

# **University of Washington**

School of Public Health

Department of Environmental and Occupational Health Sciences

Occupational Epidemiology and Health Outcomes Program

## **Catastrophic Care Management Evaluation Final Report**

### Evaluation Team

Deborah Fulton-Kehoe, PhD, MPH

Vi Le, MS

Jeanne Sears, PhD

Terri Smith-Weller, RN, MN, COHN-S

Thomas Wickizer, PhD

Rae Wu, MD, MPH

Prepared for: Washington State Department of Labor and Industries

Final Submitted: November 24, 2020

## Table of Contents

<b>Executive Summary</b> .....	<b>1</b>
<b>Chapter 1: Introduction to the Evaluation of the Nurse Case</b> .....	<b>6</b>
Management Pilot for Workers with Catastrophic Injuries	
<b>Chapter 2: Worker Interviews – Satisfaction</b> .....	<b>9</b>
<b>Chapter 3: Worker Interviews – Self-Reported Outcomes</b> .....	<b>43</b>
<b>Chapter 4: Claim File Review</b> .....	<b>63</b>
<b>Chapter 5: Pre-post Analysis</b> .....	<b>74</b>
<b>Chapter 6: Economic Analysis of Outcome Based Nurse</b> .....	<b>97</b>
Case Management Plans	
<b>Chapter 7: Conclusions</b> .....	<b>109</b>
<b>Acknowledgements</b> .....	<b>114</b>

# Evaluation of the Nurse Case Management Pilot for Catastrophic Injuries

## Executive Summary

This report summarizes a multi-component evaluation of a pilot program to deliver contracted nurse case management services to workers with catastrophic injuries covered by the Washington Department of Labor and Industries (L&I). Nurse case management for workers with catastrophic injuries may improve coordination of health care and rehabilitation services; assist with transitions from the hospital to other facilities or to home; improve communication between workers and their families, health care providers, and L&I; and improve worker education and adherence with treatment plans.

This report includes: 1) summaries of analyses comparing medical costs and time loss costs before and after implementation of the nurse case management pilot (pre-post analysis), 2) a summary of interviews with injured workers that includes measures of functional status and satisfaction with care, 3) a review of claim files, and 4) an economic analysis of nurse case management costs.

The results from each chapter are briefly summarized below:

### Worker Interviews – Satisfaction

- Workers had a high level of satisfaction with nurse case management, with health care, and with L&I.

### Worker Interviews – Self-Reported Outcomes

- Workers who received nurse case management had higher scores on measures of disability than workers who did not receive nurse case management. This was one indicator that workers who received nurse case management had more severe injuries than workers who did not receive any nurse case management services.

### Claim File Review

- Claim files for 216 workers with catastrophic injuries were reviewed to assess transitions, complications, and work status.
- A high percentage of workers (44%) with catastrophic injuries were “kept on salary” (KOS) at some point after their injury: 19% were KOS and had no time loss (TL) payments and 25% had both KOS and TL payments. Because of the frequency of KOS, calculations of time loss duration and time loss costs in the Pre-Post Analysis will be an underestimate of total time lost from work for these workers.

### Pre-Post Analysis

- Total medical costs (excluding nurse case management) and duration of time loss did not differ significantly before and after implementation of nurse case management for catastrophic injuries.

- Cost of nurse case management services in the two years after injury varied widely from \$567 to \$337,251 (in the two years after injury) for workers receiving nurse case management for injuries occurring between July 1, 2016 and June 30, 2017. The median cost of nurse case management was about \$13,000. Costs for nurse case management were below \$40,000 for 87% of the workers who received nurse case management. Costs were between \$40,000 and \$100,000 for 5% of the workers and were over \$260,000 for 8% of the workers with nurse case management.

### Economic Analysis

- In an analysis of the nurse case management costs for one outcome-based firm, the cost for nurse case management alone was 1.8 times the total medical costs paid by L&I. In addition, the medical costs estimated by the outcome-based firm were substantially higher than the actual medical costs paid by L&I, on average. For all other firms, the costs of nurse case management were substantially lower than the average medical costs for the injured workers.

Overall, there is a high level of worker satisfaction with nurse case management services, and there were no changes in the average duration of time loss or average medical costs after implementation of the nurse case management pilot for catastrophic injuries. Because there is a very wide variation in the costs associated with various firms providing nurse case management, L&I will need to consider the benefits of nurse case management services for injured workers with catastrophic injuries and the benefits to L&I and determine the appropriate costs for these services.

Summaries of each chapter are provided below.

### **Chapter Summaries**

#### Worker interviews – Satisfaction

- Injured workers were asked about satisfaction with health care, satisfaction with L&I, and satisfaction with nurse case management (if they received it) at interviews conducted 12 and 18 months after injury.
- Overall, injured workers with catastrophic injuries had a high level of satisfaction with the health care they received.
- Injured workers with catastrophic injuries had a high level of satisfaction with L&I.
- Satisfaction levels with health care and with L&I were generally similar for workers who received nurse case management and those who did not.
- Injured workers with catastrophic injuries were highly satisfied with how the nurse case managers coordinated health care, answered questions, addressed concerns about returning to work, communicated with injured workers, and the time spent with the injured worker.

### Worker interviews – Self-reported Outcomes

- Interviews were conducted at baseline (a few weeks after injury) and 6, 12, and 18 months after injury. Some questions on the baseline interview asked about the time period before the injury. Other questions referred to the time of the baseline interview (after injury).
- One measure of worker self-reported outcomes was the World Health Organization Disability Assessment Schedule 2.0 (WHODAS). Higher WHODAS scores indicate more disability. As expected the WHODAS disability scores 6 months after injury were substantially higher (indicating greater disability) after injury than before injury. On average, WHODAS disability scores remained high 18 months after injury. WHODAS scores were substantially higher (indicating more disability) for workers with nurse case management than for those who did not receive nurse case management.
- The workers were asked about work status at the time of each interview. At each interview, a lower percentage of workers who received nurse case management were working compared to workers who did not receive nurse case management. At the time of the baseline interview, none of the workers with nurse case management were working and only 6% of the workers without nurse case management were working. At the time of the 6 month interview, 5% of those with nurse case management and 33% without nurse case management were working. At 12 and 18 months, about 25% of workers with nurse case management were working and 40-46% of those without nurse case management were working. Overall, among those who participated in the survey 18 months after injury, 35% reported that they were working.
- At the time of the baseline interview, workers with catastrophic injuries who were not working reported high levels of pain interference with work with 77% of those with nurse case management and 55% of those without nurse case management reported high levels of pain interference with work (8 or greater on 0-10 scale with 0 indicating no interference and 10 meaning unable to carry on any activities).

### Claim File Review

- Claim files for 216 workers with catastrophic injuries were reviewed to assess transitions, complications, and work status.
- After the initial hospitalization, 53% of workers returned home, 21% went to inpatient rehabilitation, 17% went to a skilled nursing facility, 5% when to long term acute care, and 4% went to someone else's home, respite care or a transitional care facility.
- Complications were defined as additional diagnoses that were unexpected and could have been avoided. Over half of the workers with catastrophic injuries (53%) had at least one complication. Infections were the most common complications. Other common complications included other respiratory (other than pneumonia), orthopedic, and neurologic complications.
- 70% of claims remained open 18 months after a catastrophic injury.
- Two workers died within 18 months after the injury. (Four workers died within two weeks after the injury and were not included in the claim file review.)

- A high percentage of workers (44%) with catastrophic injuries were KOS at some point after their injury: 19% were KOS and had no TL payments and 25% had both KOS and TL payments. (Because of the frequency of KOS, calculations of time loss duration and time loss costs in the Pre-Post Analysis will be an underestimate of total time lost from work for these workers.)
- At 6, 12, and 18 months after injury, the majority of workers with catastrophic injuries were not working (75%, 56%, and 56%, respectively).

### Pre-post Analysis

- The pre-post analysis describes the injuries and demographics of workers with catastrophic injuries, medical costs before and after implementation of nurse case management, time loss in the two years after injury before and after implementation, differences in workers who received nurse case management and those who did not receive nurse case management, the costs of nurse case management, as well as use of durable medical equipment, use of opioid medications, and billing for mental health evaluation and treatment.
- The most common injuries were fractures (53%) and fractures in combination with other injuries (18%). The majority of workers were male (85%) and the mean age at injury was 45 years of age.
- Workers who received nurse case management services had more severe injuries than workers who did not receive nurse case management.
- Workers who received nurse case management had higher total medical costs than workers who did not receive nurse case management.
- Time loss in the two years after injury was higher for workers with nurse case management than for those without.
- It is important to note that differences in medical costs and time loss for workers with and without nurse case management is a function of differences in injury severity and is not a result of receiving nurse case management services.
- For injured workers with catastrophic injuries, total medical costs and time loss within 2 years after injury did not differ significantly before and after implementation of nurse case management.
- Cost of nurse case management services varied widely from \$567 to \$337,251 (within two years after injury) for workers receiving nurse case management for injuries between July 1, 2016 and June 30, 2017. Costs for nurse case management were below \$40,000 for 87% of the workers who received nurse case management. Costs were between \$40,000 and \$100,000 for 5% of the workers and were over \$260,000 for 8% of the workers with nurse case management.

### Economic Analysis of Outcome Based Nurse Case Management Plans

- The Economic Analysis examined the predicted and actual medical and NCM costs for one outcome based firm with the most referrals (Paradigm).
- A total of 25 workers with catastrophic injuries were referred to Paradigm between October 2016 and December 2018. Paradigm developed outcome plans for all 25

workers. L&I accepted 15 plans and declined 10 plans. We compared the costs for nurse case management for these claims with the actual medical costs for accepted and declined plans.

- L&I payments made to Paradigm for nurse case management services (including the nurse case management fee, the risk coefficient, and the actual or estimated reconciliation fee) averaged \$497,170 per worker which was substantially greater than the actual medical expense paid for these workers which averaged \$334,586 (including all acute hospital, other facilities, and provider visits). The total cost for nurse case management services provided for the cases whose plan was accepted was 1.8 times the total actual medical expenses as of September 2019.
- For cases in which L&I declined the outcome plan, the total amount L&I would have paid for nurse case management services for these cases (averaged \$595,241) would be greater than the actual medical expense paid (averaged \$348,189). The nurse case management fees paid by L&I for the 7 cases with declined plans who then received nurse case management from another firm were only a fraction (5%) of the fees that would have been paid to Paradigm had the 7 Outcome Plans been accepted by L&I. Nurse case management costs would have been 18 times higher if Paradigm's outcome plans had been accepted.
- The total nurse case management costs for services provided by Paradigm are higher than the actual medical costs paid for catastrophically injured workers and are substantially higher than what other firms charge. These findings raise questions about the appropriate costs for nurse case management services.

## Chapter 1

### **Introduction to the Evaluation of the Nurse Case Management Pilot for Workers with Catastrophic Injuries**

In an effort to improve the quality of health services received by workers who suffer catastrophic injuries, the Washington State Legislature in March 2016 passed a budget proviso (2ESHB 2376) establishing a pilot and evaluation to expand nurse case management (NCM) services for catastrophically injured workers insured for workers' compensation through the Washington Department of Labor and Industries (L&I). This initiative required L&I to "partner with an experienced firm or firms to manage care involving catastrophically injured workers." Firms ultimately selected by a Request for Proposal (RFP) to provide NCM services under this initiative included Paradigm Inc., Comagine, Coventry, Rainier and Stubbe. Paradigm provides NCM services based on a detailed plan that includes specific outcomes the worker is to achieve within a defined time period. Other NCM firms, except Comagine, provide NCM services on an hourly basis. Comagine is outcome-based, but due to contractual terms it received limited referrals.

Catastrophic injuries were defined as injuries that required hospitalization within 24 hours after injury for at least 4 days. Injuries included head injuries, burns, amputations, fractures, spinal cord injuries, and combinations of injuries. Over 70% of the injured workers with catastrophic injuries had a fracture (or fractures) or a fracture in combination with another injury. When injuries are catastrophic, nurse case management services may improve coordination of health care and rehabilitation services; assist with transitions from the hospital to other facilities or to home; improve communication between workers and their families, health care providers, and L&I; and improve worker education and adherence with treatment plans. The L&I Occupational Nurse Consultants (ONC) were responsible for determining whether a worker with eligible catastrophic injuries needed NCM services.

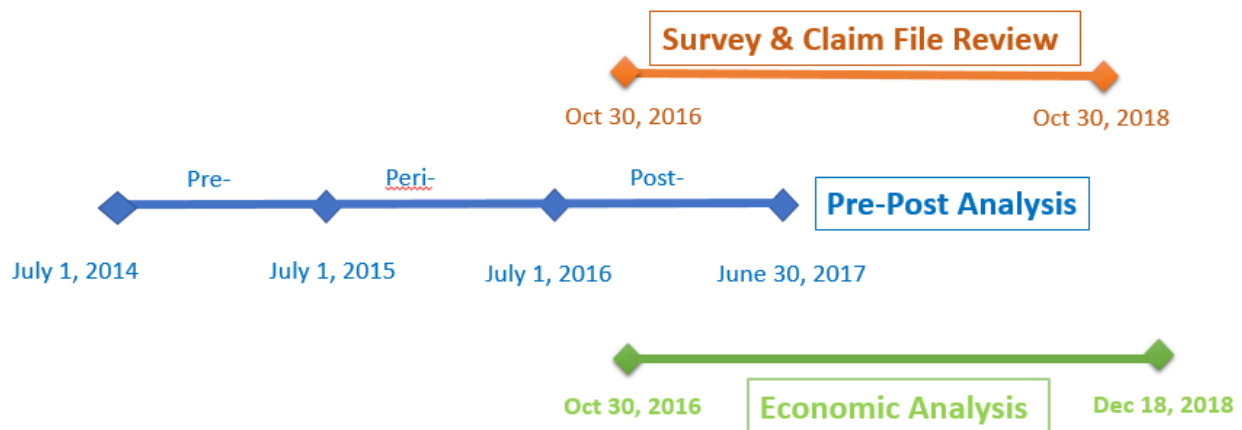
To learn as much as possible about the impact of the pilot under the budget proviso, L&I contracted with the University of Washington to provide a comprehensive evaluation of the NCM initiative. The evaluation was intended to examine worker outcomes, satisfaction, costs and other related measures.

This report summarizes a multi-component evaluation of a pilot program to deliver contracted NCM services to workers with catastrophic injuries covered by L&I. This report includes four components: 1) summaries of analyses comparing health care costs and time loss costs before and after implementation of the nurse case management pilot using administrative data (Pre-Post Analysis), 2) a summary of interviews with injured workers that includes measures of disability, satisfaction with care, and other worker-reported outcomes (Worker Interviews), 3) a detailed review of claim files to gather outcome information not available from either the administrative data or worker interviews (Claim File Review), and 4) an economic analysis of NCM costs for an outcome based firm (Economic Analysis).



Figure 1 shows the injury dates for each of the study components. The Pre-Post Analysis included all injured workers with catastrophic injuries that occurred between July 1, 2014 and June 30, 2017. The Worker Interviews and the Claim File Review were conducted with workers who had catastrophic injuries that occurred between October 30, 2016 and October 30, 2018. The Economic Analysis included workers with catastrophic injuries between October 2016 and December 2018 who were referred to one outcome based NCM firm. Brief summaries of each of these components of the evaluation are described below.

**Figure 1.** Injury dates for components of NCM evaluation



### Worker Interviews

Workers with catastrophic injuries that occurred between October 2016 and October 2018 were eligible to participate in interviews (or on-line surveys). Interviews were conducted in English or Spanish at baseline (a few weeks after injury), and 6, 12, and 18 months after injury. Worker self-reported outcomes included measures of functional status, community integration, social support, and work status from interviews conducted at all 4 time points. Injured workers were also asked about satisfaction with health care, satisfaction with L&I, and satisfaction with NCM (if they received it) at interviews conducted 12 and 18 months after injury.

### Claim File Review

The claim files for workers with catastrophic injuries between October 2016 and October 2018 were reviewed to assess transitions, complications, and work status in the 18 months following injury. The Claim File Review assessed transitions from the hospital (e.g. to a skilled nursing facility, to inpatient rehabilitation, or to home); complications that were unexpected and could have been avoided (e.g. infections); work status at 6, 12, and 18 months after injury; and whether injured workers were “kept on salary” at some point after their injury.

### Pre-Post Analysis

The Pre-Post Analysis describes the injuries and demographics of workers with catastrophic injuries, the medical costs before and after the implementation of the NCM pilot for catastrophic injuries, time loss in the two years after injury before and after implementation,

differences in workers who received NCM services and those who did not receive NCM services, and the costs of NCM. The Pre-Post Analysis also examined use of durable medical equipment, use of opioid medications, and billing for mental health evaluation and treatment.

### **Economic Analysis**

The Economic Analysis examined the predicted and actual medical and NCM costs for one outcome based firm with the most referrals (Paradigm). Between October 2016 and December 2018, 25 workers with catastrophic injuries were referred to Paradigm. Paradigm developed outcome plans for all 25 workers. L&I accepted 15 plans and declined 10 plans. When a plan was declined, some workers received NCM from hourly firms. For this analysis, the estimated payments made to Paradigm for NCM services included the NCM fee, the risk coefficient, and the actual or estimated reconciliation fee. The costs associated with other NCM firms were billed hourly. The Economic Analysis compared the costs for NCM with the actual medical costs for workers with accepted and declined NCM outcome plans.

## Chapter 2

### **Worker Interviews – Satisfaction**

#### **Interview Methods**

The Department of Labor and Industries (L&I) identified workers with catastrophic injuries between October 2016 and October 2018 and provided names and contact information to the University of Washington for the worker interviews. Workers with an accepted claim for a non-fatal catastrophic injury who were at least 18 years of age at the time of injury and spoke English or Spanish were eligible for the interviews. A total of 197 workers were eligible for the baseline interview. The baseline worker interviews were conducted a few weeks after injury (mean 1.4 months, median 1.1 months, minimum 0.4 months, maximum 4.5 months) and follow-up interviews were conducted approximately 6, 12, and 18 months after injury. Phone interviews could be completed in either English or Spanish. The option for workers to complete the interview on-line (in English) was added after about 6 months. (We will primarily use the term interview throughout this report to refer to both the interviews conducted by phone and the surveys completed on-line.) Interviews completed in Spanish were either conducted with the use of a Spanish translator or with a Spanish speaking interviewer. Interviews were conducted with the injured worker or with a surrogate (a legally authorized representative) if the worker was unable to respond to the interview personally. Eligible workers were sent an introductory letter and were then contacted by phone. Eligibility was confirmed and cognitive capacity was assessed. Workers could consent to participate or not. Workers who did complete the interviews could choose to skip any question in the interview or survey. Workers received a small incentive payment for participation in each interview. The research was approved by the University of Washington Institutional Review Board.

The interviews collected information on measures of disability, community integration, social support, and functional status. Injured workers were also asked about satisfaction with health care, satisfaction with L&I, and satisfaction with nurse case management (if they received it) at interviews conducted 12 and 18 months after injury. Interview responses were collected and managed using REDCap electronic data capture tools hosted at the Institute of Translational Health Sciences (ITHS) at the University of Washington.<sup>1</sup>

The response rates were relatively high. Out of all workers who were eligible for the baseline interview, the response rate was 49%. For the 6, 12, and 18 month interviews, the response rates were 74%, 64%, and 62% respectively. The numbers of workers with completed interviews or on-line surveys, with usable data, for each time period are shown below:

- A total of 97 workers completed the baseline interview.
- A total of 68 workers completed the 6 month interview.
- A total of 60 workers completed the 12 month interview.
- A total of 60 workers completed the 18 month interview.

See Chapter 3 for a comparison of respondents and non-respondents and its appendix for more details on eligibility and exclusions for the worker interviews.

### Interview Methods – Satisfaction

Workers with catastrophic injuries were asked about satisfaction with health services as part of the 12- and 18-month surveys. Workers were asked ten general satisfaction items plus 4 open-ended questions (see Appendix A). If the worker had a nurse case manager (NCM), they were asked an additional 14 items and 4 open-ended questions specifically about their satisfaction with the nurse case manager(s) (Appendix B). The statements are shortened in the graphs below, but the complete wording can be seen in the appendices.

Because the satisfaction items were asked as part of both the 12- and 18-month surveys, some workers responded to the same set of questions twice. Only one set of responses to the satisfaction items was included for each worker in the analysis below. The decision criteria for choosing which results to use are discussed in the respective sections below.

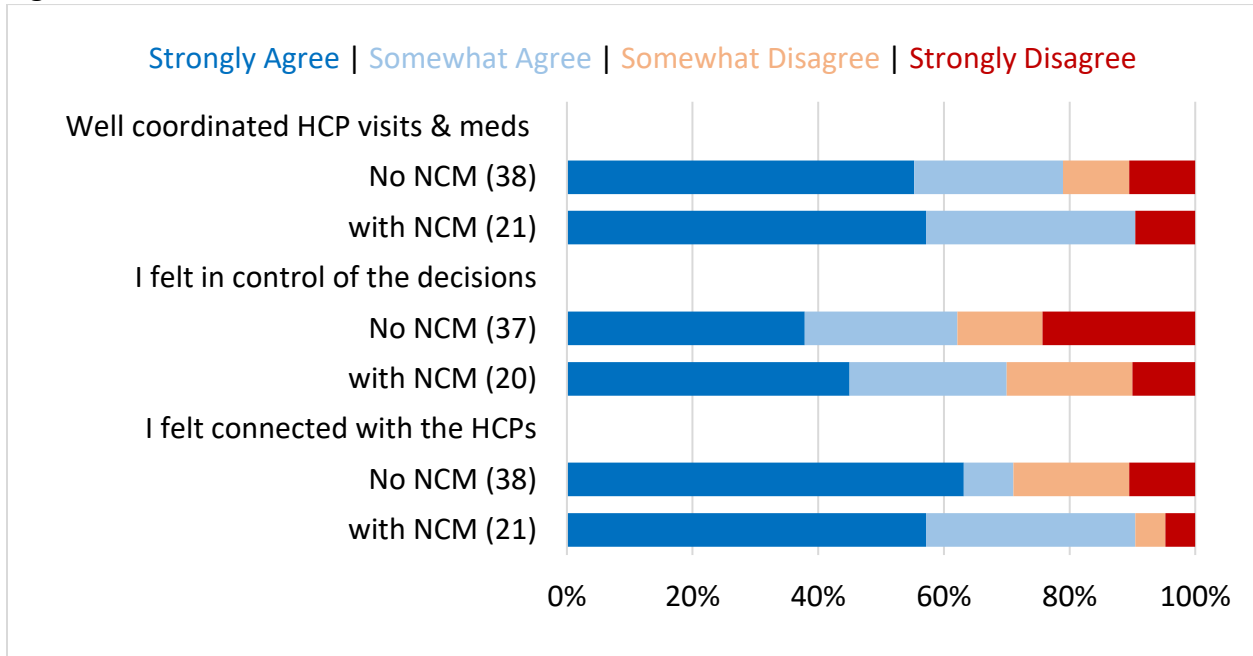
### **General Satisfaction**

Responses to the general satisfaction questions are reported separately in the following bar graphs for those who had or did not have a nurse case manager. If a worker responded to both the 12- and 18-month surveys, responses from the 12-month survey were used if the claim closed before the 12-month survey. If the worker's claim had not closed before the 12-month survey, the 18-month survey responses were used.

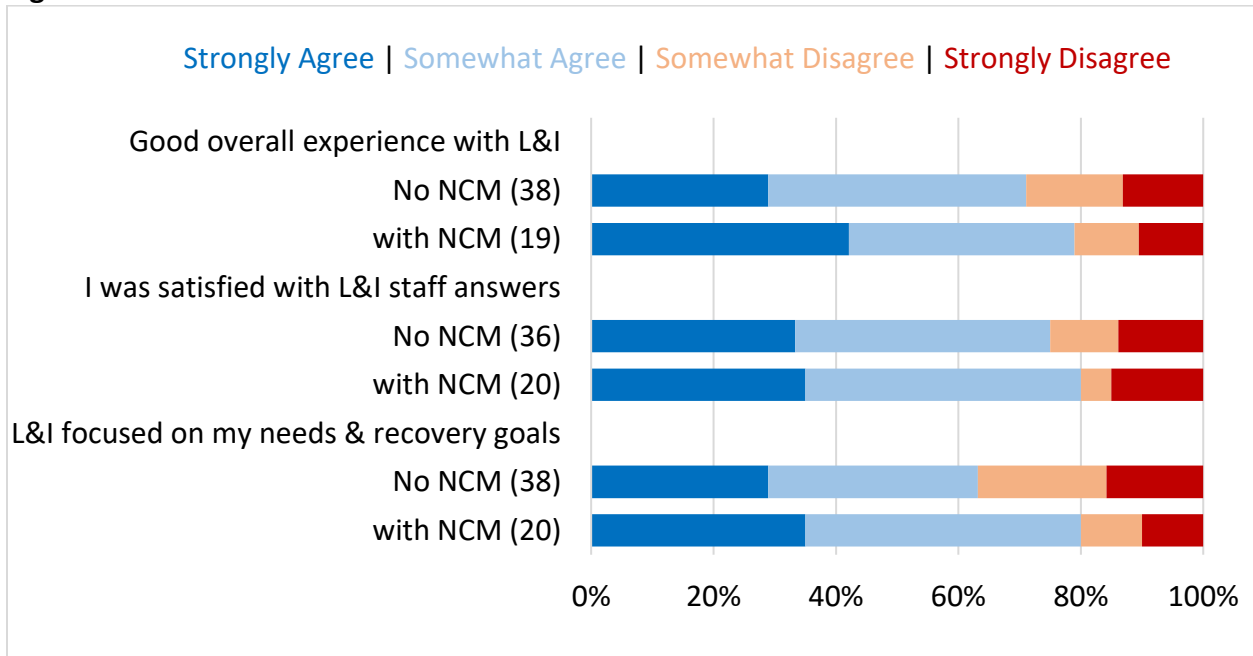
The numbers in the parentheses indicate the number of workers in the group. Among those who completed the satisfaction questions, 39 workers did not receive nurse case management and 21 workers received nurse case management. The numbers for some statements drop below 39 and 21 when someone declined to respond to a statement or said it wasn't applicable. The most common example was when the worker said the statement did not apply because the worker had an attorney so did not interact with L&I staff or because return to work (RTW) had not come up for discussion yet.

As shown in the following figures, most participants had a high level of satisfaction. The blue shows the percentage of workers who strongly or somewhat agree with each of the statements. Workers with catastrophic injuries with or without NCM had high levels of satisfaction with coordination of health care visits and medications, decision making, and connection with health care providers (Figure 1). The majority of workers with catastrophic injuries were satisfied with their overall experience with L&I, with the L&I answers to questions, and with L&I focus on recovery goals (Figure 2). These workers agreed that L&I addressed the workers concerns about RTW and most agreed that it was easy to communicate with L&I (Figure 3).

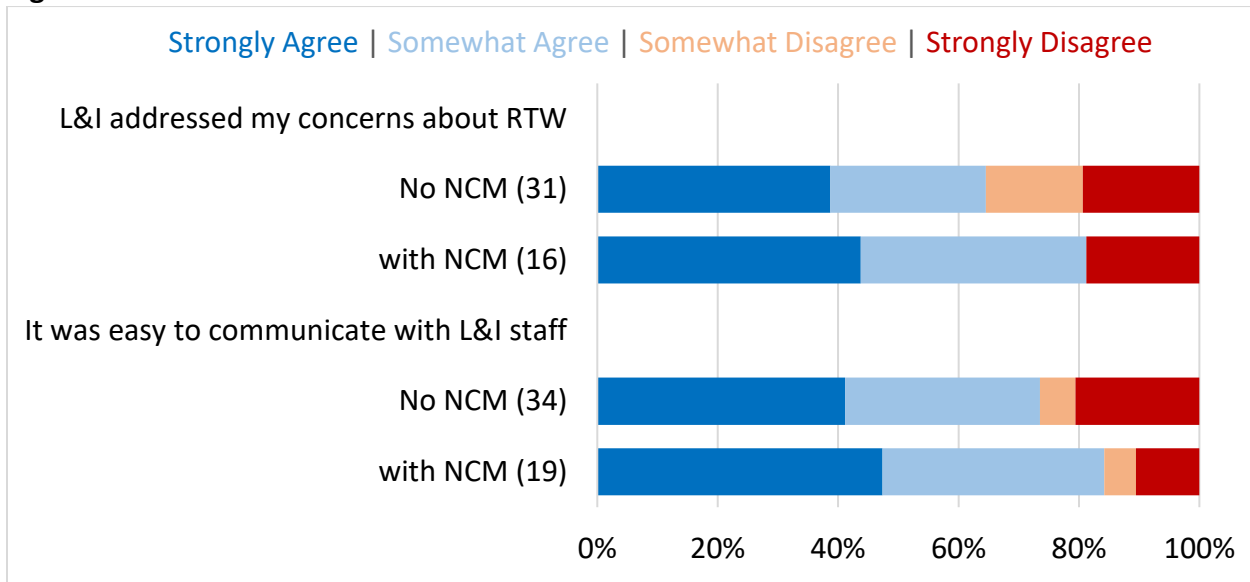
**Figure 1. General Satisfaction Questions 1-3**



**Figure 2. General Satisfaction Questions 4-6**

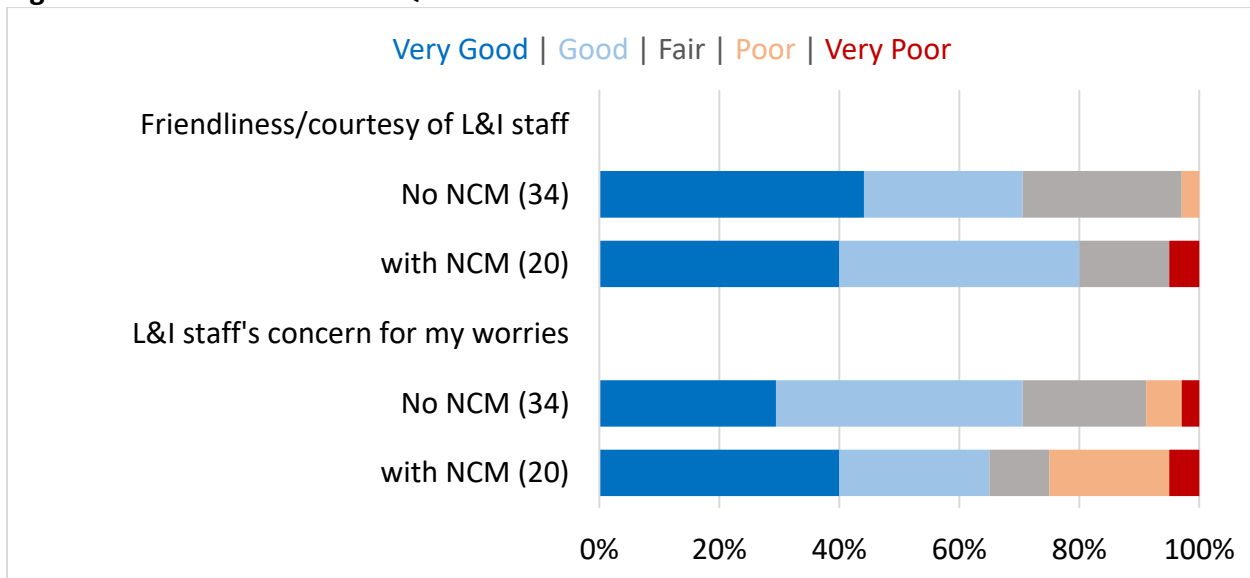


**Figure 3. General Satisfaction Questions 7-8**



Items 9 and 10 had 5 slightly different response options than the questions above. The majority of workers with catastrophic injuries reported very good or good levels of satisfaction with the friendliness of L&I staff and the staff concerns about the injured worker (Figure 4).

**Figure 4. General Satisfaction Questions 9-10**



Although satisfaction levels were quite similar for those with and without nurse case management, workers with nurse case managers had slightly higher satisfaction than workers without nurse case managers for most of the satisfaction questions. To summarize:

- Satisfaction was uniformly high for all general satisfaction statements with very little difference between those with NCM and without NCM. Only a small number of workers in either group was dissatisfied.

- The workers who had nurse case managers tended to be slightly more satisfied than those without nurse case managers.

### General Satisfaction by Type of Nurse Case Management

In the following tables the general satisfaction responses are presented by type of nurse case management. The numbers are very small especially in two of the groups: those from contracted outcome-based NCM companies and those with non-contracted hourly NCM companies. As can be seen in Table 1 the number of workers that were eligible for the survey from those two groups was small and the percentage that participated in the surveys was low as well. The lower participation rate in the contracted outcome-based NCM group may be related to the greater injury severity in this group. With greater severity the worker is likely hospitalized longer and may not be able to answer the phone number available to researchers because they are still in a health care facility and may not have a cell phone with them or may not have a surrogate to answer questions. Interviewers were only allowed to attempt to reach the worker or legally authorized representative 3 times including leaving voice mail.

**Table 1.** Survey Participation by Type of NCM Company

NCM Firm Type	Initial Survey			6 Month		12 Month		18 Month	
	Eligible	#	%	#	%	#	%	#	%
<b>No NCM</b>	127	67	53	50	75	42	84	39	93
<b>Contracted Outcome-based NCM</b>	15	5	33	4	80	3	75	4	100*
<b>Contracted Hourly NCM</b>	38	20	53	15	75	14	93	14	93
<b>Non-Contracted Hourly NCM</b>	16	4	25	2	50	2	100	2	100

\*One worker didn't complete the 12 month but participated in the 18-month survey.

Note: The number of respondents completing the previous survey were used as the response rate denominators. For example, 50 workers without NCM completed the 6-month survey, out of 67 workers who responded to the initial survey (response rate = 75%). One worker who only had NCM until the Outcome Plan was declined was not included in this table.

- **Contracted Outcome-based NCM companies:** Paradigm & Comagine
- **Contracted hourly NCM companies:** Coventry, Rainier & Stubbe
- **Non-contracted hourly NCM companies:** each worker had a different company

A total of 67 workers with catastrophic injuries who did not receive NCM completed the initial survey. Among the workers with NCM who completed the initial survey, 5 had contracted outcome-based NCM, 20 had contracted hourly NCM, and 4 had non-contracted hourly NCM. If the worker was initially assigned to Paradigm but the contract was not accepted by L&I and a contracted hourly NCM(s) was assigned, that worker was placed in the contracted hourly group. The one worker who had a Paradigm NCM initially, but no additional NCM after L&I declined the Outcome Plan at about 6 weeks, was not included in this analysis.

As before, in the far right column of the following table, the respondent numbers drop when someone declined to respond to a statement or said it wasn't applicable. The question about return-to-work concerns (question 7) has the most workers who did not answer because workers said that the statement didn't apply since discussion of RTW had not begun (Table 2). As presented above, there were high levels of satisfaction with medical care and with L&I. The tables below present satisfaction scores by type of NCM firm (Table 2 and Table 3). Lower scores indicate higher levels of satisfaction. Because of the very small numbers of workers with contracted outcome-based NCM or with non-contracted hourly NCM, we cannot draw any conclusions about differences in satisfaction by type of NCM and any differences in mean or median satisfaction scores by type of NCM should be interpreted cautiously. In the following 2 tables contracted outcome-based companies are labeled as "Outcome NCM", contracted hourly companies are labeled as "Hourly NCM," and non-contracted hourly companies are labeled as "NC Hourly NCM".

**Table 2.** General Satisfaction by Type of NCM Company, Questions 1-8

1=Strongly agree 2=Somewhat agree 3=Somewhat disagree 4=Strongly disagree		Average Score	Median score	Range	Respondents (N)
<b>Q1. The medical visits and medicines were well coordinated.</b>	no NCM	1.8	1.0	1-4	38
	Outcome NCM	1.3	1.0	1-2	4
	Hourly NCM	1.8	1.0	1-4	14
	NC Hourly NCM	1.5	1.5	1-2	2
<b>Q2. I felt in control of the decisions about injury care and recovery.</b>	no NCM	2.2	2.0	1-4	37
	Outcome NCM	1.3	1.0	1-2	3
	Hourly NCM	2.2	2.0	1-4	14
	NC Hourly NCM	1.5	1.5	1-2	2
<b>Q3. I felt connected with the health care providers.</b>	no NCM	1.8	1.0	1-4	38
	Outcome NCM	1.3	1.0	1-2	4
	Hourly NCM	1.7	1.5	1-4	14
	NC Hourly NCM	1.5	1.5	1-2	2
<b>Q4. My overall experience with L&amp;I was good.</b>	no NCM	2.1	2.0	1-4	38
	Outcome NCM	1.5	1.0	1-3	4
	Hourly NCM	2.1	2.0	1-4	12



	NC Hourly NCM	1.5	1.5	1-2	2
<b>Q5. I was satisfied with the answers L&amp;I staff gave to my questions.</b>	no NCM	2.1	2.0	1-4	36
	Outcome NCM	1.3	1.0	1-2	4
	Hourly NCM	2.3	2.0	1-4	13
	NC Hourly NCM	2.0	2.0	2	2
<b>Q6. L&amp;I focused on my needs and recovery goals.</b>	no NCM	2.2	2.0	1-4	38
	Outcome NCM	1.3	1.0	1-2	4
	Hourly NCM	2.2	2.0	1-4	13
	NC Hourly NCM	1.5	1.5	1-2	2
<b>Q7. L&amp;I addressed my concerns about RTW after the injury.</b>	no NCM	2.2	2.0	1-4	31
	Outcome NCM	1.3	1.0	1-2	4
	Hourly NCM	2.4	2.0	1-4	9
	NC Hourly NCM	1.5	1.5	1-2	2
<b>Q8. It was easy to communicate with L&amp;I staff.</b>	no NCM	2.1	2.0	1-4	34
	Outcome NCM	1.3	1.0	1-2	4
	Hourly NCM	2.1	2.0	1-4	12
	NC Hourly NCM	1.5	1.5	1-2	2

Questions 9 and 10 had the following 5 response options. Lower scores indicate higher satisfaction (Table 3).

- 1=Very good
- 2=Good
- 3=Fair
- 4=Poor
- 5=Very poor

**Table 3.** General Satisfaction by Type of NCM Company, Questions 9-10

		Average Score	Median score	Range	Respondents (N)
<b>Q9. Friendliness/courtesy of L&amp;I staff</b>	no NCM	1.9	2.0	1-5	34
	Outcome NCM	1.3	1.0	1-2	4

	Hourly NCM	2.2	2.0	1-5	13
	NC Hourly NCM	1.5	1.5	1-2	2
<b>Q10. Concern the L&amp;I staff showed for your questions or worries</b>	no NCM	2.1	2.0	1-5	34
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	2.7	2.5	1-5	14
	NC Hourly NCM	1.5	1.5	1-2	2

In general, one can conclude:

- Satisfaction is high among workers with and without NCM and by type of NCM firm.
- Those in the contracted outcome-based group tended to be slightly more satisfied than the other groups; however, this was based on only 3 participants. These results need to be interpreted with caution because of the very small numbers in these groups.

**Open Ended Questions**

The participants (60) were also asked 4 open-ended questions. A summary is provided here, but Appendix B has more complete responses.

**1. If you could change one thing about the L&I process, what would it be?**

When given the opportunity to make suggestions,

- 13 (23%) made a neutral comment or couldn't think of anything they would change
- 4 (7%) said something complimentary such as: ...
  - *"They supported me in all my needs. So, I would not change anything."*
  - *"Everything at L&I was perfect."*

**2. What was the best part of your experience with L&I?**

The most frequent response (46%) had to do with the claim manager (CM).

- Spouse said: *"The claim manager really focused on the worker's improvement. I have many good things to say about the CM."*
- *"Every time I call my CM, he/she showed care & concern for my well-being & how I was doing before answering my questions or dealing with my call."*
- Other responses included positive comments about explanations, guidance, and prompt communications.

The next largest group of responses (15%) had to do with gratitude for the workers' compensation system (bill payment, quick start of time loss, paying for all the medical care in spite of the cost)

- *"L&I allowed me to stay in a nursing home until I felt safe and I healed up as good as could be expected. [Insurance company] was trying to send me home by*

*myself. I am grateful for those days in the nursing home. A year before this I could not imagine that I would be grateful to stay in a nursing home."*

- *"Thanks to L&I I have my life back."*

### **3. What was the worst part of your experience with L&I?**

28% didn't provide a "worst part" or said everything was good.

Other responses mentioned:

- 6 (10%) an L&I decision they were unhappy about
- 4 (7%) an IME doctor
- 5 (8%) delays and processing time, etc.
- 3 (5%) paperwork
- 2 (3%) something specific to a claim manager

### **4. Is there anything else you want us to know about your experience with L&I?**

Of the 60 workers responding, 23 had additional comments.

Of those 23 responses,

- 9 (39%) had something positive to say, including gratitude to L&I
- 4 (17%) made a neutral comment
- 10 (43%) said something negative or had a complaint

The workers had many positive responses including the following:

- *"Easier to deal with than expected for a state agency"*
- *"All in all, they seemed fair" [in spite of disappointment about impairment rating]*
- *"Very good, very helpful. I am appreciative."*
- *"In the end they did the right thing" [after trying to end coverage "too soon"]*
- *My family has not been by my side and only L&I has been helping me and supporting me. I would give them five stars!*
- *"I hope that future people who receive treatment also experience the attention and humility that I was able to experience."*
- *"My claim manager always believed I would go back to work."*
- *"They are excellent, and their personnel is very professional. I have never experienced anything negative."*
- *"The process was well managed, and the staff interaction was wonderful."*
- *"I was surprised by how efficient they were and how genuine in their feelings of understanding and kindness once they understood the degree of my injury."*

### Open Ended Question Summary

- Even when asked what they would change – 30% couldn't think of anything.
- Almost half the respondents mentioned the claim manager when asked about the best part of their experience with L&I.
- When asked about the worst part of their experience with L&I almost 1/3 said there was nothing bad.
- When asked what else they us to know, the majority had something complimentary to say.

### **Satisfaction with Nurse Case Management**

The workers who had a nurse case manager were also asked about their agreement with NCM-specific satisfaction items (Table 4). Additional open-ended questions were also added. If a worker answered these satisfaction questions during both the 12- and 18-month surveys, the 12-month responses were used if the nurse case manager's involvement ended before the 12-month survey. If the NCM service continued after the 12-month survey, then the 18-month responses were used.

For the analysis below, if the worker was initially assigned to Paradigm but the contract was not accepted by L&I and a contracted hourly NCM(s) was assigned, that worker was placed in the contracted hourly group. The one worker who had a Paradigm NCM initially, but no additional NCM after L&I declined the Outcome Plan at about 6 weeks was not included in this analysis. In the following table "contracted hourly" companies are labeled as "hourly", and "non-contracted hourly" companies are labeled as "other". There were only 3 respondents in the contracted outcome-based group and only 2 respondents in the "other NCM" group. One worker who participated in the general satisfaction questions did not participate in the satisfaction with NCM questions.

As before, when someone declined to respond to a statement or said it wasn't applicable the number of respondents in the far right column of the following table drops. For the question about return-to-work concerns (question 7) quite a few workers said that the statement didn't apply because discussion of RTW had not begun.

There was a high level of satisfaction with NCM, with lower scores indicating higher satisfaction (Table 4 and Table 5). Workers were satisfied with timing of response to phone calls, the role of the NCM in the workers recovery, answers to questions, coordination of health care visits and medications, decision making, help connecting with health care providers, addressing concerns about RTW, communication with the NCM, friendliness of the NCM, concern the NCM showed for the workers, ability to communicate in a way that was understandable to the worker, amount of time spent with the worker, and the worker's confidence in the NCM (Table 4 and Table 5). There were small variations in satisfaction levels by type of NCM firm, but the numbers in each category were too small to draw any conclusions about satisfaction by type of firm.

**Table 4.** Satisfaction with NCM by Type of NCM Company, Questions 15-23

1=Strongly agree 2=Somewhat agree 3=Somewhat disagree 4=Strongly disagree		Average Score	Median score	Range	Respondents (N)
<b>Q15. The NCM(s) answered my telephone calls promptly.</b>	Any NCM	1.2	1.0	1-3	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.3	1.0	1-3	14
	NC Hourly NCM	1.0	1.0	1	2
<b>Q16. The NCM(s) played an important role in my recovery.</b>	Any NCM	1.2	1.0	1-3	19
	Outcome NCM	1.3	1.0	1-2	3
	Hourly NCM	1.2	1.0	1-3	14
	NC Hourly NCM	1.0	1.0	1	2
<b>Q17. I was satisfied with the answers the NCM(s) gave to my questions.</b>	Any NCM	1.3	1.0	1-3	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.3	1.0	1-3	14
	NC Hourly NCM	1.5	1.5	1-2	2
<b>Q18. The NCM(s) made sure the medical visits and medicines were well coordinated.</b>	Any NCM	1.1	1.0	1-2	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.1	1.0	1-2	14
	NC Hourly NCM	1.0	1.0	1	2
<b>Q19. The NCM(s) made sure I was in control of decisions about injury care and recovery.</b>	Any NCM	1.4	1.0	1-4	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.5	1.0	1-4	14
	NC Hourly NCM	1.0	1.0	1	2
<b>Q20. The NCM(s) helped connect me with the health care providers.</b>	Any NCM	1.3	1.0	1-4	19
	Outcome NCM	1.3	1.0	1-2	3
	Hourly NCM	1.4	1.0	1-4	14
	NC Hourly NCM	1.0	1.0	1	2

<b>Q21. The NCM(s) focused on my needs and recovery goals.</b>	Any NCM	1.2	1.0	1-4	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.3	1.0	1-4	14
	NC Hourly NCM	1.0	1.0	1	2
<b>Q22. The NCM(s) addressed my concerns about returning to work.</b>	Any NCM	1.4	1.0	1-4	14
	Outcome NCM	1.0	1.0	1	3
<b>5 less responses</b>	Hourly NCM	1.3	1.0	1-3	9
	NC Hourly NCM	2.5	2.5	1-4	2
<b>Q23. It was easy to communicate with the NCM(s).</b>	Any NCM	1.3	1.0	1-2	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.4	1.0	1-2	14
	NC Hourly NCM	1.0	1.0	1-2	2

**Table 5.** Satisfaction with NCM by Type of NCM Company, Questions 24-28

		Average score	Median score	Range	Respondents (N)
<b>1=Very good</b>					
<b>2=Good</b>					
<b>3=Fair</b>					
<b>4=Poor</b>					
<b>5=Very poor</b>					
<b>Q24. Friendliness/courtesy of the NCM(s)</b>	Any NCM	1.2	1.0	1-2	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.1	1.0	1-2	14
	NC Hourly NCM	1.5	1.5	1-2	2
<b>Q25. Concern the NCM(s) showed for my questions or worries</b>	Any NCM	1.3	1.0	1-3	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.3	1.0	1-3	14
	NC Hourly NCM	2.0	2.0	1-3	2
<b>Q26. Degree to which the NCM(s) talked with me using words I could understand</b>	Any NCM	1.2	1.0	1-2	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.2	1.0	1-2	14
	NC Hourly NCM	1.0	1.0	1	2

<b>Q27. Amount of time the NCM(s) spent with me</b>	Any NCM	1.6	1.0	1-4	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.6	1.0	1-4	14
	NC Hourly NCM	2.0	2.0	1-3	2
<b>Q28. My confidence in the NCM(s)</b>	Any NCM	1.4	1.0	1-3	19
	Outcome NCM	1.0	1.0	1	3
	Hourly NCM	1.4	1.0	1-3	14
	NC Hourly NCM	2.0	2.0	1-3	2

In summary, among workers who had a NCM and completed the 12 and/or 18-month surveys, there was a high level of satisfaction with nurse case management.

Limitations

- Due to the very small numbers, any differences between non-contracted hourly and contracted outcome-based NCM must be interpreted with caution.
- Interpretation of the responses to question 27 is difficult. It is hard to know if responding “fair” or “poor” is because the worker feels the NCM spent too little time with them or too much.

**Open Ended Questions**

Participants with NCM were also asked 4 open-ended questions. A summary will be provided here, but a more complete listing will be provided in Appendix D.

Workers almost without exception had only good things to say about the nurse case managers. Descriptions of the nurse case manager included “awesome!”, “excellent!”, “very good” (2 workers), “very nice and courteous”, “promptly returned phone calls and texts”, “polite”, “cared about my well-being”, “couldn’t recommend high enough”, “very caring”, “treated me like family” which they really liked, and “essential to recovery”.

Occasionally it seemed some workers were confused by the roles and/or training of the people involved in their claim. This is not entirely surprising considering that the workers’ compensation system may be new to the worker, the worker has had a catastrophic injury which might involve a coma, or a head injury, and some of these workers have probably very little exposure to the complex health care system and variety of rehabilitation disciplines. The majority of the contacts with the NCM and vocational rehabilitation counselors (VRCs) in rural areas might be by phone so it’s easy to mix up people particularly if recovering from a head injury. One worker reported having 4 nurse case managers but actually only had 2, but also had 2 VRCs. It is likely this worker was confused about the difference. Although having more than one provider of any role is sometimes unavoidable because of job changes, illness, etc., it may

confuse a worker. The one thing that worker would have changed would have been to have fewer NCMs. Those who had more than one NCM company involved in their care also had lower satisfaction scores.

One of the major themes in the comments address how the nurse case managers enhanced communication and understanding of the workers' compensation process. Frequently workers mentioned that the NCM answered questions. Workers also mentioned: "willingness to explain the whole process was excellent," "always available for questions or concerns," "helped tremendously explaining everything." One worker said "the NCM helped the claims manager and doctor understand me better". Another worker mentioned that the NCM helped get an additional condition added to the claim, which had been missed by the specialists who were focused on their specialties and not looking at the whole person.

Twenty workers responded to the open-ended questions about nurse case management.

**1. If you could change one thing about you nurse case management, what would it be?**

- 12 of the 20 said there was nothing that could be improved.
- 7 of the 20 said the only improvement would have been having the NCM for longer.

One worker mentioned that he didn't realize how much the NCM did until there were no more NCM services. One worker said he felt "abandoned" when L&I asked the NCM to end services.

**2. What was the best part of your experience with the nurse case manager(s)?**

- 2 of the 20 said the NCM knew how to make things happen
- 1 worker mentioned that the NCM knew everything and asked questions of the doctor that the worker & family didn't know to ask.
- 6 workers mentioned that the NCM answered questions
- 2 mentioned the NCMs' communication skills
- 1 worker mentioned the NCM coming to the doctor appointments
- 3 mentioned the NCMs caring or support

**3. What was the worst part of your experience with the nurse case manager(s)?**

- 16 workers reported no bad parts. More than 3 workers said the only bad part was when the NCM wasn't part of the worker's care team either before the NCM was added or when they were asked to end their services by L&I.
- One said the worst part was that the NCM couldn't help with the food and mileage reimbursements. This is a claim manager role.



**4. Is there anything else you want us to know about your experience with the nurse case manager(s)?**

- 9 had nothing further to say
- 10 had only positive comments
- 1 said “There wasn’t always a translator.”

*Summary of Comments about NCMs*

- The workers were almost exclusively enthusiastic satisfaction with NCM services
- There was some confusion about roles and/or training of those involved in their claim (vocational rehabilitation counselors vs. claim manager vs. NCM)
- Half of the workers who had contracted hourly NCMs volunteered that they wished that the NCM had provided services to the worker longer. That was not mentioned by those with NCMs from contracted outcome-based companies.

## References

Interview data were collected and managed using REDCap electronic data capture tools hosted at the Institute of Translational Health Sciences.<sup>1,2</sup> REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.

[1] REDCap at ITHS is supported by the National Center For Advancing Translational Sciences of the National Institutes of Health under Award Number UL1 TR002319.

[2] Paul A. Harris, Robert Taylor, Robert Thielke, Jonathon Payne, Nathaniel Gonzalez, Jose G. Conde, Research electronic data capture (REDCap) – A metadata-driven methodology and workflow process for providing translational research informatics support, *J Biomed Inform.* 2009 Apr;42(2):377-81.

## Appendices

<b>Appendix A.</b> General Satisfaction Questions .....	Page 26
<b>Appendix B.</b> General Satisfaction Open-Ended Questions & Responses .....	Page 28
<b>Appendix C.</b> Satisfaction with NCM Questions .....	Page 37
<b>Appendix D.</b> Satisfaction with NCM Open-Ended Questions & Responses .....	Page 40

## Appendix A

Confidential

Page 1

### Patient Satisfaction Survey: L&I

---

The next questions are about your health care for the L&I injury.

For each statement, please indicate whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree. Please choose the answer that best describes your experience with L&I after the work injury.

---

The medical visits and medicines were well coordinated.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree
- N/A or prefer not to answer

---

I felt in control of the decisions about injury care and recovery.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree
- N/A or prefer not to answer

---

I felt connected with the health care providers.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree
- N/A or prefer not to answer

---

These next questions are about your experience with Labor and Industries (L&I).

---

My overall experience with L&I was good.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree
- N/A or prefer not to answer

---

I was satisfied with the answers L&I staff gave to my questions.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree
- N/A or prefer not to answer

---

L&I focused on my needs and recovery goals.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree
- N/A or prefer not to answer

---

L&I addressed my concerns about returning to work after the injury.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree
- N/A or prefer not to answer

---

It was easy to communicate with L&I staff.

- Strongly agree
- Somewhat agree
- Somewhat disagree
- Strongly disagree
- N/A or prefer not to answer

---

For the next questions please respond with very good, good, fair, poor, or very poor.

---

Friendliness/courtesy of L&I staff

- Very good
  - Good
  - Fair
  - Poor
  - Very poor
  - N/A or prefer not to answer
- 

Concern the L&I staff showed for your questions or worries

- Very good
  - Good
  - Fair
  - Poor
  - Very poor
  - N/A or prefer not to answer
- 

Now some questions that you can answer in your own words. If we use your exact words in a report or presentation we will not include your name or any identifying information.

---

The consent said if we report quotes it will be anonymously?

- Yes
  - No
- 

If you could change one thing about the L&I process, what would it be?

\_\_\_\_\_

---

What was the best part of your experience with L&I?

\_\_\_\_\_

---

What was the worst part of your experience with L&I?

\_\_\_\_\_

---

Is there anything else you want us to know about your experience with L&I?

\_\_\_\_\_

---

Thank you for taking this survey! We will send you a \$50 USBank cash card for being in this study. Please write your address in the box below, and include a phone number where we can reach you in case we have questions about sending the card. You may also include your email address if you would like to be contacted via email.

\_\_\_\_\_

---

Please call 1-866-866-0142 or email [wcinjury@uw.edu](mailto:wcinjury@uw.edu) with any questions.

## Appendix B

### General Satisfaction Open Ended Questions

- Not all workers consented to have their comments reported.
- Comments have been edited to maintain the confidentiality of both the worker and the NCM.
- Each row below is an individual worker.

If you could change one thing about the L&I process, what would it be?	What was the best part of your experience with L&I?	What was the worst part of your experience with L&I?	Is there anything else you want us to know about your experience with L&I?
I would have L&I put more attention to people, sometimes people need more attention and they do not give what is required.	The medical care I received at Harborview was the best part of my care provided by L&I.	[Removed because the comment was identifying.]	When L&I sends you to have exams done the people there do not care if you are in pain; the examiners for instance would move my arm whichever way they wanted even though I was in a lot of pain.
I would like more rapid response or find out some things faster.	I was never expecting to receive any support from them, that was causing me some stress at first, because I didn't know what to do, but I am very happy about all of the support I received from them.	There is nothing.	No, just thanks!
In my case, I am not likely to walk, but L&I should focus on research to help people find out about new research to help people increase their movement. There is	Their attention and concern for our well-being. They focus on our recovery.	No bad part up until today.	They are excellent and their personnel is very professional. I have never experienced anything negative.

If you could change one thing about the L&I process, what would it be?	What was the best part of your experience with L&I?	What was the worst part of your experience with L&I?	Is there anything else you want us to know about your experience with L&I?
not much of that in this region.			
Everything at L&I was perfect; but when they sent me to the therapy, I first noticed that there were many people in my same situation that were going alone, in process of divorce and there was no support for them. Because many people in that situation end up getting divorced and the stress becomes even more overwhelming. That is once people start going to the physical therapy. I wish there would be more support for that.	Thanks to L&I I have my life back.	I do not have any.	I have no complaints; my family has not been by my side and only L&I has been helping me and supporting me. I would give them five stars!
To be able to work with someone who I feel isn't too over worked	The fact that they took care of all my injury bills	Having to work with someone I felt like didn't have my best interests in mind	
get rid of [name removed], doctor	I'm getting paid, at least something	When they sent me to Seattle, and I didn't want to go to brain injury rehab.	No. Don't trust anything about them.
To make sure the person is taken care of 1st no matter what some clerk in an office says. While in the hospital the	When done with L&I. Once they ok'd the claim it was such a relief.	The fear when he was told the claim was denied as he lay in his hospital bed.	Nothing.

If you could change one thing about the L&I process, what would it be?	What was the best part of your experience with L&I?	What was the worst part of your experience with L&I?	Is there anything else you want us to know about your experience with L&I?
company denied the claim and so he had to get a lawyer. Take care of the person first. It scared him and, in his fear, & medicated status he signed 3rd party paperwork he regrets signing now. Take care of the money later.			
Wouldn't change anything	None	Slowness of decisions	Not really. Wouldn't want to have L&I's job.
Streamline it.	Seemed to be a particular immediacy with the people at the state office. They followed up as they promised and found information as quickly as possible.	They had reasonable hours but sometimes I'd like to call them outside of those hours. I can't complain.	I was surprised by how efficient they were and how genuine in their feelings of understanding and kindness once they understood the degree of my injury.
The way they started out with their doctors. The first doctor they sent me to was totally unwilling to work with me. Said I was too sick.	The [brain rehab]. A good school, but a little confusing. They started me out moving things around like I was loading a truck trailer. They'd try to get me to pick up heavy weights but later wouldn't let me lift up that heavy of weights.	Not letting him do challenging things at the [rehab program] per spouse.	
Nothing to change.	The payment of the costs and	Until now, nothing has been bad.	



If you could change one thing about the L&I process, what would it be?	What was the best part of your experience with L&I?	What was the worst part of your experience with L&I?	Is there anything else you want us to know about your experience with L&I?
	medications they have been very responsive and have not charged me anything.	Without them I would not be able to pay for any of my tests or treatments.	
Better communication between IW & 3rd party companies, such as vocational CDMS sub-contractor.		The independent medical exam, performed by [name removed] was TRULY A JOKE. Very obvious that this process is to try & provide some kind of paper work to satisfy L&I guidelines rather than to really perform a meaningful medical exam based on injuries for the IW (injured worker) And make the IME company a substantial amount of tax payer money that in my opinion, is not really earned....	
To help and understand more the risk of my health	When they accept my claim	When they stop my help	No
Amount of time it takes	Helped explain things	Processing time	No
No change	Dependable	I was only issued under [\$ amount] a month for an accident that has had me out of work for almost 2 years	No nothing else
The L&I website was initially difficult to	The staff and medical process. The case	The final IME review process (with travel)	The process was well managed, and the

If you could change one thing about the L&I process, what would it be?	What was the best part of your experience with L&I?	What was the worst part of your experience with L&I?	Is there anything else you want us to know about your experience with L&I?
<p>navigate based on the complexity of choices. My traumatic brain injury in had a small role in the difficulty. I am experienced with parts of IT and still had to follow multiple links and backtrack to find the correct end result of my query.</p>	<p>manager was easily reached by phone and email.</p>	<p>for evaluation of impairment rating was somewhat tedious. I understand the need for an unbiased decision, but the medical staff involved in my treatment throughout most of the process would likely be better suited to make an assessment. The more technical aspect of my evaluation was performed with older equipment and an update of the machinery may be helpful for an evaluation. I am pleased with the overall result of my impairment rating (no significant impairment), so the final decision was as expected and very reasonable to me.</p>	<p>staff interaction was wonderful.</p>
<p>Better communication by voice communication</p>	<p>When I was done</p>	<p>Return to work. Put back to work more quickly than he felt he should have at light duty. "Each person progresses differently and has their own unique</p>	<p>The nurses at the hospital were much nicer than the doctors who sometimes didn't listen. They were trying to give me some blood thinners.</p>

If you could change one thing about the L&I process, what would it be?	What was the best part of your experience with L&I?	What was the worst part of your experience with L&I?	Is there anything else you want us to know about your experience with L&I?
		<p>needs. The PT was supposed to start while working which was difficult. Not everyone fits into their category blocks.</p> <p>I was more motivated to go back to work, so I wanted to push a little a little more, so I fell outside their boxes."</p>	<p>At one point my wife said, "he said, "no" When I was half asleep, they tried to get me to sign something. [The hospital] was EXCELLENT &amp; the nurses were awesome as was the surgeon. The aftercare (outpatient care) wasn't so great, though."</p>
<p>Not to generalize people. They used the statistics at me about the dangers of not going back to work</p>	<p>Not going broke! CM is second best. She was honest &amp; would answer everything. He trusted her.</p>	<p>Paperwork</p>	<p>Sometimes the voc people would go behind my back to get my boss to offer me a job with low salary. I got pushed to go back a little early, but my boss was really good to me. It worked out. Some people always suspected me, but my CM always believed I would go back to work.</p>
<p>Stop acting like an HMO</p>	<p>They listened to my doctors</p>	<p>Trying to end coverage too soon</p>	<p>In the end they did the right thing</p>
<p>Care more for the injured worker, not the money that might have to go out.</p>	<p>They opened my claim immediately, at the beginning communication was excellent</p>	<p>Stopping my therapy even though I continually showed improvement...rules need to be changed.</p>	<p>All in all they seemed fair, but they sent me to an IME to get his independent take on my impairment...he said I was [xx]% impaired, then they gave it to their in house medical</p>

If you could change one thing about the L&I process, what would it be?	What was the best part of your experience with L&I?	What was the worst part of your experience with L&I?	Is there anything else you want us to know about your experience with L&I?
			person who changed it to [xx]%...there are many things I will never do again: [list removed], drive a vehicle with 100% confidence that I might react quickly, climb a ladder...but hey what does the IME know. I mean why bother if they are going to change the findings of the doctor they hired????????????
Communication - they don't communicate promptly even with my attorney e.g., appeals.	None	Just the dragging it out and taking so much time.	They need to care about the workers' wellbeing although they pretend to.
My partner had power of attorney, but they didn't treat her as if she was me. They wouldn't take her word for it even when I was drugged up. Even though they had the paperwork.	When the accident happened, they were on the spot and everything was taken care of. The early care was pretty smooth.	As soon as I was back to work, they wanted to rush to close the case even though I still had medical care needs so I'm trying to get reopened.	No
Listen to people over concern about their money.	None	Noncompassion, they don't care	No
Better communication with the patient.	I don't know.	Trying to get paperwork over to them.	No

If you could change one thing about the L&I process, what would it be?	What was the best part of your experience with L&I?	What was the worst part of your experience with L&I?	Is there anything else you want us to know about your experience with L&I?
Nothing.	For me everything was great.	Nothing. Everything was good.	Nothing, because for me everything went well. I did not have a problem. Until now there is no problem.
Nothing, everything was good.	The treatment I receive and the patience everyone had.	There was nothing too bad.	No.
Get a timely call back and IME appointments closer than 160 miles. I have to go to Seattle 3x this week for IME appointments and they told me that was the closest they could arrange when I know they have IME doctors in Vancouver [the closest large city]. AND they don't reimburse me for my work missed and my work won't pay me.	Can't think of any	Multiple CM's don't seem to know what is going on and won't approve a prosthesis which they don't understand.	Better not to have experience with L&I
Don't push back to work	Beginning was good because I didn't have to worry about work.	Was pushed to return to work before my boss & I were ready because the environment was not good for recovery	
Legally authorized representative: It would be great if [the claim manager] could be more communicative;	They have always supported us our care wishes for the worker.	Nothing	Nothing

If you could change one thing about the L&I process, what would it be?	What was the best part of your experience with L&I?	What was the worst part of your experience with L&I?	Is there anything else you want us to know about your experience with L&I?
reach out to us on the phone with updates about what is going on. I believe they call the lawyer, but we often do not speak to them.			
	THEY REALLY SEEMED CONCERNED ABOUT MY HUSBAND AFTER HIS INJURY		
Not much, in my case they supported me in all my needs. So, I would not change anything.	Everything until now; although my case has not been closed, everything is going well.	The worst part was when they denied my treatment for something I fractured in my accident, but for some reason L&I denied my treatment.	Nothing else to add.
Nothing right now	Response time. L&I always willing to foot the bill.	Nothing right now	Not really
L&I doesn't understand my industry: how payment is structured & the process of work (union based)	Claim mgr very responsive to my needs for getting home. I said I would need a ramp to get home and she set about getting it made within a couple days.	Paperwork	
Too much paperwork	Every time I call my CM, she showed care & concern for my wellbeing & how I was doing before answering my questions or dealing with my call.	Having to go through it. Trying to learn the process & how to do the paperwork, coordinate between L&I, Job & doctor. This was stressful initially, but it got easier.	

## Patient Satisfaction Survey

Name of NCM(s) \_\_\_\_\_

According to L&I records, a nurse case manager (NCM) was assigned to help you after the injury. The next questions are about your experience with the NCM service. Your nurse case manager(s) was/were [ncm\_name].

If you had more than one nurse case manager, please average your response. At the end you can comment about particular NCMs.

Please indicate whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with each statement.

The NCM(s) answered (or returned) my telephone calls promptly.

- Strongly agree  
 Somewhat agree  
 Somewhat disagree  
 Strongly disagree  
 N/A or prefer not to answer

The NCM(s) played an important role in my recovery.

- Strongly agree  
 Somewhat agree  
 Somewhat disagree  
 Strongly disagree  
 N/A or prefer not to answer

I was satisfied with the answers the NCM(s) gave to my questions.

- Strongly agree  
 Somewhat agree  
 Somewhat disagree  
 Strongly disagree  
 N/A or prefer not to answer

The NCM(s) made sure the medical visits and medicines were well coordinated.

- Strongly agree  
 Somewhat agree  
 Somewhat disagree  
 Strongly disagree  
 N/A or prefer not to answer

The NCM(s) made sure I was in control of decisions about injury care and recovery.

- Strongly agree  
 Somewhat agree  
 Somewhat disagree  
 Strongly disagree  
 N/A or prefer not to answer

The NCM(s) helped connect me with the health care providers.

- Strongly agree  
 Somewhat agree  
 Somewhat disagree  
 Strongly disagree  
 N/A or prefer not to answer

The NCM(s) focused on my needs and recovery goals.

- Strongly agree  
 Somewhat agree  
 Somewhat disagree  
 Strongly disagree  
 N/A or prefer not to answer

---

The NCM(s) addressed my concerns about returning to work.

- Strongly agree  
 Somewhat agree  
 Somewhat disagree  
 Strongly disagree  
 N/A or prefer not to answer

---

It was easy to communicate with the NCM(s).

- Strongly agree  
 Somewhat agree  
 Somewhat disagree  
 Strongly disagree  
 N/A or prefer not to answer

---

For the next questions please respond with very good, good, fair, poor, or very poor.

---

Friendliness/courtesy of the NCM(s)

- Very good  
 Good  
 Fair  
 Poor  
 Very poor  
 N/A or prefer not to answer

---

Concern the NCM(s) showed for my questions or worries

- Very good  
 Good  
 Fair  
 Poor  
 Very poor  
 N/A or prefer not to answer

---

Degree to which the NCM(s) talked with me using words I could understand

- Very good  
 Good  
 Fair  
 Poor  
 Very poor  
 N/A or prefer not to answer

---

Amount of time the NCM(s) spent with me

- Very good  
 Good  
 Fair  
 Poor  
 Very poor  
 N/A or prefer not to answer

---

My confidence in the NCM(s)

- Very good  
 Good  
 Fair  
 Poor  
 Very poor  
 N/A or prefer not to answer

---

Now some questions that you can answer in your own words. If we use your exact words in a report or presentation we will not include your name or any identifying information.

---

If you could change one thing about your nurse case management, what would it be?

---



---

What was the best part of your experience with nurse case manager(s)?

---



---

What was the worst part of your experience with the nurse case manager(s)?

---

---

Is there anything else you want us to know about the nurse case manager(s)?

---

---

Thank you for taking this survey! We will send you a \$50 USBank cash card for being in this study. Please write your address in the box below, and include a phone number where we can reach you in case we have questions about sending the card. You may also include your email address if you would like to be contacted via email.

---

Please call 1-866-866-0142 or email [wcinjury@uw.edu](mailto:wcinjury@uw.edu) with any questions.

## Appendix D

### Satisfaction with NCM Open Ended Questions

- Not all workers consented to have their comments reported.
- Comments have been edited to maintain the confidentiality of both the worker and the NCM.
- Each row below is an individual worker.

If you could change one thing about your nurse case management, what would it be?	What was the best part of your experience with nurse case manager(s)?	What was the worst part of your experience with the nurse case manager(s)?	Is there anything else you want us to know about the nurse case manager(s)?
Would not change anything about my NCM, [the NCM] has worked really well with me.	The best part was that [the NCM] was always ready to help me like when I needed a new prescription refill, [the NCM] would move things around. I am very satisfied.	I do not have any bad experiences.	My experience --I am very happy and very grateful. I was expecting not to receive any help. But thanks to L&I, I was. I understand why they are monitoring worksites and collect taxes. I am very thankful for their work and I know I am not the only one that receives help from them. Thanks to their help I am not living under a bridge. I feel very thankful for them.
Should have stayed involved longer in my care	Showed up at doctor's appointments	They work for L&I	No
Nothing. [The NCM] is awesome.	The NCM calls me [the legally authorized representative] to keep in touch.	No	[The NCM] does a wonderful job of talking to the worker, not the LAR.
Can't think of anything	Easy to talk to & answered questions so worker could understand	No	Not really

If you could change one thing about your nurse case management, what would it be?	What was the best part of your experience with nurse case manager(s)?	What was the worst part of your experience with the nurse case manager(s)?	Is there anything else you want us to know about the nurse case manager(s)?
Nothing.	Getting support and anything I needed I could go to [the NCM] and [the NCM] would answer any of my questions. [The NCM] was coordinating everything--from medications to other things. The treatment I received and the patience. [The NCM] was very involved.	No other bad part.	[The NCM] did a great job.
Extend the NCM for longer periods of time	[The NCM] knew everything and who to get a hold of. [The NCM] was all over everything. Asked questions of doctors that we didn't know to ask.	Not having [the NCM] long enough.	Everyone should have one.
Legal guardian: Right now, we would love to get more updates; to hear how everything is going and get a phone call to hear updates.	[The NCM] has always supported us [the family] a lot. Whenever we were able to speak with [the NCM (and understood each other) it went very well.	Nothing	Sometimes there was no translator.
I would not change anything to do with my NCM. [The NCM is a very good person, that speaks very clearly and tells you how things are --I would not change a thing.	[The NCM] was always so supportive--always made me feel that I should not give up, that even though things happen we must continue and move forward.	No bad experience.	No feedback, NCM should continue as is and continue to do what [the NCM] does to help people.

If you could change one thing about your nurse case management, what would it be?	What was the best part of your experience with nurse case manager(s)?	What was the worst part of your experience with the nurse case manager(s)?	Is there anything else you want us to know about the nurse case manager(s)?
Nothing, nothing to change. My NCM know how to do [the] job and thanks to [the NCM] my case advanced much faster than it could have. [The NCM] knew how to advise me on my needs and healthcare treatment.	Everything was perfect. I have no complaints. [The NCM] helped me more than anything.	The only bad thing was that [the NCM] was not present at the start of my case but from when [the NCM] arrived everything has been great!	[The NCM] was excellent, always in contact, who to contact, an excellent nurse. Since [the NCM] took over the case, everything went faster.
Wished the first NCM had been able to continue as the NCM the entire time.	Always willing to answer questions and called right back. They were good at coordinating service providers.	Difficulty communicating with the 2nd NCM.	Not really

## Chapter 3

### **Worker Interviews – Self-Reported Outcomes**

#### **Interview Methods**

The Department of Labor and Industries (L&I) identified workers with catastrophic injuries between October 2016 and October 2018 and provided names and contact information to the University of Washington for the worker interviews. Workers with an accepted claim for a non-fatal catastrophic injury who were at least 18 years of age at the time of injury and spoke English or Spanish were eligible for the interviews. A total of 197 workers were eligible for the baseline interview. The baseline worker interviews were conducted a few weeks after injury (mean 1.4 months, median 1.1 months, minimum 0.4 months, maximum 4.5 months) and follow-up interviews were conducted approximately 6, 12, and 18 months after injury. Phone interviews could be completed in either English or Spanish. The option for workers to complete the interview on-line (in English) was added after about 6 months. (We will primarily use the term interview throughout this report to refer to both the interviews conducted by phone and the surveys completed on-line.) Interviews completed in Spanish were either conducted with the use of a Spanish translator or with a Spanish speaking interviewer. Interviews were conducted with the injured worker or with a surrogate (a legally authorized representative) if the worker was unable to respond to the interview personally. Eligible workers were sent an introductory letter and were then contacted by phone. Eligibility was confirmed and cognitive capacity was assessed. Workers could consent to participate or not. Workers who did complete the interviews could choose to skip any question in the interview or survey. Workers received a small incentive payment for participation in each interview. The research was approved by the University of Washington Institutional Review Board.

The interviews collected information on measures of disability, community integration, social support, and functional status. Injured workers were also asked about satisfaction with health care, satisfaction with L&I, and satisfaction with nurse case management (if they received it) at interviews conducted 12 and 18 months after injury. Interview responses were collected and managed using REDCap electronic data capture tools hosted at the Institute of Translational Health Sciences (ITHS) at the University of Washington.<sup>1</sup>

The response rates were relatively high. Out of all workers who were eligible for the baseline interview, the response rate was 49%. For the 6, 12, and 18 month interviews, the response rates were 74%, 64%, and 62% respectively. The numbers of workers with completed interviews or on-line surveys, with usable data, for each time period are shown below:

- A total of 97 workers completed the baseline interview.
- A total of 68 workers completed the 6 month interview.
- A total of 60 workers completed the 12 month interview.
- A total of 60 workers completed the 18 month interview.

See the appendix for more details on eligibility and exclusions for the worker interviews.

Comparison of respondents and non-respondents to baseline interview

Out of the 197 workers who were eligible for the baseline interview, 97 completed the baseline interview and 100 did not complete the baseline interview. Out of the 97 completed baseline interviews, 13 (13%) were completed by a legally authorized representative, 25 (26%) were completed in Spanish, and 18 (19%) were completed on-line. Over time the percentage of interviews completed by legally authorized representatives decreased (9% at 6 months, 7% at 12 months, and 7% at 18 months).

A comparison of respondents and non-respondents to the baseline interview is shown in Tables 1 – 3 based on claims data received in February, 2020. Respondents and non-respondents were similar on most measures available from the L&I administrative data.

At baseline, survey respondents and non-respondents were comparable in terms of age, gender, marital status, urban/rural residency, and industry (Table 1). A slightly higher proportion of non-respondents did not have any dependents (non-respondents: 74.0% vs. respondents: 63.9%). Respondents and non-respondents were also comparable in terms of the distribution in occupations; however, a slightly higher proportion of respondents (21.6%) were in transportation, compared to non-respondents (13.0%). Fifty-one percent of respondents had at least one comorbid condition (from the Functional Comorbidity Index, FCI), compared to 59% of non-respondents.

**Table 1.** Characteristics of respondents and non-respondents for the baseline interview, N=197

Characteristics	Non-respondents N=100	Respondents N=97	Total N=197
<b>Age at injury, mean (SD)</b>	42.3 (13.1)	44.8 (15.2)	43.5 (14.2)
<b>Sex, n (%)</b>			
Male	91 (91.0%)	94 (96.9%)	185 (93.9%)
Female	9 (9.0%)	3 (3.1%)	12 (6.1%)
<b>Marital Status, n (%)</b>			
Married	40 (40.0%)	47 (48.5%)	87 (44.2%)
Single	59 (59.0%)	50 (51.5%)	109 (55.3%)
Missing	1 (1.0%)	0 (0%)	1 (0.5%)
<b>Dependents, n (%)</b>			
No	74 (74.0%)	62 (63.9%)	136 (69.0%)
Yes	26 (26.0%)	35 (36.1%)	61 (31.0%)
<b>Urban/Rural Residency, n (%)</b>			
Rural	38 (38.0%)	42 (43.3%)	80 (40.6%)
Urban	62 (62.0%)	55 (56.7%)	117 (59.4%)
<b>Occupation, n (%)</b>			
Building	3 (3.0%)	3 (3.1%)	6 (3.0%)
Business	4 (4.0%)	4 (4.1%)	8 (4.1%)
Construction	33 (33.0%)	37 (38.1%)	70 (35.5%)

Farming	8 (8.0%)	7 (7.2%)	15 (7.6%)
Food prep and service	1 (1.0%)	1 (1.0%)	2 (1.0%)
Health care	0 (0%)	1 (1.0%)	1 (0.5%)
Installation, maintenance	10 (10.0%)	8 (8.2%)	18 (9.1%)
Personal care	3 (3.0%)	1 (1.0%)	4 (2.0%)
Production	9 (9.0%)	4 (4.1%)	13 (6.6%)
Sales, office, admin support	6 (6.0%)	1 (1.0%)	7 (3.6%)
Transportation	13 (13.0%)	21 (21.6%)	34 (17.3%)
Unclassifiable	10 (10.0%)	9 (9.3%)	19 (9.6%)
<b>Industry, n (%)</b>			
Agriculture	8 (8.0%)	11 (11.3%)	19 (9.6%)
Arts	6 (6.0%)	3 (3.1%)	9 (4.6%)
Construction	37 (37.0%)	41 (42.3%)	78 (39.6%)
Education	3 (3.0%)	3 (3.1%)	6 (3.0%)
Information	7 (7.0%)	2 (2.1%)	9 (4.6%)
Manufacturing	5 (5.0%)	8 (8.2%)	13 (6.6%)
Retail/wholesale trade	14 (14.0%)	13 (13.4%)	27 (13.7%)
Services	13 (13.0%)	9 (9.3%)	22 (11.2%)
Transportation, warehousing	7 (7.0%)	7 (7.2%)	14 (7.1%)
<b>Functional Comorbidity Index (FCI) score, n (%)</b>			
0	41 (41.0%)	47 (49.0%)	88 (44.9%)
1	27 (27.0%)	20 (20.8%)	47 (24.0%)
2	17 (17.0%)	15 (15.6%)	32 (16.3%)
3	12 (12.0%)	9 (9.4%)	21 (10.7%)
4	3 (3.0%)	3 (3.1%)	6 (3.1%)
5	0 (0%)	1 (1.0%)	1 (0.5%)
7	0 (0%)	1 (1.0%)	1 (0.5%)

Respondents and non-respondents were comparable in terms of injury severity, with 66% of respondents experiencing an injury that was rated as “serious/critical”, compared to 61% of non-respondents (Table 2). (See Chapter 5 for more details on the injury severity score.) The body part and nature of injury varied between respondents and non-respondents; however, injuries involving multiple body parts were prevalent for both non-respondents (60.0%) and respondents (69.1%). A higher proportion of non-respondents experienced injury to the trunk (18.0%), compared to respondents (9.3%). A higher proportion of respondents experienced injury to the head or neck (14.4%), compared to non-respondents (9.0%). In terms of the nature of injuries, fractures and fractures in combination with other injuries were common among respondents and non-respondents.

**Table 2.** Characteristics of injury by respondents and non-respondents, N=197

Characteristics	Non-respondents N=100	Respondents N=97	Total N=197
<b>Body part of injury<sup>a</sup> , n(%)</b>			
Head or neck	9 (9.0%)	14 (14.4%)	23 (11.7%)
Lower extremities	3 (3.0%)	2 (2.1%)	5 (2.5%)
Trunk	18 (18.0%)	9 (9.3%)	27 (13.7%)
Upper extremities	8 (8.0%)	3 (3.1%)	11 (5.6%)
Multiple body injuries	60 (60.0%)	67 (69.1%)	127 (64.5%)
Others	2 (2.0%)	2 (2.1%)	4(2.0%)
<b>Nature of injuries<sup>b</sup></b>			
Amputations	4 (4.0%)	3 (3.1%)	7 (3.6%)
Other open wounds	7 (7.0%)	2 (2.1%)	9 (4.6%)
Fractures	44 (44.0%)	30 (31.0%)	74 (37.6%)
Fractures and others	16 (16.0%)	30 (31.0%)	46 (23.4%)
Head/brain injuries	4 (4.0%)	8 (8.2%)	12 (6.1%)
Soreness, sprains, tears	1 (1.0%)	0 (0%)	1 (0.5%)
Surface wound, bruises, burns	4 (4.0%)	7 (7.2%)	11 (5.6%)
Multiple injuries	16 (16.0%)	13 (13.4%)	29 (14.8%)
Others	4 (4.0%)	4 (4.1%)	8 (4.1%)
<b>Injury severity, n (%)</b>			
1 or 2 (minor/moderate)	37 (37.0%)	32 (33.0%)	69 (35.0%)
3 - 5 (serious/critical)	61 (61.0%)	64 (66.0%)	125 (63.5%)
Missing	2 (2.0%)	1 (1.0%)	3 (1.5%)

<sup>a</sup> **Head or neck:** injuries to the brain, cranial region, eye(s), head, scalp, neck (except internal location of disease or disorders), and/or skull; **lower extremities:** injuries to the ankle(s), foot (feet), leg(s), heel(s), knee(s), and/or thigh(s); **trunk:** injuries to the back (including the spine or spinal cord), internal abdominal location, chest (except internal location of diseases or disorders), heart, pelvic region, pelvis, hip(s), lumbar region, scrotum, trunk, and/or the thoracic region; **upper extremities:** injuries to the shoulder (including clavicle, scapula), elbow(s), forearm(s), hand(s), arm(s), wrist(s), finger(s), and/or fingernail(s); **multiple body:** injuries in multiple back region, multiple body parts, multiple face locations, multiple head locations, multiple leg(s) locations, multiple lower extremities locations, multiple pelvic region locations, multiple trunk locations, and/or multiple upper or missing

<sup>b</sup> **Amputations:** amputations (with and without fingertip); **other open wounds:** avulsions, cuts, lacerations, open wounds, gunshot wounds, punctures, and/or animal or insect bites; **fractures:** fractures; **fractures and others:** fractures in combination with other injuries or burns; **head/brain injuries:** cerebral hemorrhages, concussions, intracranial injuries, loss of consciousness--not heat related, and/or anoxic brain damage; **soreness, sprains, tears:** crushing injuries, back pain or hurt back, soreness/pain/hurt except the back, dislocations, and/or sprains, strains, tears; **surface wounds, bruises, burns:** bruises, contusions, heat burns, scalds, electrical burns; **multiple injuries:** other combinations of traumatic injuries and disorders, multiple traumatic injuries to bones, nerves, or spinal cord, multiple intracranial injuries, and/or sprains and bruises; **others:** other diseases, conditions, and disorders, nonclassifiable nature of injuries, chronic obstructive pulmonary diseases and allied conditions, ischemic heart disease, myocardial infarction (heart attack), electrocutions or electric shocks, other poisonings and toxic effects, and/or other traumatic injuries and disorders or missing



Claim status and claim closures (as of February, 2020) were similar among respondents and non-respondents (Table 3).

**Table 3.** Characteristics of respondents and non-respondents by injury date and claim types as of February 2020

Characteristics	Non-respondents N=100	Respondents N=97	Total N=197
<b>Claim types, n (%)</b>			
Rejected	1 (1.0)	0 (0)	1 (0.5)
Compensable	71 (71.0)	71 (73.2)	142 (72.1)
Fatal	0 (0)	0 (0)	0 (0)
TPD/pension	3 (3.0)	3 (3.1)	6 (3.1)
Kept on salary	24 (24.0)	21 (21.7)	45 (22.8)
Loss of earning power	1 (1.0)	2 (2.1)	3 (1.5)
<b>Claim closed, n (%)</b>	49 (49.0)	45 (46.4)	94 (47.7)
within 1 year of injury	16 (32.7)	13 (28.9)	29 (30.9)
within 2 year of injury	36 (73.5)	39 (86.7)	75 (79.8)

### Results – Self-Reported Outcomes

The baseline interviews included some questions that asked workers (or their surrogates) about the time period before injury (pre-injury) and other questions asked for the workers’ responses at the time of the interview. The interviews collected information on measures of disability, community integration, social support, and a measure of risk of long-term disability. We used the 36-item World Health Organization Disability Assessment Schedule 2.0 (WHODAS) to assess disability. We also used the Community Integration Questionnaire (CIQ) and the Multidimensional Scale of Perceived Social Support (MSPSS). We report on questions from the Functional Recovery Questionnaire (FRQ) including work status at the time of interview, pain interference with the ability to work, number of pain sites, whether light duty is available at work, return to work expectations, and concern that work may make the injury worse. (References for these scales are provided at the end of this report.)

During the baseline interview, workers were asked about disability, community integration, and social support prior to their injury. The pre-injury measures of disability, community integration, and social support are shown in Table 4 for workers who received nurse case management (NCM) and those who did not receive any NCM services. At the time of the baseline survey, the mean pre-injury WHODAS scores were slightly higher (implying slightly more limitations) among cases with no NCM after injury than for those who had NCM after injury, but the differences were small. The pre-injury community integration and social support scores were roughly equal for cases with and without NCM. (In each of the following tables, the number of workers with complete data for each score is shown in the columns labeled “N”. The

numbers vary slightly because workers may choose to skip some questions during the interview or survey.)

**Table 4.** Pre-injury WHODAS, CIQ, and MSPSS scores

Measure	NCM		No NCM		Total		Range
	N	mean	N	Mean	N	mean	
<b>WHODAS</b>							Higher scores = greater limitation
Cognition	30	1.83	67	5.52	97	4.38	0-100
Mobility	30	2.08	67	4.94	97	4.06	0-100
Self-Care	30	0.00	67	3.88	97	2.68	0-100
Getting along	30	1.39	67	6.22	97	4.73	0-100
Life activities, domestic	30	1.33	67	6.27	97	4.74	0-100
Life activities, work and school	30	4.67	67	6.57	97	5.98	0-100
Participation	30	2.78	66	6.69	96	5.47	0-100
WHODAS total score	30	2.09	66	5.72	96	4.59	0-100
							0-100
<b>Community Integration Questionnaire (CIQ)</b>							Higher scores = more independent/capable
Home integration	28	5.57	65	5.34	93	5.41	0-10
Social Integration	29	9.00	64	8.84	93	8.89	0-12
Productive Activity	30	5.57	67	5.72	97	5.67	0-7
CIQ total score	28	20.21	62	20.26	90	20.24	0-27
<b>Multidimensional Scale of Perceived Social Support</b>							Higher scores = more support
Significant other	29	6.05	66	5.95	95	5.98	1-7
Friends	30	6.03	63	5.47	93	5.65	1-7
Family	29	5.88	64	5.79	93	5.82	1-7
Total	28	6.01	61	5.74	89	5.82	1-7

At the time of the 6 month survey (Table 5), the workers who did not receive NCM had much lower WHODAS scores (indicating lower limitations) than those who received NCM. The workers with NCM had substantially higher means on all sub-scores and the overall WHODAS score (indicating greater limitations) compared to cases with catastrophic injuries without NCM. The community integration scores were higher (better) for workers who did not receive NCM

compared to those with NCM. There were only small differences in social support for cases with and without NCM at the time of the 6 month interview, and all scores were quite high.

**Table 5.** 6 month survey WHODAS, CIQ, and MSPSS scores

Measure	NCM		No NCM		Total		Range
	N	mean	N	mean	N	mean	
<b>WHODAS</b>							Higher scores = greater limitation
Cognition	22	37.05	45	15.11	67	22.31	0-100
Mobility	22	54.83	46	31.79	68	39.25	0-100
Self-Care	22	34.55	46	17.39	68	22.94	0-100
Getting along	19	36.40	43	12.60	62	19.89	0-100
Life activities, domestic	22	55.00	43	37.67	65	43.54	0-100
Life activities, work and school	22	91.36	46	61.30	68	71.03	0-100
Participation	22	64.02	43	37.21	65	46.28	0-100
WHODAS total score	19	48.71	39	27.12	58	34.20	0-100
<b>Community Integration Questionnaire (CIQ)</b>							Higher scores = more independent/capable
Home integration	19	2.84	42	4.76	61	4.16	0-10
Social Integration	17	7.06	41	7.71	58	7.52	0-12
Productive Activity	22	1.68	46	3.37	68	2.82	0-7
CIQ total score	15	11.13	40	16.25	55	14.85	0-27
<b>Multidimensional Scale of Perceived Social Support</b>							Higher scores = more support
Significant other	21	5.27	44	5.66	65	5.54	1-7
Friends	21	4.71	43	5.21	64	5.05	1-7
Family	22	5.65	44	5.57	66	5.60	1-7
Total	21	5.20	41	5.46	62	5.37	1-7

At the time of the 12 month interview (Table 6), the mean WHODAS sub-scores and the mean total WHODAS scores were substantially higher (indicating greater limitations) in workers with catastrophic injuries who received NCM compared to workers with catastrophic injuries who did not receive NCM. The community integration scores were somewhat higher in workers without NCM than those with NCM. There were no large differences in social support between those with and without NCM.

**Table 6.** 12 month survey WHODAS, CIQ, and MSPSS scores

Measure	NCM		No NCM		Total		Range
	N	mean	N	mean	N	mean	
<b>WHODAS</b>							Higher scores = greater limitation
Cognition	19	34.74	41	16.10	60	22.00	0-100
Mobility	19	40.79	41	30.03	60	33.44	0-100
Self-Care	19	27.37	41	12.68	60	17.33	0-100
Getting along	19	37.28	38	14.25	57	21.93	0-100
Life activities, domestic	19	48.95	40	30.50	59	36.44	0-100
Life activities, work and school	19	72.63	40	56.75	59	61.86	0-100
Participation	18	52.78	40	35.94	58	41.16	0-100
WHODAS total score	18	44.12	36	27.10	54	32.77	0-100
							0-100
<b>Community Integration Questionnaire (CIQ)</b>							Higher scores = more independent/capable
Home integration	15	2.80	39	5.00	54	4.39	0-10
Social Integration	17	6.35	39	7.90	56	7.43	0-12
Productive Activity	19	2.53	41	4.00	60	3.53	0-7
CIQ total score	15	12.20	38	17.16	53	15.75	0-27
<b>Multidimensional Scale of Perceived Social Support</b>							Higher scores = more support
Significant other	19	5.41	41	5.49	60	5.47	1-7
Friends	18	4.72	40	5.18	58	5.03	1-7
Family	19	5.74	40	5.59	59	5.64	1-7
Total	18	5.25	40	5.42	58	5.37	1-7

At the time of the 18 month interview (Table 7), the mean WHODAS sub-scores and the mean total WHODAS scores were substantially higher in workers with catastrophic injuries who received NCM compared to workers with catastrophic injuries who did not receive NCM. The community integration scores were higher in workers without NCM than workers with NCM. There were no large differences in social support between those with and without NCM. Please note, the differences in the WHODAS disability scores at 6, 12, and 18 months after injury is likely to be the result of workers with more severe injuries being referred for NCM and does not indicate that receipt of NCM led to poorer outcomes.

**Table 7.** 18 month survey WHODAS, CIQ, and MSPSS scores

Measure	NCM		No NCM		Total		Range
	N	mean	N	mean	N	mean	
<b>WHODAS</b>							Higher = greater limitation
Cognition	20	38.00	40	17.25	60	24.17	0-100
Mobility	20	41.88	40	25.78	60	31.15	0-100
Self-Care	20	30.50	40	16.25	60	21.00	0-100
Getting along	20	42.08	38	15.57	58	24.71	0-100
Life activities, domestic	20	47.50	39	31.79	59	37.12	0-100
Life activities, work and school	19	77.37	39	53.59	58	61.38	0-100
Participation	19	53.95	38	34.32	57	40.86	0-100
WHODAS total score	18	45.48	34	26.18	52	32.86	0-100
							0-100
<b>Community Integration Questionnaire (CIQ)</b>							Higher = more independent/capable
Home integration	17	3.12	37	5.11	54	4.48	0-10
Social Integration	16	6.19	33	7.52	49	7.08	0-12
Productive Activity	18	2.56	39	3.64	57	3.20	0-7
CIQ total score	14	12.14	31	17.00	45	15.49	0-27
<b>Multidimensional Scale of Perceived Social Support</b>							Higher = more support
Significant other	20	5.04	39	5.42	59	5.29	1-7
Friends	20	4.54	38	5.03	58	4.86	1-7
Family	20	5.26	39	5.55	59	5.45	1-7
Total	20	4.95	38	5.33	58	5.20	1-7

For workers with catastrophic injuries who completed the baseline, 6 month, 12 month, and 18 month interviews, we present the mean WHODAS scores, the CIQ scores, and MSPSS scores in Table 8. The baseline scores for each of these measures are workers' self-report of their health disability, community integration, and social support prior to injury (pre-injury). The mean scores pre-injury are quite low likely indicating normal levels of activity in these workers prior to injury, as expected. The mean scores at 6, 12, and 18 months after injury are substantially higher indicating high levels of disability at all three time points. While some sub-scores improved, on average, others were poorer at 18 months than at 6 or 12 months.

**Table 8.** Mean scores at baseline, 6 months, 12 months, and 18 months for workers who completed all 4 interviews

Measure	N	Pre-injury mean	N	6 month mean	N	12 month mean	N	18 month mean	Range
<b>WHODAS</b>									Higher scores = greater limitation
Cognition	53	3.40	52	22.79	53	21.98	53	23.77	0-100
Mobility	53	3.54	53	37.03	53	32.55	53	29.95	0-100
Self-Care	53	1.89	53	21.89	53	16.23	53	19.43	0-100
Getting along	53	3.46	48	18.75	50	20.33	52	23.88	0-100
Life activities, domestic	53	3.21	51	45.29	52	35.38	52	34.23	0-100
Life activities, work and school	53	5.85	53	68.68	52	62.12	51	59.22	0-100
Participation	52	4.17	50	45.75	51	40.44	50	39.33	0-100
WHODAS total score	52	3.68	44	32.40	47	32.08	46	31.44	0-100
									0-100
<b>Community Integration Questionnaire (CIQ)</b>									Higher scores = more independent/capable
Home integration	50	5.36	48	4.38	47	4.17	49	4.51	0-10
Social Integration	50	8.74	47	7.62	49	7.51	45	7.18	0-12
Productive Activity	53	5.49	53	2.92	53	3.47	50	3.38	0-7
CIQ total score	48	20.13	44	15.36	46	15.61	42	15.76	0-27
<b>Multidimensional Scale of Perceived Social Support</b>									Higher scores = more support
Significant other	52	5.81	52	5.40	53	5.37	52	5.35	1-7
Friends	51	5.50	50	5.01	51	5.15	51	4.79	1-7
Family	51	5.63	52	5.51	52	5.60	52	5.45	1-7
Total	49	5.66	49	5.28	51	5.36	51	5.20	1-7

If workers chose to skip a question (or more than one question) they may have missing values for the WHODAS sub-scores or total score. We repeated the comparison of WHODAS scores at each time point limiting the sample to those who had complete WHODAS scores on the 6 month interview (N=44). Tables 8b, 8c, and 8d show the mean WHODAS scores for workers with and without NCM (Table 8b, N=44), for those with NCM (Table 8c, N=14), and for those without NCM (Table 8d, N=30). As seen in tables 8b-8d there tended to be some improvement in the mean WHODAS subscores and mean WHODAS total between 6 and 18 months after injury, however, the values at 18 months remained substantially higher (worse) than the pre-injury scores.

**Table 8b.** Mean WHODAS scores at baseline, 6 months, 12 months, and 18 months for workers who completed all 4 interviews and had complete WHODAS scores on the 6 month interview (N=44)

Measure	N	Pre-injury mean	N	6 month mean	N	12 month mean	N	18 month mean	Range
<b>WHODAS</b>									Higher scores = greater limitation
Cognition	44	1.25	44	19.43	44	17.95	44	18.86	0-100
Mobility	44	1.85	44	33.52	44	28.98	44	24.15	0-100
Self-Care	44	0.00	44	20.91	44	15.23	44	16.36	0-100
Getting along	44	1.89	44	18.37	42	18.25	43	19.57	0-100
Life activities, domestic	44	1.59	44	41.36	44	30.00	44	31.14	0-100
Life activities, work and school	44	2.27	44	64.55	44	58.41	42	53.57	0-100
Participation	43	2.23	44	40.81	43	34.88	42	34.33	0-100
WHODAS total score	43	1.66	44	32.40	41	27.95	39	26.27	0-100

**Table 8c.** Mean WHODAS scores at baseline, 6 months, 12 months, and 18 months for workers who completed all 4 surveys, had complete WHODAS scores on the 6 month survey, and received NCM (N=14)

Measure	N	Pre-injury mean	N	6 month mean	N	12 month mean	N	18 month mean	Range
<b>WHODAS</b>									Higher scores = greater limitation
Cognition	14	1.43	14	31.43	14	27.50	14	28.21	0-100
Mobility	14	2.68	14	50.00	14	30.80	14	32.14	0-100

Self-Care	14	0.00	14	29.29	14	22.14	14	25.71	0-100
Getting along	14	1.19	14	33.33	14	30.36	14	35.12	0-100
Life activities, domestic	14	1.43	14	55.71	14	39.29	14	40.00	0-100
Life activities, work and school	14	2.86	14	86.43	14	70.00	13	66.92	0-100
Participation	14	2.38	14	57.44	13	44.87	13	47.12	0-100
WHODAS total score	14	1.82	14	47.13	13	36.73	12	36.19	0-100

**Table 8d.** Mean WHODAS scores at baseline, 6 months, 12 months, and 18 months for workers who completed all 4, had complete WHODAS scores on the 6 month survey and did not receive NCM (N=30)

Measure	N	Pre-injury mean	N	6 month mean	N	12 month mean	N	18 month mean	Range
<b>WHODAS</b>									Higher scores = greater limitation
Cognition	30	1.17	30	13.83	30	13.50	30	14.50	0-100
Mobility	30	1.46	30	25.83	30	28.13	30	20.42	0-100
Self-Care	30	0.00	30	17.00	30	12.00	30	12.00	0-100
Getting along	30	2.22	30	11.39	28	12.20	29	12.07	0-100
Life activities, domestic	30	1.67	30	34.67	30	25.67	30	27.00	0-100
Life activities, work and school	30	2.00	30	54.33	30	53.00	29	47.59	0-100
Participation	29	2.16	30	33.06	30	30.56	29	28.59	0-100
WHODAS total score	29	1.59	30	25.52	28	23.88	27	21.86	0-100

Questions from the Functional Recovery Questionnaire were included on the baseline, 6 month, 12 month, and 18 month interviews. All respondents were asked about work status at the time of interview. Workers who reported not working at the time of the interview (most of the workers) were asked about pain interference with ability to work, number of body parts with pain, recovery expectations, availability of light duty work, and whether work may make the injury worse (fear avoidance).

Self-reported work status at the time of each interview is shown in Table 9. At the time of the baseline interview, only 6% of the workers who had not received NCM had returned to work and none of the workers who received NCM had returned to work. By 6 months after injury, 33% of workers who had not received NCM had returned to work and only 5% of those with



NCM had returned to work. By 12 and 18 months after injury 40-46% of those without NCM were working and 25-26% of those with NCM were working.

**Table 9.** Self-reported work status at the time of baseline, 6 month, 12 month, and 18 month interview

	NCM		No NCM		Total	
	N	%	N	%	N	%
Baseline						
Working	0	0%	4	6%	4	4%
Not working	26	87%	62	93%	88	91%
Missing	4	13%	1	1%	5	5%
Total	30	100%	67	100%	97	100%
6 month						
Working	1	5%	15	33%	16	24%
Not working	21	95%	31	67%	52	76%
Missing	0	0%	0	0%	0	0%
Total	22	100%	46	100%	68	100%
12 month						
Working	5	26%	19	46%	24	40%
Not working	14	74%	22	54%	36	60%
Missing	0	0%	0	0%	0	0%
Total	19	100%	41	100%	60	100%
18 month						
Working	5	25%	16	40%	21	35%
Not working	15	75%	23	58%	38	63%
Missing	0	0%	1	3%	1	2%
Total	20	100%	40	100%	60	100%

Workers who did not report working at the time of the interview were asked about pain interference with work, number of body parts with pain, return to work expectations, whether light duty was available, and whether workers thought that work might make their injury worse (fear avoidance). Results from the baseline interview are shown in Table 10. Overall, the large majority of workers with catastrophic injuries reported a high level of pain interference with work (scores of 5 or higher). About 80% of workers with catastrophic injuries reported pain in 2 or more body parts. Light duty work was available for about 50% of the workers. About half of the workers who were not working at the time of the interview were afraid that work could make the injury worse. There were some differences for workers who received NCM and those who did not. Those who were not working and who received NCM reported higher levels of pain interference with work and more pain sites and reported lower recovery expectations.

Fear that work may make the injury worse (fear avoidance) was the same for those who received and did not receive NCM.

**Table 10.** Baseline interview FRQ questions among those who were not working

		NCM		No NCM		Total	
			mean		mean		mean
Pain interference with work*		26	8.69	62	6.84	88	7.39
Number of pain sites		26	2.85	62	2.58	88	2.66
RTW expectations		26	3.46	62	5.68	88	5.02
		N	%	N	%	N	%
Pain interference with work*							
	0	1	4%	4	7%	5	6%
	1-4	0	0%	8	13%	8	9%
	5-7	5	19%	16	26%	21	24%
	8-10	20	77%	34	55%	54	61%
Number of pain sites							
	0-1	3	12%	14	23%	17	19%
	2-10	23	89%	48	77%	71	81%
Light duty available							
	Yes	17	65%	27	46%	44	52%
	No	9	35%	32	54%	41	48%
RTW expectations**							
	0	13	50%	14	23%	27	31%
	1-4	1	4%	7	11%	8	9%
	5-7	6	23%	15	24%	21	24%
	8-10	6	23%	26	42%	32	36%
Work may make injury worse							
	Yes	11	48%	28	48%	39	48%
	No	12	52%	30	52%	42	52%

\*0 no interference; 10 unable to carry on any activities

\*\*0 not at all certain; 10 extremely certain

Table 11 shows the results at the time of the 6 month interview among those who were not working at the time of the interview. There were no large differences in pain interference with work or with number of pain sites for workers with or without NCM. The workers who received NCM were less likely to report that they had light duty available at work. There continued to be a wide range of responses on recovery expectations in both groups with 35-41% of workers reporting very low expectations of being able to return to work within 6 months. Recovery

expectations were somewhat lower in workers who received NCM than workers who did not receive NCM.

**Table 11.** 6 month interview FRQ questions among those who were not working

		NCM		No NCM		Total	
			mean		mean		mean
Pain interference with work*		21	5.38	31	5.19	52	5.27
Number of pain sites		21	2.24	31	2.42	52	2.35
RTW expectations		20	3.05	29	3.62	49	3.39
		N	%	N	%	N	%
Pain interference with work*							
	0	2	10%	4	13%	6	12%
	1-4	5	24%	8	26%	13	25%
	5-7	8	38%	9	29%	17	33%
	8-10	6	29%	10	32%	16	31%
Number of pain sites							
	0-1	6	29%	10	32%	16	31%
	2-10	15	71%	21	68%	36	69%
Light duty available							
	Yes	3	14%	11	39%	14	29%
	No	18	86%	17	61%	35	71%
RTW expectations**							
	0	7	35%	12	41%	19	39%
	1-4	4	20%	3	10%	7	14%
	5-7	8	40%	8	28%	16	33%
	8-10	1	5%	6	21%	7	14%
Work may make injury worse							
	Yes	11	58%	17	65%	28	62%
	No	8	42%	9	35%	17	38%

\*0 no interference; 10 unable to carry on any activities

\*\*0 not at all certain; 10 extremely certain

Among those who were not working at the time of the 12 month survey (Table 12), pain interference levels were high in both groups and workers still averaged 2-3 body parts with

pain. In workers who did not report working at the time of the 12 month interview, return to work expectations were low.

**Table 12.** 12 month interview FRQ questions among those who were not working

		NCM		No NCM		Total	
			mean		mean		mean
Pain interference with work*		14	6.07	22	5.73	36	5.86
Number of pain sites		14	2.21	22	2.95	36	2.67
RTW expectations		14	0.85	21	2.00	35	1.54
		N	%	N	%	N	%
Pain interference with work*							
	0	2	14%	5	23%	7	19%
	1-4	1	7%	2	9%	3	8%
	5-7	6	43%	5	23%	11	31%
	8-10	5	36%	10	46%	15	42%
Number of pain sites							
	0-1	6	43%	6	27%	12	33%
	2-10	8	57%	16	73%	24	67%
Light duty available							
	Yes	3	23%	5	31%	8	28%
	No	10	77%	11	69%	21	72%
RTW expectations**							
	0	11	79%	13	62%	24	69%
	1-4	2	14%	2	9%	4	11%
	5-7	1	7%	5	24%	6	17%
	8-10	0	0%	1	5%	1	3%
Work may make injury worse							
	Yes	7	58%	13	81%	20	71%
	No	5	42%	3	19%	8	29%

\*0 no interference; 10 unable to carry on any activities

\*\*0 not at all certain; 10 extremely certain

Among those who were not working at the time of the 18 month interview (Table 13), pain interference levels were high in both groups and workers still averaged 2-3 body parts with pain. In workers who did not report working at the time of the 18 month interview, return to work expectations were low.

**Table 13.** 18 month interview FRQ questions among those who were not working

		NCM		No NCM		Total	
			mean		mean		mean
Pain interference with work*		15	5.80	22	4.73	37	5.16
Number of pain sites		15	2.73	23	2.13	38	2.37
RTW expectations		15	1.80	22	2.23	37	2.05
		N	%	N	%	N	%
Pain interference with work*							
	0	2	13%	6	27%	8	22%
	1-4	3	20%	3	14%	6	16%
	5-7	4	27%	7	32%	11	30%
	8-10	6	40%	6	27%	12	32%
Number of pain sites							
	0-1	6	40%	8	35%	14	37%
	2-10	9	60%	15	65%	24	63%
Light duty available							
	Yes	2	14%	5	26%	7	21%
	No	12	86%	14	74%	26	79%
RTW expectations**							
	0	9	60%	14	64%	23	62%
	1-4	3	20%	2	9%	5	13.5%
	5-7	2	13%	2	9%	4	11%
	8-10	1	7%	4	18%	5	13.5%
Work may make injury worse							
	Yes	12	86%	16	73%	28	78%
	No	2	14%	6	27%	8	22%

\*0 no interference; 10 unable to carry on any activities

\*\*0 not at all certain; 10 extremely certain

### Limitations

There are a number of limitations of the evaluation of NCM for workers with catastrophic injuries. First, the overall number of workers with catastrophic injuries was relatively low and the number of workers who received nurse case management during this time period was also low. In addition, the workers who received nurse case management had more severe injuries than those who did not receive nurse case management. Because the workers were not

randomized to receive NCM versus not receiving NCM, we cannot come to any firm conclusions about the impact of NCM on workers with catastrophic injuries.

## **Conclusions**

To briefly summarize the results of the worker surveys, there were only small differences between pre-injury measures of disability, community integration, and social support between workers who subsequently received nurse case management (NCM) versus those without NCM. Workers who received NCM had more severe injuries than workers without NCM.

Workers with NCM had higher levels of disability (more limitations) than workers without NCM at 6, 12, and 18 months after injury. At the 6 month follow-up survey, workers receiving NCM compared to workers not receiving NCM reported more disability and much less independence. The two groups reported no differences in degree of perceived social support, and the overall reported level of social support was high, not much different than reported support pre-injury. Similar patterns of recovery were seen on these scales at 12 and 18 months.

At the time of each survey, the majority of catastrophically injured workers who had not returned to work reported pain interference with ability to work whether receiving NCM or not. Consistent with having had more severe injuries, workers who received NCM had lower return to work rates compared to those who did not receive NCM. In both groups, however, the RTW rates changed very little between 12-18 months. At 18 months, about a third of the workers with catastrophic injuries had returned to work.

## References

World Health Organization Disability Assessment Schedule (WHODAS) 2.0, 36-item:  
Ustün TB, Chatterji S, Kostanjsek N, et al. Developing the World Health Organization Disability Assessment Schedule 2.0. *Bull World Health Organ.* 2010;88(11):815-823.

doi:10.2471/BLT.09.067231

Community Integration Questionnaire (CIQ):

Willer, B., Rosenthal, M., Kreuzer, S., Gordon, A., & Rempel, R. (1993). Assessment of community integration following rehabilitation for traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 8(2):75.

Multidimensional Scale of Perceived Social Support (MSPSS):

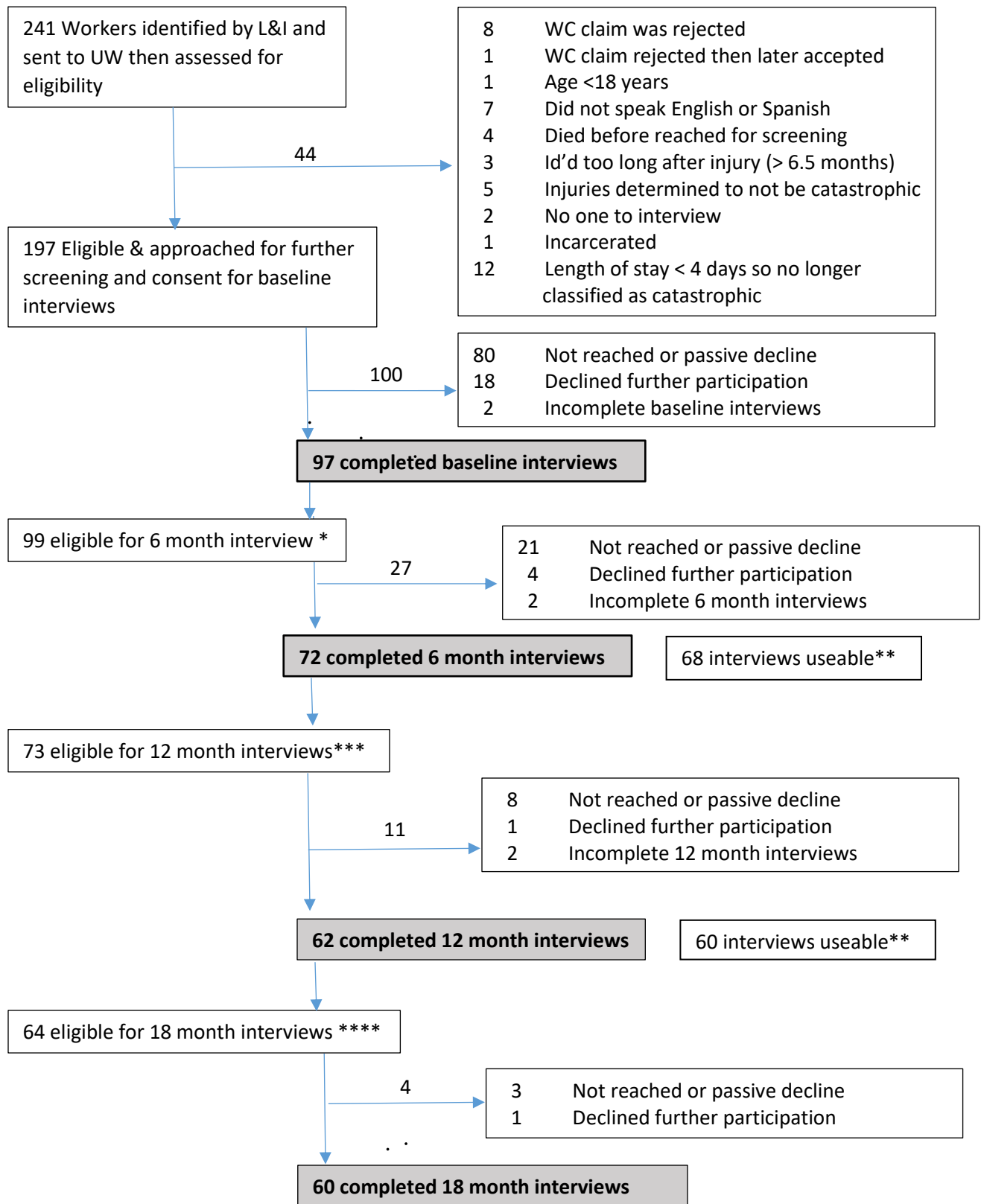
Zimet, GD, Dahlem, NW, Zimet SG, Farley GF. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, 52, 30-41.

Functional Recovery Questionnaire (FRQ):

This FRQ is Copyright © 2008, 2016 University of Washington. All Rights Reserved. The use of this FRQ is covered by the conditions described at [deohs.washington.edu/occepi/frq](http://deohs.washington.edu/occepi/frq) and is being used with permission from the University of Washington.

[1] REDCap at ITHS is supported by the National Center for Advancing Translational Sciences of the National Institutes of Health under Award Number UL1 TR002319

## Appendix: eligibility and exclusions for the worker interviews



\*2 were eligible that didn't complete the baseline interview

\*\* due to inadvertent data loss

\*\*\* 1 added that was inadvertently not contacted for the 6 month interview

\*\*\*\* 2 added who were not recruited for the 12 month interview due to timing

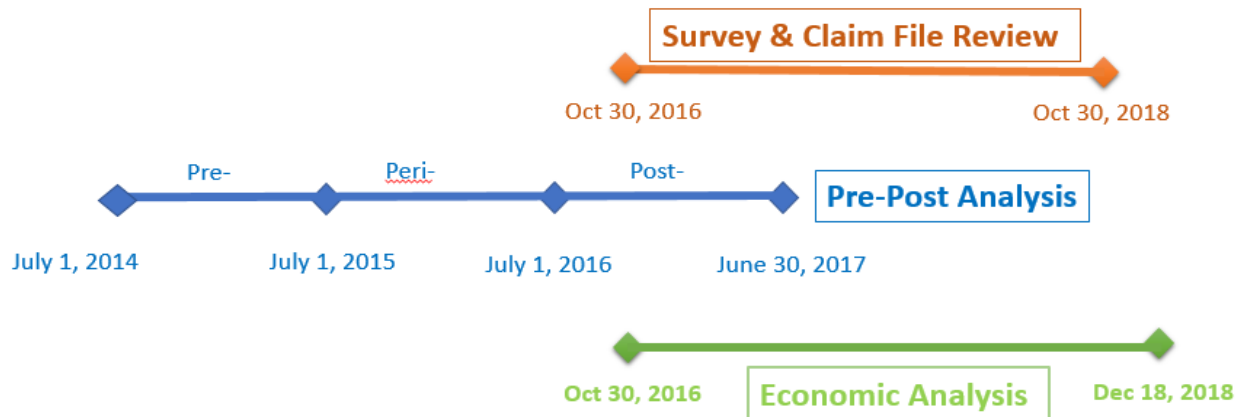


## Chapter 4

### Claim File Review

L&I claim files (claim documents and notes) were reviewed for all 216 workers with accepted claims for catastrophic injuries with injury dates occurring between October 2016 and October 2018, the red line in Figure 1 below.

**Figure 1.** Injury Dates for Study Samples



Abstracted data were collected and managed using REDCap electronic data capture tools hosted at the Institute of Translational Health Sciences (ITHS) at the University of Washington.<sup>1</sup> Information abstracted included dates of hospital discharge and other transitions between facilities, reported complications, work and restriction status at 6, 12, and 18 months from injury, involvement in Centers of Excellence, engagement of a legal representative, beginning and ending dates of nurse case management (NCM), and start and stop dates if Kept on Salary (KOS). Claim file review did not go past 18 months from date of injury.

#### Time to NCM Referral

Table 1 reports the days from date of injury to referral to NCM (in calendar days, not business days). The referrals to outcome based companies occurred an average of 9-10 days after injury. Referrals to the contracted hourly firms occurred an average of 16-24 days after injury. Referrals to the noncontracted hourly NCM companies occurred about 3 months after injury, on average, and seemed to be used for needs that arose later in the claim (e.g. if a worker was having a difficult time locating an attending provider) but also for out-of-state workers.

<sup>1</sup> REDCap at ITHS is supported by the National Center For Advancing Translational Sciences of the National Institutes of Health under Award Number UL1 TR002319

**Table 1.** Days from date of injury to NCM referral

	Average	Median	Range	Workers (N)
<b>Outcome Based NCM</b>				
Comagine	9	8	7-11	4
Paradigm	10	10	2-28	24
<b>Contracted Hourly NCM</b>				
Coventry	20	19	18-23	3
Rainier	16	9	3-63	14
Stubbe	24	13	5-98	21
<b>Uncontracted Hourly NCM</b>				
	95	70	8-269	15

Table 2 reports the length of time between the dates the claim is received at L&I and the referral to NCM. Referrals to the outcome based firms occurred an average of a week after claim receipt at L&I. Referrals to the contracted hourly firms occurred 11-16 days after claim receipt, on average. Referral to the uncontracted hourly firms occurred about 2.5 months after claim receipt.

A referral for a NCM can only be made after a claim has been opened and allowed by the claim manager. This involves establishing the employee/employer relationship, determining if the injury occurred at work, etc. Although it is possible a referral can occur within a day of the claim being received at L&I, as shown in Table 2, that process typically involves at least a couple business days and sometimes considerably longer.

An NCM referral can only be made after a claim has been opened and allowed by the claim manager which involves establishing the employee/employer relationship and determining if the worker was in the course of work when the injury occurred, etc. Although it is possible a NCM referral can occur on the day the claim is received at L&I as shown in the range numbers in Table 2, that process typically involves at least a couple business days and sometimes considerably longer.

**Table 2.** Days to NCM referral from the date the claim is received at L&I

	Average	Median	Range	Workers (N)
<b>Outcome Based NCM</b>				
Comagine	7	7	6-8	4
Paradigm	7	4	1-23	24
<b>Contracted Hourly NCM</b>				
Coventry	16	17	14-17	3
Rainier	11	6	3-60	14
Stubbe	16	6	1-97	21
<b>Noncontracted Hourly NCM</b>				
	75	51	7-243	15

## Transitions

Transitions (e.g., hospital discharge, transfer from inpatient rehab to skilled nursing facility) were abstracted for the 18 months following injury. Table 3 shows discharge destination after the initial hospitalization. The majority of workers (53%) went home, but inpatient rehabilitation (21%) and skilled nursing facilities (17%) also were common.

**Table 3.** Discharge destination after initial hospitalization (N=216)

Discharge destination	n (%)
Home	114 (53%)
Inpatient Rehabilitation	46 (21%)
Transitional care or skilled nursing facility	37 (17%)
Long term acute care (LTAC)	10 (5%)
Someone else's home (e.g., parent)	7 (3%)
Respite care & another hospital	2 (1%)

The healing process after a catastrophic injury is not always linear. For example, stays at skilled nursing facilities may be interrupted by hospital readmissions due to complications or planned surgeries (e.g., replacing a skull flap). Consequently, a worker might have more than one episode at the same type of facility. Table 4 shows the number of workers who stayed at each type of facility within 18 months from injury and how many episodes occurred at each type of facility, excluding the initial hospitalization. No workers had more than 2 stays at a skilled nursing or inpatient rehabilitation facility.

**Table 4.** Facility types excluding initial hospitalization

Facility type	# Workers	# Episodes of care
Skilled nursing facility (SNF)	48	54
Long term acute care (LTAC)	10	10
Inpatient rehab (IPR)	55	61
Hospital episodes (not counting initial visits)	33	48
Someone else's home	23	23

Table 5 shows the location of workers at 6, 12, and 18 months after injury. Although the vast majority were at home, some workers remained in skilled nursing facilities, assisted living, and others' homes. Specifically, at 6 months after injury, 89% of workers were living at their home which increased to 93% by 12 months after injury but didn't increase in the next 6 months.

**Table 5.** Worker locations at 6, 12 and 18 months after injury (N=216)

Facility Type	6 months	12 months	18 months
Hospital	2 (1%)	0	1 (0%)
Inpatient Rehab (IPR)	3 (1%)	2 (1%)	0
Skilled Nursing Facility (SNF)	7 (3%)	3 (1%)	2 (1%)

Brain rehab	1 (0%)	0	1 (0%)
Adult Family Home	1 (0%)	0	0
Assisted Living	0	1 (0%)	1 (0%)
Other's home	8 (4%)	8 (4%)	9 (4%)
Home	193 (89%)	201 (93%)	201 (93%)
Respite Care (then homeless)	1 (0%)	0	0

Note: One worker died between 6 and 12 months

Table 6 adds the percentage of workers that had a nurse case manager at some point in their recovery who stayed at each facility type. Of the 216 workers, 35% had a nurse case manager (NCM) at some point within 18 months from injury. An individual worker can be in more than one row if they stayed in more than one type of facility after the initial hospitalization. Within 18-month from injury, all 10 workers who were in long-term acute care had a NCM, while 64% of those with inpatient rehab, 61% of those with hospital visits, 61% of those residing in someone else's home, and 46% of those with visits to a skilled nursing facility had a NCM.

**Table 6.** Percentage of workers who ever had a NCM by facility type within 18 months of injury

Facility Type	# Workers	% Workers ever NCM	# Episodes of care
Skilled nursing facility (SNF)	48	46%	54
Long term acute care (LTAC)	10	100%	10
Inpatient rehab (IPR)	55	64%	61
Hospital episodes (not counting initial visits)	33	61%	48
Someone else's home	23	61%	23

Workers went to someone else's home for a variety of reasons, such as proximity to future health care provider appointments, the need for more care than available in their own home, or lack of stable housing. One worker no longer had housing because it had been provided by his employer. Typically, a worker stayed with a family member such as parent or adult child.

#### Failed Transitions

Failed transitions are defined in this report as unplanned hospitalizations within 7 or 30 days of any hospitalization. The Centers for Medicare & Medicaid Services' measure is 30 days (<https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/HRRP/Hospital-Readmission-Reduction-Program>).

Of the 216 workers in this population, 9 had an unplanned readmission within 7 days of hospital discharge. Of those 9 workers, 5 had a NCM at the time of readmission. Those nurse case managers worked for a contracted outcome-based company (3), a contracted hourly company (1), and a noncontracted hourly company (1). In 2 of those cases, the NCM had only been assigned a week or less before the failed transition.

Sixteen workers had unplanned readmissions within 30 days of a hospital discharge. Although most (81%) only had one readmission, one worker had 3 readmissions, and 2 workers had 2 readmissions within 30 days. Half of those 16 workers had a NCM at the time of the readmission: 6 workers from a contracted outcome-based company, 1 worker from a contracted hourly company, and 1 worker from a non-contracted hourly company.

#### Transitions and Failed Transitions Summary

- The majority of catastrophically injured workers were discharged from the initial hospitalization to home
- 11% of workers were not at home at 6 months after injury
- At 12 and 18 months after injury 7% of workers were not at their own home

Most workers with transitions had a NCM at some time during recovery. Although 35% of the workers in the study cohort had a NCM, they represented:

- 50% of all the transitions excluding the initial hospital discharge
- 56% of the unplanned readmissions within 7 days
- 50% of the unplanned readmissions within 30 days

This likely is because the workers with NCMs were more severely injured.

#### **Complications**

Complications were also abstracted through 18 months after injury as part of the claim file review. We defined complications as diagnoses that were unexpected and could have been avoided. They do not include conditions that occurred at the time of injury but were not diagnosed until later due to the severity and/or number of the initial injuries. We also excluded planned hospitalizations that are part of the expected healing process (e.g., debridement of a burn or planned surgery to remove hardware).

The number of complications reported here should be considered undercounts. Information in the claim file may have been missed by the reviewer or never documented in the claim file. The reviewer relied on mentions of complications in NCM reports, VRC notes, claim manager notes, discharge summaries, physician reports, and the medical record reviews within Independent Medical Examination (IME) reports. Although many of the claim file medical documents were reviewed, review of each document was not feasible.

Among the 216 workers whose claim files were reviewed, 115 (53%) workers had complications occurring within 18-months from injury, contributing to a total of 297 complications. Among those with complications, 65 (57%) had a nurse case manager. The higher percentage of those with complications with a NCM is most likely because more severely injured workers were assigned NCMs.

In Table 7 the “respiratory complications other than pneumonia” include respiratory failure, pneumothorax and hemothorax. The “other orthopedic” complications include tarsal tunnel syndrome, an osteophyte, a wrist drop, and bursitis.

**Table 7.** Blood, Respiratory, Bone & Joint Complications (216 workers)

Blood and Respiratory Complications	Episodes	Workers
Deep vein thrombosis	5	5
Bleeding & other blood complications	8	7
Pulmonary emboli, thrombophlebitis & thrombosis	5	5
Respiratory complications (other than pneumonia)	5	3
<b>Bone &amp; Joint Complications</b>		
Non-union, malunion, delayed healing	14	11
Arthritis or avascular necrosis	5	5
Contractures, frozen joints, adhesive capsulitis	15	12
Heterotopic ossification	4	4
Fractures, amputations, hardware failure	11	9
Other orthopedic complications	5	5

The most common type of complication was infection, occurring in at least 61% of workers who experienced a complication. The majority (81%) of the pneumonias occurred while the worker was hospitalized with at least two related to ventilators and at least 2 caused by methicillin-resistant staphylococcus aureus (MRSA). Others could have been related to ventilators or caused by MRSA, but the documentation did not mention that information. “Other infections” included bacteremia, skin infections, wound infections, and hardware infections. The most common mental health diagnoses were PTSD and depression; these were usually accepted diagnoses on the claim.

**Table 8.** Infections, Neurological and Mental & Behavioral Health Complications (216 workers)

Infections	Episodes	Workers
Osteomyelitis	5	4
Urinary tract & kidney infections	20	12
Sepsis	12	5
Abscess	3	3
Pneumonia	16	16
Other infections	37	27
<b>Neurological and Mental &amp; Behavioral Health Complications</b>		
Neurologic	33	26
Mental health diagnoses	36	28
Substance abuse	3	3
Seizures	1	1

In Table 9 “other skin complications” examples include wound breakdown and advancing scar tissue. Examples of “other GI complications” include gastritis, GI tract spasms, and esophageal narrowing.

**Table 9.** Soft Tissue and Other Complications (216 workers)

Soft Tissue Complications	Episodes	Workers
Atrophy	3	3
Pressure sores or ulcers	6	4
Rhabdomyolysis	3	3
Hernia	2	2
Other skin complications	5	5
Other Complications		
Bowel obstruction	4	4
Other GI complications	7	7
Edemas, ascites, etc.	5	5
Falls	6	6
Surgical sponges left in abdomen	1	1
Medication reaction	1	1
Medication administration error	1	1

Complications Summary

- More than half of the catastrophically injured workers had complications occurring within 18-months from injury.
- More workers with NCM had complications perhaps because those with a NCM were more severely injured.
- Infections were the most common type of complication

**Centers of Excellence**

Labor and Industries had 2 Centers of Excellence (amputations and burns) in existence during the study. Some of the workers in this study were participants in the Centers of Excellence:

Amputation Center of Excellence: 8 workers  
Burn Center of Excellence: 10 workers

The COHE (Center of Health and Education) Community of Eastern Washington conducted a quality improvement project focused on multi-trauma during this time which involved 6 of the workers in this population.

**Legal Representation**

Workers have the option to have an attorney represent them to manage their claim with L&I. As part of the claim review the date that the claim manager recorded the addition (or removal) of a legal representative was abstracted. At some point in the first 18 months after their injury 102 (47%) of the 216 workers added legal representation. Six workers ended their legal representation.

### Claim Closures

Table 10 shows the number and percent of workers whose claims had closed by 6, 12, and 18 months from injury as well as whether they ever had a NCM or legal representation. Time to claim closure might be related to injury severity. Of those whose claims closed within 6 months of injury (4), none had a NCM and only 1 (25%) had an attorney. In contrast, the 153 workers whose claims were still open at 18 months after injury had the highest rate of NCMs (44%) and legal representation (56%).

**Table 10.** Claim closures, Attorneys and NCM status

Months from DOI to Claim Closure	Workers (N=216)		Ever NCM		Ever Attorney	
	N	%	N	%	N	%
< 6 Months	4	2	0	0	1	25
>6-12 Months	27	13	2	7	5	19
12-18 Months	32	15	4	13	11	34
Not closed at 18 Months	153	71	68	44	85	56

The percentage of closed claims increased over time, but 70% of claims remained open at 18 months. Among those with a NCM, only a small proportion of claims (6 of 74) closed before 18 months, which may reflect the higher injury severity of workers that were referred to NCM.

### Deaths

Two of these 216 workers died within 18 months of the injury. This does not include 4 worker deaths within two weeks of injury who were not included in these 216 workers. One worker died 6.5 months after injury of an unrelated condition and one worker died 8.7 months after injury due to the injury.

### Kept on Salary (KOS)

Employers have the option to keep paying an injured worker instead of having Labor and Industries pay time loss (TL) compensation, which is usually only a portion of the worker's wages. Frequently the employer will have a policy to keep paying the worker for 3 months or 6 months, but an employer may choose to continue paying the worker until they return to work.

- 19% of the 216 workers were entirely KOS so had no TL payments.
  - 8% of those who had a NCM were entirely KOS
  - 26% of those who didn't have a NCM were totally KOS
- 25% were both KOS and received some TL payments

Adding the 19% (entirely KOS, no TL) and 25% (some TL & some KOS) together

- 44% had at least some KOS ranging from 7 days to multiple years
  - 39% of those who had a NCM
  - 45% of those who didn't have a NCM



- Mean KOS was 6.0 months (range 7 days to 31 months) ending when TL started or the worker returned to work (RTW).

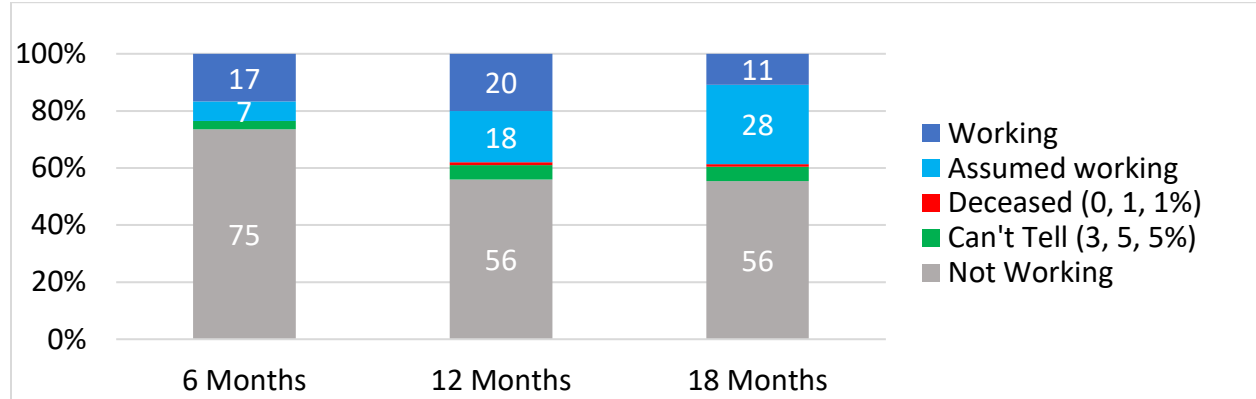
**KOS and TL Summary**

- TL costs do not represent the true wage costs of catastrophic injuries since some employers are paying wages.
- TL days do not represent the true number of days away from work
- Because of the large proportion of workers who are KOS, TL end dates are not a valid estimate of return to work in the catastrophically injured population.

**Work Status and Restrictions**

Work and restriction status at 6, 12 and 18 months from injury were abstracted during the claim file review; however, work status was occasionally missing. Figure 2 reports the broad categories of working, not working, deceased, and unknown. We classified a person as “assumed working” if documents showed they were solidly working prior to the date in question and no changes in work status had been documented. In Figure 2 the blues indicate the percentage of workers that were working or most likely working while the gray shows the percentage not working. As expected, the percentage not working decreases from 6 months to 12 months from injury. However, from 12 to 18 months there is no further change in the percentage not working.

**Figure 2.** Work Status from Claim File Review (216 Workers)



If the worker was “not working” or “working,” additional information was abstracted when it could be found. All the numbers in the “if working” and “if not working” additional detail categories should be considered undercounts. Information in the claim file may have been missed by the reviewer or never documented in the claim file.

Figure 3 reports the additional detail for those who are working and assumed working. The number of workers who are assumed working (shown in gray) increased at each time point. Since information about work status no longer comes to the claim files once a claim closes those who had returned to their job of injury often moved to the “Assumed Working” category

after claim closure, hence the decrease in the number of those working at their regular duty job from 12 to 18 months in Figure 3.

**Figure 3.** Numbers of Those Working and Assumed Working (216 Workers)

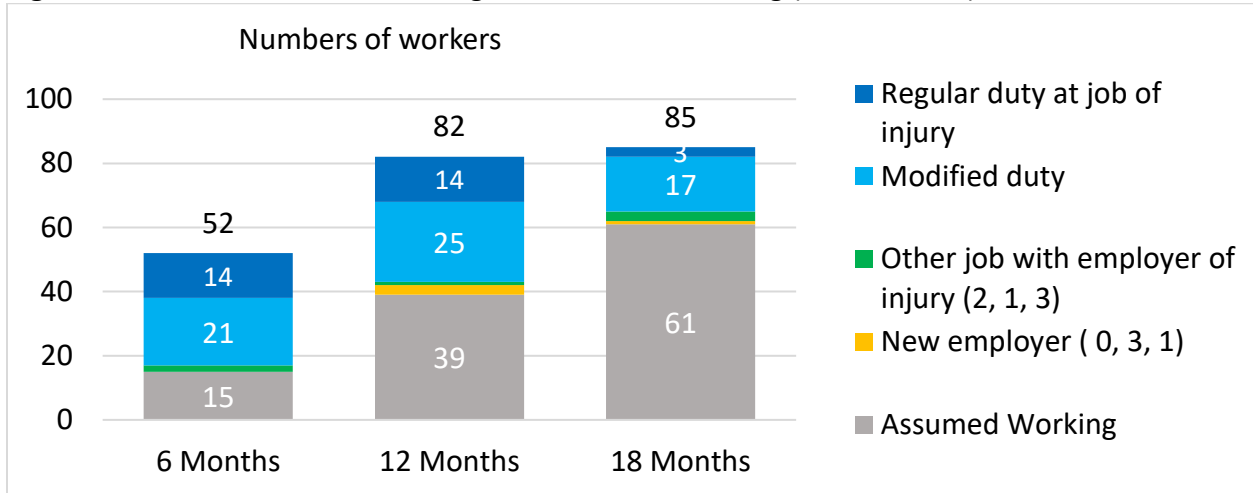
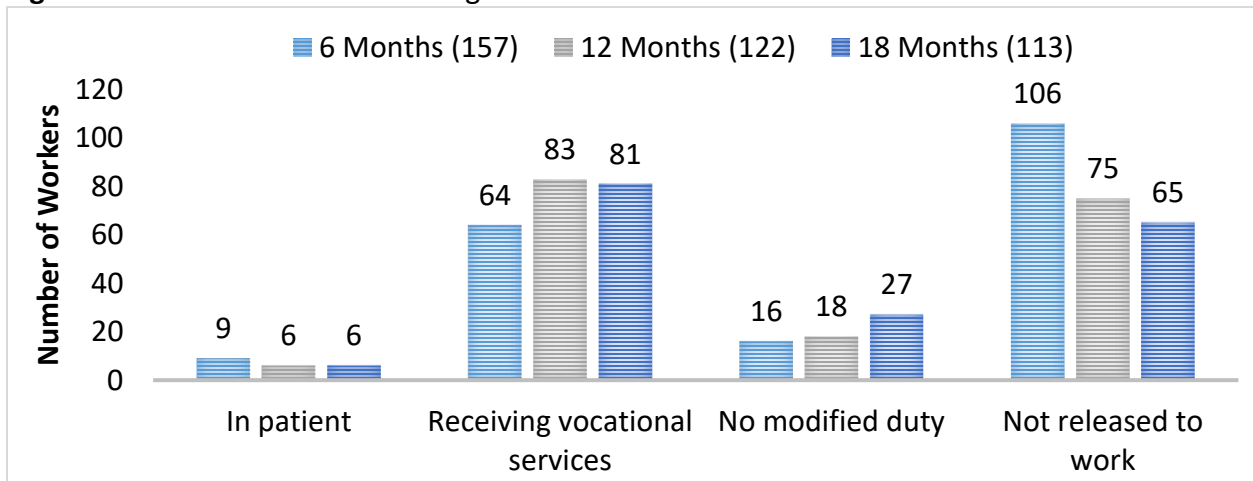


Figure 4 provides additional detail about those who are “not working” at each time period. Workers can be in multiple categories. For example, a worker might be “not yet released to work” and “Receiving vocational services”.

The number of those not released to work drops from 6 to 18 months but the number of those without modified duty available increased. The number of workers receiving vocational services jumped from 6 to 12 months. The slight drop in the number of those receiving vocational services from 12 to 18 months likely occurs because of workers returning to work.

**Figure 4.** More Detail if Not Working



Although additional categories were abstracted (Fired; Laid off/Seasonal; No RTW option with employer of injury (EOI); Job description not approved yet; Choosing not to RTW; Choosing not

to RTW with EOI), the numbers of those in each category were less than 5 at each of the time points so are not reported here.

In summary, return to work progress appeared to plateau at 12 months with only a 1% increase at 18 months. The biggest changes in the number of workers receiving vocational services (increase) and not released to work (decrease) also occurred between 6 and 12 months.

### **Summary of Claim File Review Results**

A wealth of information can be abstracted through claim file review that is not available in billing data.

- Most workers were discharged from the initial hospitalization to home
- At 18 months after injury, 5% of workers were still not living in their own home
- More than half of the catastrophically injured workers had at least one complication.
- Workers with NCMs had more transitions, complications, and legal representation than workers without NCMs. This may be due to the higher injury severity of workers referred to NCM.
- 39% of workers had returned to work by 18 months post-injury
- Because of the large percentage (44%) of catastrophically injured workers who are KOS for at least 7 days (averaging 6 months of KOS), TL end dates cannot be used to accurately estimate return to work.
- The percentage of workers working in any capacity didn't increase from 12 months to 18 months from injury (38% to 39%, respectively).
- By 18 months from injury, 29% of the catastrophic claims had closed.

## **Chapter 5**

### **Pre-post Analysis**

In collaboration with L&I, the study team at the University of Washington Occupational Epidemiology and Health Outcomes Program plan to evaluate nurse case management (NCM) for workers who experienced work-related catastrophic injuries.

One objective of this evaluation was to compare return to work outcomes and medical costs for workers with a catastrophic injury occurring before the implementation of NCM to those in the first year of NCM. This report compares total medical costs and time loss before and after implementation of the nurse case management pilot for catastrophic injuries. For the purpose of this report, catastrophic injuries are defined as injuries that require hospitalization within 24 hours and at least four consecutive days of hospitalization at the time of injury. We will refer to “nurse case management for catastrophic injuries” as “nurse case management” or “NCM” throughout this report.

#### **Retrospective Evaluation of Nurse Case Management for Catastrophic Injuries**

L&I began referring workers with catastrophic injuries to contracted hourly rate firms, which provide NCM services on an hourly basis, in February 2016. In August 2016, L&I began referring workers to outcome-based firms, which provide NCM services based on a plan that includes specific outcomes. Table 1 shows the classification of injury dates based on the implementation of NCM for catastrophic injuries. The pre-implementation period consisted of injuries occurring between July 1, 2014 and June 30, 2015. The post-implementation period consisted of injuries occurring between July 1, 2016 and June 30, 2017. We created a 1-year washout period between the pre-implementation period and the post-implementation period, which consisted of injuries occurring between July 1, 2015 and June 30, 2016 (referred to as “peri-implementation” or “peri-period” throughout this document).

**Table 1.** Implementation of NCM for catastrophic injuries time periods

<b>Period</b>	<b>Date of Injury</b>
Pre-implementation	July 1, 2014 - June 30, 2015
Peri-implementation	July 1, 2015 - June 30, 2016
Post-implementation	July 1, 2016 - June 30, 2017

#### **Analysis**

We conducted a retrospective evaluation using L&I’s administrative databases for workers, aged 18 or older, in order to compare the duration of time loss and total medical costs before and after implementation of NCM for catastrophic injuries. Outcome data were extracted from L&I’s records in September 2019, allowing for 2 years of follow-up after date of injury. Time loss (TL) was calculated as the number of compensated lost wage days within 1 year and within 2 years after injury. Lost wage days compensated by the employer (Kept on Salary) are not

included when discussing TL in this document. Total medical costs incurred during the 2 years of follow-up was calculated based on hospital/facility, medical/professional, and pharmacy bills paid within two years after injury. All costs were adjusted to June 2017 using the medical care component of the Consumer Price Index, based on the month and year of injury.

We compared demographic and injury-related characteristics of workers across the three time periods. Demographics consisted of age at injury, sex, marital status, number of dependents, occupation, type of industry, rural/urban residence (with rural defined as counties with a population density less than 100 persons per square mile or counties smaller than 225 square miles),<sup>1</sup> and the number of comorbid illnesses, using the Functional Comorbidity Index (FCI). The FCI uses the presence or absence of 18 diagnoses, ascertained from hospital and medical ICD billing codes, to predict physical function. The index is scored from 0 to 18, with 0 indicating no comorbid illness and 18 as the highest number of comorbidities.<sup>2</sup> We examined the distribution of injury-related characteristics, such as the nature and body part of injury, using the Occupational Injury and Illness Classification System (OIICS). We calculated injury severity using the Association for the Advancement of Automotive Medicine's Abbreviated Injury Scale (AIS), which measures the initial injury severity and is independent of patient-specific factors (e.g., comorbidities, general health status) that could affect hospitalization.<sup>3</sup> We used the maximum AIS across body regions (maxAIS), which ranges from 1 (minor injury) to 6 (maximal injury), to classify injury severity as a binary variable cut at maxAIS at 3+. Thus, scores of 1-2 indicated minor/moderate injuries, and scores ranging from 3-6 indicated serious/critical injuries. In our study population, severity scores could not be accurately classified for 2.3% (n=11) of workers due to the presence of nonspecific ICD codes or injuries that could not be linked to the AIS.

Linear regression with robust standard errors was used to compare the 2-year total medical costs and TL (days) for workers injured before and after implementation of NCM for catastrophic injuries. In secondary analyses, logistic regression was used to compare the odds of having  $\geq 365$  days of paid TL between workers injured before and after implementation of NCM. We presented unadjusted analyses, as well as analyses adjusting for injury severity and number of comorbid illnesses.

## Results

### Study population

A total of 483 participants were included in our analysis, 31.7% (n=153) of whom were injured before the implementation of NCM (pre-implementation), 35.0% (n=169) injured during the peri-implementation, and 33.3% (n=161) injured in the first year of NCM for catastrophic injuries (post-implementation), Table 2. The mean age at injury was 45 years (standard deviation [SD]: 15). A majority of workers were male (85.3%), single (53.8%), had no dependents (73.7%), resided in an urban county (60.5%), and had at least one comorbidity (55.1%). Workers in the pre-implementation period were comparable to those in the post-implementation period in terms of the number of comorbidities (mean number of comorbidities: 1.1 [SD: 1.3] vs. 0.9 [SD: 1.1], respectively). The most common occupation was in

construction (29.4%), followed by transportation (16.8%), and farming (9.7%). In terms of industry, a high proportion of workers were in construction (31.3%), services (13.5%), and agriculture (12.9%). These characteristics of workers with catastrophic injuries did not vary substantially over these three time periods.

**Table 2.** Characteristics of workers by time period, N=483

<b>Characteristics</b>	<b>Pre- implementation N = 153</b>	<b>Peri- implementation N = 169</b>	<b>Post- implementation N = 161</b>	<b>Total N = 483</b>
<b>Age at injury, mean (SD)</b>	45.0 (15.4)	45.6 (14.7)	44.5 (14.9)	45.1 (15.0)
<b>Sex, n(%)</b>	<b>n(%)</b>	<b>n(%)</b>	<b>n(%)</b>	<b>n(%)</b>
Male	133 (86.9%)	144 (85.2%)	135 (83.9%)	412 (85.3%)
Female	20 (13.1%)	25 (14.8%)	26 (16.1%)	71 (14.7%)
<b>Marital status, n(%)</b>				
Married	72 (47.1%)	80 (47.3%)	66 (41.0%)	218 (45.1%)
Single	80 (52.3%)	88 (52.1%)	92 (57.1%)	260 (53.8%)
Missing	1 (0.7%)	1 (0.6%)	3 (1.9%)	5 (1.0%)
<b>Dependents, n(%)</b>				
No	116 (75.8%)	122 (72.2%)	118 (73.3%)	356 (73.7%)
Yes	37 (24.2%)	47 (27.8%)	43 (26.7%)	127 (26.3%)
<b>County residence, n(%)</b>				
Rural	44 (28.8%)	50 (29.6%)	45 (28.0%)	139 (28.8%)
Urban	94 (61.4%)	99 (58.6%)	99 (61.5%)	292 (60.5%)
Missing	15 (9.8%)	20 (11.8%)	17 (10.6%)	52 (10.8%)
<b>Occupation, n(%)<sup>a</sup></b>				
Building	13 (8.5%)	11 (6.5%)	14 (8.7%)	38 (7.9%)
Business	12 (7.8%)	9 (5.3%)	9 (5.6%)	30 (6.2%)
Construction	42 (27.5%)	52 (30.8%)	48 (29.8%)	142 (29.4%)
Farming	20 (13.1%)	17 (10.1%)	10 (6.2%)	47 (9.7%)
Food prep and service	3 (2.0%)	5 (3.0%)	5 (3.1%)	13 (2.7%)
Health care	0 (0.0%)	4 (2.4%)	3 (1.9%)	7 (1.4%)
Installation, maintenance	8 (5.2%)	11 (6.5%)	13 (8.1%)	32 (6.6%)
Personal care	5 (3.3%)	2 (1.2%)	3 (1.9%)	10 (2.1%)
Production	9 (5.9%)	11 (6.5%)	12 (7.5%)	32 (6.6%)
Sales, office, admin support	9 (5.9%)	7 (4.1%)	8 (5.0%)	24 (5.0%)
Transportation	26 (17.0%)	28 (16.6%)	27 (16.8%)	81 (16.8%)
Unclassifiable	6 (3.9%)	12 (7.1%)	9 (5.6%)	27 (5.6%)

<b>Industry, n(%)<sup>b</sup></b>				
Agriculture	23 (15.0%)	22 (13.0%)	17 (10.6%)	62 (12.8%)
Arts	6 (3.9%)	9 (5.3%)	6 (3.7%)	21 (4.3%)
Construction	45 (29.4%)	59 (34.9%)	47 (29.2%)	151 (31.3%)
Education	3 (2.0%)	5 (3.0%)	13 (8.1%)	21 (4.3%)
Information	12 (7.8%)	7 (4.1%)	6 (3.7%)	25 (5.2%)
Manufacturing	12 (7.8%)	14 (8.3%)	12 (7.5%)	38 (7.9%)
Retail/wholesale trade	16 (10.5%)	21 (12.4%)	23 (14.3%)	60 (12.4%)
Services	21 (13.7%)	22 (13.0%)	22 (13.7%)	65 (13.5%)
Transportation, warehousing	14 (9.2%)	10 (5.9%)	15 (9.3%)	39 (8.1%)
Unclassifiable	1 (0.7%)	0 (0%)	0 (0%)	1 (0.2%)
<b>FCI summary score, n(%)</b>				
0	65 (42.5%)	81 (47.9%)	71 (44.1%)	217 (44.9%)
1	44 (28.8%)	41 (24.3%)	51 (31.7%)	136 (28.2%)
2	23 (15.0%)	22 (13.0%)	23 (14.3%)	68 (14.1%)
3	12 (7.8%)	16 (9.5%)	10 (6.2%)	38 (7.9%)
4	5 (3.3%)	4 (2.4%)	5 (3.1%)	14 (2.9%)
5	1 (0.7%)	4 (2.4%)	1 (0.6%)	6 (1.2%)
6	3 (2.0%)	1 (0.6%)	0 (0.0%)	4 (0.8%)

<sup>a</sup> Occupation categories: 1) Building/grounds, maintenance, protective; 2) Business, science, social services, education, arts, entertainment; 3) Construction, extraction; 4) Farming, fishing, forestry; 5) Food preparation and service; 6) Health care; 7) Installation, maintenance, repair; 8) Personal care and service; 9) Production; 10) Sales, office, administrative support; 11) Transportation; 12) Unclassifiable.

<sup>b</sup> Industry categories: 1) Agriculture, forestry, fishing, hunting; 2) Arts, entertainment, hospitality; 3) Construction, utilities, mining; 4) Education, health care, social services; 5) Information, finance, real estate, professional, technology; 6) Manufacturing; 7) Retail/wholesale trade; 8) Services: administrative, support, waste, other; 9) Transportation, Warehousing; 10) Unclassifiable.

Injuries involving multiple body parts were common, occurring in 44.1% of these workers, followed by injuries to the lower extremities (21.7%), Table 3. The most common nature of injury was fractures (53.0%), followed by fractures in combination with other injuries or burns (18.2%). The majority of workers had an injury severity that was rated as “serious/critical” (53.2%) using the maximum AIS score. A higher proportion of workers experienced injuries rated as “serious/critical” in the pre-implementation period (58.2%) than the post-implementation period (50.9%).

**Table 3.** Characteristics of injury by time period, N=483

Characteristics, n(%)	Pre- implementation N = 153	Peri- implementation N = 169	Post- implementation N = 161	Overall N = 483
<b>Body part of injury<sup>a</sup></b>				
Head or neck	12 (7.8%)	11 (6.5%)	10 (6.2%)	33 (6.8%)
Lower extremities	34 (22.2%)	40 (23.7%)	31 (19.3%)	105 (21.7%)
Trunk	19 (12.4%)	29 (17.2%)	19 (11.8%)	67 (13.9%)
Upper extremities	20 (13.1%)	17 (10.1%)	22 (13.7%)	59 (12.2%)
Multiple body injuries	67 (43.8%)	68 (40.2%)	78 (48.4%)	213 (44.1%)
Others	1 (0.7%)	4 (2.4%)	1 (0.6%)	6 (1.2%)
<b>Nature of injuries<sup>b</sup></b>				
Amputations	4 (2.6%)	5 (3.0%)	7 (4.3%)	16 (3.3%)
Other open wounds	5 (3.3%)	6 (3.6%)	9 (5.6%)	20 (4.1%)
Fractures	85 (55.6%)	85 (50.3%)	86 (53.4%)	256 (53.0%)
Fractures and others	33 (21.6%)	27 (16.0%)	28 (17.4%)	88 (18.2%)
Head/brain injuries	6 (3.9%)	6 (3.6%)	5 (3.1%)	17 (3.5%)
Soreness, sprains, tears	5 (3.3%)	15 (8.9%)	4 (2.5%)	24 (5.0%)
Surface wound, bruises, burns	1 (0.7%)	5 (3.0%)	5 (3.1%)	11 (2.3%)
Multiple injuries	11 (7.2%)	10 (5.9%)	11 (6.8%)	32 (6.6%)
Others	3 (2.0%)	10 (5.9%)	6 (3.7%)	19 (3.9%)
<b>Injury severity</b>				
Minor/moderate	61 (39.9%)	79 (46.7%)	75 (46.6%)	215 (44.5%)
Serious/critical	89 (58.2%)	86 (50.9%)	82 (50.9%)	257 (53.2%)
Missing	3 (2.0%)	4 (2.4%)	4 (2.5%)	11 (2.3%)

<sup>a</sup> **Head or neck:** injuries to the brain, cranial region, eye(s), head, scalp, neck (except internal location of disease or disorders), and/or skull; **lower extremities:** injuries to the ankle(s), foot (feet), leg(s), heel(s), knee(s), and/or thigh(s); **trunk:** injuries to the back (including the spine or spinal cord), internal abdominal location, chest (except internal location of diseases or disorders), heart, pelvic region, pelvis, hip(s), lumbar region, scrotum, trunk, and/or the thoracic region; **upper extremities:** injuries to the shoulder (including clavicle, scapula), elbow(s), forearm(s), hand(s), arm(s), wrist(s), finger(s), and/or fingernail(s); **multiple body:** injuries in multiple back region, multiple body parts, multiple face locations, multiple head locations, multiple leg(s) locations, multiple lower extremities locations, multiple pelvic region locations, multiple trunk locations, and/or multiple upper

<sup>b</sup> **Amputations:** amputations (with and without fingertip); **other open wounds:** avulsions, cuts, lacerations, open wounds, gunshot wounds, punctures, and/or animal or insect bites; **fractures:** fractures; **fractures and others:** fractures in combination with other injuries or burns; **head/brain injuries:** cerebral hemorrhages, concussions, intracranial injuries, loss of consciousness--not heat related, and/or anoxic brain damage; **soreness, sprains, tears:** crushing injuries, back pain or hurt back, soreness/pain/hurt except the back, dislocations, and/or sprains, strains, tears; **surface wounds, bruises, burns:** bruises, contusions, heat burns, scalds, electrical burns; **multiple injuries:** other combinations of traumatic injuries and disorders, multiple traumatic injuries to bones, nerves, or spinal cord, multiple intracranial injuries, and/or sprains and bruises; **others:** other diseases, conditions, and



disorders, nonclassifiable nature of injuries, chronic obstructive pulmonary diseases and allied conditions, ischemic heart disease, myocardial infarction (heart attack), electrocutions or electric shocks, other poisonings and toxic effects, and/or other traumatic injuries and disorders.

Claim closure was assessed for the first and second year after injury, with results showing that 20.7% of claims closed within 1 year after injury and 46.8% of claims closing within 2 years after injury.

**Table 4.** Characteristics of claim type and status by time period, N=483

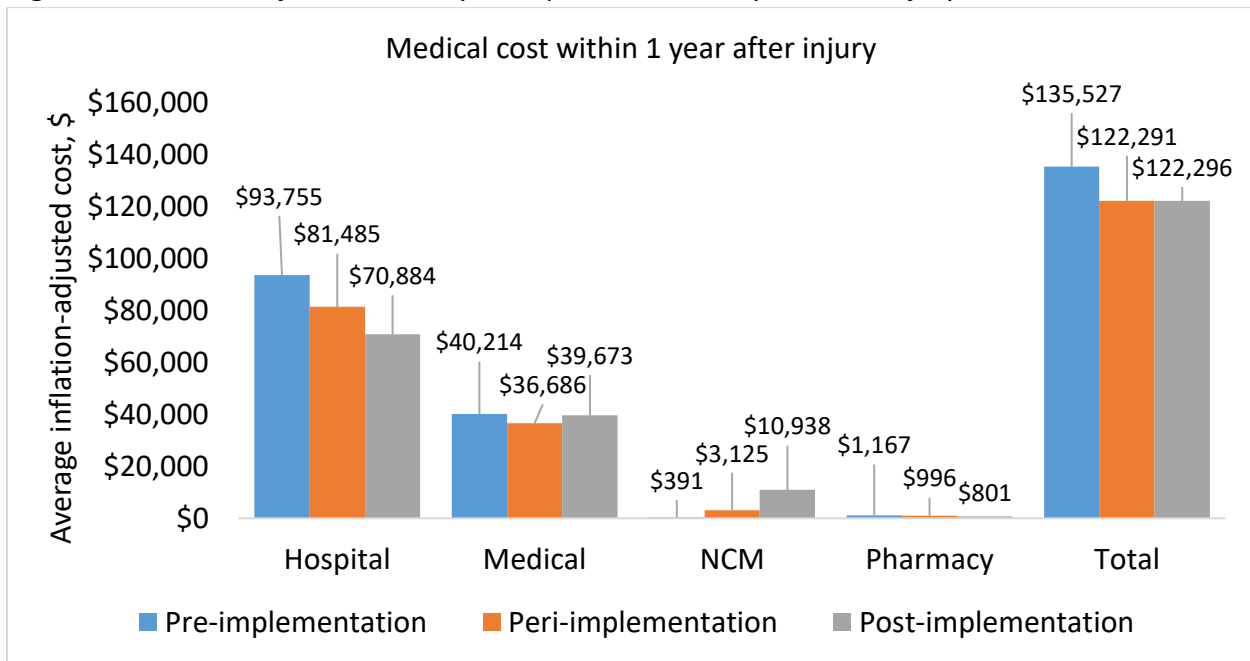
Characteristics	Pre- implementation N = 153	Peri- implementation N = 169	Post- implementation N = 161	Overall N = 483
<b>Claim closed, n(%)</b>				
within 1 year after injury	26 (17.0%)	39 (23.1%)	35 (21.7%)	100 (20.7%)
within 2 years after injury	68 (44.4%)	79 (46.7%)	79 (49.1%)	226 (46.8%)

*Distribution of total medical costs within first and second year of injury*

The average total inflation-adjusted medical costs (including hospital, medical, and pharmacy) within 1 year after injury was slightly lower in the post-implementation period (mean: \$122,296; median: \$84,505), compared to the pre-implementation period (mean: \$135,527, median: \$91,756), Figure 1 and Table 5. The average hospital costs was higher for workers in the pre-implementation period (mean: \$93,755; median: \$57,720), compared to the post-implementation period (mean: \$70,884; median: \$50,098). Excluding the costs of NCM, the average medical/professional costs was similar between the pre-implementation period (mean: \$40,214; median: \$24,944) and the post-implementation period (mean: \$39,673; median: \$27,522). Among all workers in the post-implementation period (including those without NCM services, n=161), the mean costs associated with NCM within 1 year after injury was \$10,938.

These patterns persist when examining the average total inflation-adjusted costs within 2 years after injury (Figure 2 and Table 6).

**Figure 1.** Inflation-adjusted costs by time period within 1 year after injury, N=483

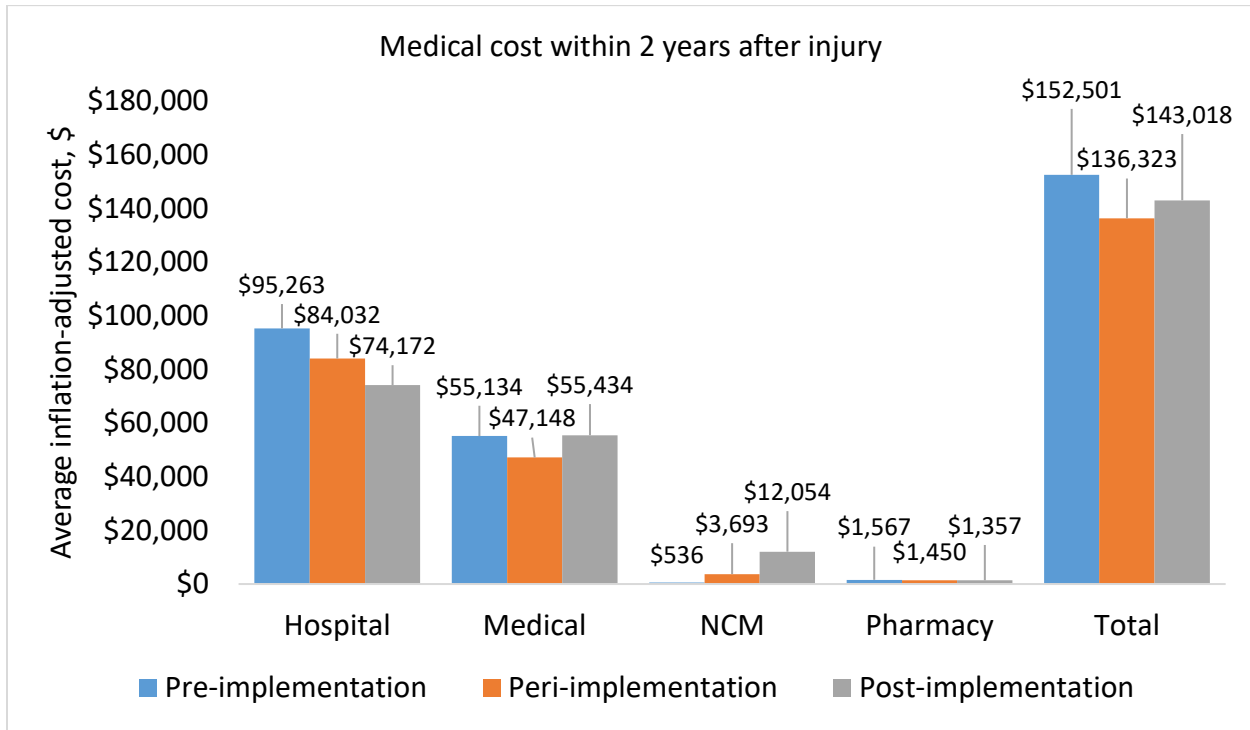


**Table 5.** Inflation-adjusted medical costs by time period within 1 year after injury, N=483

	Time period	Mean	SD	25 <sup>th</sup> percentile	Median	75 <sup>th</sup> percentile
Hospital	Pre	\$93,755	\$138,004	\$39,378	\$57,720	\$99,435
	Peri	\$81,485	\$101,055	\$33,232	\$49,552	\$85,726
	Post	\$70,884	\$64,123	\$30,209	\$50,098	\$89,780
Medical/ professional	Pre	\$40,214	\$50,388	\$15,701	\$24,944	\$45,693
	Peri	\$36,686	\$33,984	\$14,105	\$27,230	\$48,322
	Post	\$39,673	\$39,416	\$15,419	\$27,522	\$50,779
NCM	Pre	\$391	\$1,544	\$0	\$0	\$0
	Peri	\$3,125	\$7,009	\$0	\$0	\$2,770
	Post	\$10,938	\$47,829	\$0	\$0	\$3,503
Pharmacy	Pre	\$1,167	\$3,585	\$32	\$291	\$1,042
	Peri	\$996	\$4,337	\$15	\$224	\$775
	Post	\$801	\$1,945	\$32	\$238	\$810
Total	Pre	\$135,527	\$174,920	\$60,890	\$91,756	\$144,303
	Peri	\$122,291	\$130,308	\$56,696	\$78,872	\$139,265
	Post	\$122,296	\$122,072	\$50,840	\$84,505	\$141,858

*Note:* NCM costs are averaged over all catastrophic claims and are not restricted to workers receiving NCM services. NCM in the pre-implementation period consisted of non-contracted hourly services.

**Figure 2.** Inflation-adjusted costs by time period within 2 years after injury, N=483



**Table 6.** Inflation-adjusted medical costs by time period within 2 years after injury, N=483

	Time period	Mean	SD	25 <sup>th</sup> percentile	Median	75 <sup>th</sup> percentile
Hospital	Pre	\$95,263	\$139,533	\$39,893	\$58,835	\$102,073
	Peri	\$84,032	\$102,669	\$33,379	\$50,390	\$90,842
	Post	\$74,172	\$66,505	\$31,621	\$53,177	\$91,577
Medical/ professional	Pre	\$55,134	\$81,271	\$18,566	\$30,026	\$61,483
	Peri	\$47,148	\$41,455	\$15,300	\$36,007	\$66,871
	Post	\$55,434	\$59,023	\$16,597	\$34,817	\$74,317
NCM	Pre	\$536	\$2,013	\$0	\$0	\$0
	Peri	\$3,693	\$8,219	\$0	\$0	\$3,416
	Post	\$12,054	\$49,459	\$0	\$0	\$4,106
Pharmacy	Pre	\$1,567	\$4,105	\$39	\$418	\$1,342
	Peri	\$1,450	\$4,937	\$33	\$279	\$1,008
	Post	\$1,357	\$4,064	\$41	\$329	\$1,008
Total	Pre	\$152,501	\$208,684	\$63,749	\$108,887	\$163,371
	Peri	\$136,323	\$136,989	\$59,593	\$91,271	\$164,571
	Post	\$143,018	\$143,319	\$56,377	\$92,719	\$172,941

*Note:* NCM costs are averaged over all catastrophic claims and are not restricted to workers receiving NCM services. NCM in the pre-implementation period consisted of non-contracted hourly services.

Among workers injured in the post-implementation period, 52 workers (32.3%) received NCM services within 2 years after injury. Table 7 shows the distribution of paid NCM services within 2 years after injury among workers who received NCM in the post-implementation period. For workers who received NCM in the post-implementation period, the mean inflation-adjusted costs of NCM services within 2 years after injury was \$37,321 (median: \$13,044). Costs due to NCM services were highly variable, ranging from a minimum of \$567 to a maximum of \$337,251 (Figure 3). Around 87% of workers (n=45) who received NCM had NCM costs that were \$40,000 or less. The four highest costs (>\$260,000) were associated with outcome-based firms. Three workers had NCM costs between \$40,001 and \$100,000.

**Table 7.** Distribution of paid NCM services within the 1<sup>st</sup> and 2<sup>nd</sup> year after injury

NCM costs	Min	Max	Percentiles						Mean
			10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	
Within 1 year after injury (n=50)	\$567	\$327,999	\$2,374	\$4,762	\$10,925	\$19,517	\$31,610	\$294,074	\$35,219
Within 2 years of injury (n=52)	\$567	\$337,251	\$1,249	\$4,270	\$13,044	\$22,922	\$46,410	\$291,128	\$37,321

*Note:* There were 50 workers who had NCM-related costs within the first year of injury, compared to 52 workers within the 2<sup>nd</sup> year of injury. Two workers did not have NCM-related costs in the 1<sup>st</sup> year of injury because their first NCM cost was billed a year after injury; both of these workers received hourly, non-contracted NCM.

**Figure 3.** Distribution of paid, inflation-adjusted costs due to NCM within 2 years after injury for workers in the post-implementation period who received NCM (N=52)

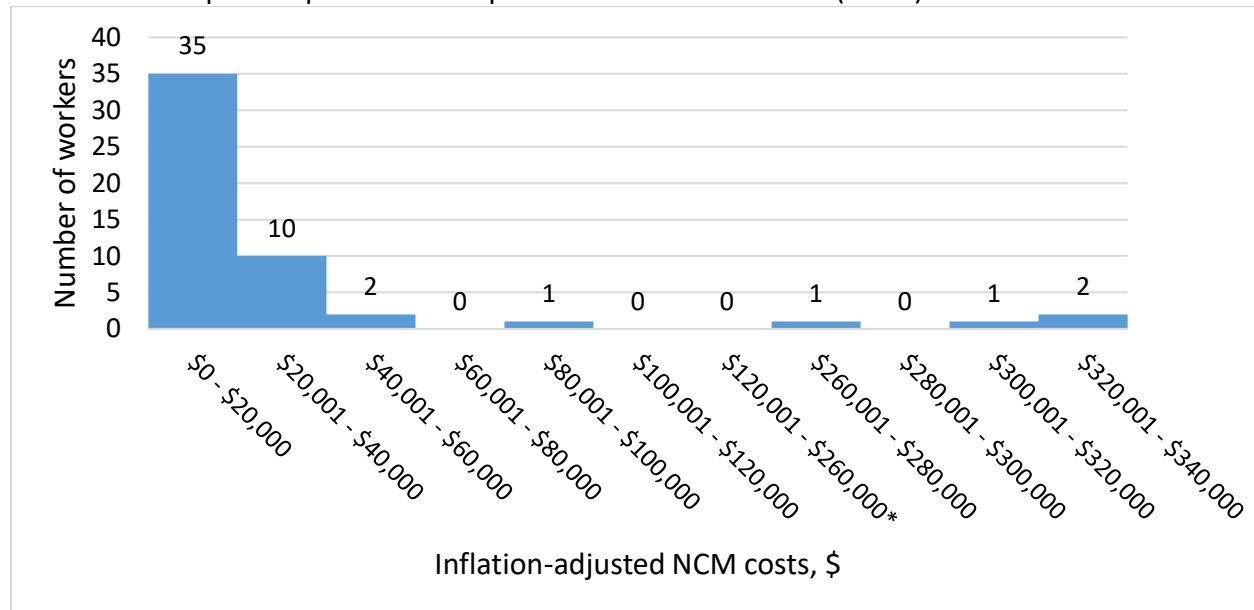
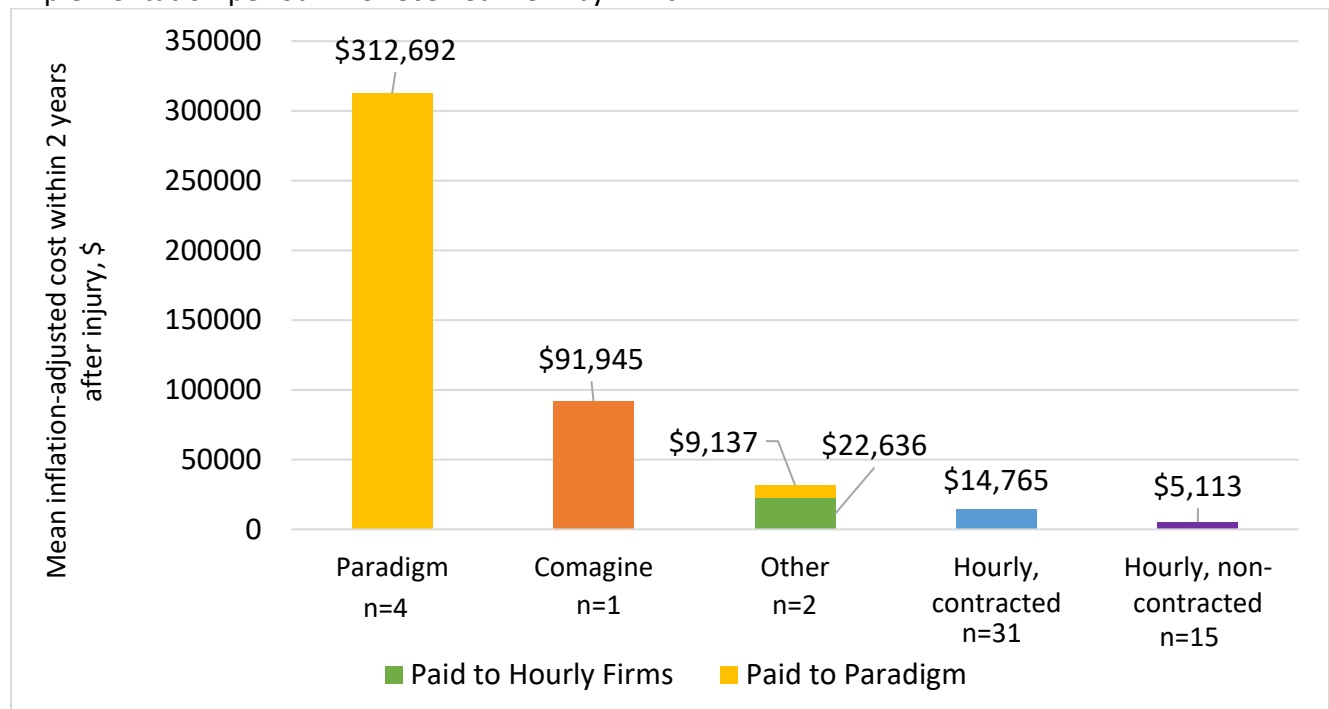


Figure 4 shows the costs associated with NCM within the first 2 years of injury by firms. There were 4 workers with NCM from Paradigm, an outcome-based firm. For these workers, the mean costs of NCM paid within the first 2 years after injury was \$312,692. One worker received NCM services from Comagine (an outcome-based firm) where the paid costs of NCM services within 2 years after injury was \$91,945. Two workers switched from Paradigm to an hourly NCM firm. For these workers (classified as “Other”), the average costs of NCM paid to hourly firms in the first 2 years after injury was \$22,636, and the average costs of NCM paid to outcome Firm A was \$9,137. There were 31 workers who received hourly, contracted NCM services. For these workers, the mean costs of NCM was \$14,765. Fifteen workers received NCM from hourly, non-contracted firms. For these workers, the mean costs of NCM in the first 2 years of injury was \$5,113.

NCM costs shown here underestimate the true cost of NCM, particularly for outcome-based firms. For Paradigm, some payments to NCM firms are contingent on the completion of an agreed-upon Outcome Plan, with payment reconciliation not starting until 12 months after the outcome plan ends (see Chapter 6 for more information). In this sample, only one worker completed the Outcome Plan within the 2 year follow-up, and payment reconciliation did not occur during the follow-up period.

**Figure 4.** Inflation-adjusted costs due to NCM within 2 years after injury for workers in the post-implementation period who received NCM by firms

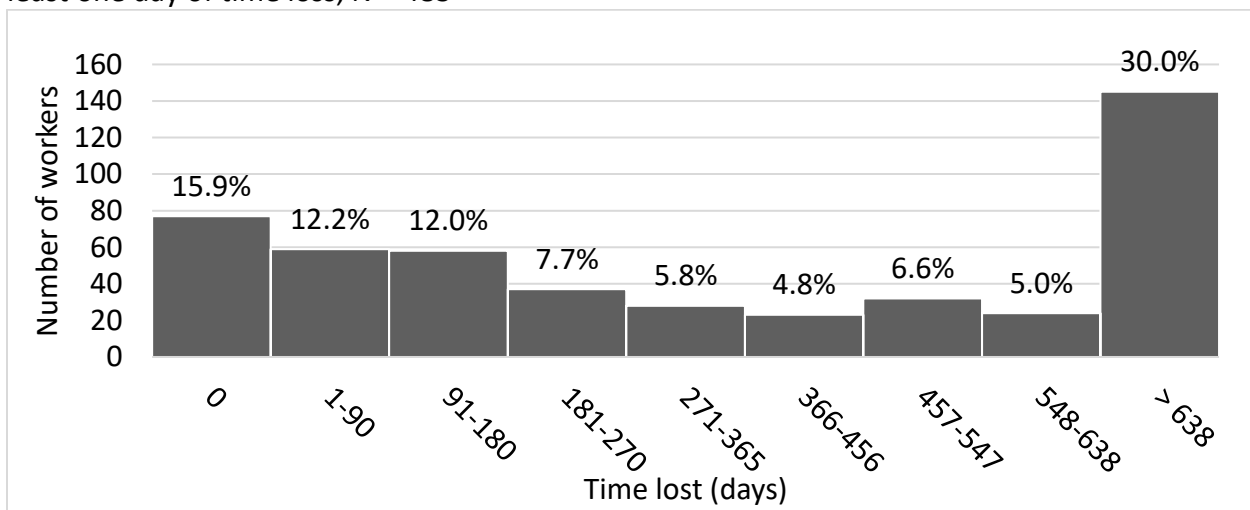


Note: “Other” consists of workers who switched from Paradigm to an hourly NCM firm. Total number of workers adds up to 53 because 1 worker switched between hourly, contracted and hourly, non-contracted firms, and NCM costs for this worker contributes to the averages for both of these categories.

Distribution of time loss in first and second year of injury

Eighty-four percent (n = 406) of all workers had at least 1 day of TL (Figure 5). There were 77 workers (15.9% of all workers) without any time loss payments. For workers without time loss, 70.1% were kept on salary, 11.7% were non-compensable, 10.4% were fatal, and 7.8% were compensable when the data was ascertained from L&I’s records in September 2019. Among all catastrophically-injured workers (n=483), 46.4% had at least 1 year of TL (>365 days) through their second year of injury (Figure 5). Among catastrophically-injured workers who had at least 1 day of TL (n=406), 55.2% of workers had more than 1 year of TL (>365 day) through their second year of injury (Table 8).

**Figure 5.** Frequency and percentage of time loss within 2 years after injury for workers with at least one day of time loss, N = 483



**Table 8.** Frequency and percentage of time loss within 2 years after injury for workers with at least one day of time loss, N = 406

	Pre-implementation N = 153	Peri-implementation N = 169	Post-implementation N = 161	Overall N = 483
<b>Workers with at least 1 day of TL</b>	131	139	136	406
>1 month (30 d) TL	127 (96.9%)	134 (96.4%)	129 (94.9%)	390 (96.1%)
>3 months (90 d) TL	118 (90.1%)	115 (82.7%)	114 (83.8%)	347 (85.5%)
>6 months (180 d) TL	98 (74.7%)	97 (69.8%)	94 (69.1%)	289 (71.2%)
>1 year (365 d) TL	75 (57.3%)	78 (56.1%)	71 (52.2%)	224 (55.2%)

Note: There were 77 workers (15.9%) without any time loss payments.

Catastrophic care implementation and incurred medical costs within 2 years after injury

In the unadjusted analysis, total medical costs for workers injured after the implementation of catastrophic care was not significantly different from costs incurred before implementation of NCM. After adjusting for injury severity and number of comorbid illnesses, workers with

catastrophic injuries in the post-implementation period incurred slightly less (average of \$4,469 less; 95% CI: -\$43287, \$34350]; p=0.81) in total medical costs within 2 years after injury than those in the pre-implementation period, although the difference was not statistically significant (Table 9). Workers injured in the peri-implementation period had slightly lower total medical cost (average of \$11,491 less; 95% CI: -\$49676, \$26694; p = 0.56) than those in the pre-implementation period, adjusting for injury severity and comorbid illnesses.

When examining specific costs, workers in the post-implementation period on average incurred slightly lower hospital/facilities costs (\$18,426 less; 95% CI: -\$42243, \$5390; p=0.13) and lower pharmacy costs (\$177 less; 95% CI: -\$1112, \$758; p=0.73), compared to workers in the pre-implementation period, after adjusting for injury severity and number of comorbid illnesses. Average medical/professional costs (which includes the cost of NCM services) were slightly higher among workers injured in the post-implementation period (average of \$14,135 more; 95% CI: -\$5682, \$33951; p=0.16), compared to workers in the pre-implementation period, after adjusting for severity and number of comorbid illnesses. The difference in medical/professional costs between these two time periods was attenuated after excluding the cost of NCM services from medical/professional bills. Specifically, workers in the post-implementation period had slightly higher medical costs, excluding NCM (average \$2196 more; 95% CI: -\$13189, \$17580); p=0.78), than workers in the pre-implementation period. Compared to workers injured in the pre-implementation period, workers injured in the peri-implementation period had slightly lower medical cost, excluding NCM (average \$6,183 less; 95% CI: -\$20138, \$7772, p=0.39), than those injured in the pre-implementation period. None of these differences were statistically significant, defined as p<0.05.

**Table 9.** Linear regression analyses predicting inflation-adjusted medical costs incurred within 2 years after injury, N=472

Outcomes	Time period	Unadjusted $\beta$ (95% CI)	Severity adjusted $\beta$ (95% CI)	Severity + FCI adjusted $\beta$ (95% CI)
<b>Total medical cost</b>	Pre	<i>ref</i>	<i>ref</i>	<i>ref</i>
	Peri	-\$16,114 (-\$55698, \$23471)	-\$11,643 (-\$49943, \$26658)	-\$11,491 (-\$49676, \$26694)
	Post	-\$9,255 (-\$49677, \$31167)	-\$4,851 (-\$43907, \$34206) <sup>a</sup>	-\$4,469 (-\$43287, \$34350) <sup>b</sup>
<b>Hospital</b>	Pre	<i>ref</i>	<i>ref</i>	<i>ref</i>
	Peri	-\$11,656 (-\$39077, \$15765)	-\$8,873 (-\$35529, \$17784)	-\$8,783 (-\$35407, \$17842)
	Post	-\$21,395 (-\$46165, \$3376)	-\$18,653 (-\$42467, \$5160) <sup>a</sup>	-\$18,426 (-\$42243, \$5390) <sup>b</sup>
<b>Medical (including NCM)</b>	Pre	<i>ref</i>	<i>ref</i>	<i>ref</i>
	Peri	-\$4,342 (-\$19272, \$10588)	-\$2,709 (-\$17186, \$11768)	-\$2,641 (-\$17031, \$11749)
	Post	\$12,355 (-\$7887, \$32597)	\$13,963 (-\$6080, \$34007) <sup>a</sup>	\$14,135 (-\$5682, \$33951) <sup>b</sup>

<b>Medical (excluding NCM)</b>	Pre	<i>ref</i>	<i>ref</i>	<i>ref</i>
	Peri	-\$7,577 (-\$22090, \$6935)	-\$6,254 (-\$20,293, \$7785)	-\$6,183 (-\$20138, \$7772)
	Post	\$714 (-\$15302, \$16730)	\$2,017 (-\$13562, \$17597) <sup>a</sup>	\$2,196 (-\$13189, \$17580) <sup>b</sup>
<b>Pharmacy</b>	Pre	<i>ref</i>	<i>ref</i>	<i>ref</i>
	Peri	-\$116 (-\$1123, \$890)	-\$61 (-\$1101, \$979)	-\$67 (-\$1096, \$962)
	Post	-\$216 (-\$1136, \$705)	-\$161 (-\$1108, \$786)	-\$177 (-\$1112, \$758)

Abbreviation: CI (confidence interval)

<sup>a</sup> Severity independently predictive of cost outcome (+ association; p<0.01)

<sup>b</sup> Severity independently predictive of cost outcome (+ association; p<0.01), but FCI was not

### NCM for catastrophic injuries and time loss within 2 years after injury

Time loss within 2 years after injury was not significantly different between workers injured before and after implementation of NCM. Among workers with at least 1 day of TL, workers in the post-implementation period on average had 4 fewer days of time loss (95% CI: -68, 59; p = 0.89) compared to workers in the pre-implementation period, adjusting for injury severity and comorbid illnesses, but differences were not statistically significant (Table 10). Odds of obtaining ≥1 year (365 d) of TL were not significantly different (odds ratio [OR]: 0.8; 95% CI: 0.5, 1.4; p=0.50) for workers in the post-implementation period, compared to those injured in the pre-implementation period.

**Table 10.** Linear and logistic regression analyses predicting time loss within 2 years after injury among workers with at least 1 day of time loss, N = 398

<b>Outcomes</b>	<b>Time period</b>	<b>Unadjusted β (95% CI)</b>	<b>Severity adjusted β (95% CI)</b>	<b>Severity + FCI adjusted β (95% CI)</b>
<b>Time loss (d)</b>	Pre	<i>ref</i>	<i>ref</i>	<i>ref</i>
	Peri	3 (-60, 66)	4 (-59, 67)	4 (-59, 67)
	Post	-5 (-69, 58)	-4 (-68, 59)	-4 (-68, 59)
<b>Odds ratios (95% CI)</b>				
<b>Received ≥1 year (365 d) of TL</b>	Pre	<i>ref</i>	<i>ref</i>	<i>ref</i>
	Peri	1 (0.6, 1.6)	1 (0.6, 1.6)	1 (0.6, 1.6)
	Post	0.8 (0.5, 1.4)	0.8 (0.5, 1.4)	0.8 (0.5, 1.4)

*Note:* Time loss (days; continuous) was examined using linear regression. Logistic regression was used to examine the odds of obtaining ≥1 year of time loss, with the exponentiated β (95% confidence intervals [CI]) presented.

### **Additional Findings**

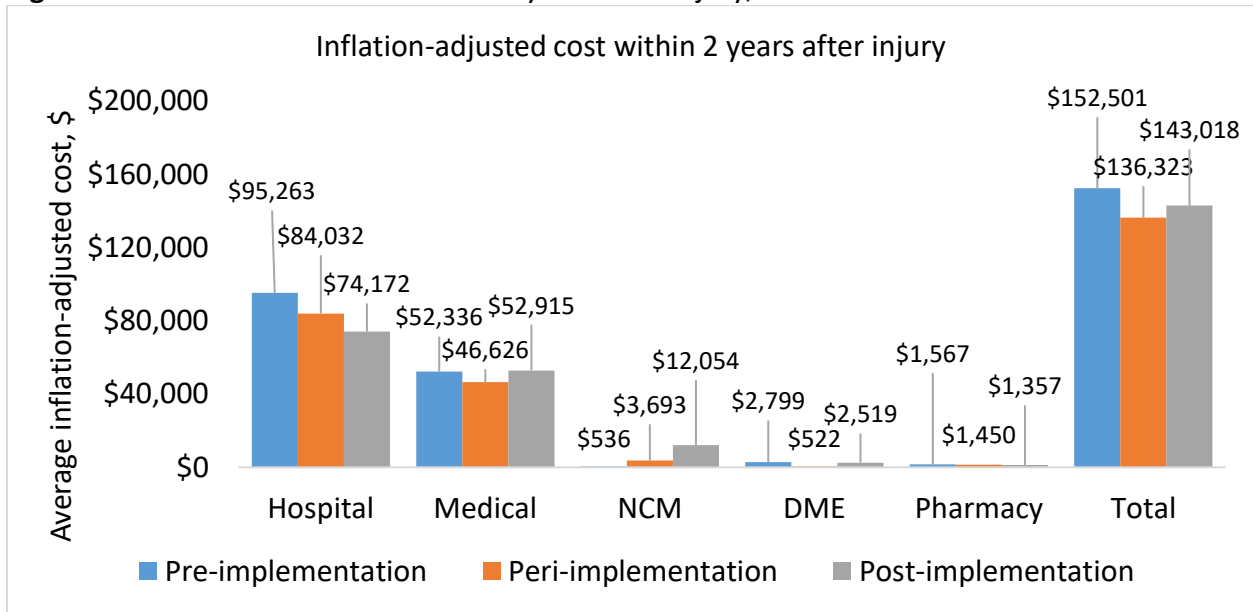
#### Classification of expenses

On average, hospital costs accounted for the majority (61.5%) of the total medical costs incurred within 2 years after injury, followed by medical (excluding NCM and durable medical



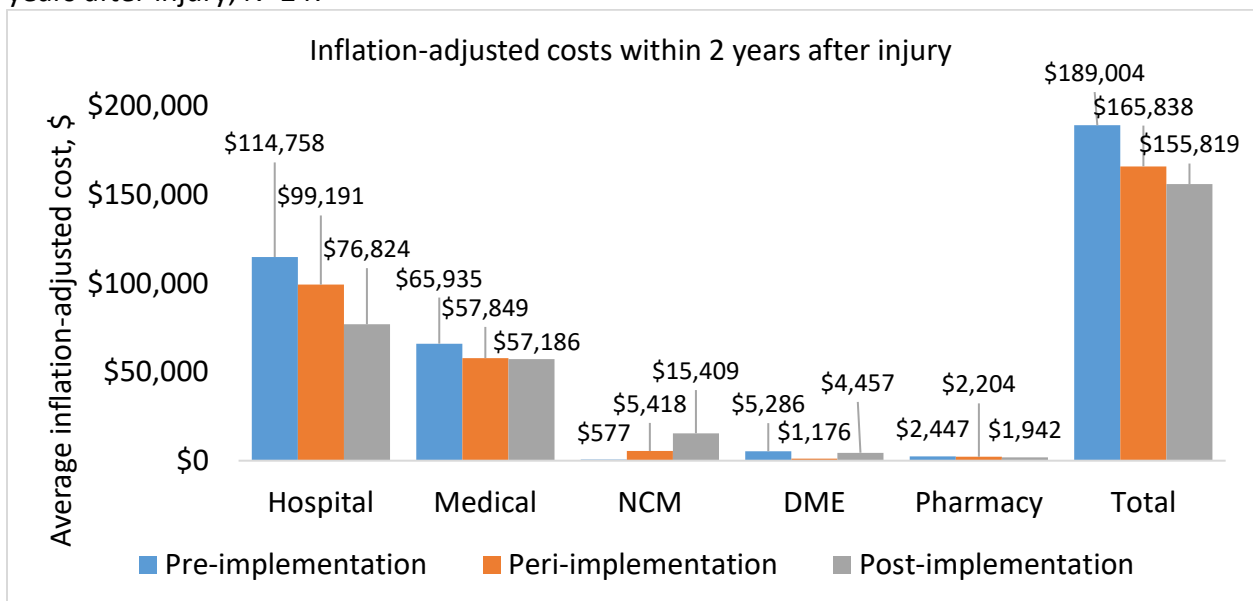
equipment [DME]; 35.0%), and pharmacy (0.8%), Figure 6. On average, DME consisted of 0.8% of the total medical costs incurred within 2 years after injury.

**Figure 6.** Classification of costs within 2 years after injury, N=483



Fifty-one percent of workers received DME within 2 years after injury (n=247). Stratified by the implementation of catastrophic care, 53% of workers in the pre-implementation period (n=81), 44% of workers in the peri-implementation period (n=75), and 57% of workers in the post-implementation period (n=91) received DME. Among workers who received DME, DME accounted for 1.5% of the total medical costs incurred 2 years after injury on average (Figure 7).

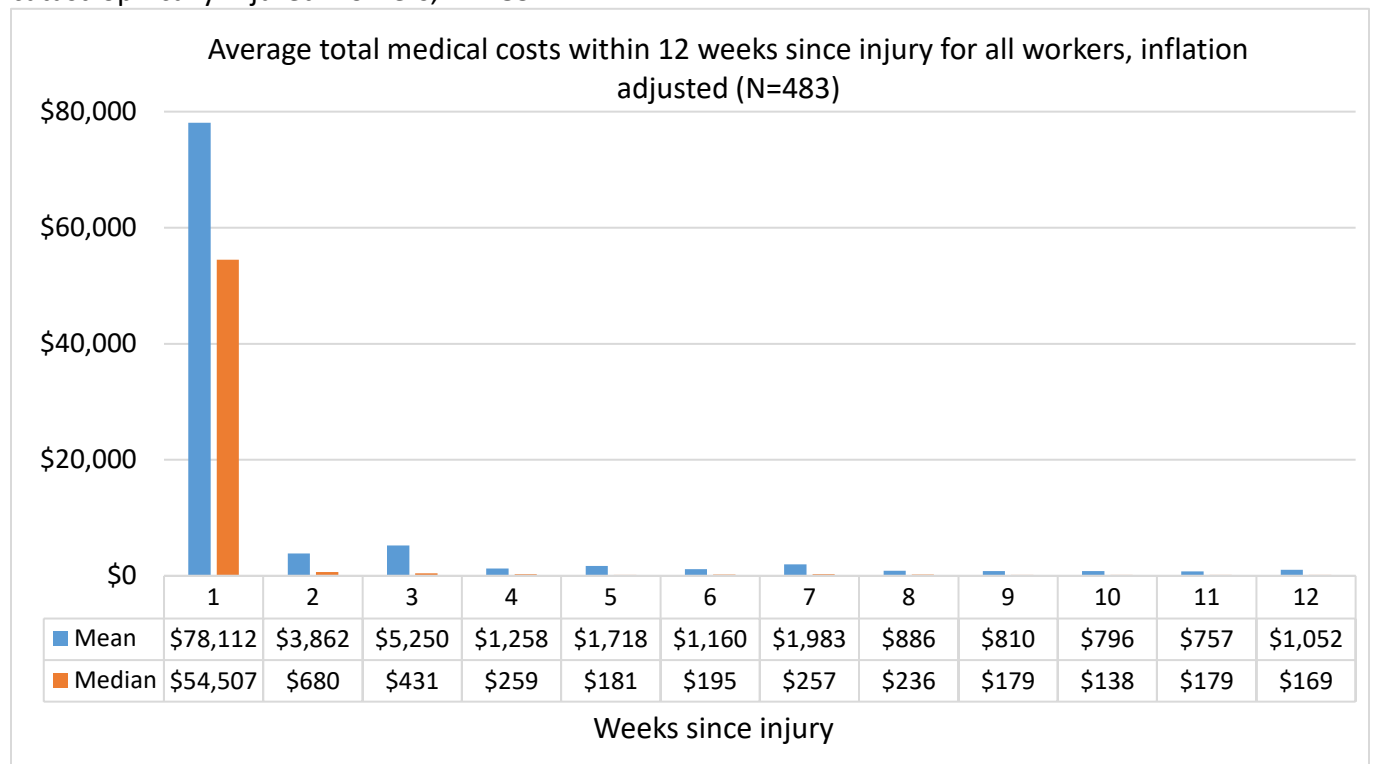
**Figure 7.** Classification of expenses among workers with durable medical equipment within 2 years after injury, N=247



Trajectories of total medical costs within 2 years after injury for all catastrophically-injured workers

Figure 8 shows the trajectory of total medical costs in the first 12 weeks since injury for all catastrophically-injured workers (n=483). The average total medical costs in the first week after injury was \$78,112 (median: \$54,507). On average, total medical costs in the first week after injury accounted for 62.6% of the total medical cost incurred in the 2 years after injury. After the first week of injury, the average total medical costs varied by weeks, but costs remained substantially lower than the costs acquired in the first week after injury. On average, total medical cost in the first 12 weeks after injury accounted for 72.3% % of the total medical cost incurred within 2 years after injury.

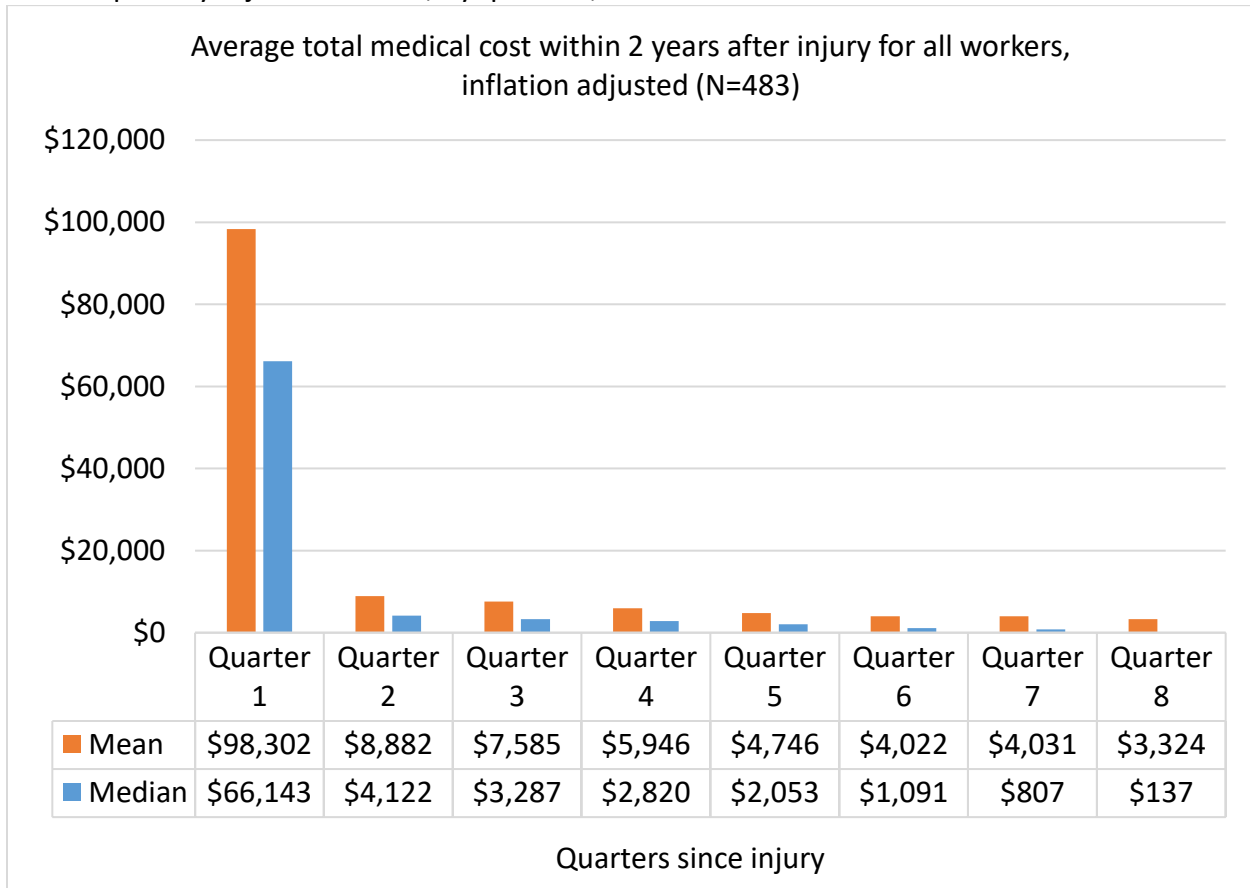
**Figure 8.** Trajectory of inflation-adjusted total medical costs in first 12 weeks since injury for all catastrophically-injured workers, N=483



*Note:* Total medical costs includes hospital, medical (excluding NCM), and pharmacy costs (including only scheduled drugs). Percent of total medical costs within 2 years after injury is calculated by a mean of ratios. For each worker, we estimated the percent of the total medical cost within 2 years after injury at each time point and then averaged these proportions over all workers (n=483).

Figure 9 shows the trajectory of total medical costs within 2 years after injury for all catastrophically-injured workers, by quarters since injury (N=483). The average total medical costs in the first quarter after injury was \$98,302 (median: \$66,143). On average, total medical costs in the first quarter after injury accounted for 75.8% of the total medical costs incurred within 2 years after injury. The average total medical costs incurred decreased over time. Cost trajectories did not differ substantially when stratified by the three time periods coinciding with implementation of NCM for catastrophic injuries.

**Figure 9.** Trajectory of inflation-adjusted total medical cost within 2 years after injury for all catastrophically-injured workers, by quarters, N=483



*Note:* Total medical costs includes hospital, medical (excluding NCM), and pharmacy costs (including only scheduled drugs). Percent of total medical costs within 2 years after injury is calculated by a mean of ratios. For each worker, we estimated the percent of the total medical cost within 2 years after injury at each time point and then averaged these proportions over all workers (n=483).

### Mental health utilization

Overall, 23% (n=111) of workers in the study population received paid mental health services within 2 years after injury (Table 11). A higher proportion of workers in the post-implementation period received mental health services (28.0%), compared to those injured in the pre-implementation period (19.0%). Among workers who had paid mental health services, the vast majority (93.7%) received mental health assessments (e.g., diagnostic exams and neurobehavioral or behavioral/emotional assessment), followed by mental health treatments (68.5%).

**Table 11.** Workers with paid mental health services within 2 years after injury by time period, N=483

Characteristic, n(%)	Pre-implementation N = 153	Peri-implementation N = 169	Post-implementation N = 161	Overall N = 483
<b>Received mental health services</b>				
Yes	29 (19.0%)	37 (21.9%)	45 (28.0%)	111 (23.0%)
No	124 (81.0%)	132 (78.1%)	116 (72.0%)	372 (77.0%)
<b>Type of mental health services received</b>				
Assessments	28 (96.6%)	34 (91.9%)	42 (93.3%)	104 (93.7%)
Testing	0 (0%)	0 (0%)	1 (2.2%)	1 (0.9%)
Treatments	19 (65.5%)	26 (70.3%)	31 (68.9%)	76 (68.5%)

Note: Data on mental health services were obtained using billed and paid procedure codes. Mental health services excluded health and behavior codes.

Opioid utilization by time period

Overall, 68.7% of workers received at least one paid opioid prescription within 2 years after injury (Table 12). Among those who received opioids within 2 years after injury, 86.4% received an opioid prescription in the first 6 weeks of injury.

**Table 12.** Workers with at least one paid outpatient opioid prescription within 2 years after injury by time period, N=483

Characteristic, n(%)	Pre-implementation N = 153	Peri-implementation N = 169	Post-implementation N = 161	Overall N = 483
Workers with at least one paid opioid prescription	105 (68.6%)	118 (69.8%)	109 (67.7%)	332 (68.7%)
By time interval:				
0-6 weeks	92 (87.6%)	102 (86.4%)	93 (85.3%)	287 (86.4%)
7-12 weeks	29 (27.6%)	27 (22.9%)	17 (15.6%)	73 (22.0%)
13 weeks-6 months	15 (14.3)	25 (21.2%)	19 (17.4%)	59 (17.8%)
7-9 months	7 (6.7%)	20 (16.9%)	11 (10.1%)	38 (11.4%)
10-12 months	13 (12.4%)	15 (12.7%)	14 (12.8%)	42 (12.7%)

Classification of NCM recipients and non-recipients

For workers injured in the period after implementation of NCM for catastrophic injuries, we compared the demographic and injury-related characteristics, total medical costs, and time loss (days) between workers who received any NCM services versus those who did not receive any NCM services within 2 years after injury. Workers with “any NCM” services consist of those who

received any type of NCM services from either a contracted hourly firm, a contracted outcome-based firm, or a non-contracted NCM firm/individual. Workers without any NCM services (referred to as “No NCM”) consist of those who did not receive any NCM services from a contracted hourly firm, a contracted outcome-based firm, and a non-contracted NCM firm/individual within 2 years after injury.

For workers injured in the period after implementation of NCM for catastrophic injuries, 32% of workers received any type of NCM services within 2 years of injury (Table 13). Workers who received any NCM services were comparable to workers who did not receive any NCM services in terms of gender, age, and occupation. Compared to those who did not receive any NCM services, workers who received NCM services were more likely to be married, had at least 1 dependent, resided in an urban county, and had at least 1 comorbidity. The average number of comorbid illnesses for NCM recipients was 1.2 (SD: 1.2), compared to 0.8 (SD: 1.2) for workers without any NCM services. In terms of industry, 16.5% of workers who did not receive any NCM was in retail/wholesale, compared to 9.6% of workers with NCM. A higher proportion of workers with NCM were in the construction industry (34.6%), compared to those without any NCM services (26.6%).

**Table 13.** Characteristics of workers by receipt of any NCM services within 2 years of injury in the post-implementation period, N=161

Characteristics	No NCM N=109	NCM N=52
Age at injury (mean, SD)	44.7 (14.6)	44.3 (15.7)
Sex, n(%)		
Male	89 (81.7%)	46 (88.5%)
Female	20 (18.3%)	6 (11.5%)
Marital status, n(%)		
Married	41 (37.6%)	25 (48.1%)
Single	65 (59.6%)	27 (51.9%)
Missing	3 (2.8%)	0 (0.0%)
Dependents, n(%)		
No	84 (77.1%)	34 (65.4%)
Yes	25 (22.9%)	18 (34.6%)
County residence, n(%)		
Rural	33 (30.3%)	12 (23.1%)
Urban	65 (59.6%)	34 (65.4%)
Missing	11 (10.1%)	6 (11.5%)
Occupation, n(%) <sup>a</sup>		
Building	11 (10.1%)	3 (5.8%)
Business	6 (5.5%)	3 (5.8%)
Construction	31 (28.4%)	17 (32.7%)
Farming	6 (5.5%)	4 (7.7%)

Food prep and service	5 (4.6%)	0 (0.0%)
Health care	3 (2.8%)	0 (0.0%)
Installation, maintenance	10 (9.2%)	3 (5.8%)
Personal care	1 (0.9%)	2 (3.8%)
Production	7 (6.4%)	5 (9.6%)
Sales, office, admin support	7 (6.4%)	1 (1.9%)
Transportation	18 (16.5%)	9 (17.3%)
Unclassifiable	4 (3.7%)	5 (9.6%)
<b>Industry, n(%)<sup>b</sup></b>		
Agriculture	10 (9.2%)	7 (13.5%)
Arts	5 (4.6%)	1 (1.9%)
Construction	29 (26.6%)	18 (34.6%)
Education	10 (9.2%)	3 (5.8%)
Information	4 (3.7%)	2 (3.8%)
Manufacturing	6 (5.5%)	6 (11.5%)
Retail/wholesale trade	18 (16.5%)	5 (9.6%)
Services	17 (15.6%)	5 (9.6%)
Transportation, warehousing	10 (9.2%)	5 (9.6%)
<b>Number of comorbidities, n(%)</b>		
0	53 (48.6%)	18 (34.6%)
1	35 (32.1%)	16 (30.8%)
2	13 (11.9%)	10 (19.2%)
3	4 (3.7%)	6 (11.5%)
4	4 (3.7%)	1 (1.9%)
5	0 (0.0%)	1 (1.9%)
6	0 (0.0%)	0 (0.0%)

<sup>a</sup> Occupation categories: 1) Building/grounds, maintenance, protective; 2) Business, science, social services, education, arts, entertainment; 3) Construction, extraction; 4) Farming, fishing, forestry; 5) Food preparation and service; (6) Health care; 7) Installation, maintenance, repair; 8) Personal care and service; 9) Production; 10) Sales, office, administrative support; 11) Transportation; 12) Unclassifiable.

<sup>b</sup> Industry categories: 1) Agriculture, forestry, fishing, hunting; 2) Arts, entertainment, hospitality; 3) Construction, utilities, mining; 4) Education, health care, social services; 5) Information, finance, real estate, professional, technology; 6) Manufacturing; 7) Retail/wholesale trade; 8) Services: administrative, support, waste, other; 9) Transportation, Warehousing; 10) Unclassifiable.

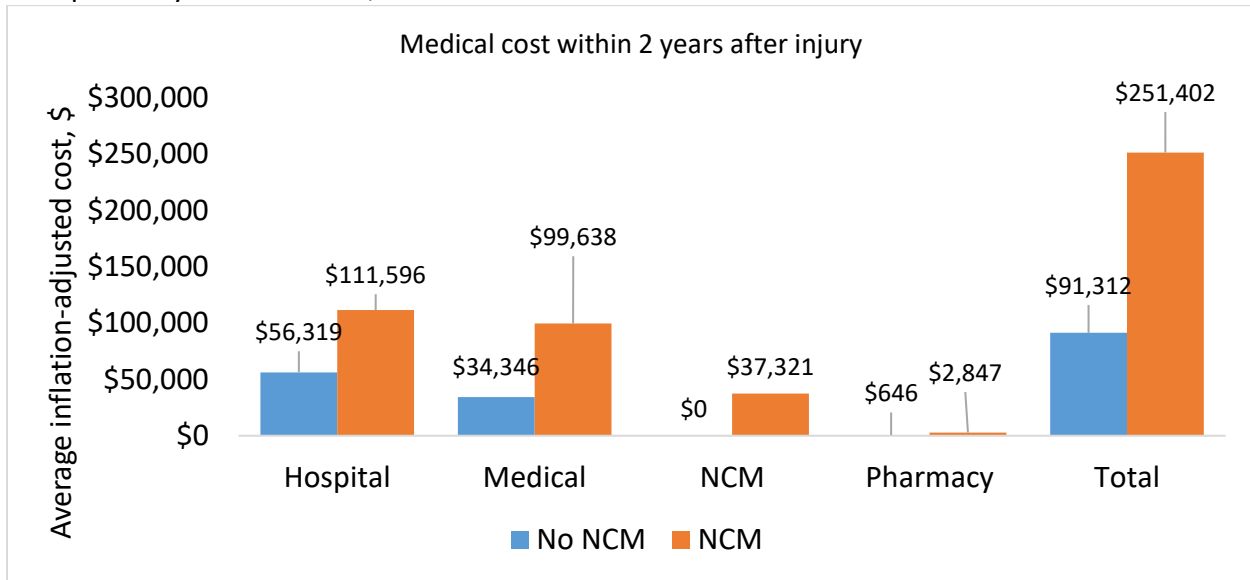
A higher proportion of workers who received any NCM, compared to those who did not, had an injury involving multiple body parts (57.7% vs. 44.0%, respectively), Table 14. The majority of workers receiving NCM had injuries that were classified as “serious/critical” (61.5%), compared to 45.9% for those without any NCM services.

**Table 14.** Characteristics of workers' injuries by receipt of catastrophic NCM in the post-implementation period, N=161

<b>Injury characteristics</b>	<b>No NCM N=109</b>	<b>NCM N=52</b>
<b>Body part of injury, n(%)</b>		
Head or neck	5 (4.6%)	5 (9.6%)
Lower extremities	23 (21.1%)	8 (15.4%)
Trunk	15 (13.8%)	4 (7.7%)
Upper extremities	18 (16.5%)	4 (7.7%)
Multiple body injuries	48 (44.0%)	30 (57.7%)
Others	0 (0.0%)	1 (1.9%)
<b>Nature of injury, n(%)</b>		
Amputations	3 (2.8%)	4 (7.7%)
Other open wounds	6 (5.5%)	3 (5.8%)
Fractures	62 (56.9%)	24 (46.2%)
Fractures and others	18 (16.5%)	10 (19.2%)
Head/brain injuries	3 (2.8%)	2 (3.8%)
Soreness/sprains/tears	3 (2.8%)	1 (1.9%)
Surface wounds/bruises/burns	3 (2.8%)	2 (3.8%)
Multiple injuries	7 (6.4%)	4 (7.7%)
Others	4 (3.7%)	2 (3.8%)
<b>Severity, n(%)</b>		
1 or 2 (minor/moderate)	56 (51.4%)	19 (36.5%)
3 - 5 (serious-critical)	50 (45.9%)	32 (61.5%)
Missing	3 (2.8%)	1 (1.9%)

Inflation-adjusted medical costs within 2 years after injury were higher for workers who received NCM, compared to those who did not receive any NCM services (Figure 10 and Table 15). On average, workers who received NCM had roughly two times the hospital costs, three times the medical costs (excluding NCM), and over three times the pharmacy costs, compared to those without any NCM services. Among workers who had at least one day of TL (n=136, 84% of workers in the post-implementation period), TL was higher among those who received NCM, compared to those who did not receive any NCM services (Table 15).

**Figure 10.** Inflation-adjusted medical costs and time loss (days) within 2 years after injury by receipt of any NCM services, N=161



**Table 15.** Inflation-adjusted medical costs within 2 years after injury by receipt of any NCM services

	Classification	Mean	SD	25 <sup>th</sup> percentile	Median	75 <sup>th</sup> percentile
Hospital	No NCM	\$56,319	\$47,526	\$27,796	\$42,667	\$67,013
	NCM	\$111,596	\$83,567	\$41,802	\$90,235	\$165,444
Medical/professional	No NCM	\$34,346	\$28,798	\$13,235	\$24,173	\$46,968
	NCM	\$99,638	\$78,933	\$45,463	\$83,424	\$132,545
NCM	No NCM	\$0	\$0	\$0	\$0	\$0
	NCM	\$37,321	\$81,932	\$4,270	\$13,044	\$22,922
Pharmacy	No NCM	\$646	\$1,384	\$19	\$174	\$601
	NCM	\$2,847	\$6,664	\$145	\$932	\$2,082
Total medical cost	No NCM	\$91,312	\$67,155	\$44,720	\$76,271	\$112,372
	NCM	\$251,402	\$192,870	\$103,376	\$217,309	\$298,521
Time loss (days)	No NCM	362	284	94	248	714
	NCM	512	224	325	569	722

*Note:* Time loss within 2 years after injury was calculated among workers with at least 1 day of TL (n=136, 84% of workers in the post-implementation period).

Mental health services were more common among workers who received NCM, compared to those without NCM (Table 16). Among workers injured in the post-implementation period, 48.1% of workers who received NCM had paid mental health services, compared to 18.4% of those who did not receive NCM. Among those who received mental health services, 100% of workers who received NCM had mental health assessments, compared to 85% of those without any NCM services.



**Table 16.** Workers with paid mental health services within 2 years after injury by receipt of any NCM services

Characteristics, n (%)	No NCM n=109	NCM n=52
Received mental health services		
Yes	20 (18.4%)	25 (48.1%)
No	89 (81.7%)	27 (51.9%)
Types of mental health services received		
Assessments	17 (85.0%)	25 (100%)
Testing	0 (0%)	1 (4.0%)
Treatments	15 (75%)	16 (64%)

*Note:* Data on mental health services were obtained using billed and paid procedure codes. Mental health services excluded health and behavior codes.

Among workers who received NCM, 69.2% had at least one paid opioid prescriptions in the first 2 years after injury, compared to 67.0% for those who did not receive NCM (Table 17). Among those who received at least one opioid prescription, 63.3% of workers without any NCM services received opioids in the first 6 weeks after injury, compared to 46.2% of workers with NCM. However, outpatient prescription trends may be a reflection of the higher injury severity (and correspondingly, longer inpatient hospitalization) for workers who received NCM.

**Table 17.** Workers with at least one paid outpatient opioid prescriptions within 2 years of injury by receipt of any NCM services

Characteristics, n(%)	No NCM N=109	NCM N=52
Had at least one paid opioid prescription	73 (67.0%)	36 (69.2%)
By time interval:		
0-6 weeks	69 (63.3%)	24 (66.7%)
7-12 weeks	10 (9.2%)	7 (19.4%)
13 weeks-6 months	10 (9.2%)	9 (25.0%)
7-9 months	3 (2.8%)	8 (22.2%)
10-12 months	8 (7.3%)	6 (16.7%)

### Limitations

Several limitations exist. We obtained claim status information at the time billing data were extracted from L&I records. As such, information on claim status at the time of data extraction may not accurately reflect claim status within the 2 years after injury. Paid-to-date total medical costs within 2 years after injury were assessed for all workers in our population. However, the 2-year follow-up does not sufficiently capture the true costs of NCM. Costs shown in this chapter underestimate the true costs of NCM, particularly for outcome-based firms where payments to vendors are contingent on the completion of an agreed-upon Outcome Plan.

## Conclusions

Total medical costs and time loss (days) within 2 years after injury did not differ significantly between workers injured before implementation and workers injured after implementation of NCM for catastrophic injuries. Among workers injured in the post-implementation period, 32% received NCM services. Workers who received any NCM services tended to have a higher severity of injury and a greater number of comorbid illnesses, compared to workers who did not receive any NCM services. For workers who received any NCM services, costs due to NCM varied across firms. In Chapter 6, we provide a more thorough economic assessment of NCM services for catastrophic injuries.

## References

- [1] Population density and land area criteria used for rural area. Population density and land area criteria used for rural area assistance and other programs. <https://www.ofm.wa.gov/washington-data-research/population-demographics/population-estimates/population-density/population-density-and-land-area-criteria-used-rural-area-assistance-and-other-programs>. Published June 29, 2020. Accessed August 14, 2020.
- [2] Groll DL, To T, Bombardier C, Wright JG. The development of a comorbidity index with physical function as the outcome. *J Clin Epidemiol*. 2005;58(6):595-602. doi:10.1016/j.jclinepi.2004.10.018
- [3] Sears JM, Bowman SM, Rotert M, Hogg-Johnson S. A New Method to Classify Injury Severity by Diagnosis: Validation Using Workers' Compensation and Trauma Registry Data. *J Occup Rehabil*. 2015;25(4):742-751. doi:10.1007/s10926-015-9582-5

## Chapter 6

### **Economic Assessment of Catastrophic Nurse Case Management Services Pilot Program Authorized Under 2016 Supplemental Budget (2ESHB 2376)**

#### **Introduction and Background**

In an effort to improve the quality of health services received by workers who suffer catastrophic injuries, the Washington State Legislature in March 2016 passed a budget proviso (2ESHB 2376) establishing a pilot and evaluation to expand nurse case management (NCM) services for such catastrophically injured workers insured for workers' compensation through the Washington Department of Labor and Industries (L&I). This initiative required L&I to "partner with an experienced firm or firms to manage care involving catastrophically injured workers." Firms ultimately selected by an RFP to provide NCM services under this initiative included Paradigm Inc., Comagine, Coventry, Rainier and Stubbe. Paradigm provides NCM services based on a detailed plan that includes specific outcomes the worker is to achieve within a defined time period. Other NCM firms, except Comagine, provide NCM services on an hourly basis. Comagine is outcome-based but due to contractual terms it received limited referrals. This report focuses primarily on the NCM services provided by Paradigm because its NCM services were outcome-based and it had the most referrals of the firms that used outcome-based planning to provide NCM services.

Contract criteria specified for referral to any of these contracted firms included at least four days of hospitalization starting within 24 hours of injury, ensuring that only the most severe injuries were included for study. The L&I Occupational Nurse Consultants (ONC) became responsible for determining whether a worker with eligible catastrophic injuries needed NCM services, then assigned the case to a firm on an approximate round robin basis. However, this process became non-systematic in that a firm with insufficient available staff could refuse to accept a referral, and the ONCs would move on to the next firm in line.

The general process of establishing the need for NCM services provided by Paradigm in individual cases involved several steps. First, the ONC decided to refer a worker to Paradigm for NCM services, as described above. Once Paradigm is notified of the referral it then assigns a nurse case manager to the case, who initiates a planning process that includes meetings with the injured worker and the family, along with a detailed review of the medical records. After 30 to 40 days, Paradigm presents an Outcome Plan to L&I that includes information about the nature of the injury, potential problems and risks that may arise, expected medical costs, NCM fees, and the expected length of time to completion of the Outcome Plan. Paradigm continues to provide NCM services until a final decision is reached by L&I accepting or declining the Outcome Plan. Five different outcome levels are noted in the plan, with level 0 indicating physiologic instability and level 5 indicating capacity to return to work. Based on information included in the Outcome Plan, L&I either accepts the plan or declines it. If the plan is declined,

Paradigm's NCM services end and the claim is usually, but not always, referred by the ONC to another NCM firm.

To learn as much as possible about the impact of the pilot under the budget proviso, the L&I contracted with the University of Washington to provide a comprehensive evaluation of the NCM initiative. The evaluation was intended to examine worker outcomes, satisfaction, costs and other related measures. This section of the evaluation report provides an economic assessment of NCM services and focuses primarily on those services provided by Paradigm. Our focus on Paradigm reflects 1) the perceived importance of this NCM firm within the scope of NCM services provided through the NCM pilot, and 2) the emphasis in the budget proviso on a minimum number of referred cases to an outcome-based company.

The scope and depth of this analysis are limited by the small number of NCM referrals made since the start of the NCM initiative. This is largely due to the declining numbers of injured workers sustaining catastrophic injuries during the study period, compared to the period preceding the passage of the Supplemental Budget Proviso. We received cost and payment data for 25 cases referred by L&I to Paradigm between September 2016 and December 2018. The proposed Outcome Plans developed by Paradigm were declined by L&I for 10 of the 25 cases (40%). These cases were then mostly managed by other NCM firms. This analysis focuses on the 15 cases managed by Paradigm. For comparison purposes, we contrast these 15 cases with the 10 comparator cases where L&I declined the proposed Outcome Plan. Three of the 10 cases received no ongoing NCM services; the remaining 7 cases were referred to hourly NCM firms and received NCM services for varying lengths of time.

The analysis presented here is best viewed as a descriptive case series. Given the nature of the available data and the small number of cases available for analysis, it was not feasible to perform standard statistical analysis. L&I staff compiled cost data and information pertaining to NCM services. The current analysis builds on that earlier work and addresses four questions:

- What was the predicted cost of health care services, excluding the NCM fee, for cases managed by Paradigm and how do these costs compare with the actual paid medical costs as of September 2019?
- What were the fees and payments made by L&I to Paradigm and to other NCM firms for NCM services?
- How did the total amount to be paid by L&I to Paradigm, including the NCM fee and other payments, compare with the actual medical cost paid for these services?
- How do the cost measures for the 15 cases managed by Paradigm compare with those of the 10 comparator cases?

An economic analysis can take different forms, for example, return on investment (ROI) analysis or cost-effectiveness analysis. The data made available to us precluded these types of formal economic analyses because there was no reliable measure of economic benefit that could be constructed. Instead, in addressing the four questions, we sought to determine the ***“economic value”*** of NCM services provided by Paradigm. We conceptualized economic value using

different measures and comparisons. In particular, we: 1) examined what L&I paid Paradigm for NCM services compared with the medical costs, 2) assessed Paradigm's proposed NCM service fees relative to the fees actually charged to manage the comparator cases, and 3) determined what L&I would have paid to Paradigm for managing the comparator cases had it not declined the Outcome Plans of those cases.

In assessing the value of NCM services, it would be desirable to assess costs in relation to health outcomes. Other portions of the UW evaluation do address some outcome issues such as satisfaction, degree of community integration, and return to work. However, formal cost-effectiveness analysis requires outcome data, if possible, validated by virtue of randomized study. Such outcome data were unavailable. Further, the available outcome measures were not appropriate for use in cost-effectiveness analysis or ROI analysis. Thus, we were able to evaluate only the cost side of the "cost-outcome equation." Nonetheless, we believe the economic assessment presented here does provide important information about the economic value of NCM services purchased by L&I.

### Cost Measures

The primary cost measures analyzed for this report include:

- Medical cost estimates included in the Outcome Plan submitted by Paradigm indicating the incurred, known and projected (IKP) medical expense.
- Risk Coefficient—the amount, beyond the IKP cost estimate, Paradigm determined might be needed should unexpected problems or complications arise during the Outcome Plan period. These two cost measures combined represent what is known as the "Case Rate."
- NCM fees charged by Paradigm and by the other hourly NCM firms.
- Actual medical expenses (medical claim costs) paid by L&I as of September 2019.

Our analysis focuses on these four cost measures, and 1) compares selected cost measures among the 15 cases managed by Paradigm and 2) assesses the cost measures for Paradigm compared with those of other (hourly) NCM firms.

Readers should note only 3 of the 15 injured workers whose care was managed by Paradigm had their Outcome Plans completed by September 2019, the date data were extracted for this report. As discussed later, the ultimate amount paid to Paradigm for NCM services was based on a formula that reconciled medical expenses (L&I medical costs) and other NCM costs after plan closure. Thus, cost and payment estimates presented here may differ from what they would have been had all the 15 Outcome Plans been closed by September 2019. But that difference should be small and have no meaningful impact on the results presented because, as discussed later, 63% of the medical expenses paid in the two years following injury are incurred in the first week after injury, and 76% are incurred in the first quarter after injury.

## Results

Table 1 shows the mean (average), median and range for the cost measures described above for the 15 workers, injured between September 2016 and December 2018, who received ongoing NCM services from Paradigm. The average (predicted) IKP cost was \$594,097, range, \$177,791 to \$1,004,722. The Risk Coefficient estimates ranged from \$72,618 to \$353,011, with a mean of \$237,660. On average, the Risk Coefficient represents 40% of the IKP predicted cost. The average Case Rate (sum of the IKP predicted cost and the Risk Coefficient) is \$831,757. The Case Rate can be viewed as the total medical expense Paradigm estimated might be needed to provide the requisite medical care and represents a key determinant of the payment L&I ultimately made to Paradigm for each case. The actual medical expense (not including NCM payments) paid by L&I averaged \$334,586 (range, \$150,231 to \$596,808), substantially less than the Case Rate figure (\$831,757) Paradigm estimated might be needed to provide the requisite medical care.

**Table 1.** Descriptive Information for Selected Cost Measures (n = 15)

Statistic	IKP Cost	Risk Coefficient	Case Rate	NCM Fee	Medical Expenses Paid by L&I as of September 2019
Mean	\$594,097	\$237,660	\$831,757	\$69,789	\$334,586
Median	\$606,635	\$259,684	\$866,621	\$71,388	\$275,810
Minimum	\$177,791	\$72,618	\$250,409	\$49,169	\$150,231
Maximum	\$1,004,722	\$353,011	\$1,357,733	\$106,035	\$596,808

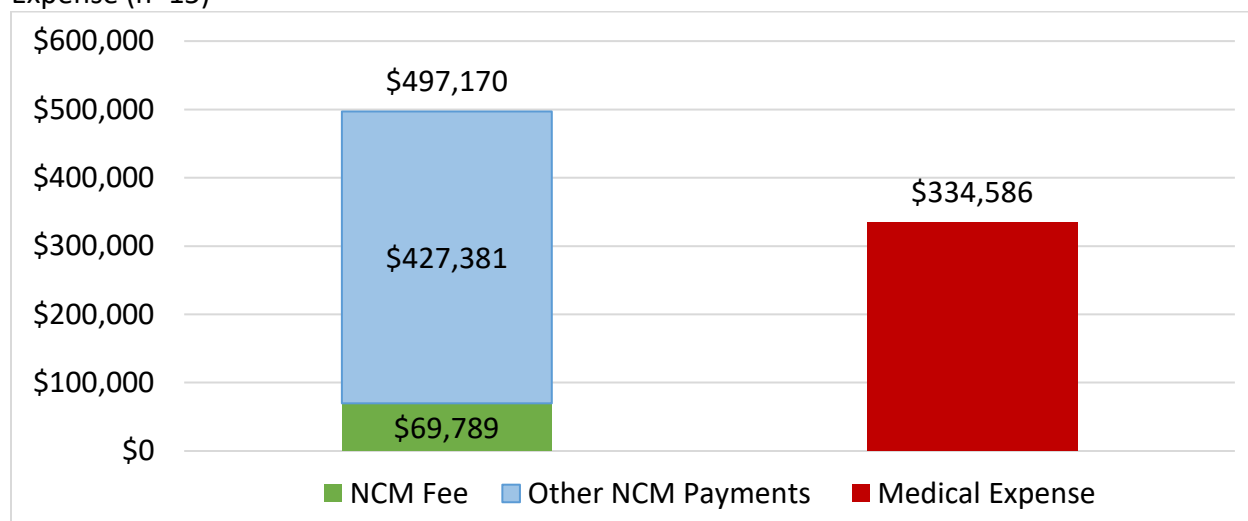
### L&I Payments to Paradigm in Relation to Medical Expense

Figure 1 presents information that allows readers to compare the costs of NCM services provided by Paradigm in relation to the medical expenses paid by L&I. This comparison provides one method of assessing **economic value** of NCM services provided by Paradigm. The left-hand column shows the average (total) estimated NCM payment made to Paradigm (\$497,170), which consists of the NCM fee (\$69,789) and “other payments” to be made to Paradigm (\$427,381). Other payments consist of the Risk Coefficient payment made at different points in time starting when the Outcome Plan is accepted plus the reconciliation payment made after the Outcome Plan is completed (see appendix for further explanation). The right-hand column shows the average medical expense (excluding NCM payments) paid by L&I as of September 2019. The NCM fee and the medical expense figure are the same (mean) figures shown in Table 1.

As shown in Figure 1, L&I estimated payments to Paradigm for all NCM firm services are substantially greater than the actual medical expense paid by L&I. The average medical expense as of September 2019 for the 15 catastrophic claims managed by Paradigm was \$334,586. The average NCM fee paid was \$69,789, and other NCM expenses to be paid by L&I averaged \$427,381. Thus, the average total payment to be made by L&I to Paradigm for NCM-related services was **\$497,170**. We computed the ratio of the total L&I-Paradigm payment to the medical expense paid by L&I for each of the 15 cases. The total payment to be made by L&I to

Paradigm for NCM services was, on average, **1.8 times greater** than the medical expense paid by L&I as of September 2019.\* Readers should note “medical expense” for these catastrophically injured workers includes all hospital costs for acute care, all rehabilitation care and nursing home care, all outpatient surgical and clinic care, all professional fees, and all costs of prescription drugs.

**Figure 1.** Estimated Average L&I Payments to be Made to Paradigm In Relation to Medical Expense (n=15)



It is possible the NCM services provided by Paradigm did improve care coordination and thus helped to limit the medical expenses. But would the improvement enhance the recovery enough to have an economic value almost twice that of all the other medical care? Further, the trajectory of medical costs casts doubt on how the NCM services could limit the medical expenses. As discussed in another section of the report, most medical expenses are incurred in the first few weeks after injury, whereas the Outcome Plans for most cases spanned 15 to 24 months and well beyond. The course of treatment during the initial months following injury is largely determined by attending physicians and inpatient institutions, and hence there may be limited impact of NCM services on medical costs. That most medical costs within the first year occur within the first few weeks after injury suggests improved care coordination achieved through NCM services would have at best a modest effect on the ultimate medical expense of injured workers provided NCM services over an extended period.

*Comparison of Paradigm Fees Relative to Fees Charged by Comparator Hourly NCM Firms*

Further insight into the value of NCM services provided by Paradigm can be gained by examining the cost measures for the 10 comparator cases whose Outcome Plans L&I declined.

\* Note the 1.8 figure is based on calculation of the ratios for each of the 15 cases. Taking the ratio of the Total Payment and Medical Expense values shown in Figure 1 (\$497,170/\$334,586) yields a figure of 1.49, but that figure is incorrect because the difference of mean ratio values for a set of numbers is not equal to the mean of the differences.

Seven of the 10 cases received ongoing NCM services from (hourly) NCM firms; 3 cases received initial NCM services but not ongoing NCM services. Table 2 provides information on the cost measures shown in Table 1, except for NCM fee, for the 10 comparator cases. The cost measures shown in Table 2 are similar but slightly greater (5% to 10%) compared to the cost measures shown in Table 1 for the Paradigm cases. For example, the average Case Rate and the medical expense paid by L&I are both 8% greater than the corresponding figures shown in Table 1. Based on the data shown in Tables 1 and 2, it is reasonable to conclude the Outcome Plans declined by L&I represent cases that, in general, are like the cases managed by Paradigm. Given this similarity, it is useful to examine what L&I would have paid Paradigm had it accepted all 7 proposed Outcome Plans that received ongoing NCM services versus what it actually paid for NCM services provided by hourly NCM firms.

**Table 2.** Descriptive Information on Selected Cost Measures for Comparator Cases Initially Assessed by Paradigm (n=10)

Statistic	IKP Cost	Risk Coefficient	Case Rate	Medical Expenses Paid by L&I as of September 2019
Mean	\$654,162	\$247,011	\$901,173	\$360,879
Median	\$619,936	\$248,515	\$885,623	\$324,237
Minimum	\$277,461	\$92,489	\$369,950	\$116,725
Maximum	\$1,204,370	\$401,457	\$1,605,827	\$930,859

Figure 2 presents information on the NCM fees for the 7 comparator cases. As shown, the average NCM fee proposed by Paradigm (right-hand column in red) was almost \$85,000. The average fee actually paid by L&I to Paradigm to provide initial NCM services during the development of the Outcome Plan (green portion of left-hand column) was \$13,006. The NCM services billed by the hourly NCM firms (blue portion of left-hand column) averaged \$19,091. Thus, the total NCM fee paid by L&I to Paradigm and to the hourly NCM firms was \$32,097. It is not possible to determine what the difference in the NCM fee proposed by Paradigm and the hourly NCM fee would have been had the NCM hourly firms taken on the cases immediately instead of later after the Outcome Plans were declined. But the difference is still large. Paradigm’s proposed NCM fee (\$84,645) is **2.6 times greater** than the actual NCM fee (\$32,097) paid by L&I for NCM services. This difference again raises questions about the economic value of the NCM services provided by Paradigm and the cost of those services.

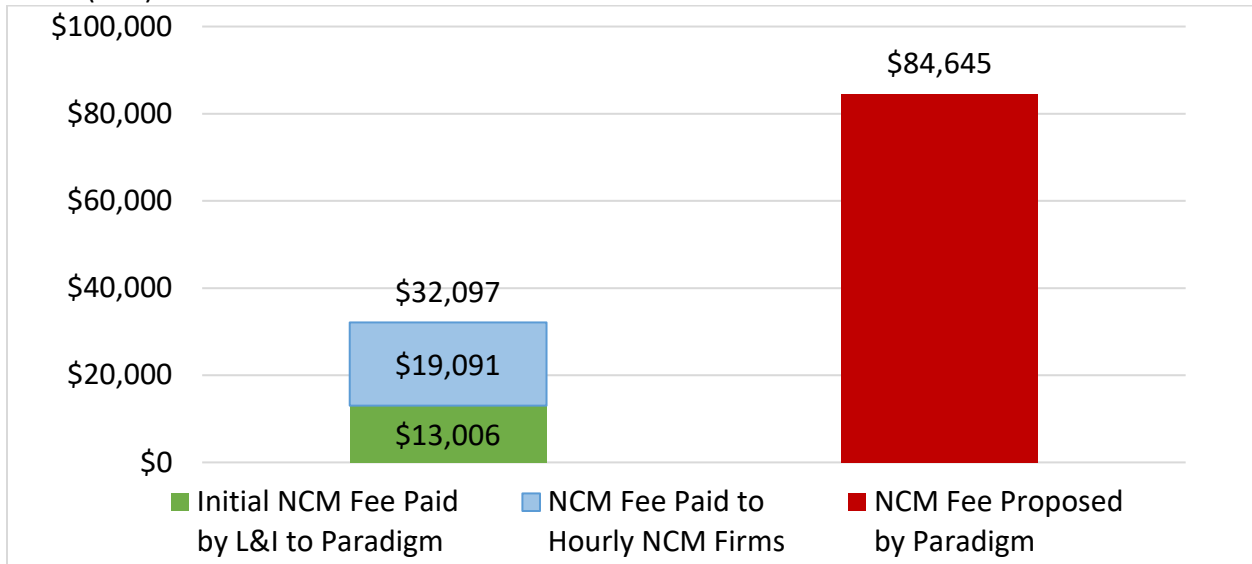
*L&I Payments that Would Have Been Made to Paradigm Had Outcome Plans Been Accepted*

Finally, in considering the economic value of NCM services provided by Paradigm, it is useful to examine the (hypothetical) amount L&I would have paid had the 7 cases shown in Figure 2 had their Outcome Plans accepted by L&I and their services provided by Paradigm instead of by the hourly NCM firms. Data that address this question are shown in Figure 3. As discussed earlier, L&I payments to Paradigm for NCM services consist of the NCM fee and other NCM payments. Other payments include the Risk Coefficient and the costs that are reconciled after the conclusion of the Outcome Plan period. The NCM fee shown in Figure 3 is the same as the proposed fee (\$84,645) shown in Figure 2. Other NCM payments equal \$510,596. Thus, the

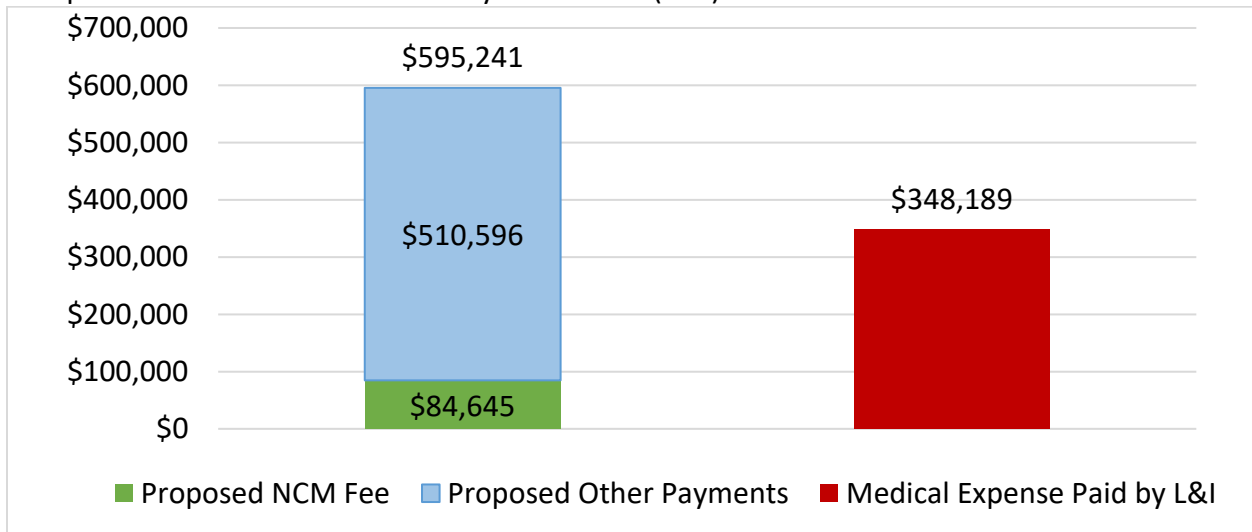


total amount L&I would have paid for NCM services for these cases equals \$595,241. We computed the ratio of the total amount that would have been paid for NCM services to the (actual) medical expense for each of the 7 comparator cases (see footnote on page 101). The average ratio equals **1.74**. Thus, had the L&I accepted the Outcome Plans it would have paid almost twice as much for NCM services compared with the actual medical expense.

**Figure 2.** NCM Fees Proposed by Paradigm Compared with Fees Paid by L&I to Hourly NCM Firms (n=7)



**Figure 3.** Proposed Paradigm NCM Payments Compared with Medical Expenses Paid by L&I for Comparator Cases Referred to Hourly NCM Firms (n=7)



Further insight into the economic value of Paradigm NCM services can be gained by considering how much L&I would have paid relative to what it **actually paid** to purchase NCM services for the 7 comparator cases. As shown in Figure 3, it would have paid \$595,241, while it actually paid \$32,097 (Figure 2). In other words, had L&I accepted the Outcome Plans for the 7

comparator cases, it would have paid **18 times** as much as it actually paid (\$595,241/\$32,097). The data presented in Figures 2 and 3 raise additional questions about the economic value of NCM services provided by Paradigm.

## Summary

This report has provided an analysis of nurse case management (NCM) services provided for catastrophic claims under a pilot initiative established by the state legislature under a budget proviso (2ESHB 2376) passed in March 2016. The report focused primarily on those NCM services provided by Paradigm Inc. under contract with the Department of Labor and Industries (L&I)). The NCM services provided by Paradigm were guided by a detailed planning process that led to the development of an Outcome Plan for each case managed. L&I approved the Outcome Plans of 15 catastrophic cases and declined the Outcome Plans for 10 other cases. Our analysis examined a set of cost measures and compared these measures for different groups of NCM cases. The limited number of Paradigm cases available for analysis (n = 15) precluded any formal statistical assessment or economic evaluation, e.g., return on investment (ROI) analysis. Rather, our intent was to conduct a descriptive analysis involving comparisons of different cost measures in order to assess the **economic value** of NCM services provided by Paradigm.

Our analysis showed a consistent pattern of findings that raise questions about the economic value of NCM services provided by Paradigm. The total payment to be made by L&I to Paradigm for NCM services provided for the cases whose Outcome Plan was accepted is **1.8 times greater** than the total medical expense paid by L&I as of September 2019 for these catastrophically injured workers. Seven of the 10 cases where L&I declined the Outcome Plan received ongoing NCM services from other NCM firms. The NCM fees paid by L&I for the 7 cases were **only a fraction (5%)** of the fees that would have been paid to Paradigm had the 7 Outcome Plans been accepted by L&I.

The prices paid by L&I to Paradigm for NCM services were set **prospectively** by Paradigm under a payment formula defined by Paradigm and reflected in the L&I-Paradigm contract. The process of setting those prospective prices according to the payment formula led to prices that are difficult to justify based on our assessment of the economic value of NCM services. Paying for health care services based on prospectively set prices is desirable if these prices are **reasonable and fair**. The Health Care Finance Administration [HCFA] (now Centers for Medicare and Medicaid Services [CMS]) developed the Prospective Payment System (PPS) for Medicare almost 40 years ago. The PPS set prospective prices, based on adjusted costs of care, hospitals agreed to accept for treating Medicare patients classified by Diagnosis Related Groups (DRGs). Thirty years ago HCFA developed the Medicare physician fee schedule, which was based on the costs of delivering care that reflected physician training, procedure time and effort, and malpractice expenses. More recently, prospective pricing schemes have been developed under the rubric of bundled payment.

The advantage of prospective payment is that it induces greater efficiency in the delivery of care because the amounts to be paid are known in advance, and providers are required in some

cases, for example PPS, to accept some degree of financial risk. Prospective payment programs are developed and operated **by payers, not providers**. Paradigm's prospective pricing differed fundamentally from the norm. Paradigm, not L&I, set the prospective prices, based on a payment formula it developed. As a practical matter, Paradigm absorbed little to no financial risk for providing NCM services. Unlike virtually all other prospective payment schemes, Paradigm (the provider) not L&I (the payer) set the prices. That process of setting prices appears to have led to unreasonably high prices of unproven economic value.

The findings presented here should not be interpreted as an indictment of all NCM services. As discussed elsewhere in this report, workers suffering from catastrophic injuries who received NCM services were very satisfied with those services, and NCM services can certainly help to promote better care coordination potentially leading to improved health service delivery. But as this analysis has shown the NCM services provided by Paradigm are difficult to justify based on their economic value.

## Appendix

This appendix includes information about payments made by the Department of Labor and Industries (L&I) to Paradigm based on a formula set forth in the L&I-Paradigm contract. The appendix also includes cost and payment data provided by L&I administrative staff for this economic assessment. Table A.1 shows cost and payment data for the 15 cases Paradigm managed. Table A.2 shows the same payment data for the 10 cases where L&I declined the Outcome Plan. Seven of these cases were referred to other hourly NCM firms and received ongoing NCM services from these firms (the 3 cases not referred are noted).

### Paradigm Payment Formula

The Paradigm payment formula includes two components: the Case Rate and what is known as the “Actual Total.” As discussed in the report, the Case Rate includes two cost measures that represent Paradigm’s prediction of the costs to be incurred in providing the range of health services (hospital care, rehabilitation care, physician care, drugs, etc.) thought to be needed to achieve the goals set forth in the Outcome Plan. The first cost measure is the “Incurred, Known and Predicted” or the IKP cost; the second cost measure is the Risk Coefficient. The IKP cost represents Paradigm’s judgment regarding the costs expected to be incurred in treating the catastrophic injury. The Risk Coefficient represents unknown costs that might arise should unexpected treatment be needed or should complications arise. The Case Rate equals the IKP plus the Risk Coefficient. For example, if the IKP is \$500,000 and the Risk Coefficient is \$350,000, the Case Rate would equal \$850,000.

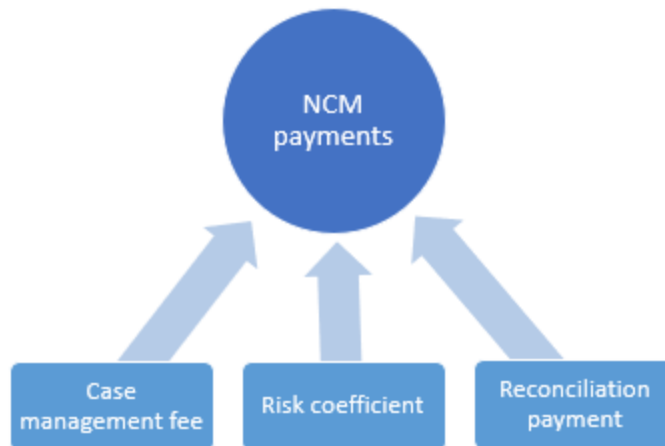


The Actual Total cost measure consists of three components that are summed: 1) the Risk Coefficient, 2) the NCM fee, and 3) the actual medical expense paid by L&I.



For example, if the Risk Coefficient is \$350,000 and the NCM fee and medical expense, respectively, are \$50,000 and \$300,000, the Actual Total cost measure would be \$700,000.

The total NCM payment made by L&I to Paradigm consists of three different payments made at different times.



These payments are 1) the case management (NCM) fee, 2) the Risk Coefficient, and 3) a reconciliation payment made after the Outcome Plan is completed and all medical expenses through the end date of the Outcome Plan have been paid. The NCM fee is paid shortly after L&I approves the Outcome Plan. Most of the Risk Coefficient is paid over the course of the first year, with the final payment withheld until the Outcome Plan is completed and L&I accepts the Outcome Achievement Report. The reconciliation payment represents the difference between the Case Rate and the Actual Total, as defined above. If the Actual Total is lower than the Case Rate, L&I pays Paradigm the difference. If it is higher, Paradigm pays L&I the difference. The example outlined below helps illustrate the payment formula.



Assume the following cost measures for a case managed by Paradigm: Case Rate, \$700,000; NCM fee, \$50,000; Risk Coefficient, \$250,000; medical expense, \$200,000; Actual Total, \$500,000. The reconciled amount would equal \$200,000 (\$700,000 - \$500,000). The total NCM payments made by L&I to Paradigm would equal \$500,000, representing the sum of the NCM fee (\$50,000), the Risk Coefficient (\$250,000) and the reconciled amount (\$200,000).

**Source Tables**

Table A.1 shows the cost measures for each of the 15 cases managed by Paradigm used for the economic assessment presented in the report. Table A.2 shows the same cost measures for the 10 cases where L&I declined the Outcome Plan. Seven of the 10 cases were referred to hourly NCM firms and received ongoing NCM services. These cases are noted in Table A.2. Note there are four reconciliation payments shown in red. These indicate cases where Paradigm was to pay L&I because the “Actual Total” amount was greater than the Case Rate.

**Table A.1. Cost Measures for 15 Cases Managed by Paradigm**

Worker ID	IKP	Risk Coefficient	Case Rate	NCM Fee	Total Medical Cost as of 9/2019	Estimated Reconciliation Payment
EA	\$664,207	\$284,662	\$948,869	\$49,169	\$596,808	\$18,230
B	\$621,472	\$266,346	\$887,818	\$54,932	\$152,928	\$413,612
C	\$557,413	\$185,805	\$743,218	\$89,945	\$260,983	\$206,485
D	\$754,704	\$265,165	\$1,019,869	\$88,191	\$512,018	\$154,495
E	\$606,635	\$259,986	\$866,621	\$75,083	\$466,490	\$65,062
F	\$177,791	\$72,618	\$250,409	\$51,152	\$150,231	(\$23,592)
G	\$233,204	\$95,253	\$328,457	\$52,258	\$184,877	(\$3,931)
H	\$409,519	\$175,508	\$585,027	\$61,440	\$405,156	(\$57,077)
I	\$1,004,722	\$353,011	\$1,357,733	\$106,035	\$471,000	\$427,687
J	\$739,102	\$259,684	\$998,786	\$71,596	\$477,983	\$189,523
K	\$791,390	\$339,167	\$1,130,557	\$72,700	\$255,266	\$463,424
L	\$521,340	\$223,432	\$744,772	\$68,727	\$385,228	\$67,385
M	\$567,222	\$243,095	\$810,317	\$62,177	\$195,225	\$309,820
N	\$567,405	\$243,174	\$810,579	\$71,388	\$228,794	\$267,223
O	\$695,325	\$297,996	\$993,321	\$72,045	\$275,810	\$347,470

**Table A.2. Cost Measures for 10 Cases Where L&I Declined Outcome Plan**

Worker ID	IKP	Risk Coefficient	Proposed Paradigm NCM Fee	Initial NCM Fee Paid to Paradigm	NCM Fee Paid to Hourly NCM Firms	Total Medical Cost as of 9/2019	Estimated Reconciliation Payment
P *	\$426,369	\$182,728	\$55,017	\$12,880	\$1,095	\$116,725	\$254,627
Q	\$487,015	\$208,720	\$75,002	\$10,254	\$37,248	\$281,715	\$130,298
R	\$277,461	\$92,489	\$66,206	\$6,869	\$18,697	\$130,162	\$81,093
S	\$850,154	\$298,703	\$100,783	\$21,947	\$4,959	\$330,017	\$419,354
T	\$545,549	\$233,808	\$78,724	\$9,108	\$7,717	\$419,516	\$47,309
U	\$1,204,370	\$401,457	\$93,067	\$12,885	\$33,101	\$569,635	\$541,668
V	\$694,322	\$297,567	\$111,874	\$18,359	\$12,100	\$318,457	\$263,991
W *	\$891,120	\$313,095	\$66,456	\$17,271	\$0	\$930,859	(\$106,195)
X	\$749,171	\$263,222	\$66,857	\$11,622	\$19,816	\$387,824	\$294,490
Y *	\$416,087	\$178,323	\$47,978	\$10,271	\$0	\$123,880	\$244,229

\* Denotes cases not receiving ongoing NCM services from hourly NCM firms.

## Chapter 7

### **Conclusions**

#### **Key Results**

The key methods and results from each chapter are briefly summarized below:

#### Worker Interviews - Satisfaction

- Injured workers were asked about satisfaction with health care, satisfaction with L&I, and satisfaction with nurse case management (if they received it) at interviews conducted 12 and 18 months after injury.
- Overall, injured workers with catastrophic injuries had a high level of satisfaction with the health care they received, with L&I, and with how the nurse case managers coordinated health care, answered questions, and communicated with injured workers.
- Satisfaction levels with health care and with L&I were generally similar for workers who received nurse case management and those who did not.

#### Worker Interviews – Self-reported Outcomes

- Interviews were conducted at baseline (a few weeks after injury) and 6, 12, and 18 months after injury. Some questions on the baseline interview asked about the time period before the injury. Other questions referred to the time of the baseline interview (after injury).
- One measure of worker self-reported outcomes was the World Health Organization Disability Assessment Schedule 2.0 (WHODAS). Higher WHODAS scores indicate more disability. As expected the WHODAS disability scores 6 months after injury were substantially higher (indicating greater disability) than before injury. On average, WHODAS disability scores remained high 18 months after injury. WHODAS scores were substantially higher (indicating more disability) for workers with nurse case management than for those who did not receive nurse case management. This is one indication that workers with more severe injuries were more likely to have received NCM.
- Workers were asked about work status at the time of each interview. A lower percentage of workers who received nurse case management were working compared to workers who did not receive nurse case management. At the time of the baseline interview, none of the workers with nurse case management were working and only 6% of the workers without nurse case management were working. At the time of the 6 month interview, 5% of those with nurse case management and 33% without nurse case management were working. At 12 and 18 months, about 25% of workers with nurse case management were working and 40-46% of those without nurse case management were working. Overall, among those who participated in the survey 18 months after injury, 35% reported that they were working.

- At the time of the baseline interview, workers with catastrophic injuries who were not working reported high levels of pain interference with work with 77% of those with nurse case management and 55% of those without nurse case management reporting high levels of pain interference with work (8 or greater on 0-10 scale with 0 indicating no interference and 10 meaning unable to carry on any activities).

#### Claim File Review

- The claims files for catastrophically injured workers were reviewed to assess transitions, complications, and work status.
- After the initial hospitalization, 53% of workers returned home, 21% went to inpatient rehabilitation, 17% went to a skilled nursing facility, 5% when to long term acute care, and 4% went to someone else's home, respite care or a transitional care facility.
- Over half of the workers with catastrophic injuries (53%) had at least one complication.
- 70% of claims remained open 18 months after a catastrophic injury.
- Two workers died within 18 months after the injury. (Four workers died within two weeks after the injury and were not included in the claim file review.)
- A high percentage of workers (44%) with catastrophic injuries were "kept on salary" (KOS) at some point after their injury: 19% were KOS and had no time loss (TL) payments and 25% had both KOS and TL payments. (Because of the frequency of KOS, calculations of time loss duration and time loss costs in the Pre-Post Analysis will be an underestimate of total time lost from work for these workers.)
- At 6, 12, and 18 months after injury, the majority of workers with catastrophic injuries were not working (75%, 56%, and 56%, respectively.)

#### Pre-post Analysis

- The pre-post analysis describes the injuries and demographics of workers with catastrophic injuries, medical costs before and after implementation of nurse case management, time loss in the two years after injury before and after implementation, differences in workers referred to nurse case management and those who were not referred, the costs of nurse case management, as well as use of durable medical equipment, use of opioid medications, and billing for mental health evaluation and treatment.
- The most common injuries were fractures (53%) and fractures in combination with other injuries (18%). The majority of workers were male (85%) and the mean age at injury was 45 years of age.
- In an analysis of the timing of health care costs after a catastrophic injury, 63% of the health care costs occurs within the first week after injury and 72% of the costs occurs in the first 12 weeks after injury.
- Workers who received nurse case management services had more severe injuries and higher total medical costs than workers who did not receive nurse case management.
- Time loss in the two years after injury was higher for workers with nurse case management than for those without.



- It is important to note that differences in medical costs and time loss for workers with and without nurse case management is a function of differences in injury severity and is not a result of receiving nurse case management services.
- For injured workers with catastrophic injuries, total medical costs and time loss within 2 years after injury did not differ significantly before and after implementation of nurse case management.
- The payments for nurse case management services varied widely from \$567 to \$337,251 (within two years after injury) for workers receiving nurse case management (N=52) for injuries between July 1, 2016 and June 30, 2017. Costs for nurse case management were below \$40,000 for 87% (N=45) of the workers who received nurse case management. Costs were between \$40,000 and \$100,000 for 5% (N=3) of the workers and were over \$260,000 for 8% (N=4) of the workers with nurse case management.

#### Economic Analysis of Outcome Based Nurse Case Management Plans

- A total of 25 workers with catastrophic injuries were referred to Paradigm between October 2016 and December 2018. Paradigm developed outcome plans for all 25 workers. L&I accepted 15 plans and declined 10 plans. We compared the costs for nurse case management for these claims with the actual medical costs for accepted and declined plans.
- L&I payments made to Paradigm for nurse case management services (including the nurse case management fee, the risk coefficient, and the actual or estimated reconciliation fee) averaged \$497,170 per worker which was substantially greater than the actual medical expense paid for these workers which averaged \$334,586 (including all acute hospital, other facilities, and provider visits). The total cost for nurse case management services provided for the cases whose plan was accepted was 1.8 times the total actual medical expenses as of September 2019.
- For cases in which L&I declined the outcome plan, the total amount L&I would have paid for nurse case management services for these cases (averaged \$595,241) would have been greater than the actual medical expense paid (averaged \$348,189). The nurse case management fees paid by L&I for the 7 cases with declined plans who then received nurse case management from another firm were only a fraction (5%) of the fees that would have been paid to Paradigm had the 7 Outcome Plans been accepted by L&I. Nurse case management costs would have been 18 times higher if Paradigm's outcome plans had been accepted.
- The total nurse case management costs for services provided by Paradigm were higher than the actual medical costs paid and were substantially higher than what other firms were paid. These findings raise questions about the appropriate costs for nurse case management services.

#### **Conclusions**

This report summarizes a multi-component evaluation of a pilot program to deliver contracted, NCM services to workers with catastrophic injuries covered by the Washington Department of

Labor and Industries (L&I). The report includes: 1) summaries of analyses comparing medical costs and time loss costs before and after implementation of the NCM pilot (Pre-Post Analysis), 2) a summary of interviews with injured workers that includes measures of disability and satisfaction with care (Worker Interviews), 3) a review of claim files (Claim File Review), and 4) an economic analysis of NCM costs for an outcome based firm (Economic Analysis).

There are four important conclusions from this evaluation that L&I may want to consider in the decisions about the use of NCM services for workers with catastrophic injuries going forward.

1. First, there is a high level of worker satisfaction with NCM services. Many of the workers who received NCM services had very severe, complex injuries. Based on the comments from injured workers during the interviews, the workers greatly appreciated and benefitted from the assistance they received from NCM.
2. Second, workers who received NCM services had more severe injuries than workers who did not receive NCM services. Because workers were not randomized to receive or not receive NCM, we are unable to assess the effectiveness of NCM.
3. Third, there were no changes in the average duration of time loss or average health care costs after implementation of the NCM pilot for catastrophic injuries beyond the actual cost of NCM. Because most of the health care costs occur in the first few weeks after injury, it is unlikely that NCM will have a large impact on the total health care costs.
4. Finally, there was wide variation in the costs associated with various firms providing nurse case management. L&I will need to consider both the benefits of nurse case management services for injured workers with catastrophic injuries and the benefits to L&I and determine the appropriate compensation for these services going forward.

### **Strengths and Limitations**

There are a number of strengths of this evaluation. The evaluation was population-based and included both prospective and retrospective components. The Worker Interviews included worker-centric outcomes including satisfaction, functional status, and work status and there were relatively high response rates at each point in time. The evaluation also included detailed cost information in the Pre-Post Analysis as well as in the Economic Analysis. One strength of the Pre-Post Analysis was that it examined medical costs and time loss both before and after implementation of the pilot for nurse case management (NCM) for all eligible workers with catastrophic injuries during a three-year time period.

Another major strength of this evaluation is the Economic Analysis of the NCM costs for injured workers referred to one outcome based firm. This analysis allowed a side by side comparison of both health care and NCM costs for workers whose outcome plans were accepted by L&I and those whose plans were not accepted. One of the advantages of this analysis is that all of these claims had been referred to one firm and the claims with and without accepted plans had comparable medical and hospital costs, an indicator that the injury severity was similar for these two groups.

This evaluation also has a number of limitations. First, workers with catastrophic injuries were not randomized to receive or not receive NCM, so we are unable to assess the effectiveness of NCM. A second limitation is related to how injured workers were assigned to different NCM firms. The original plan was that the case would be referred to a NCM firm on a round robin basis. However, this process became non-systematic in three ways: 1) a firm with insufficient available staff could refuse to accept a referral, and the ONCs would move on to the next firm in line, 2) some firms had specific criteria on the types of injuries they would or would not accept, and 3) there were some geographic constraints. Because assignment to NCM firm was not randomized, the severity and type of injury could differ by NCM firm. Therefore, we are unable to determine if worker outcomes differ by NCM firm. A third limitation is that a relatively low number of catastrophic injuries occurred during the time period of this evaluation. In addition, the number of workers who received NCM services during the time periods covered by this evaluation was also relatively low. Finally, because 44 percent of workers with catastrophic injuries were “kept on salary” at some point after their injury, estimates of the number of days of time loss underestimate the total time lost from work. While this is not a limitation of the evaluation, it may be a limitation of the L&I time loss data to fully measure the duration of time lost from work after a catastrophic injury.

## **Acknowledgements**

We acknowledge the following individuals who supported the Evaluation Team. Nellie Adams and Francisco Rios Casas for their assistance with interviews. Carly Miller Eckert for assistance in development of the study design.