

# Physician Assistants as Providers for Simple Industrial Injury Claims in the Washington State Workers' Compensation System (SB 6356)

Report to the Washington State Legislature

As required by SB 6356 (Chapter 163, Laws of 2004)

December 2006





# Executive Summary

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Senate Bill (SB) 6356 (Chapter 163, Laws of 2004) took effect July 1, 2004, authorizing physician assistants (PAs) to have sole signature on accident report forms (the Report of Accident and the Physician's Initial Report) for simple industrial injury claims. (Simple industrial injury claims do not involve time loss, occupational disease, inpatient care on the date of the first medical visit, or complex injuries.) SB 6356 is scheduled to sunset on July 1, 2007. SB 6356 authorized this report to the legislature "on the implementation of this act, including but not limited to the effects of this act on injured worker outcomes, claim costs, and disputed claims."

In the first year after implementation, PAs were the reporting provider for 7.7% of the claims filed by primary care providers, and 8.9% of accepted simple industrial injury claims. (The phrase "reporting provider" is used throughout this report to refer to the provider that filed the initial accident report.) Consistent with the charge of SB 6356, this evaluation report examined a number of questions regarding potential effects on access to health care for injured workers, administrative process of care indicators (including claim disputes), worker outcomes, and claim costs.

A second bill was passed simultaneously, Substitute House Bill (SHB) 1691 (Chapter 65, Laws of 2004), which authorized advanced registered nurse practitioners (ARNPs) to independently perform the functions of an attending physician, except for rating permanent impairment and performing independent medical examinations (IMEs). SHB 1691 contained identical language regarding an evaluation (report provided under separate cover), and is scheduled to sunset on June 30, 2007.

## Background

SB 6356 was implemented amid concern about potential problems with access to health care for injured workers in rural areas. Stakeholders had expressed concern that there were areas in the state with few providers willing to treat injured workers (potentially limiting access to health care) or aid injured workers in filing a workers' compensation claim. Other concerns were expressed during deliberations on the bill regarding whether allowing PAs to have sole signature on accident reports would increase cost to the workers' compensation system.

Prior to the implementation of SB 6356, PAs who treated injured workers were required to obtain physician signatures on all accident report forms. This requirement may have caused delays in health care and claim filing, particularly for rural or underserved populations where physicians may have been less readily available.

PAs provide about 10% of the generalist outpatient visits in Washington State, and about 14% in rural areas. In Washington, physical presence of a physician is not required for PA practice, however there is a requirement that a practice plan (representing the practice agreement between the physician assistant and the supervising physician) be submitted to the Medical Quality Assurance Commission prior to licensure. Within their scope of practice, PAs have been found to

provide care that is equivalent in quality to that of physicians. However, the existing literature is limited and methodologically problematic, and little information was available regarding care provided by PAs specifically to injured workers.

## Evaluation methods

This evaluation relied on existing administrative data, primarily from the Department of Labor & Industries (L&I) administrative databases. These databases provide detailed population-based claim, provider enrollment, and medical bill payment information for two-thirds of the nonfederal employees in the state, those covered by the State Fund. This evaluation did not consider workers' satisfaction with PA versus primary care physician (PCP) health care services, because such assessment would have required more resources than were available.

Some analyses relied upon comparisons between PAs and PCPs. The definition of PCP included those allopathic and osteopathic physicians (MDs and DOs) with a recorded specialty of general practice, family practice, or internal medicine.

There were three hypothesized mechanisms by which SB 6356 might have affected costs or the process of care:

- 1) Prior to July 1, 2004, PAs treating injured workers had been required to obtain a physician's signature on the accident report (claim form). Removing this requirement may have improved administrative efficiency, potentially decreasing the time between the first medical visit and L&I's receipt of the claim (referred to as "claim filing time" throughout this report).
- 2) There may have been practice differences between PAs and PCPs that affected outcomes. For example, one might hypothesize that costs and disputes would be no different between claims filed by PAs and PCPs if these two provider types were equally competent in providing care for workers with simple industrial injuries. In addition, under L&I payment guidelines, PAs are paid at 90% of the physician fee schedule. Claim costs therefore might be somewhat lower for PAs based on this differential; however those services are likely to constitute a small portion of total claim costs, especially for the more costly claims.
- 3) The ability to have sole signature on accident reports may have encouraged greater numbers of PAs to enroll as L&I providers, thereby increasing the number of providers willing and able to treat injured workers. This could have decreased the distance an injured worker needed to travel to see a provider or the length of time required to obtain an appointment, particularly in rural or otherwise underserved areas.

For this report, these potential effects of the legislation were evaluated using two basic approaches. First, system-level effects were assessed by measuring changes that took place from one year pre- to one year post-implementation of SB 6356. Second, the performance of reporting providers was assessed — evaluating potential differences in practice and outcome between PAs and PCPs — based on claims filed only after implementation, since PAs by regulation could not be reporting providers prior to that date. The evaluation also included a number of other elements, identified through a review of the scientific literature and consultation with stakeholders.

## Summary of findings

Findings are summarized here into three categories: those relating to system factors measured pre- and post-implementation of SB 6356, those relating to rural vs. urban geographic location, and those relating to differences between PAs and PCPs in the role of reporting provider for simple industrial injury claims.

### *A. System factors measured pre- and post-implementation of SB 6356*

- Implementation appears to have encouraged PAs to enroll as L&I providers. For PAs, average monthly enrollment as new L&I providers increased by about 27% after implementation (compared with an increase of 22% for PCPs).
- The number of active PA providers in the L&I system rose 8.0% after implementation, compared with a decrease of 1.4% for PCPs (adjusted for change in the underlying employed population).
- There was no statewide effect of the legislation on 1) the likelihood of being seen in an emergency department, 2) the length of time between the date of injury and the first medical visit, or 3) the likelihood of the first medical visit occurring within one day of injury.
- The number of claims filed by other providers decreased in rough proportion to the increase in claims filed by PAs and ARNPs.
- There was no meaningful change in the percent of disputed claims (protests and appeals) attributable to SB 6356.
- The change in signature requirement for the accident report may have improved administrative efficiency. Among claimants who saw PAs for simple industrial injuries, there was a 23% decrease after implementation in the average time from the first medical visit to filing of the accident report, and a significant increase in the likelihood of filing within 7 days.

### *B. Rural vs. urban geographic location*

- 22% of PAs were located in rural areas, compared with 17% of PCPs.
- After implementation, PAs filed 10.2% of the claims in rural areas filed by PAs, ARNPs, or PCPs, compared with 7.3% in urban areas, and all but one county where PAs filed more than 10% of those claims were rural counties.
- For those workers with injuries that occurred in rural counties, 10.8% had a PA as their reporting provider, compared with 6.5% of those injured in urban counties.
- Implementation of SB 6356 was associated with a significantly larger impact on claim filing time in rural areas. There was an additional 5 day decrease in average claim filing time for rural compared with urban providers after implementation.

*C. Differences between PAs and PCPs in the role of reporting provider*

- Differences in claimant characteristics based on their reporting provider type were generally small. The distribution of injury types was similar between PAs and PCPs, but PAs were more likely to be the reporting provider for cuts, scratches and contusions, and less likely for back and neck sprains.
- 22% of PAs were located in rural areas, compared with 17% of PCPs.
- PCPs were more than twice as likely as PAs to be the reporting provider for more than 24 claims a year (29.7% compared with 11.3%).
- Claims filed by PAs were less likely to be rejected, but the magnitude of the difference was very small.
- Claims filed by PCPs were more likely to receive a permanent partial disability payment and more likely to become compensable by the end of the follow-up period, however this difference was very likely due to the rule that PAs can have sole signature only on claims for simple industrial injuries.
- There was no difference between PAs and PCPs regarding the percent of simple industrial injury claims with attorney representation.
- Among accepted simple industrial injury claims, PAs had a slightly lower percentage of protests, and among claims that were not accepted (as of the end of the follow-up period), PAs had a higher percentage of appeals. Among disputed claims, claims filed by PAs were more likely to have the protest or appeal filed by an employer, while claims filed by PCPs were more likely to have the protest or appeal filed by a claimant. There was no significant difference regarding whether the protest or appeal was filed by a provider.
- PAs were more likely to see the injured worker within a day of injury.
- Simple industrial injury claims closed on average 6.7 days sooner for PAs compared with PCPs.
- There was no difference between PAs and PCPs regarding the percent of simple industrial injury claims reopened.
- PAs were significantly more likely to file simple industrial injury claims within 7 days of the first medical visit, and filed claims on average 5.8 days faster than did PCPs.
- Medical costs per simple industrial injury claim were \$64 lower for claims filed by PAs compared with those filed by PCPs, on average. This finding was of borderline statistical significance.

## **Conclusions**

In conclusion, implementation of SB 6356 was not associated with any negative impact on medical costs or disputes, and appeared to positively affect provider enrollment, availability of authorized reporting providers in rural areas, and some measures of administrative efficiency.





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# Introduction

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Senate Bill (SB) 6356 (Chapter 163, Laws of 2004) took effect July 1, 2004, authorizing physician assistants (PAs) to have sole signature on accident report forms (the Report of Accident and the Physician's Initial Report) for simple industrial injury claims. (Simple industrial injury claims do not involve time loss, occupational disease, inpatient care on the date of the first medical visit, or complex injuries.) SB 6356 is scheduled to sunset on July 1, 2007. SB 6356 authorized this report to the legislature "on the implementation of this act, including but not limited to the effects of this act on injured worker outcomes, claim costs, and disputed claims."

A second bill was passed simultaneously, Substitute House Bill (SHB) 1691 (Chapter 65, Laws of 2004), which authorized advanced registered nurse practitioners (ARNPs) to independently perform the functions of an attending physician, except for rating permanent impairment and performing independent medical examinations (IMEs). SHB 1691 contained identical language regarding an evaluation (report provided under separate cover), and is scheduled to sunset on June 30, 2007.

## How SB 6356 was implemented

SB 6356 was implemented by the Department of Labor and Industries (L&I) as a pilot program with effective dates 7/1/04 through 7/1/07, via emergency rule-making procedures.<sup>a</sup> The new rules authorized PAs to have sole signature on accident report forms (the Report of Accident and the Physician's Initial Report) for simple industrial injury claims (WAC 296-20-01501, WAC 296-20-01502).

For the purposes of this rule, simple industrial injuries were defined as:

- No time lost from work after the date of injury; and
- A simple industrial injury limited to an insect bite, abrasion, contusion, laceration, blister, foreign body, open wound, sprain, strain, closed fracture, simple burn, or probable exposure to bloodborne pathogen due to a needle stick.

A simple industrial injury does not involve:

- Time lost from work after the date of injury; or
- Surgery or hospitalization on the date of the injury or date of first treatment; or
- Occupational diseases (e.g., dermatitis, carpal tunnel syndrome, hearing loss, asbestosis, exposure to blood with no needle stick); or

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<sup>a</sup> A provider bulletin (PB 04-09) was issued by L&I and sent to all relevant enrolled providers after the emergency rule was adopted, describing the rule changes related to both bills. The permanent rule was effective 12/15/04, and was posted on the L&I website. There were no changes to the emergency rule, so no additional provider bulletin was issued.

- Complex industrial injuries (e.g., hernias, head injuries (except simple lacerations or abrasions), mental health conditions, open fractures, extremity amputation, severe crush injuries, severe burns, spinal cord injuries, cancer, heart disease, stroke or chemical exposure.)

The rule also specifies that an attending physician must be assigned to the claim to certify any time off work after the date of injury, and that the PA must identify on the accident report the name of the doctor who will be supervising care. It should be noted that a claim that met the definition of “simple industrial injury claim” at the time of claim filing may no longer meet the definition as time passes, since diagnoses may change or (initially unanticipated) time loss may occur.

## **Stakeholder involvement in the evaluation**

Stakeholder contact regarding the evaluation of SB 6356 began with introductory phone calls, followed by semi-structured interviews. The following stakeholder organizations were contacted:

- Workers’ Compensation Advisory Committee (WCAC)
- Association of Washington Business (AWB)
- Washington Self-Insurers Association (WSIA)
- ARNPs United of Washington State (AU)
- Washington Academy of Physician Assistants (WAPA)
- Washington Osteopathic Medical Association (WOMA)
- Washington State Chiropractic Association (WSCA)
- Washington State Labor Council, AFL-CIO (WSLC)
- Washington State Medical Association (WSMA)
- Washington State Nurses Association (WSNA)

Interview topics included comments on the details of implementation, any noted early impact, and a request for input regarding the evaluation design. The preliminary evaluation design was refined based on information from these interviews, and a brief summary was provided to stakeholders in August of 2005 with a formal request for comments. Following this process, a presentation of the evaluation plan was made to the L&I Workers’ Compensation Advisory Committee (WCAC) on September 26, 2005. In general, stakeholders have been interested in maintaining communication about plans for the evaluation.

## **Background**

SB 6356 was implemented amid concern about potential problems with access to health care for injured workers in rural areas. Provider surveys conducted by L&I contained evidence of provider dissatisfaction with the functioning of the workers’ compensation system and resultant unwillingness to participate. In Washington State, providers must enroll with L&I prior to billing for workers’ compensation-related services. Stakeholders had expressed concern that there were

areas in the state with few providers willing to treat injured workers (potentially limiting access to health care) or aid injured workers in filing a workers' compensation claim.

Geographic access and the timeliness of care can be considered system-level quality factors, insofar as they are affected by other system factors such as provider enrollment levels and state policy regarding authorized provider roles and signature requirements. Barriers to access may interfere with the mission of facilitating timely health care and appropriate benefits for injured workers. Delays in diagnosis and treatment can lead to increased disability.<sup>1, 2</sup> Although there has been a fair amount of research on geographic health care access, none was found that specifically addressed workers' compensation systems. However, in general, rural areas are served by fewer health care providers per capita than are urban areas, and the distance involved in traveling to an appropriate provider may present a significant access barrier, disproportionately so in rural areas.<sup>3</sup> A number of studies have documented difficulty in timely access to care for urgent conditions and related reliance on emergency departments.<sup>4</sup> The L&I Attending Doctor's Return to Work Desk Reference<sup>5</sup> lists same-day scheduling for work-related injuries or illnesses as a best practice<sup>b</sup> An increase in the number of available providers and/or appointments could decrease the length of time required to obtain an appointment, potentially leading to better outcomes.<sup>6, 7</sup>

Prior to the implementation of SB 6356, PAs who treated injured workers were required to obtain physician signatures on the accident report (the initial claim form). This requirement may have caused delays in health care and claim filing, particularly for rural or underserved populations where physicians may have been less readily available. Providers of workers' compensation-related care in Washington State are legally required to file the accident report within five days of identifying a work-related injury or illness, however compliance is inconsistent. The statewide average filing time is 13.2 business days, with 50% filed within 4.5 business days. At or after the first medical visit, the injured worker and provider each complete sections of the accident report, and it is then sent to L&I. Claim filing times thus depend on characteristics of both reporting providers<sup>c</sup> and claimants. The length of time from the first medical visit to claim filing was identified for the Washington State Centers of Occupational Health and Education (COHE) project as a useful administrative indicator.<sup>8</sup> Removing the necessity for PAs to obtain physician signatures on accident reports for simple industrial injuries may have improved system efficiency and timely access to care.

PAs provide about 10% of the generalist outpatient visits in Washington State, and about 14% in rural areas.<sup>9</sup> Inclusion of PAs in the health care workforce has been found to mitigate both sociodemographic and geographic disparities in access to care.<sup>10</sup> There are similarities in practice and case mix between PAs and primary care physicians (PCPs), particularly in rural settings.<sup>11-14</sup> A study of data from the 1997 National Ambulatory Medical Care Survey found that the pattern of ambulatory care diagnoses for PAs was similar compared with other health care providers.<sup>15</sup> PAs work in primary care and increasingly in specialty care.<sup>16</sup> In 1998, a higher proportion of

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<sup>b</sup> The time from the date of injury to the first medical visit was considered as a possible quality indicator for the Washington State Centers of Occupational Health and Education (COHE) project, but was not included as it was not considered to be completely under provider control.

<sup>c</sup> The phrase "reporting provider" is used throughout this report to refer to the provider that filed the accident report.

PAs worked in rural Washington (27.8%) compared with family physicians (23.6%) and nurse practitioners (19.7%).<sup>17</sup>

In Washington, physical presence of a physician is not required for PA practice, however there is a requirement that a practice plan (representing the practice agreement between the physician assistant and the supervising physician) be submitted to the Medical Quality Assurance Commission prior to licensure.<sup>16</sup> Within their scope of practice, PAs have been found to provide care that is equivalent in quality to that of physicians.<sup>10, 18</sup> However, the existing literature is limited and methodologically problematic,<sup>10, 12</sup> and little information was available regarding care provided by PAs specifically to injured workers.

Disputed claims (protests and appeals) stem from many causes and require increased levels of system resources. Both protests and appeals can be filed by the injured worker (or legal representative), the injured worker's health care provider, and/or the employer. A markedly lower rate of worker and/or employer protests for a given provider type could indicate closer adherence to worker and/or employer expectations, and may be a partial indicator of quality (to the limited extent that those expectations represent appropriate care). Higher levels of disputed claims and attorney representation may also be proxies for patient dissatisfaction.<sup>19</sup>

Controlling system costs has been an ongoing priority,<sup>7</sup> and some stakeholders have expressed concern that expanding the definition of reporting provider may increase costs. There is specific interest in whether costs and outcomes attributable to PAs in this role are comparable to those of physicians. Although the classic OTA review documented that PAs provide safe and cost-effective care, only one study was found specific to workers' compensation-related care.<sup>10</sup> That observational retrospective Texas-based study found that when light duty or limited work activity was assigned to an injured worker, PAs prescribed less time on average than did physicians (15.6 days compared with 17.4 days).<sup>20</sup> Little recent research was found comparing utilization between PAs and physicians in non-specialty settings. One study concluded that length of visit or total charges did not differ between PAs and physicians in emergency department settings.<sup>13</sup> Only two studies were found comparing clinical outcomes for PAs and physicians, and neither found evidence for a difference.<sup>21, 22</sup>

There is little information available related to the impact of health care provider type on disability or costs within the workers' compensation arena. It is important to note that practice differences between provider types may not be an important determinant of outcomes; for example, in studies of acute low back pain, outcomes were similar for patients of primary care physicians, chiropractors, and orthopedic surgeons.<sup>23, 24</sup> The effect of health care may be small in comparison with that of sociodemographic, economic, psychosocial, employment, or administrative factors.<sup>25, 26</sup>

# The basis for this report

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This section describes how the impacts of the legislation were evaluated, including describing the study sample and variables and discussing the evaluation's weaknesses and strengths.

## Evaluation approach

Figure 1 presents a diagram of the approach to this evaluation. There were three hypothesized mechanisms by which SB 6356 might have affected the process of care and costs:

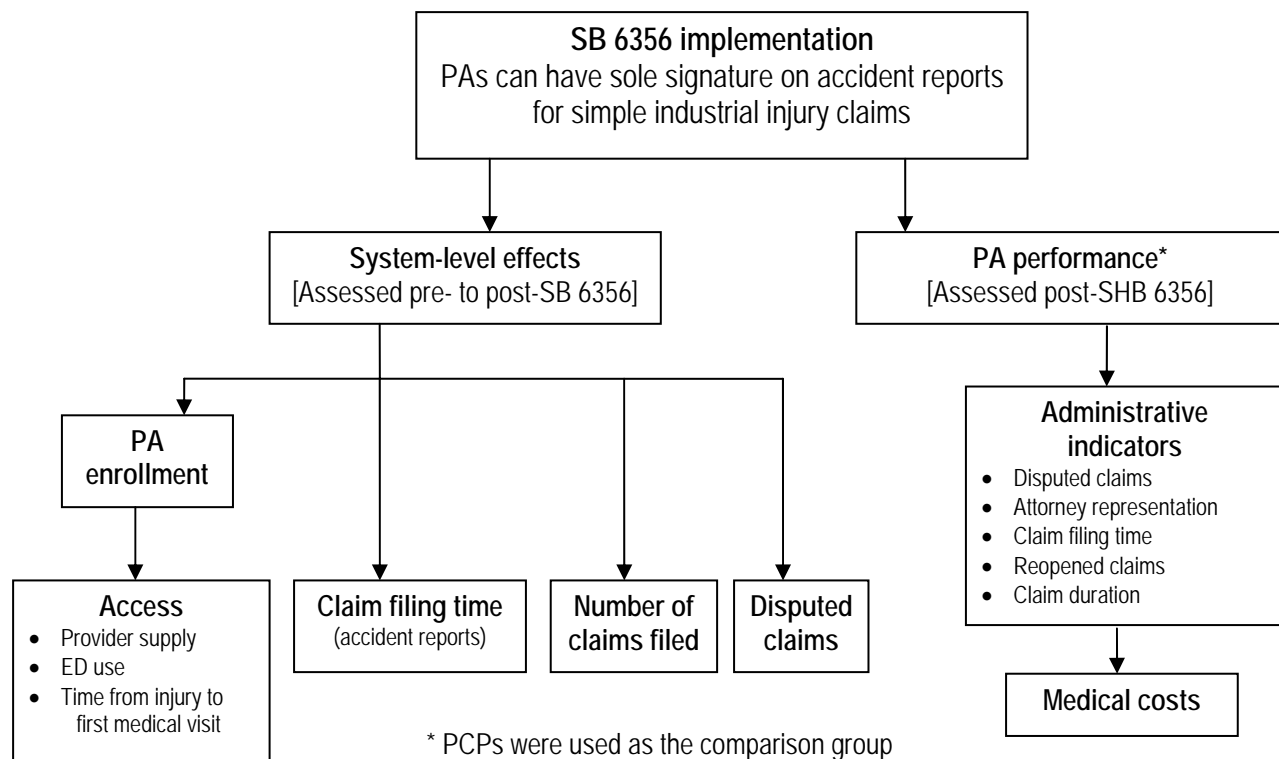
- 1) Prior to July 1, 2004, PAs treating injured workers had been required to obtain a physician's signature on the accident report (claim form). Removing this requirement may have improved administrative efficiency, potentially decreasing the time between the first medical visit and L&I's receipt of the claim (referred to as "claim filing time" throughout this report).
- 2) There may have been practice differences between PAs and PCPs that affected outcomes. For example, one might hypothesize that costs and disputes would be no different between claims filed by PAs and PCPs if these two provider types were equally competent in providing care for workers with simple industrial injuries.<sup>d</sup> In addition, under L&I payment guidelines, PAs are paid at 90% of the physician fee schedule. Claim costs therefore might be somewhat lower for PAs based on this differential; however those services are likely to constitute a small portion of total claim costs, especially for the more costly claims.
- 3) The ability to have sole signature on accident reports may have encouraged greater numbers of PAs to enroll as L&I providers, thereby increasing the number of providers willing and able to treat injured workers. This could have decreased the distance an injured worker needed to travel to see a provider or the length of time required to obtain an appointment, particularly in rural or otherwise underserved areas.

There were two basic approaches taken in evaluating the potential pathways depicted in the diagram. System-level effects of the legislation were assessed via measuring changes that took place from one year pre- to one year post-implementation of SB 6356. In contrast, the assessment of reporting provider performance (evaluating potential practice and outcome differences between PAs and PCPs) included claims filed only after implementation, since PAs by regulation could not be reporting providers prior to that date.

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<sup>d</sup> Simple industrial injury claims do not involve time loss, occupational disease, inpatient care on the date of the first medical visit, or complex injuries.

Figure 1. Diagram of evaluation approach



## Evaluation questions

SB 6356 specified that this report include an evaluation of the effects of SB 6356 on injured worker outcomes, claim costs, and disputed claims. Based on a review of the scientific literature and consultation with stakeholders, a number of additional elements were also included in the evaluation. Several of these had been developed for use in the Washington State Centers of Occupational Health and Education (COHE) project via the convening of expert panels.<sup>27</sup> The following questions were identified and addressed in this report:

### *I. Access to health care for injured workers*

- A. Who do PAs serve? Are the injured workers whose claims are filed by PAs different than those whose claims are filed by PCPs?
- B. Are there differences between the PAs and PCPs who serve as reporting providers?
- C. How much workers' compensation-related health care is provided by PAs?
- D. Did PA enrollment increase after implementation?



- E. Were there measurable effects of the legislation on the percentage of injured workers that went first to emergency departments (EDs) vs. to providers in a clinic or office, or on the elapsed time from the date of injury to the first medical visit?

## *II. Administrative indicators*

- A. Did the number of claims filed change after implementation?
- B. Did the percent of claims with disputes change after implementation?
- C. Did implementation affect the average claim filing time for PAs?
- D. Did implementation have a differential effect on the average claim filing time for PAs in rural vs. urban areas?
- E. Did administrative indicators differ for claimants having PAs vs. PCPs as the reporting provider?
  - Claim status
  - Disputed claims and attorney representation
  - Time to first medical visit
  - Claim filing time
  - Percent of claims reopened
  - Claim duration

## *III. Medical costs*

- A. Did average medical costs per claim differ for claimants having PAs vs. PCPs as their reporting provider?

## **Study sample and variables**

This evaluation relied on existing data from the L&I administrative databases. These databases provide detailed population-based claim, provider enrollment, and medical bill payment information for two-thirds of the nonfederal employees in the state, those covered by the State Fund.<sup>28</sup> (The other third is covered by self-insured employers. This evaluation was restricted to State Fund claims, because the information available for self-insured claims is insufficient.) County-level unemployment statistics were obtained from the Bureau of Labor Statistics (BLS).

Figure 2 presents the sample selection strategy for the analyses included in this report. Each box represents a subsample of claims used for a particular analysis or set of analyses. Each box contains the primary criteria used to create the subsample and the subsample size (broken down into pre- and post-implementation numbers where pre-implementation claims were included in the analysis). Where appropriate, the subsample size is also broken out by reporting provider type (PA or PCP).

The complete claims sample included State Fund workers' compensation claims filed between July 1, 2003 and June 30, 2005 by claimants who were 18 to 70 years of age. Providers whose place of business was outside Washington State and workers with injuries occurring outside Washington State were excluded, due to the state-specific nature of the legislation. There were a total of 262,794 claims meeting these criteria. This provided a population-based set of claims for both the year prior to and the year following implementation of SB 6356.

Data for specific variables were obtained based on existing evidence for their relationship to outcomes or costs in workers' compensation settings and based on their availability in L&I databases.<sup>e</sup> There were three dimensions of predictor variables: geographic, provider, and worker. Definitions of these variables can be found in the technical appendix.

Rural geographic location may directly affect costs, and may also function as a marker for unmeasured differences between rural and urban areas such as provider distribution and distance to care, varying standards of practice, or diffusion of best practices.<sup>29</sup> Rural/urban location was expected to modify the relationship between SB 6356 implementation and the measures of access and claim filing times.

Provider-level variables included provider type, whether the provider was enrolled in the COHE project,<sup>f</sup> and volume of L&I claimants (as a proxy for familiarity with the workers' compensation system). Several analyses relied upon comparisons between PAs and primary care physicians (PCPs). The definition of PCP included those allopathic and osteopathic physicians (MDs and DOs) with a recorded specialty of general practice, family practice, or internal medicine.

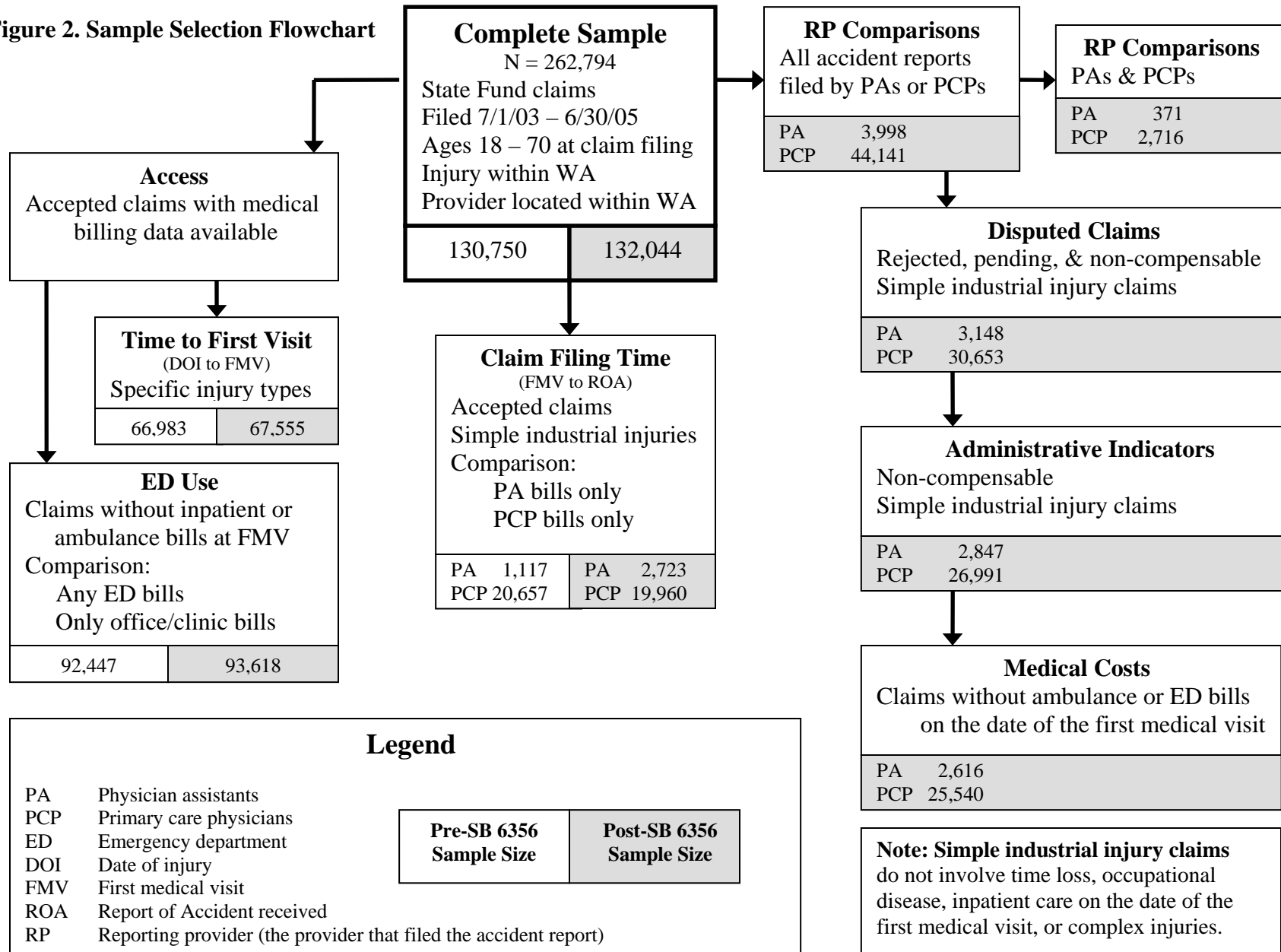
Worker-level variables included sociodemographics (age, gender, marital status, dependents, pre-injury income), injury type, public vs. private sector employment, and whether the employer participated in a retrospective rating group. There is evidence that each of these characteristics can affect both disability and costs.<sup>2, 30-33</sup>

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<sup>e</sup> This evaluation relied on computerized claim, provider enrollment, and medical billing data. It had been determined early on that neither the available resources nor the timeframe allowed for direct surveys of workers or providers to assess such factors as satisfaction or awareness of the rule change.

<sup>f</sup> The Centers of Occupational Health and Education (COHE) project is a community-based approach to health care that provides health services coordinators to facilitate return to work efforts and provides financial incentives to enrolled providers for occupational health best practices, including submitting the accident report within 2 days. Elements of this project have been found to substantially reduce claim filing times and disability among injured workers, hence it was important to control for provider enrollment in this project.

Figure 2. Sample Selection Flowchart



## Limitations and strengths of the evaluation

### *Limitations*

All analyses for this evaluation relied on existing administrative data. In general, administrative databases are not designed nor maintained to maximize data quality for research purposes.<sup>34</sup> Data fields that are not reimbursement-related may tend to be less accurate or complete.<sup>35</sup> In addition, reliance on administrative data restricted the ability to evaluate factors such as injured worker or provider satisfaction.

### The challenge of selection bias

Selection bias was a methodological challenge of particular concern, due to the fact that this evaluation was based on observational data. Selection bias refers to the extent to which the results might be affected by differences between those injured workers seeing PAs compared with PCPs. Differences in measured characteristics (such as age, sex, injury type) were controlled, however, the injured workers seen by the two provider types might have been different in ways that were not measured. It is unclear to what extent selection bias due to choice of provider, severity of injury, comorbidities, or other factors may have played a role. Although it has been suggested that the practice patterns and patient profiles of PAs do not fully overlap those of primary care physicians, perhaps being of lower average acuity or complexity,<sup>36</sup> there is not convincing evidence of this in the literature.

Practice setting may have more influence than profession on practice patterns.<sup>37</sup> There is some evidence that PAs tend to care for a higher proportion of female, younger, and less acute patients, and tend to perform less invasive procedures than do physicians.<sup>13, 22</sup> (The higher proportion of female patients may be explained by provider demographics; in a survey of generalist health care providers in Washington, 38.8% of PAs were female, compared with 28.9% of physicians.<sup>9</sup> However, in this study sample, PAs were more likely to see male patients.) On the other hand, there is evidence of general similarity in case mix and diagnoses for PAs as compared with physicians.<sup>11, 13, 15</sup> Although there was no way to be certain that there were not important unmeasured differences between the injured workers in the care of PAs compared with PCPs, the available data did not provide evidence of substantial systematic differences in case mix. The limitation to simple industrial injury claims also limits the range of severity and complexity that might vary by provider type. In addition, adding control for those variables that were available (such as geographic location and characteristics of the injured worker, the injury, and the employer) did not have much impact on the findings, suggesting that confounding was not a major problem in general.

### Other limitations

Other limitations of the evaluation included:

- The impact of excluding self-insured companies from analyses (due to incomplete and unavailable data) is uncertain, but may have affected the estimates of provider volume.

- There was a short time frame available, so extended periods of disability couldn't be evaluated.
- For some PAs, billing may have occurred under a physician provider number.
- L&I provider identification numbers are not necessarily unique identifiers. Although technically not permitted, some providers may have used another provider's existing number, rather than applying for their own. Some providers have multiple identification numbers.
- Provider addresses may reflect mailing address rather than practice location.
- Providers may not have been aware of the new legislation in the first year after implementation, or may not have changed their practice in response. Although the L&I provider bulletin explaining the new rules was sent to all enrolled clinical providers, L&I has not conducted any systematic outreach or publicity to non-enrolled providers.
- Successful outcomes are only partially influenced by the type of injury and the process of health care. Many important worker and employer characteristics were unmeasured.
- Because of the short timeframe available for evaluation, data extraction occurred at the end of the follow-up period, without any additional allowance for bill processing time. The average cost figures are likely to be underestimates.

### *Strengths*

Despite the numerous limitations inherent in relying on administrative data, there are important advantages, particularly the ability to link enrolled provider data with claim, injury, and medical billing data, both at the individual and population-based levels.<sup>38</sup> All claims meeting the basic criteria were included, providing a very large set of population-based data. This allowed for the control of a large number of covariates in the regression analyses. And finally, stakeholders were involved in planning the evaluation design at an early stage.

# Findings

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This section presents the results of research designed to answer each of the evaluation questions. Research methods are described very briefly. Definitions of key variables and other methodological details can be found in the technical appendix.

## I. Access to health care for injured workers

### *A. Who do PAs serve? Were the injured workers whose claims were filed by PAs different than those whose claims were filed by PCPs?*

Table I compares the characteristics of claimants whose reporting provider was a PA with those whose reporting provider was a PCP. This comparison was based on claims filed within the year after implementation (between 7/1/04 and 6/30/05). The most notable difference was that a markedly higher proportion of claimants with PAs as their reporting provider had their claim filed by a provider located in a rural area ( $p < 0.001$ ). Although PAs were somewhat more likely to see claimants who were male, were younger, had any dependents, and had a lower pre-injury monthly income, the differences were fairly small in magnitude. PAs were also somewhat less likely to see workers in the public sector and more likely to see those whose employers were members of a retrospective rating group at the time of injury. The distribution of injury types was fairly similar between PAs and PCPs. PAs were more likely to be the reporting provider for cuts, scratches and contusions, and less likely for back and neck sprains.

Table I. Claimant characteristics by reporting provider type

Claimant Characteristics	PA n=3,998	PCP n=44,141
Median monthly income*	\$2,138	\$2,420
Mean age	36.8	38.4
	<i>Percent of claims</i>	
Married*	50.6	51.0
1 or more dependents*	39.1	36.7
Male	68.8	66.3
Injury type:		
Back/neck sprains	12.6	17.2
UE/LE** sprains	16.7	16.7
UE/LE cuts/scratches/contusions***	27.7	21.3
UE/LE fractures	3.0	2.5
UE/LE bursitis	3.0	4.0
UE/LE heat burns	1.1	1.0
Carpal tunnel	1.1	2.7
Hearing loss	<0.1	1.5
Eye scratches	4.6	3.0
Conjunctivitis	1.3	0.6
Other/unspecified	13.1	13.5
Occupational disease	6.1	7.0
Public sector employment	7.2	9.4
Retrospective rating group at time of injury	52.0	47.3
Rural reporting provider	21.4	12.8

Note: Reporting provider refers to the provider that filed the initial accident report

\* Includes only compensable claims due to missing or unreliable data (n=9,700)

\*\* UE/LE: upper extremity & lower extremity

\*\*\*This category name is shortened to UE/LE cuts & scratches elsewhere

### *B. Were there differences between the PAs and PCPs who served as reporting providers?*

Table II compares the characteristics of PAs and PCPs who were recorded as the reporting provider for any claim filed within the year after implementation (between 7/1/04 and 6/30/05). A higher proportion of PAs were located in rural areas ( $p=0.02$ ). There was little difference in COHE participation. PCPs were more than twice as likely as PAs to be the reporting provider for more than 24 claims a year ( $p<0.001$ ).

Table II. Provider characteristics by reporting provider type

Reporting Provider Characteristics	PA n=371	PCP n=2,716
	<i>Percent of providers</i>	
Rural provider	21.8	17.1
COHE provider (by end of follow-up period)	8.1	6.8
High volume (> 24 claims/year)	11.3	29.7
Specialty		
General Practice	100.0*	13.7
Family Practice		60.9
Internal Medicine		25.4

\*12 PAs were excluded from this sample based on specialties of general surgery or oral surgery

### *C. How much workers' compensation-related health care was provided by PAs?*

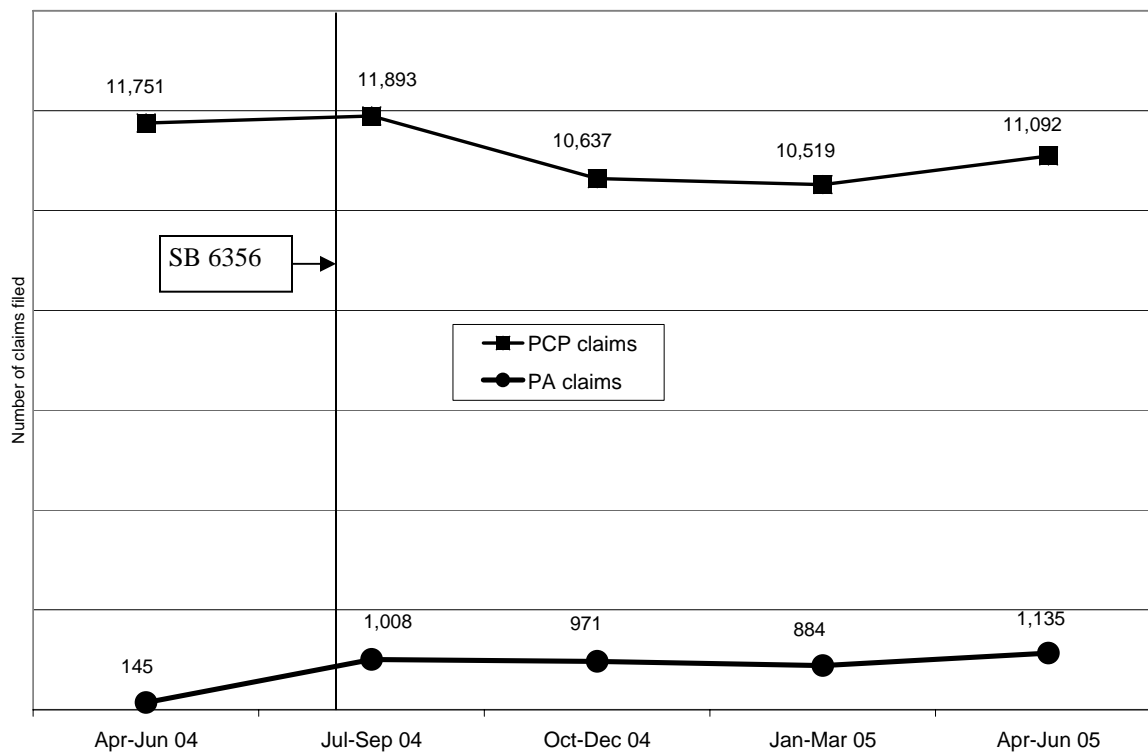
In the first year after implementation, PAs were the reporting provider for 7.7% of all claims (and 8.9% of accepted simple industrial injury claims<sup>g</sup>) filed by primary care providers (PAs, PCPs, and ARNPs). PAs filed a higher percentage of those claims in rural areas (defined by provider location); 10.2% in rural compared with 7.3% in urban areas ( $p<0.001$ ). For those workers with injuries that occurred in rural counties, 10.8% had a PA as their reporting provider, compared with only 6.5% of those injured in urban counties ( $p<0.001$ ).

Figure 3 presents the number of initial claims filed each quarter by PAs and PCPs. The number of claims filed by PCPs (along with other providers, primarily occupational medicine physicians, chiropractors and clinics, as shown in Table III) decreased in rough proportion to the increase in the number of claims filed by PAs and ARNPs. (There was also an increase in claims filed by ARNPs related to SHB 1691.) It was not possible to determine from the available administrative data whether this was due to injured workers seeing a different mix of provider types after the legislation, or solely to differences in which provider signed (and billed for) the accident report due to the rule changes.

<sup>g</sup> Based on whether the claim met the definition of "simple industrial injury" at the end of the follow-up period. It should be noted that a claim that met the definition of "simple industrial injury" at the time of claim filing may no longer have met the definition by the end of the follow-up period, since diagnoses may have changed or initially unanticipated time loss may have occurred.

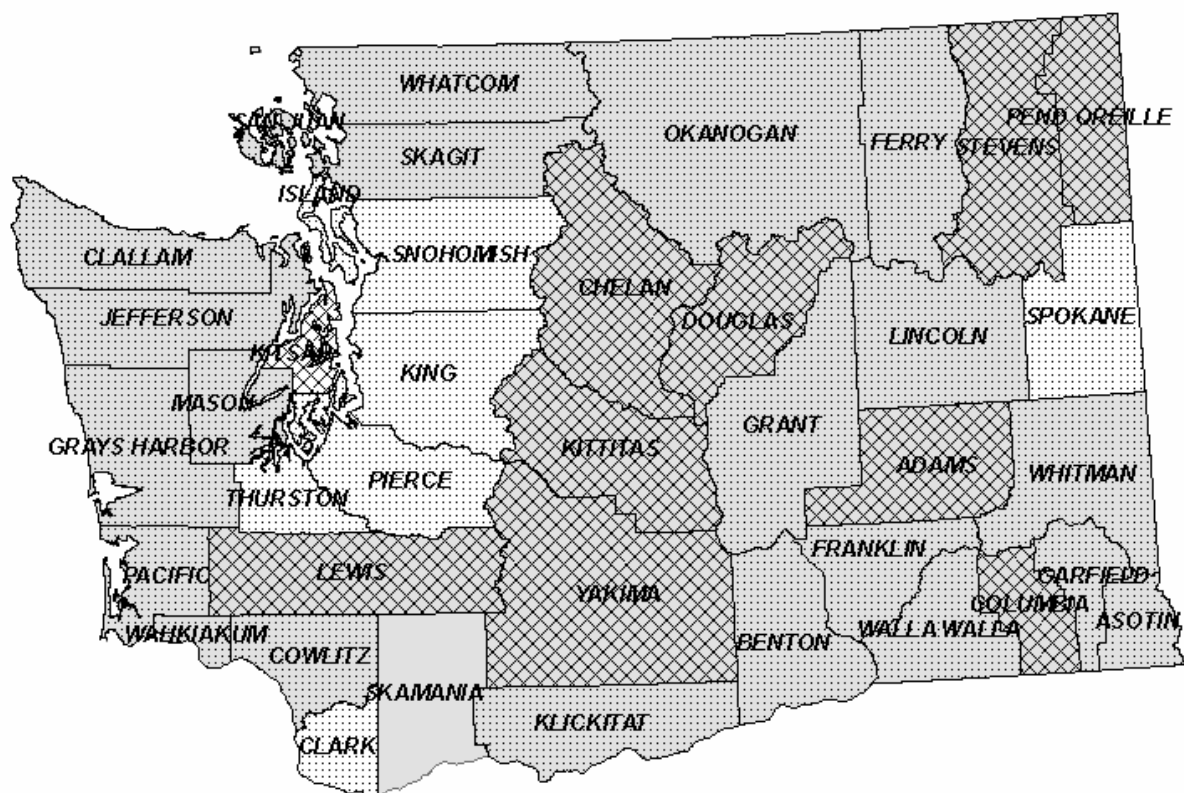


Figure 3. Number of claims filed by PAs and PCPs, by calendar quarter



The map in Figure 4 displays the percent of accepted claims filed by PAs (of accepted claims filed by PAs, PCPs, and ARNPs) in the year after implementation for each Washington county. Except for Kitsap County, all counties where PAs filed more than 10% of claims were rural counties.<sup>h</sup>

Figure 4. Percent of accepted claims filed by PAs, by county



#### Legend

##### Percent of accepted claims filed by PAs\*

< 10%

> 10%

##### County population density\*\*

Urban

Rural

\* as a % of all accepted claims filed by PAs, PCPs, and ARNPs from 7/1/04 to 6/30/05

\*\* Rural county: <100 persons/square mile (as defined by the WA State Office of Financial Management)

<sup>h</sup> No providers were located in Skamania County, so it could not be classified. The mean for the other 38 counties was 8.8%.

#### *D. Did PA enrollment increase after implementation?*

The number of active PA providers in the L&I system rose 11.3% statewide after implementation. (For this purpose, active providers were defined as those with any allowed L&I bill during the year in question.) This figure decreased to 8.0% when the increase in the underlying employed population was taken into account.<sup>i</sup> For reference, the number of active PCPs rose only 1.6% statewide, and decreased by 1.4% when the increase in underlying employed population was taken into account.

For PAs, average monthly enrollment as new L&I providers rose from about 22 per month in the year prior to implementation to about 28 per month in the year after implementation, a 27% increase. As a reference point, average monthly enrollment for PCPs rose from about 46 to 56, an increase of 22%.

#### *E. Were there measurable effects of the legislation on the percentage of injured workers that went first to emergency departments (EDs) vs. to providers in a clinic or office, or on the elapsed time from the date of injury to the first medical visit?*

##### Emergency department use

For the two years examined by this study, 35.4% of those claimants with medical bills on file had at least one bill for a service provided in an ED at the first medical visit.<sup>j</sup> This was higher for those claimants who were injured in rural counties (40.1% for rural compared with 33.4% for urban,  $p < 0.001$ ).

It was difficult to determine whether the legislation had an effect on ED use. Many factors affect ED use, not just provider availability. However, it was hypothesized that if the legislation did have an effect, it should be most apparent in those counties with a higher proportion of claims filed by PAs and/or ARNPs after implementation. (ARNPs also needed to be considered because of the simultaneous implementation of SHB 1691, authorizing ARNPs to sign accident reports and function as attending providers).

There was a slight overall increase in ED use after implementation, from 36.5% to 38% ( $p < 0.001$ ). Logistic regression was used to control for whether the worker was injured in a rural county, injury type, and sociodemographics. There was no meaningful effect of the legislation on the likelihood of being seen in an ED detected specifically for those counties with a higher proportion of claims filed by PAs and/or ARNPs after implementation.<sup>k</sup>

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<sup>i</sup> The figures for the employed population came from the BLS Current Population Survey, which included employed persons 16 and over in the civilian non-institutional population. This is not directly comparable to the numbers of workers covered by the State Fund, due to federal and self-insured employers.

<sup>j</sup> First medical visit was defined as the first date of service found in the medical and hospital billing data.

<sup>k</sup> Further statistical detail can be found in the technical appendix.

### Elapsed time from date of injury to the first medical visit

This analysis was concerned with whether provider availability might have affected the length of time between the date of injury and the first medical visit. The sample was restricted to claims with specific injury types,<sup>1</sup> because the date of injury was often missing and was considered inaccurate for occupational disease. In addition, delays in the first appointment for occupational disease may have been more likely to reflect slow development of symptoms or slow recognition as opposed to access barriers.

In general, for this group of injuries, claimants were seen quickly. 72% were seen within 1 day of injury, and 90% were seen within 7 days. The mean time from injury to first medical appointment was 3.4 days in both rural and urban areas.

As for the analysis of ED use, it was hypothesized that if the legislation did have an effect, it should be most apparent in those counties with a higher proportion of claims filed by PAs and/or ARNPs after implementation. Linear regression was used to control for whether the worker was injured in a rural county, injury type and severity, whether any provider billing at the first medical visit was a COHE provider, and sociodemographics. There was no meaningful effect of the legislation on the duration of time between the date of injury and the first medical visit detected, either overall or specifically for those counties with higher proportions of claims filed by PAs and/or ARNPs after implementation. Using logistic regression, there was also no detected effect on the likelihood of the first medical visit occurring within one day of injury.<sup>m</sup>

## **II. Administrative indicators**

### *A. Did the number of claims filed change after implementation?*

As Table III shows, there was a 1% increase in the number of claims filed after implementation of SB 6356, compared with the year before. However, there was a 3% increase in the employed population over the same time period, so some increase in claims would be expected.<sup>n</sup>

Table III. Number of claims filed before and after implementation of SB 6356

Provider Type Filing Claim	Pre-SB 6356	Post-SB 6356
ARNP	348	3,582
PA	601	3,998
PCP	46,746	44,141
Occupational Medicine Physician	8,500	7,901
Chiropractic	8,509	8,175
Clinic	10,547	9,128
Other	55,499	55,119
Total	130,750	132,044

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<sup>1</sup> Injury types included: upper and lower extremity cuts and scratches (n = 53,063), upper and lower extremity sprains (n = 27,338), back and neck sprains (n = 36,258), upper and lower extremity fractures (n = 8,054), and corneal abrasions (n = 9,825).

<sup>m</sup> Further statistical detail can be found in the technical appendix.

<sup>n</sup> The figures for the employed population came from the BLS Current Population Survey, which included employed persons 16 and over in the civilian non-institutional population. This is not directly comparable to the numbers of workers covered by the State Fund, due to federal and self-insured employers.

***B. Did the percent of claims with disputes change after implementation?***

Table IV presents the percent of claims with disputes (protests and appeals) before and after implementation of SB 6356. There was a longer follow-up time available for the claims filed prior to implementation, which if ignored would make for an unfair comparison (favoring the legislation). Therefore, the follow-up time was truncated to July 2005 for claims filed during the year prior to implementation, to equal the follow-up time available for those filed in the year after implementation (follow-up ended in July 2006).

There was no meaningful or statistically significant change in the percent of claims with employer protests at the time of claim filing or in the percent of claims with appeals. There was a statistically significant decrease in the percent of claims with protests (favoring the legislation;  $p < 0.001$ ), but the magnitude of change was very small.

Table IV. Percent of claims with disputes before and after implementation of SB 6356

Dispute Type	Pre-SB 6356 n=130,750	Post-SB 6356 n=132,044
Employer protest at claim filing	5.92	5.84
Any protest within 1 year	10.80	10.24
Any appeal within 1 year	1.76	1.84

***C. Did implementation affect the average claim filing time for PAs?***

This analysis considers whether SB 6356's removal of the physician signature requirement for accident reports filed by PAs reduced the average time from the first medical visit to filing of the accident report for those injured workers seeing PAs for simple industrial injuries.<sup>o</sup>

The comparison of average claim filing time before and after implementation could not be based on the claim's reporting provider because PAs were not authorized to be reporting providers prior to implementation. Therefore, medical billing data was used to determine the provider type that billed for the first medical visit. This was complicated by the fact that in a number of cases several providers billed for care on the day of the first medical visit and it was not possible to determine which provider gave care first, or was most responsible for the care provided. An algorithm was used to identify those claims that had bills only from PAs on the date of the first medical visit. A comparison group was constructed based on those claims that had bills only from PCPs on the date of the first medical visit. PCPs were used as a control group because SB 6356 had no direct effect on their practice and they were otherwise comparable, in the sense that changes over time in average claim filing time due to other policy or environmental factors would likely affect PCPs similarly to PAs.

Simple industrial injury claims were included in this analysis if the date of injury, first medical visit, and accident report filing date all occurred within one of the two study years (pre- or post-implementation). This allowed for unbiased comparison between the two study years, and avoided misclassification due to claim filing intervals that crossed the implementation date.

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<sup>o</sup> Simple industrial injury claims do not involve time loss, occupational disease, inpatient care on the date of the first medical visit, or complex injuries.

Limiting the data in this way excluded the longest claim filing times. However, any bias toward shorter claim filing times should be equivalent for both time periods, and the ability to compare across time periods was considered more important than an accurate estimation of average claim filing time.

Table V presents the average time from the first medical visit to filing of the accident report for both PAs and PCPs. Average claim filing time decreased by almost 2 days (23%) for PAs after implementation ( $p < 0.001$ ). For PCPs, claim filing time decreased by only 4% ( $p = 0.016$ ).

Table V. Claim filing time (in days), by provider type

Provider Type	n	Pre Mean (SD)	Post Mean (SD)	Difference
Only PA bills	3840	9.7 (16.7)	7.9 (12.0)	- 1.8
Only PCP bills	40617	8.0 (13.7)	7.7 (13.7)	- 0.3

Note: Due to the sample selection strategy, these are underestimates of actual claim filing times

Linear regression was used to control for whether any provider that billed at the first medical visit was rurally-located or was a COHE provider by the time the claim was filed, injury type, and sociodemographics. Control was also included for change over time, by differencing out the change for PCPs. The average decrease in claim filing time associated with implementation of SB 6356 for PA claims was 2.3 days (95% CI: -3.4, -1.2;  $p < 0.001$ ).

Logistic regression was used to investigate whether implementation was associated with a change in the likelihood of claim filing within 7 days of the first medical visit, controlling for the same factors as before. Providers in Washington State are legally required to file the accident report within five days of identifying a work-related injury or illness, however compliance is inconsistent. Seven days was used as the cutpoint for this evaluation rather than five, to allow for weekends consistently across claims. The results were similar. After implementation, PA claims were more likely to be filed within 7 days of the first medical visit, after differencing out the decrease in claim filing time for PCPs ( $p < 0.001$ ).<sup>p</sup>

#### *D. Did implementation have a differential effect on the average claim filing time for PAs in rural vs. urban areas?*

This analysis was limited to the subset of claims that had only PA bills for the first medical visit ( $N = 3,840$ ). The analysis controlled for the same factors as the previous analysis.<sup>q</sup> Implementation was associated with a significantly larger impact in rural areas. There was an additional 5 day decrease in claim filing times among rural compared with urban providers after implementation (95% CI: -8.7, -1.3;  $p = 0.008$ ).

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<sup>p</sup> Further statistical detail can be found in the technical appendix.

<sup>q</sup> The provider type variables were dropped. Further statistical detail can be found in the technical appendix.

### *E. Did administrative indicators differ for claimants having PAs vs. PCPs as the reporting provider?*

#### Claim status

Table VI presents claim status information for all claims filed by PAs or PCPs during the year after implementation (between 7/1/04 and 6/30/05). Claims filed by PAs were slightly less likely to be rejected ( $p=0.026$ ), however again the difference was very small. Claims filed by PAs were less likely to become compensable by the end of the follow-up period ( $p<0.001$ ), however this difference was very likely due to the rule that PAs can only have sole signature on claims for simple industrial injuries. Claims filed by PCPs were more likely to reflect a permanent partial disability payment ( $p<0.001$ ).

Table VI. Claim status

<b>Claim Status*</b>	<b>PA</b> <i>n</i> =3,998	<b>PCP</b> <i>n</i> =44,141
<i>Percent of claims</i>		
Claim status:		
Rejected	9.7	10.8
Non-compensable	75.5	66.8
Compensable	13.8	20.7
Other**	1.0	1.7
Permanent partial disability payment	2.6	3.8

\* As of final data extraction on 7/2/06

\*\* Pending, Provisional, Kept on Salary, Loss of Earning Power, Fatal, Total Permanent Disability

There were very few claims with a status of Kept on Salary, Loss of Earning Power, Fatal, or Total Permanent Disability. Those claims were excluded from all analyses that follow as there were too few in each category to make meaningful comparisons.

#### Disputed claims and attorney representation

There was no evidence of any systematic pattern of differences between PAs and PCPs regarding the percent of simple industrial injury claims with protests, appeals, or attorney representation during the follow-up period (Table VII). Among non-compensable claims, PAs had a slightly lower percentage of protests ( $p=0.005$ ), and among non-accepted claims, PAs had a higher percentage of appeals ( $p=0.001$ ). Within the 1,807 claims with a recorded protest and the 243 claims with a recorded appeal, claims filed by PAs were more likely to have the protest or appeal filed by an employer (38% compared with 22%;  $p<0.001$ ), while claims filed by PCPs were more likely to have the protest or appeal filed by a claimant (51% compared with 39%;  $p=0.004$ ). There was no significant difference in whether the protest or appeal was filed by a provider.

Table VII. Disputed claims and attorney representation for simple industrial injury claims

Administrative Indicators	PA n=3,148	PCP n=30,653	p-value
	Percent of claims		
Any protests			
Not accepted	11.3	9.7	NS
Accepted	3.7	4.9	0.005
Any appeals			
Not accepted	5.7	2.4	0.001
Accepted	0.3	0.5	NS
Attorney representation			
Not accepted*	1.3	1.6	NS
Accepted	0.3	0.2	NS

\*Represents claims with a status of Rejected, Pending, or Provisional

### Other administrative indicators

The ‘process of care’ indicators included here are intended to give a picture of possible differences in administrative efficiency and case mix between provider types; however, these indicators are at best only partially under the control of the reporting provider. The process indicators in this table are all worded so that a lower percent is “better” (an indicator of less potential friction costs, dissatisfaction, etc.). Only accepted simple industrial injury claims<sup>r</sup> were included.

As shown in Table VIII, PAs were less likely to file the claim more than 7 days after the first medical visit ( $p<0.001$ ), and mean claim filing time was 4 days shorter for PAs ( $p=0.004$ ). Although claims filed by PAs were more likely to remain open for 6 months ( $p<0.001$ ), there was no difference at 12 months, nor in claim reopenings. PAs were more likely to see the injured worker within a day of injury ( $p<0.001$ ). A closer look was then taken at two of these indicators: claim filing time and claim duration.

<sup>r</sup> Simple industrial injury claims do not involve time loss, occupational disease, inpatient care on the date of the first medical visit, or complex injuries.



Table VIII. Administrative process of care indicators for simple industrial injury claims

<b>Administrative Indicators</b>	<b>PA</b>	<b>PCP</b>	<b>p-value</b>
	<i>n=2,847</i>	<i>n=26,991</i>	
Mean claim filing time (in days)*	8.9	12.9	0.004
	<i>Percent of claims</i>		
First medical visit > 1 day after injury*	31.6	36.4	<0.001
Claim filing > 7 days after first medical visit*	29.3	34.1	<0.001
Claim still open 6 months after claim filing**	7.1	4.7	<0.001
Claim still open 12 months after claim filing**	1.8	2.3	NS
Claim reopened at least once	0.2	0.4	NS

\*For this table, first medical visit date was derived from the claims data

\*\*Defined as the time from the date of claim filing to the last observed claim closure date or the end of the follow-up period, whichever was earlier

### Claim filing time

This analysis considered whether there were differences after implementation between PAs and PCPs in the average length of time from the first medical visit to L&I's receipt of the accident report, and in the proportion of claims filed within 7 days of the first medical visit.<sup>s</sup> The analysis was limited to simple industrial injury claims.<sup>t</sup>

Linear regression was used to control for rural provider location, whether the reporting provider was a COHE provider by the date of claim filing, injury type, provider volume, and sociodemographics. Controlling for these factors, PAs filed claims on average 5.8 days faster than did PCPs (95% CI: -8.7, -2.9;  $p<0.001$ ).

Logistic regression was used to investigate whether there was a difference between PAs and PCPs in the likelihood of claim filing within 7 days of the first medical visit, controlling for the same factors as before. Providers of workers' compensation-related care in Washington State are legally required to file the accident report within five days of identifying a work-related injury or illness, however compliance is inconsistent. Seven days was used as the cutpoint for this evaluation rather than five, to allow for weekends consistently across claims. The results were similar. PAs were more likely to file the claim within 7 days of the first medical visit than were PCPs ( $p=0.001$ ).<sup>u</sup>

<sup>s</sup> First medical visit is defined here using the date in the claims file rather than the first date of service from the medical billing data. This is because the existence of multiple provider bills at the first medical visit did not allow for correcting standard errors by accounting for the correlation of claimant outcomes within a specific provider's practice or for identifying variables specific to a single provider, such as rural location, claim volume, etc. The first medical visit date in the claims file matched the date derived from billing data 85% of the time. In other analyses, findings did not differ based on which source was used.

<sup>t</sup> Simple industrial injury claims do not involve time loss, occupational disease, inpatient care on the date of the first medical visit, or complex injuries.

<sup>u</sup> Further statistical detail can be found in the technical appendix.

### Claim duration

For this analysis, claim duration was defined as the length of time from the accident report filing date to the last observed claim closure date within the follow-up period. If the claim was open at the end of follow-up, claim duration was set equal to the duration of follow-up. The analysis was limited to simple industrial injury claims.<sup>v</sup> All claims were followed for at least one year and up to two years after claim filing. Only 1% of simple industrial injury claims remained open at the end of follow-up, for both PAs and PCPs.

In an unadjusted comparison, those claims having PAs as the reporting provider were closed on average 9 days sooner compared with PCP claims ( $p=0.001$ ).

Table IX. Claim duration (in days) for simple industrial injury claims, by reporting provider type

Provider Type	N	Median	Mean	SD	90%	p-value*
PA	2847	62	77.5	68.2	109	<0.001
PCP	26991	66	86.5	80.3	142	

\* For the difference in mean claim duration

Linear regression was used to control for duration of follow-up, rural provider location, whether the reporting provider was a COHE provider by the end of the follow-up period, injury type and severity, provider volume, public sector employment, employer participation in a retrospective rating group, and sociodemographics. Claims closed on average 6.7 days sooner for PAs (95% CI: -9.3, -4.1;  $p<0.001$ ).<sup>w</sup>

## **III. Medical costs**

### *A. Did average medical costs per claim differ for claimants having PAs vs. PCPs as their reporting provider?*

For this analysis, the sample was limited to accepted simple industrial injury claims<sup>x</sup> with either a PA or PCP recorded as reporting provider. Claims that had any bills for ED or ambulance services at the first medical visit were excluded (less than 6% of claims were excluded on this basis). This was done in order to provide a sample that would be more homogeneous (to limit selection bias<sup>y</sup>) and because the interest was primarily in outcomes for office and clinic based PAs, rather than those that might be working in EDs (and therefore likely directly with physicians).<sup>z</sup>

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<sup>v</sup> Simple industrial injury claims do not involve time loss, occupational disease, inpatient care on the date of the first medical visit, or complex injuries.

<sup>w</sup> Further statistical detail can be found in the technical appendix.

<sup>x</sup> Simple industrial injury claims do not involve time loss, occupational disease, inpatient care on the date of the first medical visit, or complex injuries.

<sup>y</sup> Selection bias refers to the extent to which the results might be affected by differences between those injured workers having PAs compared with PCPs as their reporting provider. Differences in measured characteristics (such as age, sex, injury type) were controlled, however, the injured workers seen by the two provider types might have been different in ways that were not measured.

<sup>z</sup> Including claims with ED or ambulance bills at the first medical visit did not substantially alter the findings.

Average unadjusted medical costs per claim were slightly lower for claims filed by PAs (Table X), although this varied by injury type. Figures 5 and 6 display mean and median medical costs by injury type.<sup>aa</sup>

(Mean refers to the average, or total medical costs divided by the number of claims, while median refers to the cost for a typical claim, where half of claims have higher costs than the median, and half have lower. For these comparisons, the median was always lower than the mean, because a few claims had very high medical costs.)

Table X. Medical costs per simple industrial injury claim, by reporting provider type

Provider Type	N	Median	Mean	SD	90%	Max
PA	2616	\$281	\$572	\$1,141	\$1,068	\$15,171
PCP	25540	\$286	\$687	\$1,453	\$1,503	\$74,259

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<sup>aa</sup> A table providing complete descriptive statistics broken out by injury type can be found in the technical appendix (Table A-1).

Figure 5. Mean medical costs by injury type

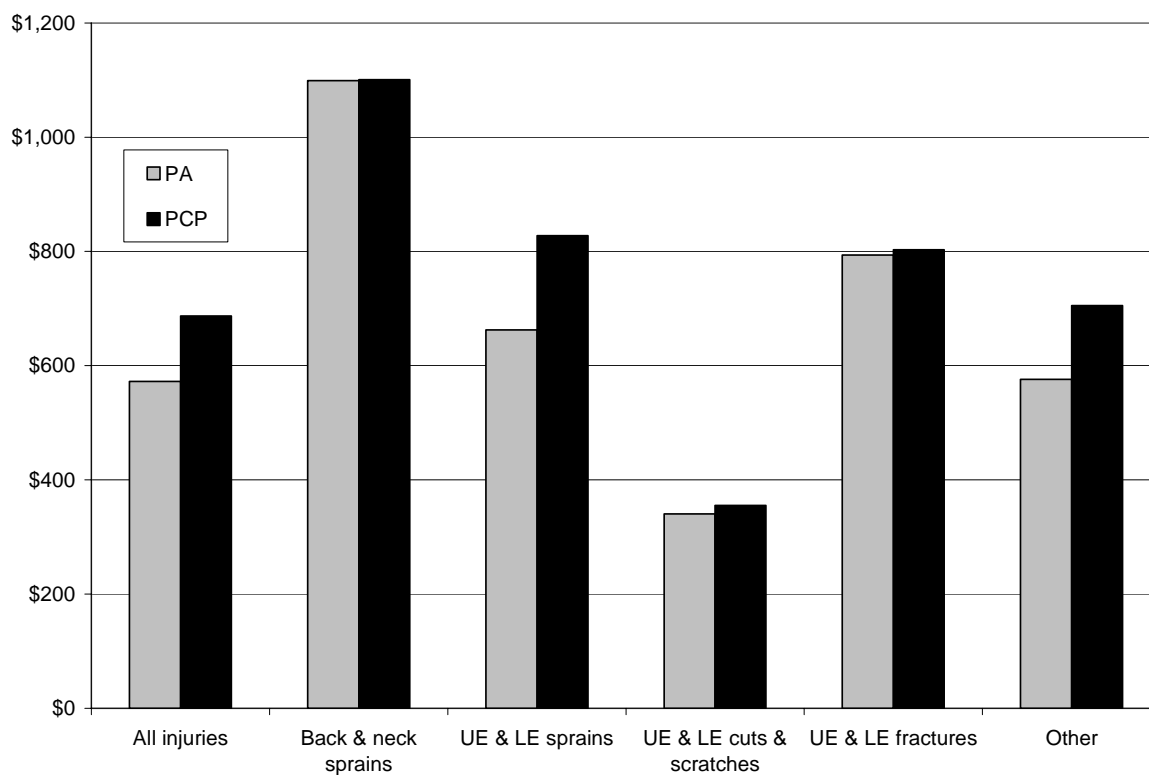
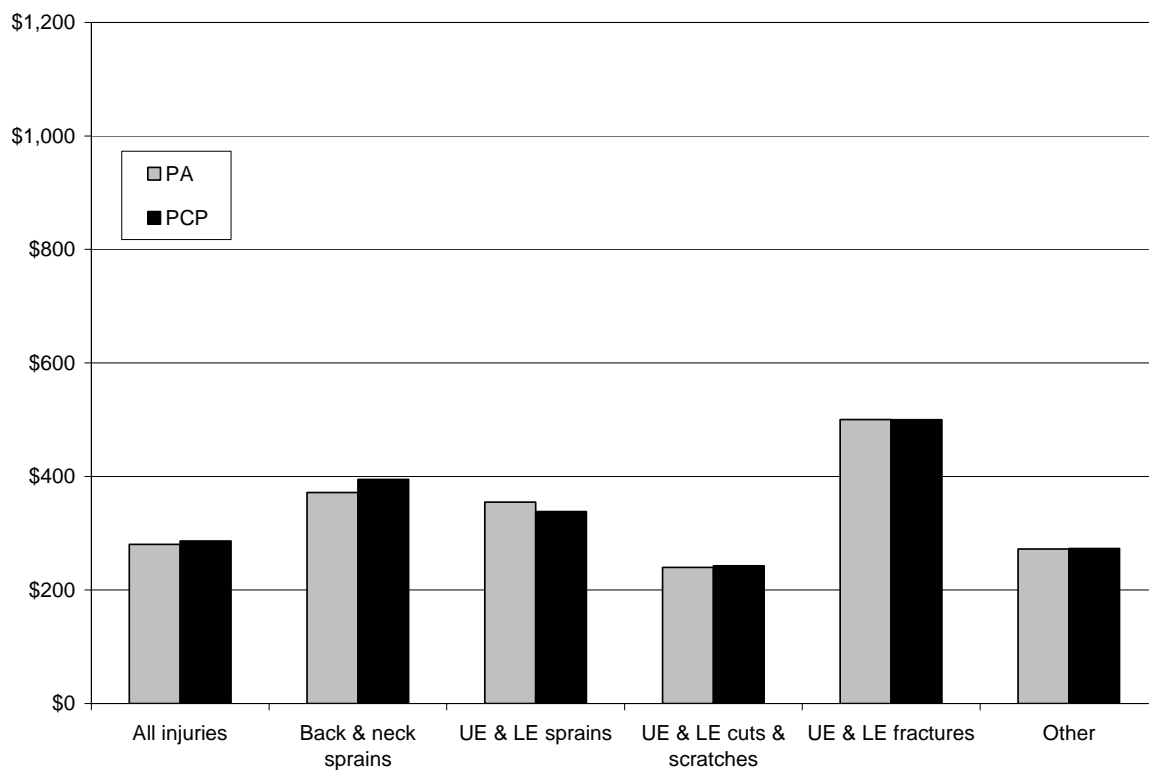


Figure 6. Median medical costs by injury type



Linear regression was used to control for duration of follow-up, rural provider location, whether the reporting provider was a COHE provider by the end of the follow-up period, injury type, provider volume, public sector employment, employer participation in a retrospective rating group, and sociodemographics.

Medical costs per claim for simple industrial injury claims were \$64 lower for claims filed by PAs compared with those filed by PCPs, on average (95% CI: -\$127, \$0;  $p=0.050$ ). This finding was of borderline statistical significance.

## Summary of findings

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SB 6356 was implemented July 1, 2004, and authorized PAs to have sole signature on accident report forms (the Report of Accident and the Physician's Initial Report) for simple industrial injury claims. In the first year after implementation, PAs were the reporting provider for 7.7% of the claims filed by primary care providers (PAs, PCPs, and ARNPs). This report examined a number of questions regarding potential effects on access to health care for injured workers, administrative process of care indicators, worker outcomes, and claim costs.

Findings are summarized here into three categories: those relating to system factors measured pre- and post-implementation of SB 6356, those relating to rural vs. urban geographic location, and those relating to differences between PAs and PCPs in the role of reporting provider for simple industrial injury claims.

### System factors measured pre- and post-implementation of SB 6356

- Implementation appears to have encouraged PAs to enroll as L&I providers. For PAs, average monthly enrollment as new L&I providers increased by about 27% after implementation (compared with an increase of 22% for PCPs).
- The number of active PA providers in the L&I system rose 8.0% after implementation, compared with a decrease of 1.4% for PCPs (adjusted for change in the underlying employed population).
- There was no statewide effect of the legislation on 1) the likelihood of being seen in an emergency department, 2) the length of time between the date of injury and the first medical visit, or 3) the likelihood of the first medical visit occurring within one day of injury.
- The number of claims filed by other providers decreased in rough proportion to the increase in claims filed by PAs and ARNPs.
- There was no meaningful change in the percent of disputed claims (protests and appeals) attributable to SB 6356.
- The change in signature requirement for the accident report may have improved administrative efficiency. Among claimants who saw PAs for simple industrial injuries, there was a 23% decrease after implementation in the average time from the first medical visit to filing of the accident report, and a significant increase in the likelihood of filing within 7 days.

### Rural versus urban geographic location

- 22% of PAs were located in rural areas, compared with 17% of PCPs.

- After implementation, PAs filed 10.2% of the claims in rural areas filed by PAs, ARNPs, or PCPs, compared with 7.3% in urban areas, and all but one county where PAs filed more than 10% of those claims were rural counties.
- For those workers with injuries that occurred in rural counties, 10.8% had a PA as their reporting provider, compared with 6.5% of those injured in urban counties.
- Implementation of SB 6356 was associated with a significantly larger impact on claim filing time in rural areas. There was an additional 5 day decrease in average claim filing time for rural compared with urban providers after implementation.

## **Differences between PAs and PCPs in the role of reporting provider**

- Differences in claimant characteristics based on their reporting provider type were generally small. The distribution of injury types was similar between PAs and PCPs, but PAs were more likely to be the reporting provider for cuts, scratches and contusions, and less likely for back and neck sprains.
- 22% of PAs were located in rural areas, compared with 17% of PCPs.
- PCPs were more than twice as likely as PAs to be the reporting provider for more than 24 claims a year (29.7% compared with 11.3%).
- Claims filed by PAs were less likely to be rejected, but the magnitude of the difference was very small.
- Claims filed by PCPs were more likely to receive a permanent partial disability payment and more likely to become compensable by the end of the follow-up period, however this difference was very likely due to the rule that PAs can have sole signature only on claims for simple industrial injuries.
- There was no difference between PAs and PCPs regarding the percent of simple industrial injury claims with attorney representation.
- Among accepted simple industrial injury claims, PAs had a slightly lower percentage of protests, and among claims that were not accepted (as of the end of the follow-up period), PAs had a higher percentage of appeals. Among disputed claims, claims filed by PAs were more likely to have the protest or appeal filed by an employer, while claims filed by PCPs were more likely to have the protest or appeal filed by a claimant. There was no significant difference regarding whether the protest or appeal was filed by a provider.
- PAs were more likely to see the injured worker within a day of injury.
- Simple industrial injury claims closed on average 6.7 days sooner for PAs compared with PCPs.

- There was no difference between PAs and PCPs regarding the percent of simple industrial injury claims reopened.
- PAs were significantly more likely to file simple industrial injury claims within 7 days of the first medical visit, and filed claims on average 5.8 days faster than did PCPs.
- Medical costs per simple industrial injury claim were \$64 lower for claims filed by PAs compared with those filed by PCPs, on average. This finding was of borderline statistical significance.

## **Conclusions**

In conclusion, implementation of SB 6356 was not associated with any negative impact on medical costs or disputes, and appeared to positively affect provider enrollment, availability of authorized reporting providers in rural areas, and some measures of administrative efficiency.



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# Technical Appendix

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## Software

All statistical analyses were conducted using Stata 8.2 for Windows (StataCorp, College Station, TX). Graphs were produced using Stata 8.2 or Excel 2002 (Microsoft Corporation).

## Data characteristics and data cleaning

### *Missing data*

Aside from some sociodemographic variables (see variable definitions below), missing data was not a major problem. In general, binary indicators were set to default to the most likely case when data was missing. (For example, if there were no medical bills available for a particular claim, the indicators for ED and inpatient services were set to 0, meaning it was assumed there were no such services.) In many cases, the presence of a particular indicator was documented in the claims or billing data, but there was not a consistent method of documenting its absence. In these cases, the indicator was set to 0 as the default. (For example, if there was no evidence of attorney activity, it was assumed there was no attorney involved.) Although these strategies may have introduced some misclassification, it was considered more important to retain a complete population-based sample.

### *Outcome variables*

In a small number of cases, the figures for medical costs were negative. This may have been due to system calculation errors in processing repayments. Medical costs were set to 0 for those claims with negative values.

### *Non-unique provider identification numbers*

As noted in the Limitations section, L&I provider identification numbers are not necessarily unique identifiers. Some providers may have used another provider's existing number, rather than applying for their own. This was impossible to detect in the data available. Some providers have multiple identification numbers. This issue was investigated and remedied to the limited extent possible. Where multiple identification numbers for the same provider could be identified with a reasonable level of certainty (based on exact matches for provider name, county, zip code, and provider type), one of the multiple provider identification numbers was selected as a master number for that provider and the others were replaced with the master number in all datasets (prior to the calculation of numbers of providers, etc.). This was a conservative strategy meant to minimize the introduction of new errors, and it is likely that this strategy did not capture many multiple identification numbers, due to potential typographical errors in names, etc. This strategy resulted in provider identification number changes for 4% of providers and 10% of claims.

## Definitions of key variables

### *Sociodemographics*

The sociodemographic variables available in the data included age, gender, marital status, dependents and pre-injury income. The variables for marital status, dependents, and pre-injury income are not considered reliable for non-compensable claims. Therefore, most analyses included only age and gender. Age was categorized as 18-24, 25-34, 35-44, 45-54, and 55-70 (18-24 was the referent category). Gender, marital status (married vs. widowed/separated/divorced/single), and having dependents were binary. Pre-injury income was measured in hundreds of dollars per month.

### *Injury type*

Injury categories were constructed using existing American National Standards Institute (ANSI) Z16.2 coding for nature of injury and part of body.<sup>39</sup>

### *Occupational disease*

The indicator for occupational disease identified claims that were recorded as probably or possibly being the result of an occupational disease.

### *Severity*

For some analyses, an indicator for severity was included, or those cases identified by this indicator were excluded. The severity indicator identified those cases with any first medical visit bill for emergency department or ambulance services. (See Place of Service definition for details.)

### *Simple industrial injury claims*

Simple industrial injury claims do not involve time loss, occupational disease, inpatient care on the date of the first medical visit, or complex injuries. For purposes of this evaluation, this subset of claims was defined as closely to the definition provided in the rule (see the report section titled “Rule-making and Implementation”) as was possible using the Z16 codes available. ICD-9 codes were not used. It should be noted that a claim that met the definition of “simple industrial injury” at the time of claim filing may no longer have met the definition by the end of the follow-up period, since diagnoses may have changed or initially unanticipated time loss may have occurred.

### *Claim status*

All claim status variables were based on the claim status as noted at the time of final data extraction (July, 2006).

- ***Allowed claim:*** approved claim
- ***Rejected claim:*** a claim denied because it either did not meet the criteria for a valid claim or was a duplicate of a previously filed claim

- ***Non-compensable***: any claim that results in payment for medical treatment only
- ***Compensable***: any claim that is expected to result in compensation payments
- ***Time loss***: compensated (partial and temporary) time away from work after a work-related injury or disease
- ***Permanent partial disability***: a condition that results from the permanent loss of a body part or a lasting impairment (loss of function) that has been deemed unlikely to improve
- ***Total permanent disability***: permanent and complete incapacitation, preventing gainful employment
- ***Pending***: undetermined claim status
- ***Provisional***: conditional authorization of medical treatment while a claim is pending
- ***Kept on salary***: the worker continues to be paid by the employer during a period of disability
- ***Loss of earning power***: a percentage of time loss compensation paid for wages lost due to situations such as modified work assignment or enrollment in a vocational program

### ***Claim duration***

Claim duration was defined as the length of time from filing of the accident report to either the last claim closure date observed within the follow-up period or the end of the follow-up period, whichever was earlier. The accident report filing date was used rather than the date of injury because the date of injury was not considered reliable for occupational disease claims. The following limitations are noted:

- This definition underestimates actual claim duration by the amount of any delay in medical care and/or claim filing. However, an accurate comparison between provider types was considered more important than an accurate estimate of actual claim duration.
- This definition overestimates claim duration by the amount of time a claim may have been closed between the two endpoints (if the claim were closed and reopened). However less than 1% of claims were reopened during the follow-up period.
- This definition underestimates claim duration for censored claims (those claim that were still open at the end of the follow-up period). However, less than 6% of claims were censored, and the level of censoring did not differ between ARNPs and PCPs.

### ***Place of service***

The variables for office or clinic, emergency department, inpatient, and/or ambulance services were derived from the medical and hospital billing data for the first date of service noted in the billing data. In order to reduce missing data issues, these indicators defaulted to 0 if there were no bills available for the claim. This may have introduced some misclassification, however only 2.3% of claims did not have billing data available.

- ***Emergency department:*** this indicator identified those claims for which any medical bill noted the place of service as a hospital emergency room or urgent care facility
- ***Office/clinic:*** this indicator identified those claims for which all medical bills noted the place of service as an office or clinic (including independent clinics, Federally Qualified Health Centers, state or local public health clinics, and rural health clinics)
- ***Ambulance:*** this indicator identified those claims for which any medical bill noted the place of service as a land, air, or water ambulance
- ***Inpatient:*** this indicator identified those claims for which any hospital bill noted the type of service as an inpatient service

### *Rural/urban*

Rural/urban was defined two ways. Where zip codes were available, rural was defined using zip code-based Rural Urban Commuting Area (RUCA) codes (version 2.0). For this project, the definition of rural included large rural city/towns and small and isolated small rural towns (Categorization C: details available at: <http://depts.washington.edu/uwruca/>). In cases where zip codes were not available (particularly for injury location and for county-level provider data from the Department of Health) or for sensitivity analyses, rural/urban was defined at the county level using the Washington State Office of Financial Management's designation of rural as a population density of fewer than 100 persons per square mile. Of 39 counties in Washington, 31 were designated rural using this definition.<sup>40</sup>

### *Provider type*

The definition of primary care physician (PCP) included those allopathic and osteopathic physicians (MDs and DOs) with a designated specialty of general practice, family practice, or internal medicine.

### *COHE provider*

The Centers of Occupational Health and Education (COHE) project is a community-based approach to health care that provides health services coordinators to facilitate return to work efforts and provides financial incentives to enrolled providers for occupational health best practices, including submitting the accident report within 2 days. Elements of this project have been found to substantially reduce claim filing times and disability among injured workers, hence it was important to control for provider enrollment in this project.

This indicator was tailored to the particular analysis. For the analysis of time from injury to the first medical visit, the indicator was based on whether any of the providers who billed on the first date of service had enrolled with the COHE project by the first date of service. For those analyses concerned with time to claim filing, the indicator was based on whether any of the providers who billed on the first date of service had enrolled with the COHE project by the date of claim filing. For those analyses looking at administrative indicators or costs occurring after claim filing, the indicator was based on whether the reporting provider enrolled in the COHE project by the end of the follow-up period.

### *Provider volume*

For each provider, the number of claims for which that provider served as a reporting or attending provider at any point during the year following implementation was derived using the complete sample of claims. An indicator was then created to represent those providers who were associated with a higher volume of claims (over 24 claims in that year).

### *Unemployment rate*

County-level seasonally-unadjusted unemployment rates by month were obtained from the Bureau of Labor Statistics (seasonally adjusted data was not available at the county level). The unemployment rate assigned to each claim was based on the date the accident report was filed.

### *Retrospective rating group*

This indicator identified those claims for which the employer participated in a retrospective rating group at the time of the claimant's injury.

### *Public sector employment*

This indicator was based on Standard Industrial Classification (SIC) codes. Claims were identified as being from the public sector if the industry was coded as governmental (federal, state, county, or city).

## **Methodological details**

Additional methodological details are provided below for many of the evaluation questions. Basic statistical information is provided here for each linear and logistic regression model; the predictor, outcome, and control variables for each model are presented in the body of the report. (In general, information provided in the body of the report is not repeated here.)

### *I. Access to health care for injured workers*

#### D. Did new PA enrollment increase after implementation?

To determine the number of active providers in the L&I system, active providers were defined as those with any allowed L&I bill during the year in question. This may have been an undercount of available providers, since those providers who submit very few bills would tend not to be captured using this definition (e.g., if there were few worker injuries occurring within their service area).

#### E. Were there measurable effects of the legislation on the percentage of patients that went first to emergency departments (EDs) vs. to providers in a clinic or office, or on the average time from the date of injury to the first medical visit?

For the purposes of this question, first medical visit was based on the first date of service in the medical billing data. (Sensitivity analyses using the date from the accident report in the claims data did not alter the findings.) Non-allowed bills were included in this determination because they were considered likely to represent actual visits, even if there were irregularities leading to



their non-allowance. (Only accepted claims were included.) Because there were often multiple providers that billed on the first date of service, the rural/urban indicator was set to rural if any of those providers was rurally located. For the same reason, COHE provider status was based on whether any of the providers at the first medical visit were enrolled in COHE by that date.

At the county level, the proportion of claims filed by PAs and/or ARNPs in the year after implementation accounted for anywhere from 0 to 58% of all claims filed by PAs, ARNPs, and PCPs. The median was 6%, which was used as the cutoff for this indicator. (The mean was 10%; 25% of counties had a proportion over 10%, and using that cutoff did not alter the results.) This indicator was then combined with the indicator for SHB 1691 implementation to create an interaction term that would represent the effect of the legislation specifically in those counties having higher proportions of claims filed by PAs and/or ARNPs after implementation. This interaction term was the predictor variable of interest for both parts of this question. The coefficient for this term signified the effect of the legislation specifically for those counties where PAs and ARNPs filed a higher proportion of claims after implementation. The “control group” thus consisted of those counties where PAs and ARNPs did not file many of the claims, even after implementation. This was done to isolate the effect that the legislation may have had on access from effects due to secular trends, to the limited extent possible.

Because no providers were located in Skamania County, 119 claims from Skamania County were excluded. This left 38 counties. Standard errors were adjusted to account for within-county correlation based on the county where the injury occurred (since the predictor of interest was a county-level variable), and robust variance estimates were used to account for heteroskedasticity.

### *Emergency department use*

This analysis compared claims having any bill reporting the site of service as an emergency department with those claims having all bills reporting the site of service as an office or clinic. (Those claims with a site of service reported as “outpatient hospital” were excluded, however including those claims either in the ED or office/clinic group did not alter the findings.) Site of service was determined by medical and hospital billing data for the first recorded date of service. Because this analysis was concerned with whether provider availability might affect the use of emergency departments (rather than severity), those claims with bills for inpatient or ambulance services at the first medical visit were excluded.

### Logistic regression model

N: 186,065  
Cluster N: 38  
Pseudo R<sup>2</sup>: 0.064

Odds Ratio	95% Confidence Interval	p-value
0.94	(0.84, 1.05)	0.30

The odds ratio represents the change in likelihood of the first medical visit occurring in an ED (vs. office or clinic) associated with implementation, specifically for those counties with a higher proportion of claims filed by PAs and/or ARNPs after implementation, and controlling for whether the worker was injured in a rural county, injury type, and sociodemographics. (Note:

because a high proportion of workers were seen within one day of injury, the odds ratio is an overestimate of the relative risk.)

### *Average time from date of injury to the first medical visit*

In addition to restricting this sample to specific injury types as noted in the findings, claims with a notation of probable or possible occupational disease were excluded.

#### Linear regression model

N: 134,538  
Cluster N: 38  
R<sup>2</sup>: 0.050

Coefficient	95% Confidence Interval	p-value
- 0.02	(- 0.25, 0.22)	0.88

The coefficient represents the change in the number of days between the date of injury and the first medical visit associated with implementation, specifically for those counties with a higher proportion of claims filed by PAs and/or ARNPs after implementation, and controlling for whether the worker was injured in a rural county, injury type and severity, whether any provider billing at the first medical visit was a COHE provider, and sociodemographics.

#### Logistic regression model

N: 134,538  
Cluster N: 38  
Pseudo R<sup>2</sup>: 0.166

Odds Ratio	95% Confidence Interval	p-value
1.01	(0.94, 1.08)	0.78

The odds ratio represents the change in likelihood of the first medical visit occurring within one day of injury associated with implementation, specifically for those counties with a higher proportion of claims filed by PAs and/or ARNPs after implementation, and controlling for whether the worker was injured in a rural county, injury type and severity, whether any provider billing at the first medical visit was a COHE provider, and sociodemographics. (Note: because a high proportion of claims were filed within 7 days, the odds ratio is an overestimate of the relative risk.)

## *II. Administrative indicators*

### C. Did implementation affect the average claim filing time for PAs?

This analysis incorporated a difference in difference approach to control for secular trends. The primary predictor variable was the interaction term created by interacting the indicator for SHB 1691 implementation with the indicator for whether only PAs or only PCPs billed at the first medical visit.

Because there were often multiple providers that billed on the first date of service, the rural/urban indicator was set to rural if any of those providers was rurally located. For the same reason, COHE provider status was based on whether any of the providers at the first medical visit was enrolled in COHE by the time the accident report was filed. The existence of multiple provider bills at the first medical visit did not allow for correcting standard errors by accounting for the correlation of claimant outcomes within a specific provider's practice. Robust variance estimates were used to account for heteroskedasticity.

#### Linear regression model

N: 44,457  
R<sup>2</sup>: 0.034

Coefficient	95% Confidence Interval	p-value
- 2.32	(- 3.43, - 1.22)	< 0.001

The coefficient represents the change in claim filing time (in days) associated with implementation, specifically for workers with simple industrial injuries seen by PAs, and controlling for secular trends, whether any provider that billed at the first medical visit was rurally-located or was a COHE provider by the time the claim was filed, injury type, and sociodemographics.

#### Logistic regression model

N: 44,457  
Pseudo R<sup>2</sup>: 0.059

Odds Ratio	95% Confidence Interval	p-value
1.58	(1.34, 1.86)	< 0.001

The odds ratio represents the change in likelihood of the claim being filed within 7 days associated with implementation, specifically for workers with simple industrial injuries seen by PAs, and controlling for secular trends, whether any provider that billed at the first medical visit was rurally-located or was a COHE provider by the time the claim was filed, injury type, and sociodemographics. (Note: because a high proportion of claims were filed within 7 days, the odds ratio is an overestimate of the relative risk.)

D. Did implementation have a differential effect on the average claim filing time for PAs in rural vs. urban areas?

Linear regression model

N: 3,840  
R<sup>2</sup>: 0.028

Coefficient	95% Confidence Interval	p-value
- 4.97	(- 8.67, - 1.27)	0.008

The primary predictor variable was the interaction term created by interacting the indicator for SHB 1691 implementation with the indicator for rural/urban. The coefficient represents the change in claim filing time (in days) associated with implementation for injured workers seen by rural (compared with urban) PAs, and controlling for whether any provider that billed at the first medical visit was a COHE provider by the time the claim was filed, injury type, and sociodemographics. Robust variance estimates were used to account for heteroskedasticity.

E. Did administrative indicators differ for claimants having PAs vs. PCPs as the reporting provider?

*Claim filing time*

The date of the first medical visit was missing in 3.7% of cases. Those cases were excluded, leaving 28,814 claims. Standard errors were adjusted to account for the correlation of claim filing times within a specific provider's practice, and robust variance estimates were used to account for heteroskedasticity.

Linear regression model

N: 28,814  
Cluster N: 2,520  
R<sup>2</sup>: 0.001

Coefficient	95% Confidence Interval	p-value
- 5.81	(- 8.73, - 2.89)	< 0.001

The coefficient represents the difference between PAs and PCPs in average claim filing time (in days), controlling for rural provider location, whether the reporting provider was a COHE provider by the date of claim filing, injury type, provider volume, and sociodemographics.

### Logistic regression model

N: 28,814  
 Cluster N: 2,520  
 Pseudo R<sup>2</sup>: 0.068

Odds Ratio	95% Confidence Interval	p-value
1.75	(1.27, 2.41)	0.001

The odds ratio represents the likelihood of claim filing occurring within 7 days for PAs compared with PCPs, controlling for rural provider location, whether the reporting provider was a COHE provider by the date of claim filing, injury type, provider volume, and sociodemographics. (Note: because a high proportion of claims were filed within 7 days, the odds ratio is an overestimate of the relative risk.)

### *Claim duration*

#### Linear regression model

N: 29,838  
 Cluster N: 2,582  
 R<sup>2</sup>: 0.097

Coefficient	95% Confidence Interval	p-value
- 6.69	(- 9.27, - 4.11)	<0.001

The coefficient represents the difference between PAs and PCPs in average claim duration (in days), controlling for duration of follow-up, rural provider location, whether the reporting provider was a COHE provider by the end of the follow-up period, injury type and severity, provider volume, public sector employment, employer participation in a retrospective rating group, and sociodemographics. Standard errors were adjusted to account for the correlation of claim duration within a specific provider's practice, and robust variance estimates were used to account for heteroskedasticity.

### III. Medical costs

#### A. Did average medical costs per claim differ for claimants having PAs vs. PCPs as the reporting provider?

Table A-1. Unadjusted medical costs per simple industrial injury claim, by reporting provider type and injury type

Injury Type	Provider Type	N	Median	Mean	SD	90%	Max
<b>All Injury Types</b>							
	PA	2616	\$281	\$572	\$1,141	\$1,068	\$15,171
	PCP	25540	\$286	\$687	\$1,453	\$1,503	\$74,259
<b>Back &amp; neck sprains</b>							
	PA	310	\$372	\$1,099	\$2,062	\$2,475	\$15,171
	PCP	4293	\$395	\$1,101	\$2,221	\$2,729	\$74,259
<b>UE &amp; LE* sprains</b>							
	PA	422	\$355	\$663	\$889	\$1,496	\$6,543
	PCP	4368	\$338	\$828	\$1,483	\$1,900	\$26,356
<b>UE &amp; LE cuts &amp; scratches</b>							
	PA	939	\$240	\$340	\$428	\$568	\$4,797
	PCP	7866	\$243	\$355	\$578	\$583	\$15,598
<b>UE &amp; LE fractures</b>							
	PA	62	\$500	\$794	\$1,137	\$1,427	\$7,804
	PCP	572	\$500	\$803	\$1,289	\$1,459	\$19,716
<b>Other</b>							
	PA	883	\$272	\$576	\$1,244	\$1,003	\$14,755
	PCP	8441	\$273	\$705	\$1,457	\$1,574	\$30,708

\*UE & LE: upper extremity and lower extremity

#### Linear regression model

N: 28,156

Cluster N: 2,505

R<sup>2</sup>: 0.051

Coefficient	95% Confidence Interval	p-value
- 63.51	(- 127.14, 0.12)	0.050

The coefficient represents the difference between PAs and PCPs in average medical costs per simple industrial injury claim (in dollars), controlling for duration of follow-up, rural provider location, whether the reporting provider was a COHE provider by the end of the follow-up period, injury type, provider volume, public sector employment, employer participation in a retrospective rating group, and sociodemographics. Standard errors were adjusted to account for the correlation of outcomes within a specific provider's practice, and robust variance estimates were used to account for heteroskedasticity.