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Occupational Epidemiology and Health Outcomes Program

Task 5

Centers of Occupational Health and Education: Final Report on Outcomes from the Initial Cohort of Injured Workers, 2003-2005

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Prepared for:
Occupational Health Services Project
Washington State Department of Labor and Industries
Submitted 22 April 2007

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Centers of Occupational Health and Education: Final Report on Outcomes from the Initial Cohort of Injured Workers, 2003-2005

Executive Summary

As part of its effort to improve the quality of care delivered to injured workers through the Washington State workers' compensation program, the Department of Labor and Industries (DLI) is sponsoring a major initiative known as the Occupational Health Services (OHS) project. This initiative is directed at promoting improved secondary prevention (prompt intervention to improve treatment and rehabilitation of injured workers) in order to reduce long term worker disability and improve outcomes.

Two pilot Centers of Occupational Health and Education (COHE) were established in Renton, Washington and Spokane, Washington in July 2002 and July 2003 respectively. The purpose of the COHEs is to promote disability prevention through helping coordinate health services and return to work activities, assisting providers to adopt occupational health best practices, and early identification of cases that appear to be at risk for long-term disability.

A research team at the University of Washington (UW) is evaluating the COHE pilots. The UW team conducted an initial evaluation of claims seen during the second year of each COHE's operation which are presented in two reports available on the DLI web site (www.lni.wa.gov/ClaimsIns/Providers/Research/OHS/default.asp). This report presents the findings of additional analyses conducted to improve understanding of COHE performance.

Methods

The analyses presented here are based upon two data sources: (1) DLI administrative data pertaining to disability incidence, disability duration and medical costs; and (2) a long-term (18-month post claim receipt) telephone interview of injured workers conducted at both COHE sites. All analyses using DLI administrative data derive from claims filed during the evaluation year. For the Renton COHE, the evaluation year began July 1, 2003 and ended

June 30, 2004. The Spokane COHE evaluation year began July 1, 2004 through June 2005. The evaluation incorporated comparison groups consisting of all DLI providers in both pilot target areas that were not participating in the COHE. A total of 34,069 claims were analyzed for the evaluation, including 22,544 claims for Renton and 11,525 claims for Spokane. The COHE group accounted for 10,725 claims in Renton and 7,359 in Spokane, with the comparison group accounting for the remaining claims at each pilot site (11,819 claims at Renton and 4,166 claims at Spokane).

The measures and statistical techniques used for this combined report vary depending upon the specific question addressed. The primary measures derived from the DLI administrative data include:

- incidence of time loss¹ (a time loss claim in WA State workers' compensation is defined as a claim involving 4 or more lost work days)
- on time loss at different points following claim receipt, e.g., 180 days or 365 days
- duration of disability measured in days
- disability costs
- medical costs

In general, the analyses conducted to address the questions regarding COHE performance involve comparisons between the COHE group and comparison group at each pilot site. The analyses include bivariate comparisons, e.g., difference of means test or difference in proportions test (Chi-square test), as well as multivariate regression analysis. Data available in the DLI administrative data base enabled us to control for the following factors in our multivariate statistical models:

- Injured worker age and sex
- Type of injury

¹ The term "time loss" and "disability" are used somewhat interchangeably in this report. In other words, a time loss claim and a disability claim are the same. Similarly, the number of days of time loss and the number of days of disability have the same meaning.

- Type of provider
- Baseline year costs (medical and disability costs combined) measured at the provider level

In addition, for some analyses two other variables were included in the statistical model: industry type and size of firm, measured as full time equivalent (FTE) employees.

The UW research team initially conducted interviews with workers to assess their views of their treatment experience within a few months of their injury. The research team compared patient-reported outcomes and administrative data on time loss which demonstrated extremely high concordance between good self reported outcomes and fewer time-loss days. To further assess if this relationship held longer term, the research team conducted a telephone interview with workers at both pilot sites to assess their longer-term (18-month) views of their recovery for COHE and comparison-group respondents. The interviews gathered information on a limited set of outcomes, including work status, earnings and self-reported recovery status. 839 interviews were completed in Renton and 825 in Spokane.

Results

COHE Effects by Type of Injury and Type of Provider

We conducted a series of stratified regression analyses to determine if the COHEs' effects on disability prevention varied by type of injury or type of provider. The results of this analysis showed the effects did vary somewhat depending upon the specific disability measure as shown below.

- Strongest COHE effect on disability incidence (both COHEs):
 - Back sprain and other sprains; primary care physicians
- Strongest COHE effect on prevention of long-term (365-day) disability:
 - Renton: carpal tunnel syndrome; hospital ER
 - Spokane: back sprain
- Strongest COHE effect on reduced days of disability within year after claim receipt:

- Renton: carpal tunnel syndrome and other sprains; hospital ER and primary care physicians
- Spokane: back sprain and other sprains; primary care physicians

Where Was the COHE Impact on Disability Prevention Greatest?

Analysis indicated that 73% of the estimated cost savings in Renton and 52% of the cost savings in Spokane resulted from reduced disability. These cost savings could result from different forms of disability prevention. For example, a small percentage of cases could avoid costly long-term disability, or a larger percentage could avoid shorter-term disability whose average cost is less. To explore this question, we defined three disability categories representing different lengths of disability (1 to 179 days, 180 to 359 days, and 360 and over days) and then used regression analysis to estimate the number of COHE disability cases avoided for a hypothetical cohort of 100 workers. The findings are summarized below:

Renton

- 1 to 179 days: 2.6 cases avoided per 100 workers
- 180 to 359 days: 0.4 cases avoided per 100 workers
- 360 days or more: 1.0 cases avoided per 100 workers

Spokane:

- 1 to 179 days: 4.5 cases avoided per 100 workers
- 180 to 359 days: 1.0 cases avoided per 100 workers
- 360 days or more: 0.3 cases avoided per 100 workers

While more disability cases per 100 workers were avoided in the short term category (1 to 179 days), the aggregate disability burden and disability costs were higher in the longer term disability categories. In Renton, 73% of disability savings accrued from preventing long-term (360 or more days) disability. In Spokane, 42% of the disability savings came from preventing moderate (180 to 359 days) disability.

As part of this analysis, we examined the COHEs in relation to disability prevention on a broader population basis. Regression analysis indicated the Renton and Spokane COHEs, respectively, were associated with 4,800 days and 5,800 days of reduced disability per 1,000 injured workers treated. Averaging the reduction in disability between the two pilot sites and translating it to a per-year basis yields an estimate of approximately 14.5 years of reduced disability per 1,000 workers treated through the COHEs.

Adoption of Occupational Health Best Practices

The evaluation collected billing data from the DLI on three important quality indicators, which constituted occupational health best practices:

- submission of the accident report within two business days
- provider telephone communication with employers
- use of activity prescription forms to formalize treatment plans and identify work restrictions.

In general, occupational medicine physicians at Renton, the high volume providers (> 200 visits per year) at both pilot sites, and hospital ERs at Spokane achieved the best performance in terms of submission of the accident report. At Renton high-volume providers, occupational medicine physicians and primary care physicians exhibited high rates (> 75%) of communication with employers. Provider telephone communication at Spokane occurred less frequently. The use of activity prescription forms varied but was highest (> 70%) among hospital ERs (Renton), high volume providers (Spokane) and occupational medicine physicians (both pilot sites).

We examined whether adoption of occupational health best practices, as represented by the three quality indicators, furthered the goal of disability prevention. To assess this question, we divided the COHE providers into two groups representing “high adopters” and “low adopters,” based upon an index that combined the three occupational health best practices, and compared the number of disability days for back sprain cases for the two groups of COHE providers. COHE providers at both pilot sites in the high-adopter group had significantly fewer disability days compared to providers in the low-adopter group. For

example, the average number of disability days per back sprain case in the high-adopter group (among all such cases) at Renton and Spokane were 5.3 days and 8.9 days, respectively. In contrast, the corresponding average disability days for the low-adopter groups at the two pilot sites were 18.3 days and 22.2 days ($p < .01$). These findings suggest the COHE approach to encouraging adoption of occupational health best practices through training and financial incentives did promote improved disability prevention.

Analysis of ER-COHE Operations in Renton

The hospital ER in Renton accounted for a substantial proportion of the overall disability prevention effect observed at the Renton pilot site. We conducted an ER-specific analysis to better understand the nature of this effect. Since we did not find a similar effect in Spokane, we limited this analysis to the Renton pilot site. To help control for differences in case mix, we restricted the analysis to back sprain cases.

Of the 3,480 back sprain cases treated in Renton, 809 cases (23.3%) were treated initially in a hospital ER. The estimated reduction in time loss days for the 3,480 back sprain cases in Renton was 7.1 days. In contrast, the reduction in time loss days for 809 cases treated through the hospital ER was 11.1 days ($p = .05$). The ER effect represents a weighted average of several different effects, namely: (1) the effect of back sprain cases treated only in the ER and not referred ($n = 412$), (2) cases treated and then referred to an occupational medicine physician ($n = 149$), (3) cases treated and then referred to a primary care physician ($n = 121$), and (4) cases treated and then referred to some other provider ($n = 127$). We repeated the regression analysis, comparing COHE to non-COHE providers, to examine the effects of the COHE for each of the above four strata. The reduction in time loss days (for back sprain cases) associated with four different COHE treatment strata are summarized below:

- Treated only in ER, not referred: 1.7 reduced days of time loss
- Treated in the ER, referred to occupational medicine physician: 39.4 reduced days of time loss

- Treated in ER, referred to primary care physician: 26.2 reduced days of time loss
- Treated in ER and referred to some other provider: 32.7 reduced days of time loss

This limited analysis shows the importance of ER referral arrangements developed by the COHE.

Effects of Industry and Firm Size on Cost Savings Estimates

Information on industry mix and firm size was unavailable when the UW research team conducted its initial pilot evaluations. This information became available and was incorporated into the pilot databases. We then repeated the basic statistical analysis incorporating these two variables into the model to determine whether the cost savings estimates would change. The two variables had only a small effect on our estimates changing them as follows:

- Renton: cost savings estimates decreased by 5% from \$401 to \$381 per claim
- Spokane: cost savings estimates increased by 4% from \$497 to \$518 per claim.

Effects of the Retrospective Rating Program on Cost Savings Estimates

Approximately 40% of the claims in both COHE pilot sites represented injured workers whose employers were participating in the DLI retrospective rating (retro) program. This program offers employers who reduce their injury rates and claim costs an opportunity to decrease their workers' compensation insurance premiums on an accelerated basis. Employers who participate in the retro program often sub-contract with retro firms or third party administrators (TPAs) to assist in the management of their claims. There was some question whether our estimate of COHE cost savings might be attributable in part to activities employers adopted as part of their participation in the retro program. Since we did not include a variable representing the retro program in our initial statistical analysis, it was possible our estimate of COHE cost savings might have captured not only the "COHE effect" but also a "retro effect."

We obtained information from the DLI identifying all claims at both COHE pilot sites that represented retro claims and then repeated the basic multivariate statistical analysis for the cost outcome but included a variable representing retro status in the statistical model. This enabled us to determine the effect of retro status on claim costs independent of the COHE effect, and also to obtain updated estimates of COHE cost savings controlling for the effect of retro status.

In both pilot sites, retro claims were associated with reduced costs (medical and disability costs combined) as compared to the non-retro claims, but the differences were not statistically significant. The estimated cost savings associated with the COHEs were substantially larger and were also statistically significant ($p < .05$) as compared to non-COHE claims. The basic results are summarized as follows:

- Renton:
 - Retro cost savings estimates: \$99
 - COHE cost savings estimates: \$380
- Spokane:
 - Retro cost savings estimates: \$246
 - COHE cost savings estimates: \$510

In sum, our analysis indicates: (1) the retro program had a modest, nonsignificant effect on cost per claim in the multivariate analyses and (2) the estimated COHE cost saving effect was not influenced by the retro program. Although retro employers may currently receive reductions based on lower costs (potentially related to factors such as reduced incidence of injury), retro employers accrued similar additional cost savings from COHE claims as did non-retro employers.

Long-Term (18-Month) Interview Outcomes

Overall, a smaller number of workers treated in the COHE's became disabled over the long term, which primarily accounted for the reported cost-savings. Our interview revealed no

important overall differences in long-term outcomes (work status at time of interview, earnings and self-reported recovery status) between the COHE and comparison group. Our inability to detect differences could have been due to several factors, including: (1) we interviewed a small sample of cases (< 5% in Renton) that included injury conditions (fractures) where the COHE had little effect and (2) long-term outcomes are influenced by many factors beyond medical care provided through the workers' compensation system. Further, the interview findings could be subject to a conservative bias because respondents were more likely to be disabled than non-respondents, while the COHE cases overall were less disabled.

Although important overall differences in long-term outcomes between the COHE and comparison groups were not observed (a sub-analysis of back sprain cases for the Spokane COHE did show modest differences in outcomes for certain workers on time loss), the interview found that workers who avoided long-term disability had better outcomes. For example, whereas 70% to 80% of the interview respondents with time loss less than 30 days reported working at time of interview, having the same earnings compared to before their injury, or having a good or very good recovery status, less than 35% of the interview respondents with over 180 days of time loss did so.

Do COHE Cost Savings Increase Over Time?

After the UW research team began the current analysis, additional administrative data from the DLI became available that enabled us to conduct a limited, preliminary analysis to examine the question of whether COHE cost savings increased over time. These data represent 10 months of additional follow up time for Renton beyond the evaluation year (July 2003 to June 2004). Because Spokane started a year later, it was not feasible to include it in this analysis.

Using the extended follow-up data, we re-estimated the basic statistical model to examine whether COHE cost savings increased over time. The results indicated savings did increase. The cost savings estimate increased from \$401 to \$572 per claim. The estimated net cost

savings (accounting for 10 months of additional administrative costs) would be \$539 per claim.

Conclusions

This report was intended to enhance understanding of the COHE performance and to document the intervention's effects on disability prevention. The COHE had the strongest preventive effect on back sprains and other sprains. Its effect was more selective for carpal tunnel syndrome (Renton pilot only). At Renton we found evidence of a notable "COHE-ER effect." COHE back sprain cases treated initially in the ER then referred to occupational medicine physicians had substantially less time loss compared to non-COHE cases treated in the ER. Improving disability prevention in hospital ERs is important because substantial numbers of injured workers are treated in hospital ERs, and because traditionally ERs have faced many barriers in referring injured workers for needed follow up care and in attending to administrative processes that are required by the workers' compensation system.

The disability prevention that was associated with the COHEs appeared to have a substantial effect on a population basis. Our statistical analysis indicated that each of the COHEs was associated with a reduction in disability of over 4,500 days per 1,000 workers treated. On a per-year basis this translates into a combined reduction (average effect in the two pilots) of approximately 14.5 years of disability per 1,000 workers.

An important question we examined concerned the adoption of occupational health best practices and its effect on reducing worker disability. Descriptive data showed a moderately high level of best practice adoption, particularly among occupational medicine physicians and high volume providers. Our analysis of back sprain cases indicated that the adoption of occupational health best practices is associated with greater reductions in disability. Back sprain cases treated by COHE providers who were categorized as "high adopters" had 30% to 60% fewer disability days as similar cases treated by COHE providers who were categorized as "low adopters."

The COHEs were designed as a system intervention to improve the delivery of workers' compensation health care. This model can be contrasted with approaches that focus on changing insurance administrative processes and procedures but do not change health care delivery processes. The DLI retrospective rating program is such an "administrative approach." Although the retrospective rating program was associated with (nonsignificant) reduced costs, the cost savings associated with the COHE intervention were considerably larger (and statistically significant).

The COHE intervention focused primarily on reducing worker disability as a measure of quality improvement. But as part of our evaluation, we conducted a long-term (18-month) follow-up interview to assess worker outcomes pertaining to employment status, earnings and self-reported recovery status. Long-term outcomes were found to be similar in both the COHE group and comparison group. The interview reinforced the importance of disability prevention. Workers on disability for shorter periods (< 90 days) were much more likely to be working, to have the same earnings as before their injury, or to report a favorable recovery status compared to workers who were on extended disability (> 180 days). These findings demonstrate the importance of developing system interventions, such as the COHE, to promote improved disability prevention.

Finally, our analysis showed that enhanced disability prevention can have an important cumulative effect over time. When we analyzed cost data representing 10 more months of follow up time for the Renton COHE, our estimate of COHE cost savings increased substantially from \$401 to \$572 per claim (\$539 per claim accounting for administrative costs). This increased cost savings may reflect the impact of successful prevention of long-term disability.

At both pilot sites we found evidence that workers treated through the COHE avoided long-term disability. The avoidance of these long-term disability cases appears to have an important cumulative effect, reducing the aggregate disability burden over time.

Within the workers' compensation arena, the COHE intervention represents a major (and unique) quality improvement initiative. The findings described in this report reinforce the importance of effective disability prevention and demonstrate the potential to improve the quality of workers' compensation health care delivery through a well-organized system intervention.

Centers of Occupational Health and Education: Final Report on Outcomes from the Initial Cohort of Injured Workers, 2003-2005

Introduction

As part of its effort to improve the quality of care delivered to injured workers through the Washington State workers' compensation program, the Department of Labor and Industries (DLI) is sponsoring a major initiative known as the Occupational Health Services (OHS) project. This initiative is directed at promoting improved secondary prevention (prompt intervention to improve treatment and rehabilitation of injured workers) in order to reduce long term worker disability and improve outcomes. As discussed in prior reports,¹ Centers of Occupational Health and Education (COHEs) have been developed on a pilot basis to perform quality improvement activities. Currently, two pilot COHEs are operating, one in Renton and the other in Spokane. The COHEs promote disability prevention through helping coordinate health services and return to work activities, encouraging providers to adopt occupational health best practices, and monitoring cases early on that appear to be at risk for long-term disability. The Renton pilot site began operations in July 2002; the Spokane pilot site began a year later in July 2003.

A research team at the University of Washington (UW) is evaluating the COHE pilots. The UW team conducted an initial evaluation of both COHE pilots and presented the findings of this analysis in two earlier evaluation reports available on the DLI web site (www.lni.wa.gov/ClaimsIns/Providers/Research/OHS/default.asp). This report presents the findings of further analyses conducted to improve understanding of COHE performance. These analyses were intended to address nine specific questions related to COHE activities and performance. The following sections of the report highlight the methods used for the analysis and present the results of analyses performed to address these questions.

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 Quarterly* 2004;82(3):547-567.

Summary of Data, Measures and Analytical Techniques Used for Report

The analyses presented here are based upon two data sources: (1) DLI administrative data pertaining to disability incidence, disability duration and medical costs; and (2) a long-term (18-month post claim receipt) interview of injured workers conducted at both COHE sites, described in more detail in a later section of the report. All analyses using DLI administrative data derive from claims filed during the evaluation year. For the Renton COHE, the evaluation year began July 1, 2003 and ended June 30, 2004. The Spokane COHE evaluation year began July 1, 2004 through June 2005. The evaluation incorporated comparison groups consisting of all DLI providers in both pilot target areas that were not participating in the COHE. Detailed information about the numbers of COHE and comparison-group providers is given in the two prior COHE evaluation reports described earlier. The Renton COHE had recruited approximately 120 providers by the beginning of the evaluation year; the Spokane COHE recruited approximately 175 by the beginning of its evaluation year. Summary information regarding the number of cases analyzed for this report is shown in Table 1 below. The number of cases in the pilot represents approximately 15% of the DLI claims filed in the state during the evaluation year.

Table 1. Descriptive Information on Number of Cases Analyzed for Evaluation Year

Pilot Site	COHE Group	Comparison Group	Total
<u>Renton</u>	10,725	11,819	22,544
<u>Spokane</u>	7,359	4,166	11,525
Total	18,084	15,985	34,069

The measures and statistical techniques used for this combined report vary depending upon the specific question addressed. Because of this variation in methods, we provide more detailed information about measures and methods in each of the sections that follow. In brief, the primary measures derived from the DLI administrative data include:

- incidence of time loss¹ (a time loss claim in WA State workers' compensation is defined as a claim involving 4 or more lost work days)
- on time loss at different points following claim receipt, e.g., 180 days or 365 days
- duration of disability measured in days
- disability costs
- medical costs

In general, the analyses conducted to address the questions regarding COHE performance involve comparisons between the COHE group and comparison group at each pilot site. As discussed later, some of the analyses involve bivariate comparisons, e.g., difference of means test or difference in proportions test (Chi-square test), while other analyses involve multivariate statistical methods such as regression analysis or logistic regression. The purpose of using multivariate statistical methods is to control for differences in factors that may affect an analysis. For example, COHE and comparison-group cases differ somewhat in terms of injuries, types of providers, age and other related factors. By controlling for these factors, the evaluation is able to produce more valid information concerning the effects of the COHEs. Data available in the DLI administrative data base enabled us to control for the following factors in our statistical models:

- Injured worker age and sex
- Type of injury
- Type of provider
- Baseline year costs (medical and disability costs combined) measured at the provider level

In addition, for some analyses two other variables were included in the statistical model: industry type and size of firm, measured in full time equivalent (FTE) employees. More specific information about the particular statistical approach used for a given analysis is provided in the sections that follow.

¹ The term "time loss" and "disability" are used somewhat interchangeably in this report. In other words, a time loss claim and a disability claim are the same. Similarly, the number of days of time loss and the number of days of disability are the same.

After beginning the analysis for this report, we discovered errors in the analysis database for Renton and received updated information regarding the enrollment of providers in the Spokane COHE. We corrected and updated the data for both pilot sites and repeated the analyses presented earlier in the pilot outcome evaluation reports. Information regarding the corrections and updated findings is summarized in a brief appendix included at the end of this report.

The following sections present the results of our current analyses that address specific questions related to COHE performance. The sections are organized according to the question posed. The final section of the report concludes with a summary of key findings and offers some recommendations regarding improving the quality of workers' compensation health care delivery through COHE-type interventions.

Results

1. Was the Impact of COHE Disability Prevention Different among Injury Conditions or Types of Providers?

To address this question, we conducted a series of stratified regression analyses that allowed us to examine the COHE effects by type of injury and type of provider (type of provider is based upon first attending doctor) for three key measures of disability: (1) incidence of disability (time loss), (2) the occurrence of long-term disability (365-day) among time loss cases, and (3) days of disability within a year. The third measure, days of disability (among all cases), provides a summary measure that captures the impact of both time loss incidence and days of disability among time loss cases. The injury conditions examined for this analysis included back sprain, carpal tunnel syndrome, fractures and other sprains. The provider types analyzed include primary care physicians, hospital emergency departments (ERs), chiropractors, and occupational medicine physicians. We estimated logistic regression models for the first two disability measures, and estimated a linear regression model for the third measure.

To conduct the stratified analyses, we divided the sample into groups of cases representing different injury conditions and provider types and tested the basic statistical model. This provided a set of estimates for the three disability measures described above comparing COHE cases to comparison-group cases for each of the defined strata. For example, the analysis of back sprain cases compared the COHE group to the comparison group for back cases only. In this way, we were able to estimate the effects of COHE on disability prevention for different injury conditions and for different providers who served as the attending doctor for the case. The control variables included in these statistical models were the same ones as described previously in the report's methods section. These included injured worker age and sex, type of injury, type of provider and baseline year provider total cost (medical and disability) per claim, a surrogate measure for provider efficiency pre-pilot.

In general, the COHE appears to have had the largest effect on disability prevention for cases involving two injury conditions: back sprains and other sprains. For Renton, the COHE also had a significant effect on prevention of long-term disability for carpal tunnel syndrome cases. More detailed information regarding the results of this analysis is summarized below:

- Strongest COHE effect on disability incidence (both COHEs):
 - Back sprain and other sprains
- Strongest COHE effect on prevention of long-term (365-day) disability:
 - Renton: carpal tunnel syndrome
 - Spokane: back sprain
- Strongest COHE effect on reduced days of disability within year after claim receipt:
 - Renton: carpal tunnel syndrome and back sprain
 - Spokane: back sprain

With regard to type of provider, the COHE appeared to have its largest effect on disability prevention for primary care physicians (both COHEs) and hospital emergency department

(ER) in the case of Renton. More detailed information regarding these effects is summarized below:

- Strongest COHE effect on disability incidence (both COHEs):
 - Primary care physicians
- Strongest COHE effect on prevention of long-term (365-day) disability:
 - Renton: hospital ER
 - Spokane: no single provider group showed significantly different effects
- Strongest COHE effect on reduced days of disability within year after claim receipt:
 - Renton: hospital ER and primary care physicians
 - Spokane: primary care physicians

As the above summary indicates, an important element of the Renton COHE's disability prevention effect was through the hospital ER. The impact of the COHE in this area resulted from the combined effect of (1) improved internal ER operations that affected disability prevention, e.g., submission of the report of accident within two business days, and (2) treatment of injured workers who were referred by the ER for follow-up care to COHE providers (31% of the injured workers were referred primarily to primary care physicians, occupational medicine physicians or surgeons). For Spokane, disability prevention was more selective and occurred primarily among primary care physicians.

2. Did the COHEs' Impact on Disability Prevention Differ for Short-Term versus Long-Term Disability Cases?

One of the important questions we sought to explore concerned the nature of the effect of disability prevention. Analysis indicated that 73% (\$296) of the estimated cost savings in Renton and 52% (\$259) of the cost savings in Spokane resulted from reduced disability costs (the remainder was reduced medical costs). The two estimates of disability cost savings, \$296 for Renton and \$259 for Spokane, could result from different forms of disability prevention. For example, a small percentage of cases could avoid costly long-term

disability, or a larger percentage could avoid shorter-term disability whose average cost is less.

We conducted a two-part analysis to (1) estimate the number of avoided cases for different categories of disability, and (2) apply the estimate of avoided cases to expected costs for the different categories of disability. In this way we were able to assess where disability prevention had most of its impact. We first defined three disability categories as follows: 1 to 179 days, 180 to 359 days, and 360 days and over. We then estimated linear probability regression models to determine the reduction in the probability of a COHE case occurring within one of these three disability categories. Using these estimates, we then performed a simulation to determine the number of COHE disability cases avoided for a hypothetical cohort of 100 workers. The findings are summarized below:

Renton

- 1 to 179 days: 2.6 cases avoided per 100 workers
- 180 to 359 days: 0.4 cases avoided per 100 workers
- 360 days or more: 1.0 cases avoided per 100 workers

Spokane:

- 1 to 179 days: 4.5 cases avoided per 100 workers
- 180 to 359 days: 1.0 cases avoided per 100 workers
- 360 days or more: 0.3 cases avoided per 100 workers

Even though in both pilot sites the most avoided disability cases occurred within the category 1 to 179 days, this may not reflect the COHEs' true impact on disability burden. If we assume that disability costs represent some indication of aggregate disability burden among workers (in the aggregate the more days of disability the higher the disability costs), we can assess which of the above avoided cases had the biggest impact on disability costs. The average disability cost per claim for the category representing 1 to 179 days was roughly \$2,500. In contrast, the average disability cost for the category representing 180 to 359 days was roughly \$6,500, while the cost for the category representing 360 days or more was over \$23,000 per claim.

Combining information regarding the numbers of COHE cases that avoided disability with information on expected disability costs (an indicator of aggregate disability burden) provides an assessment of where disability prevention had its greatest impact. The results of this assessment are shown below:

Renton

- 73% of disability savings accrued from preventing long-term (360 or more days) disability
- Preventing disability for the other two categories accounted for approximately 13% of reduced total disability costs for each

Spokane

- 42% of disability savings accrued from preventing moderate disability (180 to 359 days)
- 32% of disability savings accrued from preventing short-term disability (1 to 179 days)
- 26% of disability saving accrued from preventing long-term (360 or more days) disability

As this analysis shows, the two COHEs differed somewhat in terms of the nature of disability prevention they engendered. For Renton, the biggest impact was on long-term disability (360 days or more). In contrast, the Spokane COHE had a larger preventive effect on cases representing moderate and short-term disability. (This finding may be due in part to Spokane's later pilot start, which would reduce the number of cases on very long-term disability.) This analysis shows that preventing disability among just a few cases can in the aggregate have a large impact on total worker disability burden.

As part of this analysis, we examined the COHEs in relation to disability prevention on a broader population basis. Regression analysis indicated the Renton and Spokane COHEs, respectively, were associated with 4,800 days and 5,800 days of reduced disability per 1,000 injured workers treated. Averaging the reduction in disability between the two pilot sites and translating it to a per-year basis yields an estimate of approximately 14.5 years of reduced disability per 1,000 workers.

3. *To What Extent Did COHE Providers Adopt Occupational Health Best Practices and Were Such Changes In Practice Associated With Improved Injured Worker Outcomes (e.g., Lower Disability and Cost)?*

To address this question, we conducted a two-part analysis. The first part consisted of collecting and analyzing descriptive data for three important quality indicators, which constituted occupational health best practices. These indicators were: (1) submission of the accident report within two business days, (2) provider telephone communication with employers, and (3) use of activity prescription forms to formalize treatment plans and identify work restrictions. The figures below indicate the percentage of time that COHE providers achieved these quality indicator goals during the evaluation year. As shown in figure 1, the high volume providers (> 200 visits per year), the occupational medicine physicians, and hospital ERs achieved the best performance in terms of submission of the accident report. The provider groups shown in figures 1 – 3 are not mutually exclusive; for example, 45% of the high volume providers in both COHE sites combined were occupational medicine physicians.

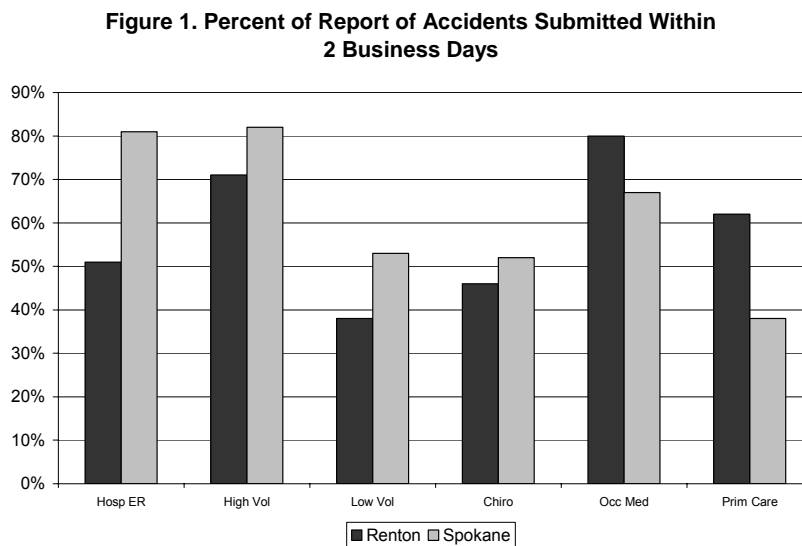


Figure 2 shows the percentage of cases where provider-employer communication occurred. The data in figure 2 do not convey the complete picture for Spokane because this COHE pilot used e-mail through its tracking system to initiate communications. The frequency of provider-employer communication via e-mail is not shown in figure 2. Three groups of

providers in the Renton pilot achieved a high level of performance on this quality indicator, occupational medicine physicians, high volume physicians and primary care physicians.

Figure 2. Percentage of Cases Involving Provider Phone Call to Employer

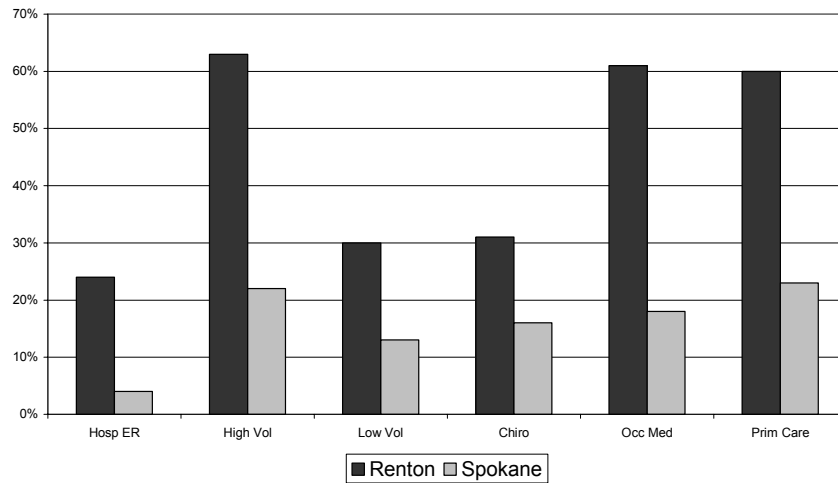
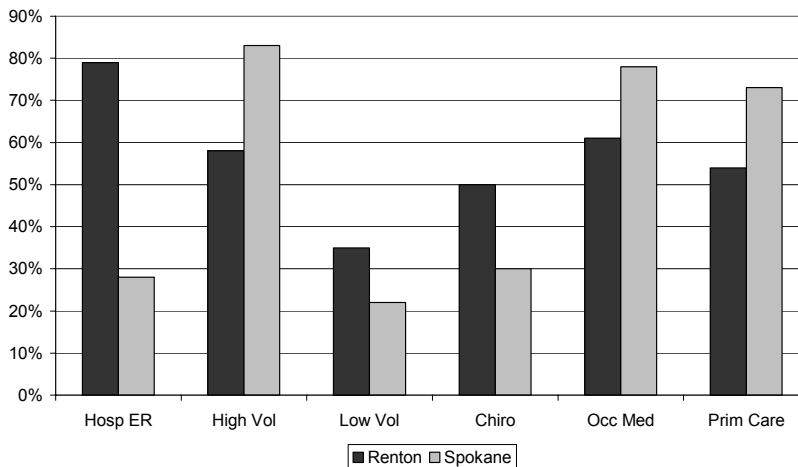


Figure 3 presents information on the use of activity prescription forms. Here too a high level of performance was achieved by selected groups of COHE providers. Those providers using the activity prescription form for at least 50% of the cases included all provider groups in Renton, except the low volume providers. In Spokane the activity prescription form was used for at least 50% of the cases treated by occupational medicine physicians, high volume providers and primary care physicians.

Figure 3. Percentage of Cases Where Activity Prescription Form Was Used



Based upon the data presented in the figures above, we then examined whether adoption of occupational health best practices, as represented by the three quality indicators, furthered the goal of disability prevention. To assess this question, we divided the COHE providers into two groups representing “high adopters” and “low adopters.” The high-adopter group consisted of all COHE providers whose performance on two of the three quality indicators was above the median (50th percentile) provider performance level. In other words, if a provider sent in the accident report within two business days 70% of the time based upon the cases he or she treated in the evaluation year and if the median performance level was 60% that provider would be defined as a “high adopter” for that given quality indicator. If that provider also was above the median performance level on another quality indicator, he or she would be grouped within the “high adopter” category for purposes of analysis. Providers defined as low adopters were below the median performance level on all three indicators.

We then conducted a difference of means test on back sprain cases to compare high adopters to low adopters with regard to disability days within the year after claim receipt. We chose back sprain cases for this analysis because this was the only injury type with sufficient cases to warrant analysis. This was done for two groups of cases: (1) all back sprain cases and (2) back sprain compensable (time loss) cases only. These two analyses capture different effects. The analysis of all cases captures the effect of occupational health best practices on both the incidence of disability and the duration of disability, while the analysis of compensable cases captures the effect on disability duration for time loss cases. The results are shown in the figures 4 and 5 below. The differences in mean disability days shown in both figures are statistically significant ($p < .05$) and are large in magnitude. For example, in Renton (figure 4) the average number of disability days for all back sprain cases was 5.3 days for high-adopter providers as compared to 18.3 days for low-adopter providers. Similarly as figure 4 shows, the number of days among time loss back sprain cases for high-adopter providers in Renton was 22.1 days as compared to 71.6 days for low-adopter providers ($p < .05$). A similar pattern, but with somewhat smaller differences, is shown in figure 5 for Spokane. In addition to the difference of means test, we specified a regression model that enabled us to control for differences in baseline-year provider costs (a surrogate

measure for provider efficiency). The results of the regression analysis generated virtually the same results as shown in figures 4 and 5. These findings suggest the COHE approach to encouraging adoption of occupational health best practices through training and financial incentives did promote improved disability prevention.

Figure 4. Mean Disability Days for Providers with High Adoption Versus Low Adoption of Occupational Health Best Practices: Back Sprain Cases, Renton COHE

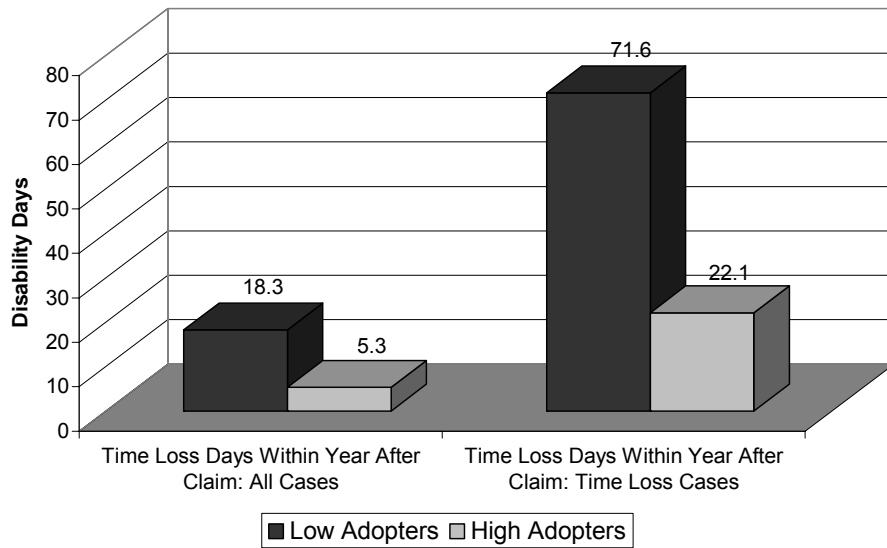
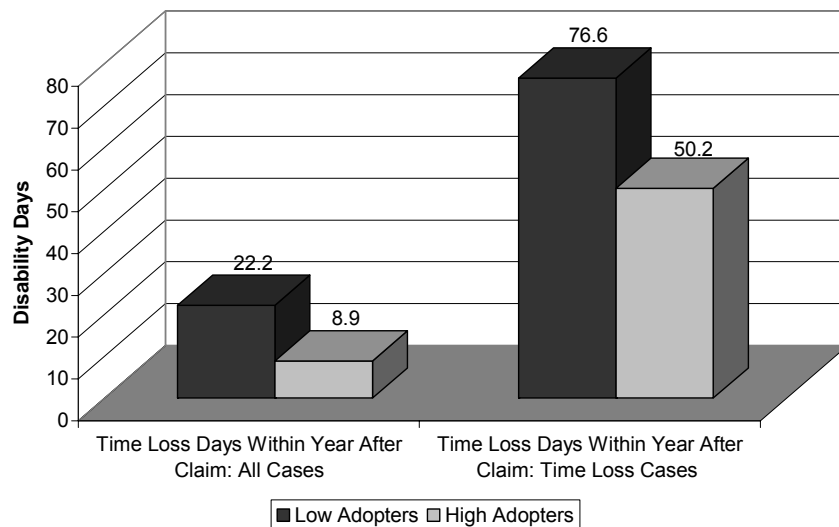


Figure 5. Mean Disability Days for Providers with High Adoption Versus Low Adoption of Occupational Health Best Practices: Back Sprain Cases, Spokane COHE



4. What Health Services Coordination Activities Were Documented?

A major weakness in workers' compensation health care delivery is the lack of coordination and communication. A major component of the COHE's disability prevention model is health services coordination (HSC) imbedded in the health care system. At each COHE pilot site, health services coordinators were hired to coordinate care, initiate provider or employer communication when needed, perform return to work impediment assessments and conduct related activities. It was hoped that by providing more effective coordination and communication the COHEs could foster improved disability prevention. As part of the evaluation, we collected DLI billing data submitted by the COHE for health services coordination activities (not reported here), as well as data on HSC activities collected directly by the COHEs. The two COHE sites coded HSC activities somewhat differently, making direct comparisons of the activities infeasible. Descriptive data on selected HSC activities that were frequently provided are shown in the table below. (Note the data presented in the table do not represent unduplicated counts of HSC activities.) The most frequently recorded activities performed by HSCs in Renton involved communication with attending participating providers (APPs), followed by communication with a claim manager or a call to an employer or union representative. Coding of HSC activities in Spokane was somewhat less specific. It appears the most common form of activity involved checking on work status or on time loss status of the injured worker. Almost half the time the "other activity" code was used, and it is not possible to determine what specific activity occurred. However, when this code was used, about 45% of the time the contact involved an APP.

Table 2. Selected HSC Activities Provided during Evaluation Year

HSC Activity	Number of Cases (% of cases)
<u>Renton</u>	
Staffing with APP	532 (26.2%)
Call to APP	365 (18.0%)
Call to claim manager	300 (14.8%)
Call to employer or union	235 (13.6%)
Call to injured worker	193 (9.5%)
Meet with injured worker	136 (6.7%)
Consult with vocational rehabilitation counselor or RN consultant	134 (6.6%)
<u>Spokane</u>	
Check work status	1,373 (64.4%)
Check on case/claim where specific activity not coded	1,057 (49.6%)
Check on time loss status	575 (27.0%)
Check on job accommodation	150 (7.0%)

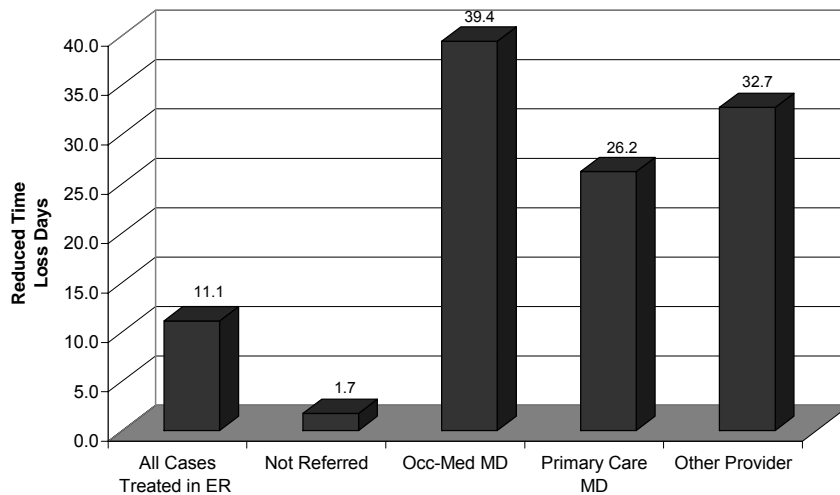
5. What Aspects of the ER-COHE Operations Were Associated With Improved Disability Prevention Among ER Injured Workers?

In describing the COHE effects on disability prevention by injury condition and provider type (Question #1), we noted that the ER in Renton accounted for a substantial proportion of the overall disability prevention effect observed in that pilot site. In this section, we describe further analyses conducted to better understand the nature of this effect for the Renton COHE. Since the earlier analysis pertaining to Question #1 did not find this same effect in Spokane, we limit the current analysis to the Renton pilot site. To help control for differences in case mix, we restricted this analysis to back sprain cases.

Among all back sprain cases in Renton, our analysis estimated the COHE was associated with a reduction of 7.1 days of time loss per case. (Assessing the reduction in time loss days among all cases provides a useful global measure of disability prevention effects because it

combines the effects of reduced incidence and duration of time loss.) Of the 3,480 back sprain cases analyzed, 809 cases (23.3%) were treated initially in an ER. The overall estimate of reduced time loss days associated with the COHE (7.1 days) would be a weighted average of cases treated by different types of providers: primary care physicians, chiropractors, ER, occupational medicine physicians, etc. For back sprain cases treated by ER providers (n = 809), the estimate of reduced time loss days associated with the COHE (11.1 days, p = .05) is substantially greater than the overall average (7.1 days). The ER effect, in turn, represents a weighted average of several effects, namely, (1) the effect of back sprain cases treated only in the ER and not referred (n = 412), (2) cases treated and then referred to an occupational medicine physician (n = 149), (3) cases treated and then referred to a primary care physician (n = 121), and (4) cases treated and then referred to some other provider (n = 127). We repeated the regression analysis to examine the effects of the COHE for each of the above four strata. This analysis compared COHE to non-COHE providers within each of the four strata. The results are shown in figure 6 below and include the overall ER effect (11.1 days of reduced time loss) as a reference point. For back sprain cases treated only in the ER and not referred, there was little COHE effect (1.7 reduced time loss days). In contrast, for back sprain cases initially treated in the ER then referred to occupational medicine physicians, the COHE-ER effect appears to be substantially larger (39.4 reduced days of time loss). The other two referral categories, representing referral to primary care physicians or other physicians beside occupational medicine physicians or primary care physicians, also showed strong evidence of a COHE-ER effect, with 26.2 and 32.7 reduced time loss days, respectively. This limited analysis shows the importance of ER referral arrangements developed by the COHE. COHE back sprain cases referred from the ER and treated by occupational medicine physicians had, on average, far fewer days of time loss (39.4 fewer days) than cases referred from the ER to non-COHE occupational medicine physicians.

Figure 6. Reduction in Time Loss Days for Back Sprain Cases Treated through ER by Type of Referral, Renton



6. What Can Be Assessed Regarding the Relationship of Industry Mix or Firm Size on Estimates of Disability and Cost Savings Associated With the COHEs?

When the UW research team performed the original statistical analysis, data on industry mix and firm size were not available. We subsequently obtained these data and repeated the analysis to determine whether including these two variables in the statistical model affected the estimates we reported earlier regarding lower disability and cost savings associated with the COHE. Descriptive information on industry mix and firm size is presented in figures 7 and 8 below. As shown in figure 7, the overall profile of industry was similar in the two COHE pilots, but there were some differences in specific industries. For example, the Renton pilot site has a somewhat greater proportion of cases within construction, wholesale, transportation and “other industries,” while the Spokane COHE has a greater proportion of cases within the manufacturing and service sectors. (Agriculture and farming are included in the “other” category and account for less than 5% of cases at each pilot site.) There were few differences between the two pilot sites in the distribution of cases within different size firms (figure 8). Spokane had a slightly greater proportion of cases representing small firms (< 25 FTE employees) or very large firms (> 500 FTE employees) as compared to Renton. In contrast, Renton has a slightly greater proportion of cases representing firms from 100 to 500 FTE employees as compared to Spokane.

Figure 7. Industry Mix of COHE and Comparison-Group Cases

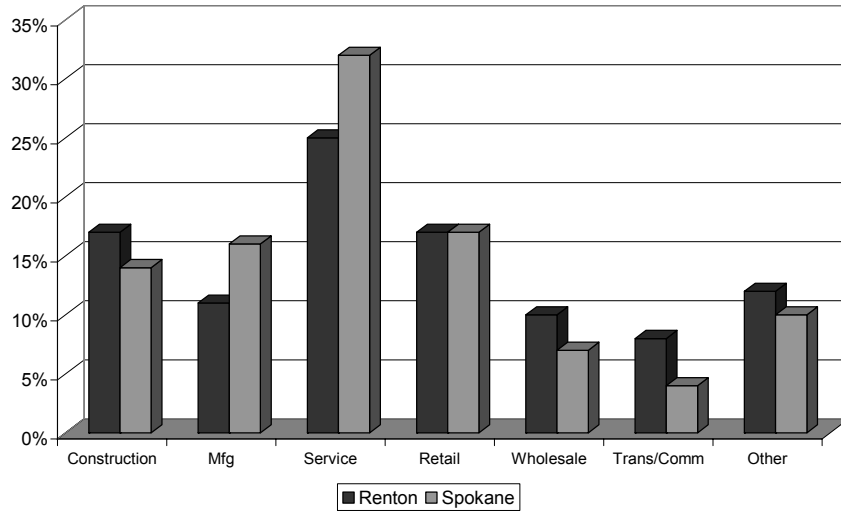
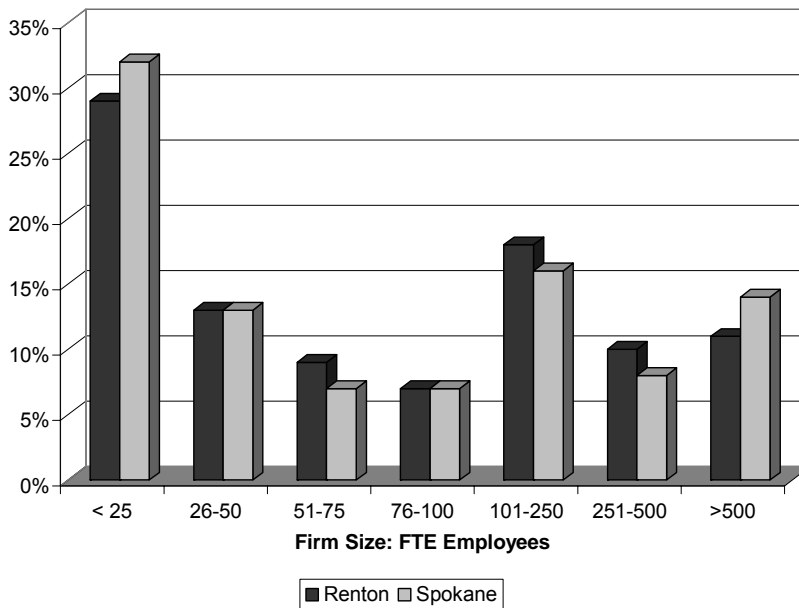
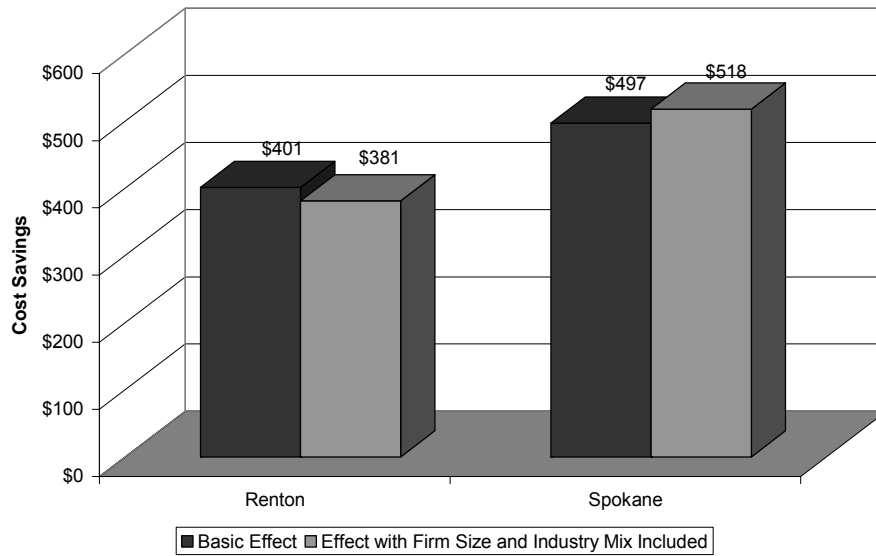


Figure 8. Distribution of Cases within Different Size Firms



Including the two variables representing industry mix and firm size in the statistical model had limited effect on our estimates of cost savings associated with the COHE, as shown in figure 9 below. For Renton, the cost saving estimate decreased by approximately 5% from \$401 to \$381 per claim. For Spokane, the cost saving estimate increased by approximately 4% from \$497 to \$518.

Figure 9. Effect of Industry and Firm Size on Cost Saving Estimates



7. Are There Distinct Effects Related to the Cost Savings Seen in COHE Claims That May Be Related to Activities of Employers Participating in the Department’s Retrospective Rating Program?

Approximately 40% of the claims in both COHE pilot sites represented injured workers whose employers were participating in the L&I retrospective rating program. This program offers employers who reduce their injury rates and claim costs an opportunity to decrease their workers’ compensation insurance premiums on an accelerated basis. Employers who participate in the retro program often sub-contract with retro firms or third party administrators (TPAs) to assist in the management of their claims. There was some question whether our estimate of COHE cost savings might be attributable in part to activities employers adopted as part of their participation in the retro program. Since we did not include a variable representing the retro program in our initial statistical analysis, it was possible our estimate of COHE cost savings might have captured not only the “COHE effect” but also a “retro effect.”

We obtained information from the DLI identifying all claims at both COHE pilot sites that represented retro claims, and then (1) performed univariate descriptive analysis to examine differences in retro and non-retro claims and (2) repeated the basic multivariate statistical

analysis for the cost outcome but included a variable representing retro status in the statistical model. This enabled us to determine the effect of retro status on claim costs independent of the COHE effect, and also to obtain updated estimates of COHE cost savings controlling for the effect of retro status. In effect, this addressed two questions: (1) What is the estimated cost saving associated with having a claim managed through the retro program? and (2) How does the cost saving associated with the COHE compare with the cost saving associated with the retro program? Descriptive information showing the unadjusted differences between retro and non-retro cases with regard to selected disability and cost measures is presented in table 3 below. As shown, the retro programs at both pilot sites were associated with reduced disability incidence and disability days ($p < .05$) in the unadjusted analysis. Medical and disability costs, though lower among retro claims, were not statistically significantly different between the two groups (retro and non-retro).

Table 3. Unadjusted Differences in Selected Disability and Cost Measures for Retro Program

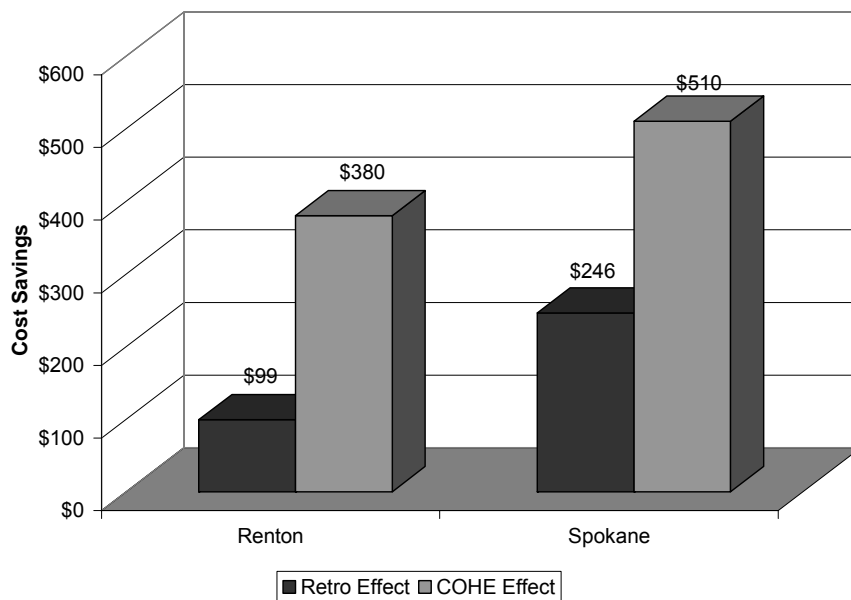
Pilot Site	Incidence of Time Loss	Days of Time Loss within First Year	Medical Cost per Claim	Disability Cost per Claim
<u>Renton</u>				
Retro	17%*	13.0*	\$1,950	\$873
Non-Retro	20%	17.3	\$2,009	\$1,049
<u>Spokane</u>				
Retro	14%*	12.3*	\$1,707	\$615
Non-Retro	18%	16.9	\$1,993	\$846

* $p < .05$.

The results of the multivariate analysis incorporating the retro variable, along with age, gender, type of injury, provider type, baseline provider costs, industry mix and firm size, as described earlier, are presented in figure 10 below. In both pilot sites, retro claims were associated with reduced costs (medical and disability costs combined) as compared to the non-retro claims, but the differences were not statistically significant in the multivariate analyses. The estimated cost savings associated with the COHEs were substantially larger

and were also statistically significant ($p < .05$) as compared to non-COHE claims. For example, in Renton the cost saving associated with the retro program was \$99, whereas the cost saving associated with the COHE was \$380. The comparable figures for Spokane were \$246 and \$510. Reference to figure 9, which shows the results of the updated statistical analysis incorporating industry mix and firm size, provides a comparison for the current analysis. Incorporating the retro variable in the statistical model had almost no effect on the COHE cost saving estimate for either pilot site. In sum, our analysis indicates: (1) the retro program had a modest, though not statistically significant, effect on cost per claim in the multivariate analyses and (2) the estimated COHE cost saving effect was not influenced by the retro program. Although retro employers may currently receive reductions based on lower costs (potentially related to factors such a reduced incidence of injury), retro employers accrued similar additional cost savings from COHE claims as did non-retro employers.

Figure 10. Cost Savings Associated with Retro Program and COHE



8. What Can Be Learned Regarding Long-Term (18-Month) Outcomes, Such as Work Status, Earnings and Self-Reported Recovery Status, for COHE and Comparison-Group Injured Workers? Can Relationships Be Seen Between Time Loss Duration and These Kinds of Outcomes?

A key element of the design of the COHE projects was to assess self-reported worker status and satisfaction levels because these were significantly lower during our previous managed care pilot studies where workers were directed to certain providers. The UW research team conducted a long-term (18-month post claim receipt) follow-up interview to assess selected outcomes, including work status, changes in earnings and self-reported recovery status. In addition to assessing these outcomes, the interview enabled us to examine the relationship between disability measures and interview outcomes. Analyses described earlier showed that the COHE intervention was associated with a significant reduction in disability incidence and duration. Given this effect, we believed the reduction in disability might be associated with improved long-term outcomes, and we examined this question as part of our analysis.

The two long-term interviews conducted in the COHE pilot sites were intended to gather information on a limited set of outcomes, including work status, changes in hours worked, earnings, and recovery status. These telephone interviews were administered approximately 18 months post claim receipt. A total of 839 workers were interviewed in Renton, 443 COHE respondents and 396 comparison-group respondents. The overall interview response rate was 42% (839/2,000), but was somewhat lower in the COHE group (39.6% versus 44.3% in the comparison group, $p = .03$). Respondents differed from non-respondents on a number of variables. Respondents were older (40.7 years versus 36.1 years ($p < .05$), had more average time loss days (60 days versus 37 days, $p < .01$), had more average time loss expenses (\$3,473 versus \$1,921, $p < .05$), and had higher average medical expenses (\$5,051 versus \$3,368).

A slightly smaller number of workers (825) were interviewed in Spokane, including 477 COHE respondents and 348 comparison-group respondents. The response rate in Spokane

(74% or 825 out of 1,123) was higher, primarily because in that site we were able to reinterview workers who had already been interviewed a year earlier. (Short-term follow-up interviews were conducted at both pilot sites 4 to 6 months after claim receipt. The results of these interviews were described previously in the earlier COHE evaluation reports.) In Renton, because of human subjects requirements, we had to select a new sample of workers who, because of the long lapsed time from claim receipt, proved harder to locate and interview. There were fewer differences in Spokane between respondents and non-respondents. Respondents were somewhat older (40.7 years versus 38.0 years), but there were no significant differences in average time loss days, time loss costs or medical costs. A higher proportion of subjects were interviewed in the comparison-group than were interviewed in the COHE group (76.7% versus 70.4%, $p = .05$). Data pertaining to the long-term interview are presented in table 4 below.

Table 4. Completed Long-Term Interviews

Pilot Site	Completed Interviews (COHE/Comparison Group)	Response Rate
<u>Renton</u>	839 (443/396)	42% (839/2,000)
<u>Spokane</u>	825 (477/348)	74% (825/1,123)

The long-term interview consisted of a subset of questions that was developed for an earlier (short-term) interview administered to workers (both COHE and comparison-group subjects) at both pilot sites approximately 4 to 6 months after claim receipt. This short-term follow-up interview found no significant differences between the COHE and comparison groups in satisfaction or related measures, with the exception of two employment-related measures at the Renton pilot site. The responses to these two measures favored the COHE group, and indicated COHE injured workers were (1) more likely to be working at time of interview and (2) more likely to have returned to work for the same employer.

There was little difference in the (unadjusted) interview measures between the COHE and the comparison group. Figures 11 and 12 present findings for three key interview measures comparing the COHE group to the comparison group. As shown, the interview findings for both groups were similar, indicating no decrement in outcomes for COHE patients. When we controlled for industry mix and type of injury through statistical analysis, the results shown in the figures remained essentially unchanged.

A number of factors, in addition to workers' compensation health care, may affect the types of long-term outcomes shown in figures 11 and 12. For example, local labor market conditions may influence employment prospects of workers and the wages they are paid. Similarly, long-term recovery status may be influenced by factors such as the ability of the employer to offer job accommodation to an injured worker or the level of support provided by the worker's family.

Figure 11. Selected Findings for Long-Term Worker Survey, Renton

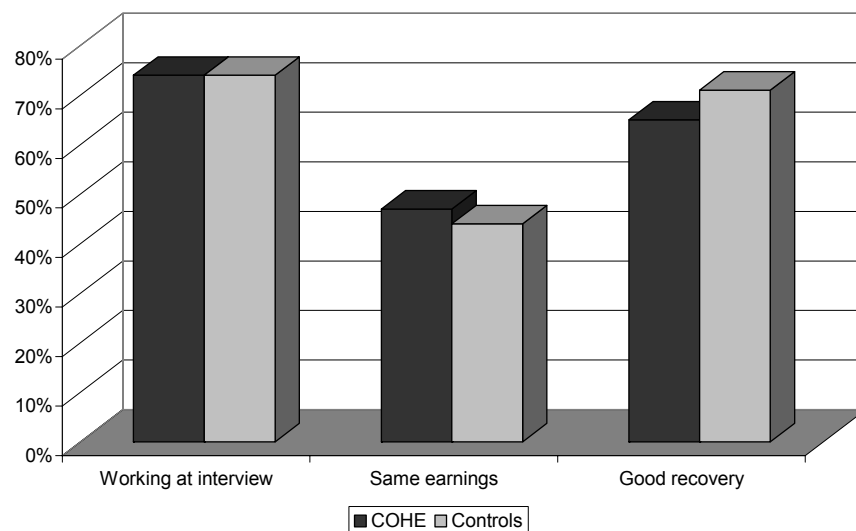
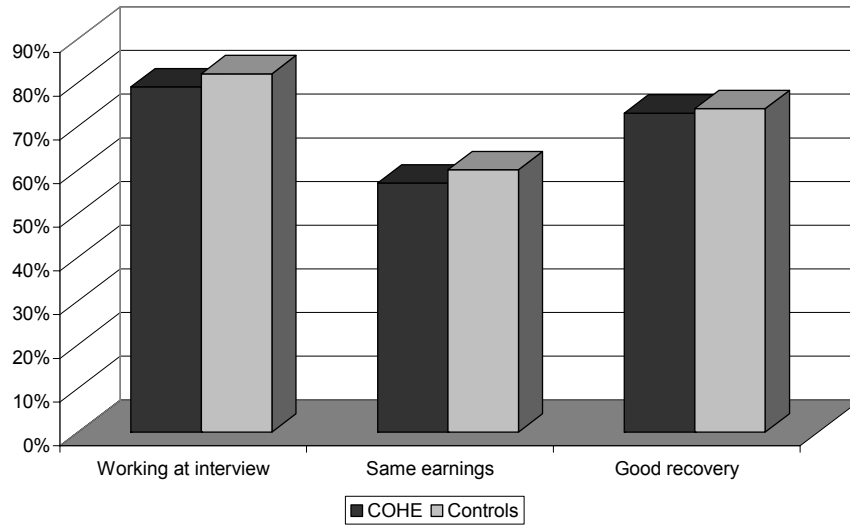


Figure 12. Selected Findings for Long-Term Worker Survey, Spokane



The COHE intervention model focuses primarily on reducing worker disability as the key outcome of COHE activities. Data presented in the two prior evaluation reports and in this report indicate the COHEs are associated with both reduced incidence of disability and disability duration. Given this effect, we felt it would be useful to examine long-term outcomes in relation to disability.

Figures 13 and 14 present data (for all COHE and comparison-group respondents combined) on the three long-term outcomes described above categorized by four levels of disability. Figures 15 and 16 provide similar data but include only back sprain respondents (to control in a limited fashion for case mix differences) for two levels of disability (< 30 days versus \geq 30 days). Figure 15 combines COHE and comparison-group respondents, while Figure 16 treats them separately. As figures 13 and 14 show, workers with shorter disability had better long-term outcomes. The likelihood of achieving successful long-term outcomes diminishes greatly with extended disability lasting 180 days or more but diminishes even with disability lasting 90 days or more. For example, in both pilot sites over 80% of the respondents with less than 30 days of time loss were working at time of the interview, approximately 18 months after claim receipt. In contrast, only 30% to 40% of the respondents with over 180 days of time loss were working. Similar patterns were found for the other two outcome measures. This same marked difference in outcomes is shown for back sprain respondents

in Renton (figure 15). Workers having fewer than 30 days of time loss had substantially better outcomes compared to workers with more than 30 days of time loss.

Figure 16 (showing data for Spokane) provides somewhat more detail than figure 15 in that it splits out COHE and comparison-group respondents for each disability category. The reason for this more detailed assessment is that, as discussed earlier, the Spokane COHE had a strong effect on reducing long-term disability for back sprain cases. Given this effect, we felt it would be useful to explore whether outcomes might differ for long-term disability cases between the COHE group and the comparison group. There were few systematic differences for respondents with less than 30 days of time loss (figure 16); a slightly greater proportion of comparison-group respondents reported having the same earnings as before the injury, but the opposite was true for recovery status where a slightly greater proportion of COHE respondents reporting having a good recovery. Differences were more pronounced for respondents with more than 30 days of time loss, with all three outcomes favoring the COHE group to some degree. While these differences are not statistically significant (in part due to small numbers of cases analyzed), the findings do suggest that where the COHE had an important effect on long-term disability, improved outcomes were more likely to be observed. The data shown in figures 13 – 16 reinforce other findings presented in this report that clearly show the importance of disability prevention.

Figure 13. Long-Term Outcomes by Level of Disability, Renton

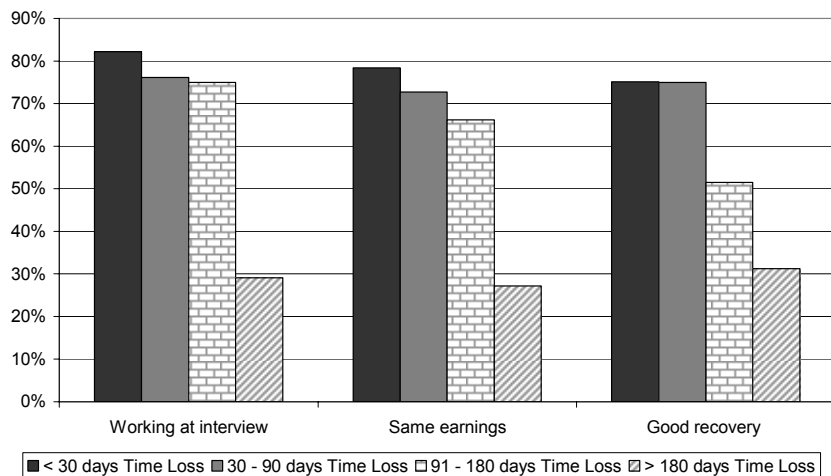


Figure 14. Long-Term Outcomes by Level of Disability, Spokane

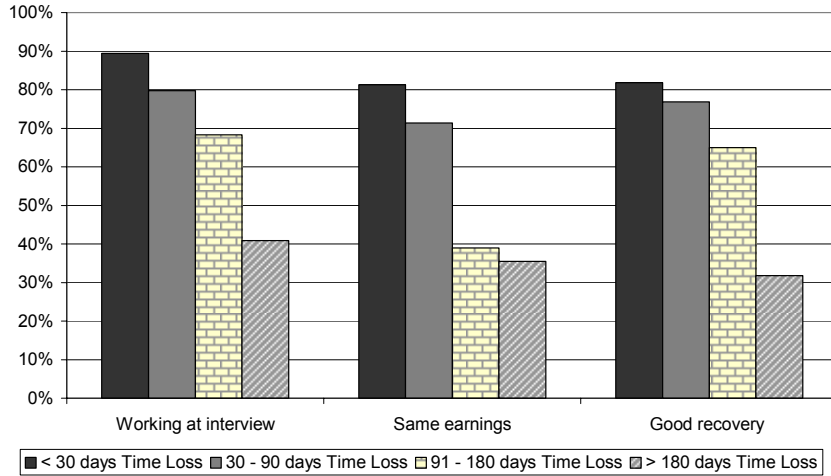


Figure 15. Long-Term Outcome by Level of Disability: Back Sprain Cases, Renton

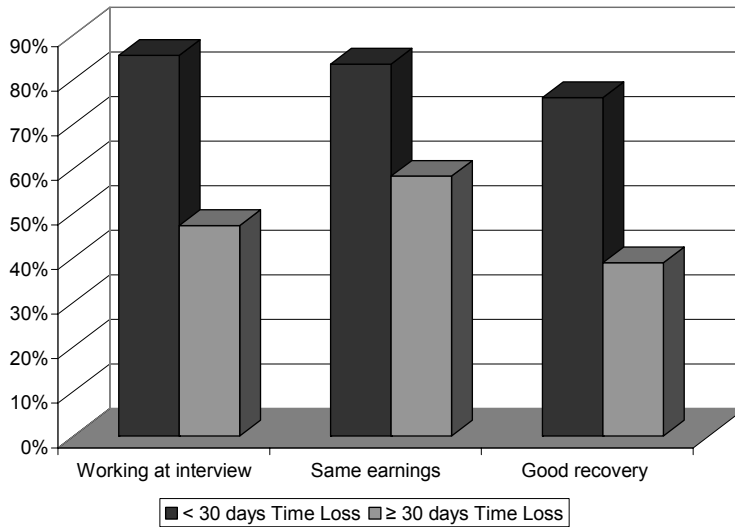
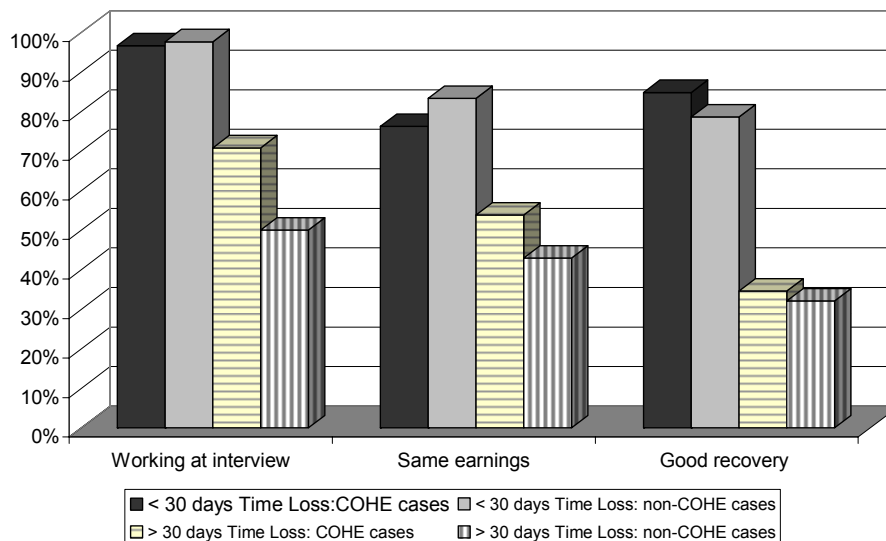


Figure 16. Long-Term Outcome by Level of Disability: Back Sprain Cases, Spokane



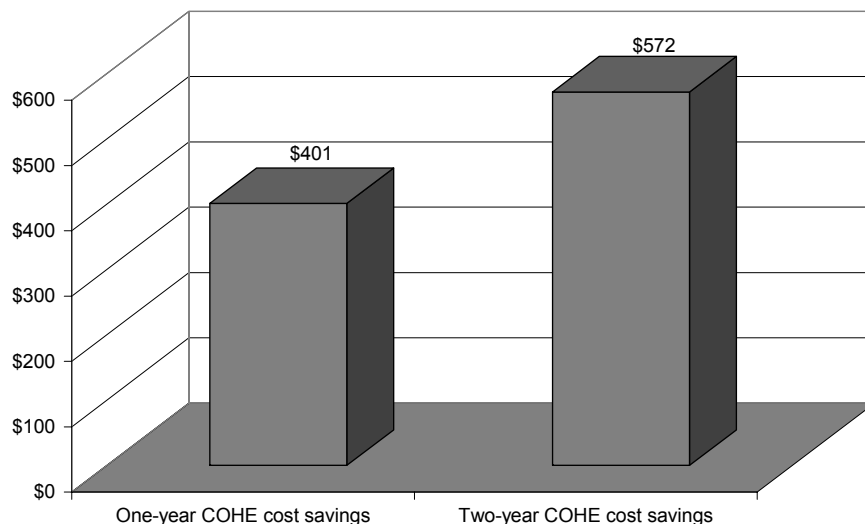
9. Do Cost Savings Seen in the First Year of COHE Claims Continue or Change Compared to Non-COHE Claims Over Time?

We originally identified the eight questions outlined above to define the analyses presented in this report. After these questions were defined, we obtained additional statewide administrative data from the DLI that enabled us to perform preliminary analyses for the Renton pilot site to examine the question of whether COHE cost savings increased over time (these additional data were not available for Spokane because that pilot site started a year later). The data we obtained represented approximately 10 months of additional follow up time for Renton. We anticipated that the COHE cost savings would increase over time because of the observed favorable effect on disability prevention.

To explore this issue, we re-estimated the basic statistical model but used the two-year follow-up cost data (medical and disability costs combined) instead of the one-year data. Figure 17 shows the results of this preliminary analysis, comparing the original cost savings to the cost savings based on extended (almost two-year) follow up. As shown, the estimated cost savings increased substantially, from \$401 to \$572 (42%), when the follow up period was extended by 10 months (net cost savings would be \$539 per claim accounting for added

administrative costs over the extended period). What caused this increase in cost savings? During year two follow up, 479 claims remained open among the comparison-group cases, as compared to 221 open claims in the COHE group ($p < .01$). These additional 258 open claims (479 minus 221) represent an aggregate cost (medical and disability combined) of approximately \$4 million. The increased cost saving shown in figure 17 represents the long-term effect of successful disability prevention associated with the COHE. These results are preliminary. More detailed analyses of long term follow-up of cases in both Renton and Spokane will be conducted during the next biennium. We expect the patterns to be quite similar although estimates of cost savings may change.

Figure 17. Cost Savings Estimates for Two-Year Versus One-Year Follow up, Renton



Conclusions

This report has described a series of analyses conducted by the UW research team to examine nine questions related to COHE activities and performance. In addition, we updated the cost savings estimates presented in our two prior evaluation reports to reflect corrections made in the coding of two variables for the Renton pilot and changes made in the assignment of intervention status (COHE versus comparison group) for a small number of cases (319) in Spokane. These corrections changed the cost saving estimate for Renton

from \$460 to \$401 and for Spokane from \$385 to \$497. The updated net cost savings, accounting for administrative costs, would be \$383 and \$470, respectively. The estimated cost savings result primarily from reducing disability. Our analysis indicated the Renton and Spokane COHEs, respectively, were associated with 4,800 days and 5,800 days of reduced disability per 1,000 injured workers treated.

Our analysis showed that the COHEs had strong effects on disability prevention both overall and for specific injury conditions and types of providers. Its effects appear to be strongest for back sprain, carpal tunnel syndrome and other sprains, depending on the particular COHE pilot site and disability measure examined. The COHEs had relatively little impact on disability prevention for fracture cases. The COHEs' effects at both pilot sites were strongest among primary care physicians, though at Renton the COHE-ER effect was also notable. The significant effect of improved occupational health quality of care for primary care physicians was an important goal of the OHS project. The observed ER effect in Renton is important because (1) a substantial number of injured workers are treated in hospital emergency departments (ERs), and (2) traditionally ERs have faced many barriers in referring injured workers for needed follow up care and in attending to administrative processes that are required by the workers' compensation system. Our analysis showed that much of the reduced disability days associated with the COHE-ER resulted from follow-up care provided by occupational medicine physicians. Though we did not find a significant reduction in disability days among injured workers treated through the COHE hospital ERs in Spokane, these hospital ERs did show substantial progress in adopting occupational health best practices in regard to submission of the accident report. Eighty percent of the time the accident report was submitted within two business days by COHE hospital ERs in Spokane. Future analyses of the Spokane pilot site may show an important COHE-ER effect.

An important question we examined as part of our analysis concerned the adoption of occupational health best practices and its effect on reducing worker disability. This is a more complex question than it seems, and the evaluation had only a limited ability to explore it. Descriptive data presented in figures 1 – 3 showed a moderately high level of

best practice adoption, particularly among occupational medicine physicians and high volume providers. Our analysis of back sprain cases indicated that the adoption of occupational health best practices is associated with greater reductions in disability. Back sprain cases treated by COHE providers who were categorized as “high adopters” had 30% to 60% fewer disability days as similar cases treated by COHE providers who were categorized as “low adopters.” Thus it appears promoting adoption of occupational health best practices as a quality improvement strategy has significant potential to reduce worker disability.

The COHEs were designed as a system intervention to improve the delivery of workers’ compensation health care. Specific COHE activities and incentives developed to achieve this goal included: (1) use of financial incentives to encourage providers to adopt occupational health best practices, (2) provision of ongoing health services coordination to foster timely return to work where appropriate, (3) delivery of continuing medical education (CME), along with academic detailing involving provider training in their own office settings, and (4) development of improved information systems to track injured worker care progress and return to work status. In short, the COHE intervention model sought to change health care delivery in ways that were expected to foster improved disability prevention. This model can be contrasted with approaches that focus on changing insurance administrative processes and procedures but do not change health care delivery processes. The retro program, described earlier, is such an “administrative approach.”

Our analysis provided an opportunity to examine the effects of these two approaches on workers’ compensation costs (medical and disability costs combined). As shown in figure 10, cost savings associated with the COHE were substantially greater than cost savings associated with the retro program. As shown in other analyses (see Question #2 analysis, pp. 10 – 12), most of the COHE savings accrue from reducing worker disability once the injury has occurred. The widely cited 2001 Institute of Medicine (IOM) report, *Crossing the Quality Chasm*, which has served as a blueprint for many quality improvement initiatives, emphasized the need for redesign of the health care delivery system by developing financial incentives to better align provider payment with quality improvement goals, by establishing

better organizational supports for care delivery, and by improving coordination of care through enhanced information systems. The types of care delivery changes and enhancements developed by the COHEs are consistent with the recommendations proposed by the IOM report. Our findings suggest that relying predominantly on changing insurance administrative processes and procedures, though important, will not ultimately yield the same positive outcomes in terms of disability prevention (as opposed to primary injury prevention which was not evaluated) as strengthening health care delivery processes through system interventions such as the COHE.

The COHE intervention focused primarily on reducing worker disability as a measure of quality improvement. But as part of our evaluation, we conducted a long-term (18-month) follow-up interview to assess worker outcomes pertaining to employment status, earnings and self-reported recovery status. Overall, long-term outcomes for COHE respondents and comparison-group respondents were similar and showed no decrement for the COHE intervention cases. The fact we did not find significant differences in long-term outcomes is perhaps not surprising given: (1) the relatively small proportion of cases interviewed (< 10% Spokane and <5% Renton); (2) the nature of the sample interviewed, which included cases such as fracture conditions where improved disability prevention was not achieved; (3) the fact that long-term outcomes related to employment and earnings are influenced by many factors beyond the health care delivery system; and (4) the workers available for the interview were more likely to be older and disabled, making it even more unlikely that substantial differences would be found. Without a more focused interview, we do not know whether improved disability prevention achieved by the COHEs would translate into better long-term outcomes, though limited evidence of this was presented in figure 16 for the Spokane COHE with regard to the treatment of back sprain cases.

These interviews did demonstrate the importance of disability as a predictor of long-term outcomes. Workers on extended disability (> 180 days) were much less likely to be working, to have the same earnings as before their injury or to report a favorable recovery status compared to workers who were on disability for shorter periods (< 90 days). The effect of disability on long-term outcomes appears to be generalized. Even when we limited

the analysis to back sprain cases and reduced the disability threshold to 30 days (< 30 days time loss versus > 30 days time loss), we observed large differences in outcomes (figure 15) and modest differences between COHE and comparison-group respondents having over 30 days of time loss (figure 16). These findings are consistent with the findings of other studies conducted by the UW research team showing strong relationships between time loss and measures of health status, pain and other indices of functioning,¹ and reinforce the importance of developing system interventions, such as the COHE, to promote improved disability prevention.

Finally, our analysis showed that enhanced preliminary disability prevention can have an important cumulative effect over time. When we analyzed cost data representing a longer follow up time (almost 2 years) for the Renton COHE, our estimate of COHE cost savings increased substantially from \$401 to \$572 per claim. Reducing long-term disability even among a small proportion of cases can in the aggregate have a large impact. Our analysis pertaining to Question #2 (pp. 10 – 12) indicated that the COHEs did lead to a measurable effect that led to avoidance of long-term disability. For example, in Renton our analysis showed that approximately one case of long term (> 365-day) disability per 100 FTE workers was avoided through COHE disability prevention actions. In Spokane, approximately 1.3 cases of disability with more than 180 days of disability were avoided. The avoidance of these long-term disability cases appears to have an important cumulative effect, reducing the aggregate disability burden over time.

We conducted analyses described in this report to enhance understanding of COHE performance at the two current pilot sites. Within the workers' compensation arena, the COHE intervention represents a major (and unique) quality improvement initiative. Our findings reinforce the importance of effective disability prevention and demonstrate the potential to improve the quality of workers' compensation health care delivery through a well-organized system intervention. Future analyses planned by the UW research team will provide an opportunity to examine other questions regarding COHE performance and update

¹ Fulton-Kehoe D, Gluck J, Wu R, Mootz R, Wickizer T, Franklin G. Measuring work disability: What can administrative data tell us about patient outcomes? *Journal of Occupational and Environmental Medicine* (in press).

these current findings to reflect recent quality improvement activities undertaken by the COHEs.

Appendix

In conducting initial analyses for this report, the UW research team discovered a coding error in the original data base constructed for the Renton pilot evaluation. This coding error involved two variables, type of injury and provider type. These errors were corrected and the earlier analysis was redone. The Renton COHE evaluation report on the DLI website was also corrected.

Information that became available after the initial evaluation reports were prepared indicated that a small number (319 out of 11,526) of cases in Spokane originally had been misclassified with regard to intervention status. 258 cases had originally been classified as a comparison-group case when they should have been classified as a COHE case, and 58 cases were misclassified as COHE cases when they were actually comparison-group cases. (One of the original cases was deleted from the data set, reducing the total number of cases to 11,525.) These misclassifications were corrected and all analyses were redone. Even though the number of providers reclassified was small in relation to the total number of providers and cases analyzed, the reclassification did make a difference in the estimate of cost savings, increasing the estimate by about 29%. The Spokane COHE report will be revised, and the revised report will be posted to the DLI website. The analysis presented in this report is based upon updated data from both COHE pilot sites.

Updated Findings for COHE Evaluations

Renton COHE

There were no meaningful changes in the estimated impact of the COHE on (1) the incidence of disability (time loss) or long-term (365-day) time loss. The estimated cost savings (medical and disability costs combined) associated with the COHE was smaller than reported initially, \$460 per claim compared to \$401 per claim, but remained statistically significant. The DLI provided \$190,000 per year to each pilot site to support administrative expense. Accounting for this administrative expense, would reduce the cost savings per claim to \$383.

The incidence of time loss for carpal tunnel cases was higher than initially reported for COHE cases (13.2% was corrected to 44.3%), leading to a non-significant difference, but the proportion of COHE CTS cases on long-term (365-day) disability was smaller (16.7% was revised to 2.7%), leading to a statistically significant difference. While the coding corrections made to the data led to some changes in the findings of the earlier Renton COHE evaluation report, overall these changes were modest and did not alter our earlier conclusion that the Renton COHE was associated with (1) a statistically significant decrease in the incidence of time loss, (2) a borderline ($p = .07$) statistically significant decrease in the occurrence of long-term time loss, (3) a statistically significant cost savings per claim on the order of \$400, and (4) a net cost savings estimate per claim of \$383.

Spokane COHE

The reclassification of the 320 cases, described earlier, did not change the evaluation's estimate of the association between the COHE and time loss incidence or the occurrence of long-term (365-day) time loss. It did change the estimate of cost savings, increasing this estimate by 29% from \$385 to \$497. Allowing for the \$190,000 in administrative expense provided by the DLI would reduce the estimated savings from \$497 to \$470. Other results presented in the earlier Spokane COHE evaluation report, based upon bivariate comparisons, did not change to any meaningful degree.