lower incidence of disability for COHE back sprain cases and other sprain cases treated through the hospital emergency department, while the updated report shows similar disability rates for these cases.

Table 9. Incidence of Disability (Time Loss) for Selected Conditions

Injury/Condition	% of Cases on Disability (Time Loss)	
	COHE	Comparison Group
<u>Back Sprain</u>		
Hospital Emergency Dep't (n = 809)	29.3%	31.1%
High Volume Provider (n = 882)	19.0%	22.8%
Low Volume Provider (n = 9448)	31.9%	30.6%
<u>Other Sprains</u>		
Hospital Emergency Dep't (n = 1,377)	23.8%	25.2%
High Volume Provider (n = 1,390)	19.3%**	25.1%
Low Volume Provider (n = 1,066)	24.4%	26.7%

** $p < .01$; * $p < .05$

Table 10 examines the occurrence of long-term disability among compensable cases for patients with these same two conditions treated by the same three groups of providers. There were no statistically significant differences in the percentage of back sprain cases on disability at 180 days or 360 days. Though some of the differences appear large, they are not statistically significant because of the few numbers of cases on long-term disability.

For the second condition representing “other sprains,” statistically significant differences favoring the COHE were observed for hospital emergency department (360-day disability) and low-volume providers (180-day disability). The earlier report showed somewhat greater differences favoring the COHE in regard to long-term disability for workers treated for “other sprains.”

Table 10. Proportion of Patients on Disability at 180 Days and 360 Days among Compensable Cases on Time Loss for Selected Conditions

Injury/Condition	% on Time Loss at 180 Days		% on Time Loss at 360 Days	
	COHE	Comp. Group	COHE	Comp. Group
<u>Back Sprain</u>				
Hospital Emergency Dep't (n = 239)	18.4%	25.2%	7.4%	13.6%
High Volume Provider (n = 168)	15.7%	22.7%	13.7%	12.1%
Low Volume Provider (n = 284)	27.0%	19.0%	15.5%	7.7%
<u>Other Sprains</u>				
Hospital Emergency Dep't (n = 331)	21.2%	21.1%	7.9%*	14.8%
High Volume Provider (n = 274)	18.9%	27.6%	6.5%	8.6%
Low Volume Provider (n = 274)	6.7%**	25.0%	6.7%	11.5%

** p < .01; * p < .05

Medical Expenses and Disability Costs

Tables 11 and 12 present information on medical and disability costs for claims incurred in the evaluation year for the same four conditions as analyzed earlier (back sprain, carpal tunnel syndrome, fractures, and other sprains) and for claims overall. Table 11 shows

medical costs and disability costs for all cases by injury condition. Table 12 shows only aggregate costs for compensable (time loss) claims.

Mean medical and disability costs were lower ($p < .05$) for COHE cases for back sprain, carpal tunnel syndrome and other sprains, as well as for all injuries combined. For all injuries combined the average (mean) medical cost per claim was \$387 less for COHE cases, while the average disability cost was \$500 less. Substantially lower disability costs were also observed for back sprain COHE cases and other sprain COHE cases. The medical and disability costs for fractures were similar for the COHE group and comparison group. Median costs were substantially less than the mean costs, reflecting the relatively large number of cases in the data set with relatively low medical costs. Median disability costs are not shown because the median value is zero, reflecting the fact that fewer than 50% of the cases incur any disability cost. The updated findings for all injuries combined are the same as previously reported, but the findings for specific injury conditions for the COHE differ from what was previously reported. Both medical and disability COHE costs are higher because of the misclassification of injury types. Injuries representing cuts, lacerations and contusions, which tend to be less costly, were misclassified as back sprain and carpal tunnel syndrome injuries. This affected the cost estimates for specific injury groups but not for all injuries combined.

Table 12 shows data on aggregate medical costs and disability costs for compensable (time loss) cases. While mean medical costs (including costs for COHE specific activities that were billed to L&I) for the COHE group and comparison group were similar, mean disability costs were significantly less ($p < .01$) for COHE cases (\$4,438 versus \$5,838). Though not shown in Table 12, we also examined aggregate medical costs for non-compensable cases (by definition disability costs for non-compensable cases are zero). The mean medical cost for COHE cases was \$812 compared to \$880 for comparison-group cases ($p < .01$).

Table 11. Medical and Disability Costs: All Cases

Injury/Condition	<u>Medical Costs</u>		<u>Disability Costs</u>	
	Mean	Median	Mean	Median +
<u>Back Sprain</u>				
COHE Group (n = 1,514)	\$2,426*	\$734	\$1,035**	--
Comparison Group (n = 1,966)	\$2,779	\$867	\$1,674	--
<u>Carpal Tunnel Syndrome</u>				
COHE Group (n = 87)	\$3,084 *	\$2,627	\$1,839	--
Comparison Group (n = 293)	\$3,688	\$2,411	\$3,112	--
<u>Fractures</u>				
COHE Group (n = 480)	\$3,690	\$1,153	\$1,629	--
Comparison Group (n = 357)	\$3,391	\$1,000	\$1,685	--
<u>Other Sprains</u>				
COHE Group (n = 2,361)	\$2,288 **	\$700	\$914 **	--
Comparison Group (n = 2,713)	\$2,691	\$660	\$1,451	--
<u>All Injuries</u>				
COHE Group (n = 10,725)	\$1,780 **	\$527	\$710 **	--
Comparison Group (n = 11,819)	\$2,167	\$463	\$1,210	--

Differences in mean costs are statistically significant: ** (p < .01), * (p < .05).

+ The median value represents the 50th percentile of the distribution . Median disability costs are not shown because fewer than half the cases had any positive disability costs; therefore, median disability costs are zero.

Table 12. Aggregate Medical and Disability Costs for Compensable (Time Loss) Cases

Injury/Condition	Medical Costs		Disability Costs	
	Mean	Median	Mean	Median
COHE Group (n = 1,711)	\$6,880	\$3,715	\$4,438 *	\$1,275
Comparison Group (n = 2,446)	\$7097	\$4,332	\$5,838	\$1,927

* p < .01.

COHE Activities

As part of our evaluation, we gathered billing data on COHE specific activities that were performed to improve coordination of care and implement occupational health best practices consistent with quality indicators developed for the OHS pilot. The specific activities tracked through billing data included:

- Submission of the report of accident within two business days
- Use of activity prescription forms at each visit
- Telephone communication with employers
- Assessment of impediments to return to work at 4 weeks of time loss
- Occupational health education with health experts or mentors
- Health services coordination

Of the 10,725 COHE claims filed during the evaluation year, one or more of the above activities were performed on 9,104 (85%) claims. On average, 1.95 activities were performed per claim, representing 20,879 total billed activities (does not include routine submission of the report of accident in more than two business days). The number and percentage of claims for which a COHE activity was billed are shown in Table 13. Note the same activity could be billed more than once for a claim, e.g., use of the activity prescription form or telephone consultation with the employer. The counts given in Table

13 reflect the number of claims for each activity type for which one or more bills were submitted. Therefore, the total count in Table 13 is 16,616, not 20,879. As shown, submission of the report of accident within two business days occurred most often (55%), followed by use of activity prescription forms (46%) and telephone consultation with employers (30%). Approximately 8% of the evaluation-year claims included a charge for some health services coordination activity. The average cost per claim (across all 10,725 claims) for these COHE activities was \$59. The aggregate cost across all claims was \$635,546.

Table 13. Distribution of COHE Activities

Activity Type	No. Claims (n = 16,616)	% of Evaluation Year Claims (n=10,725)
Submission of report of accident with 2 business days	5,945	55.4%
Use of activity prescription forms	4,927	45.9%
Telephone consultation with employer	3,207	29.9%
Telephone consultation with patient	838	7.8%
Health services coordination	804	7.5%
Medical conference	204	1.9%
Return-To-Work assessment	119	1.1%
Other activities	571	5.3%

Results of Statistical Analysis

The information presented earlier indicated that injured workers treated through the Renton COHE were less likely to go on disability (time loss) than comparison-group workers. Further, COHE patients with compensable claims were less likely to experience long-term disability. As shown in Table 11, among all cases medical costs and disability costs for COHE patients were, respectively, \$387 and \$500 less than for comparison-group patients.

Combining medical costs and disability costs would lead to an approximate difference in total costs of \$880 per case.

Not all of this cost difference is likely to be associated with the COHE, however. As Tables 2 – 5 show, there were differences in a number of factors between the COHE group and the comparison group, including differences in patient age and gender mix (Table 2), differences in injury and provider mix (Tables 3 and 4), and differences in baseline occurrence of disability (Table 5). These differences may account for some of the observed difference in costs, as well as other differences in disability reported in Tables 6 – 10.

To develop a valid assessment of the effect of the COHE on costs and disability, we tested a series of statistical models that allowed us to generate estimates of the difference in costs and disability associated with the COHE, controlling for the factors described earlier. Three models were estimated: (1) a multiple linear regression model with total costs (medical costs plus disability costs) specified as the dependent variable; (2) a logistic regression model (for all cases) with the dependent variable expressed in binary form indicating whether the case became compensable; and (3) a logistic regression model (for compensable cases only) with the dependent variable expressed in binary form representing whether the worker was on disability at 360 days post claim receipt.

In estimating these models, we controlled for the following factors:

- Age-gender mix
- Injury type
- Type of first attending doctor
- Baseline-year average total costs (medical costs plus disability costs) per provider¹

¹ Total costs were highly correlated ($r > .90$) with disability days, so only the cost measure was included in the regression model.

We sought to identify two types of COHE effects: (1) a “recruitment effect” resulting from the COHE’s efforts to recruit providers interested in and committed to the pilot and its goals of improving occupational health care for injured workers, and (2) a “program operational effect” resulting from the ongoing activities of the COHE such as health services coordination. Our statistical model enabled us to estimate both effects for our cost analysis.

Summarized below (Table 14) are the results of our statistical analysis. As shown, the COHE was associated with a “recruitment effect” of \$90 per claim. In other words, the COHE’s efforts to recruit providers committed to the goals of the pilot translated into the delivery of care that, on average, yielded costs that were \$90 lower per claim ($p < .001$) independent of other COHE activities. In addition, we estimated the COHE “program operational effect” to be \$401 per claim ($p < .001$). These two effects are additive; the total COHE effect would therefore be approximately \$491 per claim. This estimate implies that 56% of the \$880 difference in total costs reported in Table 11 could be attributed to the effects of the COHE, with the other 44% attributable to other factors such as patient age, type of doctor, or injury type. The statistical estimates of cost savings associated with the COHE, though somewhat lower than shown in the original report, are well within the 95% confidence interval of the original estimates (recruitment effect estimate = \$125; COHE operational effect estimate = \$460).

The other two measures included in Table 14 are consistent with the information provided earlier in Tables 6 and 7. The statistical analysis indicated that controlling for the effects of the factors noted above, COHE patients were 15% less likely ($p < .01$) to go on disability as comparison-group patients (estimated coefficient of .17 yields an odds ratio of .85, which translates into 15% less likelihood of going on disability). The estimated effect of the COHE on long-term disability was somewhat larger but of borderline statistical significance. The analysis implies that COHE patients were 20% less likely (estimated coefficient of .23 translates into an odds ratio of .80) to be on disability at 360 days ($p = .07$). These updated estimates are very similar to what was reported earlier.

Table 14. Abridged Results of Statistical Analysis of Costs and Disability

Outcome Measure	Estimated Coefficient	Odds Ratio	P-Value
COHE recruitment effect	- \$90	NA	.001
COHE program operational effect	- \$401	NA	.001
Likelihood of case becoming time loss claim	-.17	0.85	.001
On disability at 360 days among compensable cases	-.23	0.80	.07

As part of our analysis, we explored whether submission of the report of accident within two days affected the incidence of disability.¹ Timely submission of the report of accident was found to have an important effect on the incidence of disability. Thirty-seven percent of all (22,544) cases treated in the evaluation year had the report of accident submitted within two business days. But COHE providers submitted the report within two business days much more frequently. Whereas 17.3% of the comparison-group cases had the form submitted within two business days, 55.4% of the COHE cases did so ($p < .01$). Timely submission of the report of accident was associated with reduced likelihood of a case becoming a compensable claim. Almost 23% (22.6%) of the cases that did not have the report of accident submitted within two business days became compensable as compared to 17.8% of those that did ($p < .01$). On a relative basis, timely submission of the report of accident was associated with a reduction in the incidence of time loss of approximately 21%.

¹ It was not feasible to assess the individual effects of other COHE specific activities because we were not able to adequately control for unmeasured “selection effects.” For example, COHE cases that received health services coordination were by definition different from COHE cases that did not receive coordination. There was not practical method of controlling for these differences. This same problem does not arise with the analysis of the submission of the report of accident.

Effects of COHE on Worker Satisfaction and Employment Outcomes

As noted at the beginning of this report, one of the aims of the outcome evaluation was to assess worker satisfaction and employment outcomes for the COHE. This was done through a patient satisfaction survey administered over May and June in 2004. The survey respondents, selected on the basis of the initiation of their treatment, included 520 COHE patients and 473 comparison-group patients who received medical care from a non-COHE attending doctor. The detailed results of this survey were reported earlier to L&I in a separate report.

We found no meaningful differences in satisfaction between COHE patients and comparison-group patients. In general, both groups of patients were quite satisfied with the quality of the care they received. Although there were no significant differences in satisfaction between the COHE patients and the comparison-group patients, there were differences in employment outcomes. COHE patients were 55% more likely ($p < .05$) to return to work for the same employer for whom they were working at the time of their injury and they were 65% more likely ($p < .05$) to be working at the time of the interview (approximately 6 months after claim receipt). COHE patients also reported having better recovery status than comparison-group patients but the difference in recovery status did not achieve statistical significance.

Provider Satisfaction

As part of our evaluation, we conducted a limited survey of COHE providers in the spring of 2004 to assess their general satisfaction with the pilot. At the time of the survey 125 providers were participating in the pilot, each of whom was sent a mailed questionnaire. Sixty-nine percent (86) returned the questionnaire. Sixty-five percent of the respondents were medical doctors, 25% were chiropractic doctors, and the remaining 10% represented other providers. The responses to the survey were favorable and indicated that the majority of providers felt their participation in the pilot was valuable. For example, 75%

of the respondents indicated their ability to treat injured workers had improved since they became involved in the pilot. Seventy-four percent of the provider respondents indicated they were satisfied with their experience in treating injured workers through the COHE, a 28% increase over the number of respondents indicating satisfaction prior to participating in the COHE. Almost 70% of the provider respondents indicated the COHE experience had improved their ability to communicate with employers. Finally, one-half of the provider respondents indicated that were willing to treat more injured workers as a result of their experience with the COHE.

Conclusion

This report has presented updated findings of our evaluation of the Renton COHE. Though some of the specific updated findings differ from what we reported earlier, the general pattern of findings and the estimate of cost savings associated with the COHE are quite similar to the estimates reported earlier.

As part of a broader system innovation designed by L&I to improve quality and foster occupational health best practices, the COHE was intended to reduce disability among injured workers. Drawing on administrative data obtained from L&I, we compared the performance of the COHE to that of a comparison group of providers delivering care in the same general area as that served by the COHE. We focused our evaluation on assessing disability patterns, worker satisfaction and return to work, disability costs, and medical costs.

The findings reported here indicate the COHE was associated with a number of positive outcomes. COHE patients were less likely to incur time loss and also less likely to incur long-term disability. These favorable patterns led to an estimated reduction in total costs (medical costs plus disability costs) of approximately \$401 per claim (including additional costs billed by the COHE for coordination activities, phone communication and related activities), based upon the statistical analysis described earlier. In addition, the COHE's recruitment efforts led to the voluntary decision of 130 community providers to participate

in the pilot. These providers exhibited different practice patterns than comparison-group providers, leading to a lower incidence of time loss (Table 5), even before the pilot started. We estimated that this “recruitment effect” translated into costs per claim (medical and disability) that were \$90 less during the evaluation year. Thus the total cost-per-claim difference associated with the COHE was \$491 (\$401 plus \$90).

The COHE treated approximately 10,700 workers during the evaluation year. Therefore, the aggregate reduction in costs associated with COHE operations would be on the order of \$4,290,700 (excluding the recruitment effect). Allowing for \$190,000 in administrative expenses L&I made available through the COHE contract for the evaluation year would reduce aggregate savings to \$4,100,700. Thus, the net savings per case would be approximately \$383.

A further question concerns the source of the estimated cost savings in regard to the COHE’s apparent effect in reducing disability. The statistical analysis suggested that the COHE was associated with a reduction in the incidence of time loss as well as a reduction in long-term time loss among compensable cases. Both of these effects would lead to reduced disability costs, and perhaps to a reduction in medical costs. The data presented in Tables 11 and 12, combined with our statistical analysis, suggest that much of the savings derives from reducing disability, both the incidence of time loss and the incidence of long-term disability. There was no difference in average medical cost among compensable cases between COHE cases and comparison-group cases (Table 12). However, as noted in the text, there was a difference of \$68 in medical costs among non-compensable cases.

We conducted additional statistical analysis not reported in the text, dividing the study population into non-compensable cases and compensable cases. We then estimated the same linear regression model as described before for the two types of cases. There was little meaningful difference in costs for non-compensable cases, but there was a very large difference in total costs for compensable cases of borderline statistical significance. This

analysis supports the notion that much of the cost savings reported here derive from reducing the incidence of time loss and long-term disability among injured workers.

The results reported here compare very favorably with those reported for the managed care pilot. The evaluation of that demonstration found estimated medical savings on the order of \$160 per case, and savings in disability costs of \$285 per case, or \$445 total savings per case. This compares with net cost savings of \$383 per case associated with the COHE (excluding recruitment effect). However, unlike the managed care pilot, the COHE did not restrict the worker's choice of provider in any way. More importantly, unlike managed care patients, COHE patients were not any less satisfied with the care they received.

In sum, it appears possible to substantially reduce disability among injured workers, and thereby save resources, without sacrificing provider choice or diminishing patient satisfaction.