RESEARCH BRIEF

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Monitoring the Time From Injury to Treatment

While a recent survey of 30 US metropolitan areas showed a 30% increase from 2014 to 2017 in the average wait time for a new patient to be seen by a doctor[1], NCCI research for work comp injuries across 41 jurisdictions tells a different story. Considering these findings and the increases in the number of people with health insurance prompts the question: Did the Affordable Care Act (ACA) stress the healthcare delivery system and make it more difficult for workers compensation (WC) claimants to get medical care?

If the ACA, or other changes to US healthcare delivery, makes access to care more difficult, then it is reasonable to expect longer times from injury to medical treatment. While the ACA became law at the start of 2011, its major provisions did not take effect until January 1, 2014.[2] We find that the time from a WC injury to the initial professional medical care has remained unchanged from 2011 to 2016. While the time to receive specialized treatment has varied over that time, we find no convincing evidence relating longer times to ACA implementation. Rather, we observe the opposite—that times for referral care generally increased each year from 2011 to 2014 and since 2015 have—depending on the type of provider—stabilized or decreased to 2013 levels or lower.

KEY FINDINGS

From 2011 to 2016:

- Time from injury to initial medical care was stable
- Time to see specialists showed modest changes:
  - Many of those changes were greater than can be attributed to random differences
  - The pattern of those changes depends on the type of medical provider
    - For orthopedists, time increased year-to-year prior to 2014 and has decreased since
    - For therapists, time held steady except for a peak in 2014
    - Time for physicians other than orthopedists increased year-to-year from 2011 to 2015
- When we compare times for claims mostly treated in-network to claims mostly treated out-of-network, we observe:
  - Generally, longer times to see a surgeon for in-network claims, but the results are mixed
  - Consistently shorter times to see a physical therapist for in-network claims
- There is no consistent relationship between changes in time to treatment and changes in the proportion of the population with medical coverage

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[1] *2017 Survey of Physician Appointment Wait Times and Medicare and Medicaid Acceptance Rates*, Merritt Hawkins, Dallas TX, 2017, p. 33. A copy of the survey results can be found at www.MerritHawkins.com. Merritt Hawkins is a prominent physician search and consulting firm that produces a series of studies on how healthcare reform and related trends are affecting access to physician services in the United States. Its 2017 study surveyed more than 1,400 doctors' offices located in 15 large metropolitan markets.

[2] The major provisions of the ACA that took effect on January 1, 2014, are:

1. The mandate for individuals to have health insurance
2. The optional expansion of Medicaid
3. The inception of the exchanges, including subsidies for certain buyers

BACKGROUND

This study looks at the time lapse between the occurrence of an injury and the date the injured worker receives professional medical care. We are especially interested in the time to the first encounter with certain specified types of medical providers. We focus on referral or specialty care, such as surgery and physical therapy. Changes in time to treatment could be a signal that access to care is changing but could also be caused by changes in treatment patterns (for example, treatment protocols that allow for injuries to resolve before referral to a specialist). Innovations in medical delivery systems have the potential to both lower times and improve access to care. For example, the ability to provide medical care at a distance from the patient, as with telemedicine, may lower the time to treatment and even enable some care, like physical rehabilitation, to be accessed at the workplace, or even at home.[3]

The medical industry has seen significant structural change in recent years. There has been movement toward mergers and acquisitions among major group health insurers. Among providers, hospitals have consolidated with one another and bought up physician practices. Combined with expanded numbers of people with health insurance, especially under Medicaid, such consolidation has reduced the options that patients have in selecting medical providers, while increasing the volume of patients.

The doctor-patient relationship has also undergone changes. Many solo or small group practitioners are becoming salaried hospital employees. More of their traditional work is being done by nurse practitioners and physician assistants, as well as hospitalists. Technology has further expanded the ways that patients receive care. For WC, the use of medical provider networks has grown and served to consolidate care.

Within that matrix of change, and with special attention on the impact of the ACA on access to care, we look at recent patterns in the time from the accident to the treatment for work-related injuries.

DATA AND METHODOLOGY

This study uses NCCI's Medical Data Call (MDC) from 41 jurisdictions. The MDC captures transaction-level detail on medical bills processed on or after July 1, 2010. That detail includes dates of service, charges, payments, procedure codes, and diagnoses codes. NCCI collects the data and administers the Call for 35 jurisdictions where NCCI provides ratemaking services and for several additional states.[4]

For this study, we look at injuries occurring between January 1, 2011, and October 31, 2017. Both medical-only and lost-time claims are included in the data we use. To reduce ambiguity, we review only trauma cases and exclude disease and other cases where the assignment of a date of injury might be uncertain. Overall, the data encompasses the experience of more than 5.5 million WC claims.

More and more services are performed by physician assistants and nurse practitioners. While significant from many perspectives, such as cost versus expertise, or the time from injury to the first treatment of any kind, much of our focus is on physicians and therapists because they remain the drivers of care.

We consider two time frames for delivering medical services: within 90 days or within 360 days of the date of injury. For the 360-day window, we organize the experience by accident year, from 2011 to 2016. For the 90-day window, we organize by accident quarter, from the first quarter of 2011 to the third quarter of 2017. When assigning time to treatment into time periods we use accident date rather than the service date, i.e., we organize by the start of the time to treatment rather than when it ends.

We use the shorter 90-day window when considering the first encounter with any medical professional because trauma cases typically receive some treatment within three months following the injury. In this study, we are especially interested

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[3] The article "Telemedicine/Telehealth: Technology Tools for Enhanced Clinical Support" by Coventry Health Care Workers Compensation, Inc. surveys the current and potential use of telemedicine in WC. The article can be found at www.coventrywcs.com. The Official Disability Guidelines (ODG) now recognizes telemedicine for treating back pain, diabetes, and mental health disorders. Several states have enacted WC regulations allowing video consultations with board-certified physicians. Coventry is a leading WC medical provider network.

[4] Jurisdictions included in this study are AK, AL, AR, AZ, CO, CT, DC, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MN, MO, MS, MT, NC, NE, NH, NJ, NM, NV, OK, OR, RI, SC, SD, TN, UT, VA, VT, WI, and WV.

in specialty care because that is more revealing of treatment patterns. For that, we use the longer 360-day window and focus on the type of specialty by accident year. Injuries from the first three accident years, 2011–2013, occurred before the implementation of the main ACA provisions. Experience from the second three accident years, 2014–2016, occurred after.

Many of our analyses look at the mean, median, and 85th percentile of the time to treatment.[5] Distributions of time to treatment are often very skewed, with concentrations of treatment within one day of the injury. Often, these distributions only begin to differ at higher percentiles, like the 85th. Because times are measured in whole days, percentiles are also whole (or in exceptional instances half) days. By contrast, the mean is not constrained to whole days. Over time, percentiles tend to move in steps, while movement in the mean is typically smoother. The mean is often influenced by the handful of longest times to treatment. That weakness of the mean statistic is mitigated in this study due to a large volume of observations, together with a restricted time window. Percentiles are not as sensitive to outliers. Although when they move they do so in steps, a percentile, like the median (except when very small), is generally more stable over time than the mean. The median time to treatment is often the most informative of the three metrics, but each has its own merits (the Appendix provides visuals for the entire distribution).

Types of Providers

Encounters are classified by the provider types in Table 1. We are particularly interested in referrals to nonfacility providers and pay particular attention to the first five types. For example, services provided by an emergency room doctor, typically a hospital employee, would be classified under Hospital ER and not under Physician NOC. Therapists include both physical and occupational therapists. Physical therapy accounts for most of the treatments provided by therapists.

Table 1: Type of Provider Categories

Orthopedic Surgeon [Orthopedist]
Surgeon—Other Than Orthopedist [Surgeon NOC]
Physician—Other Than Surgeon [Physician NOC]
Chiropractor
Therapist—Physical and Occupational
Urgent Care
Hospital ER
Hospital Non-ER
Ambulatory Surgical Center
Nursing Facility
Physician Assistant
Pharmacy
Other

Measuring Time to Treatment With Means and Percentiles

One measure of access is the number of days from injury to the initial medical encounter—we call that measure the "time to treatment." For each claim and within each provider category, the time to treatment is the number of days between the date of injury and the earliest date of service. When a claimant's care does not include any encounter within the category and time window (90 or 360 days), that claim is not included in the results for that provider category.

[5] The median is the 50th percentile and is the value for which half (50%) of the times are lower and the other half greater. Over time, the median provides one perspective of overall change. The 85th percentile is the value for which 17 of 20 (85%) times are lower and, therefore, focuses on cases that take a comparatively long time to be treated.

For example, the time to be seen by an orthopedist is based on those claims in which the claimant is seen by an orthopedist within 360 days of the date of injury. Encounters with any other provider category are not considered in determining the time to see an orthopedist.

The term "treatment of any kind" is used to include all encounters, regardless of provider category. The time to initial care is the time to treatment of any kind and is determined using the shorter 90-day window. We also look at the time to treatment for several provider types, selected for their potential to influence the course of treatment. Those are the first five provider types in Table 1. The time to treatment by provider type is determined using the longer 360-day window.

Focusing on particular providers may provide different perspectives on access to care. For example, an injured worker may encounter no delay making an appointment with a general practitioner (physician NOC) but may spend more time and effort arranging to see a particular type of surgeon when doing so requires a referral, prior approval, or added travel time because the surgeon is not nearby.

We cannot measure the time from when care was initially sought to when it was first provided. For many claims, care is sought immediately upon the occurrence of the injury. But for other injuries, some time may pass until the claimant decides to see a doctor. For example, a claimant with back pain might wait a few days to see if the pain goes away before seeking professional medical treatment. As such, our time to treatment metric might be greater than the time from deciding to seek medical treatment to being treated.

A prior NCCI paper[6] looked at time to treatment before the main provisions of the ACA took effect on January 1, 2014. The injuries considered in that paper occurred prior to then. The purpose of the earlier paper was to give descriptive statistics for a pre-ACA baseline. As we do here, that paper also looked at the mean, median, and 85th percentile of the time to treatment.

Use of WC Medical Provider Networks

Recent years have seen an increase in the use of WC medical provider networks. Since directing care to a provider network is related to how care is accessed, we look at the relationship between times to treatment and whether the claim is being treated in-network. The use of provider networks varies by state in response to differences in geography and regulations, among other differences. We assign claims as being "in-network" when the percentage of payments to in-network providers is at least 80% of the medical payments for the claim and as being "out-of-network" when that percentage is at most 20%.

ACA Implementation and Medicaid Expansion

The ACA was passed in December 2010 but, for the most part, was not implemented until January 2014. This study specifically looks at whether ACA implementation in 2014 increased times to treatment. Beginning in 2014, ACA implementation increased the proportion of the population with medical insurance coverage. A major contributor to that increase was an expansion of Medicaid that varied by state. Among other important contributors were state and federal medical exchanges, subsidies, and the individual mandate. The beginning of 2014 is used as a focal point when seeking insight into how ACA implementation may have impacted time to treatment. We compare experience from 2013 as pre-ACA with experience from 2015 as post-ACA.

[6] Barry Lipton, Dan Corro, and John Robertson, "Time From Injury to Treatment in Workers Compensation: Setting a Baseline to Monitor the Affordable Care Act," January 2016, available at **ncci.com**.

ALL TRAUMA CASES

While the time from injury to initial professional medical care has remained quite steady over recent years, delving more deeply reveals some variations in the time to receive referral care. We first look at the first encounter of any kind by accident quarter. We then look at time to treatment by provider type and by accident year.

First Encounter of Any Kind

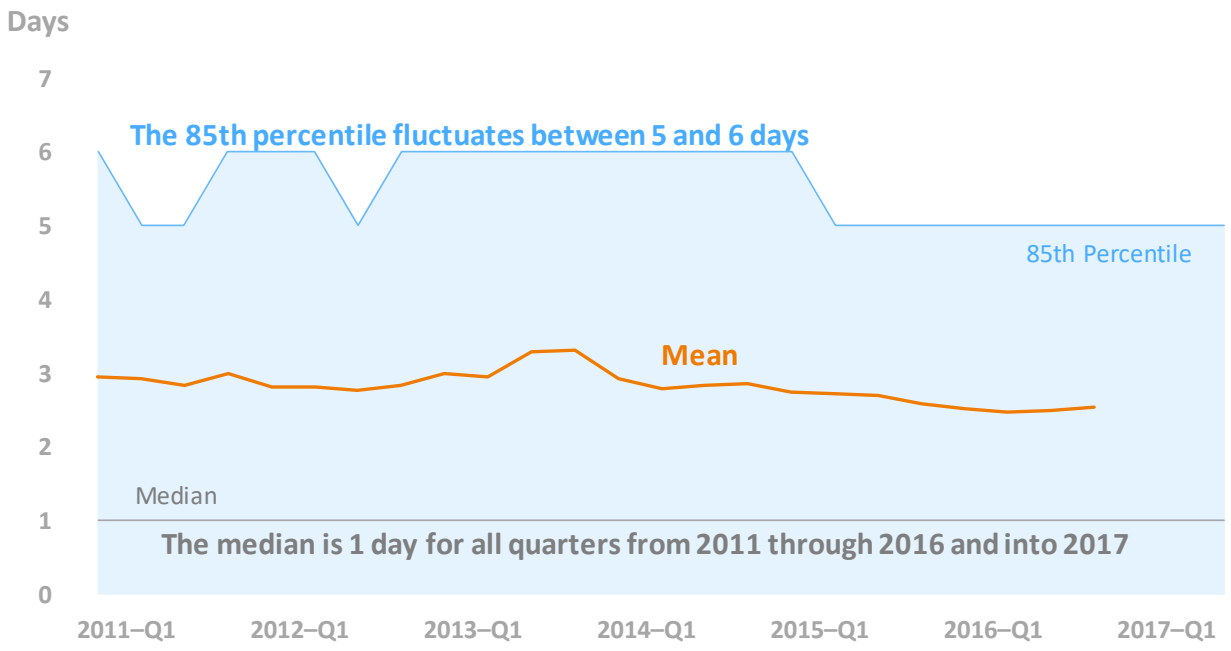
We look at three types of trauma cases: strain and sprain, open wounds, and contusions. Strain and sprain cases have the longest average time to treatment while open wounds have the shortest. Some claimants may take a wait-and-see approach or self-medicate strains and sprains but regard any open wound as demanding immediate attention.

The median, the mean, and the 85th percentile of time to treatment for strain and sprain cases are plotted in Chart 1 for accident quarters from 2011 to 2016.[7]

- The shaded region represents 85% of cases and shows that more than 17 of 20 cases were treated within 6 days of the injury, and within 5 days since 2015
- The median time was 1 day over the entire time period
- The mean peaked in the last two quarters of 2013, just before the main provisions of the ACA were implemented
- In 2014, the average time returned to its previous longer-term average of about 3 days and then declined further in 2015
- Because the analysis is based on a large number of claims, we can infer that the changes in the mean over time were not due solely to random fluctuations in the data

Chart 1: Days to Initial Treatment for Sprain and Strain Cases

Median, Mean, and 85th Percentile by Accident Quarter



[7] The Appendix includes more visual representations of the entire time to treatment distributions, showing the annual mean and median from 2011 to 2016. For example, Appendix A.1, like Chart 1, depicts the time distribution of the first encounter of any kind for strain and sprain cases.

Unlike the mean, since times to treatment are integers, percentiles are typically integer values that may remain constant over years. Chart 1 illustrates this and the value of considering movement in both the mean and percentiles:

- The median time for strain and sprain cases remains at 1 day from 2011 through 2016 and into 2017
- The 85th percentile fluctuates between 5 and 6 days
  - The drop from 6 days to 5 days in 2015 is sustained into 2017
  - The 2015 decline in the mean time is meaningful and not due to outliers or random fluctuation

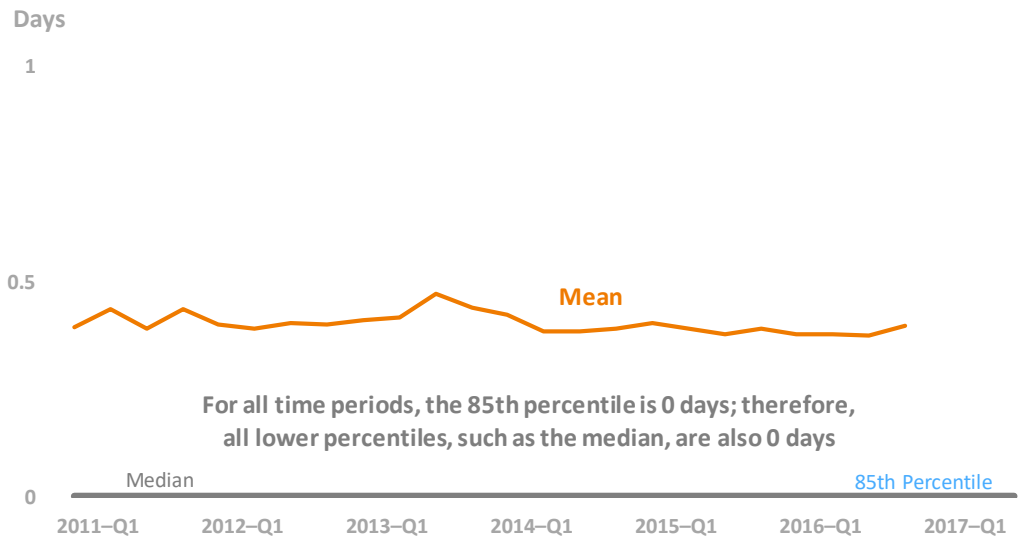
Notice that the values given for the median and 85th percentiles in Chart 1 include the first three quarters of 2017, but we have not shown values for the mean for these quarters. We expect that some of the services delivered late in 2017 are not captured into the data. Those services may have been performed within 90 days but were not processed or reported until after the cut-off for our data. Such services would likely have longer than average times and, as such, could significantly increase the mean. Percentiles, however, are less sensitive to a few additional observations, so we include percentiles for the first three quarters of 2017.[8]

Chart 2 plots the time to initial treatment median, mean, and 85th percentile for open wound cases by accident quarter from 2011 to 2016. Notice that the times are smaller than for strains and sprains. Accordingly, a different vertical scale is used.

- The mean time is consistently less than half a day
- The mean again shows a small peak in the last two quarters of 2013
- For every accident quarter from 2011 to the third quarter of 2017, the 85th percentile is 0 days; therefore, all lower percentiles, such as the median, are also 0 days
- Because at least 85% of cases were treated on the day of injury, the shaded region has no area and shrinks to the bottom of the chart
- This implies that more than five of six open wounds are treated on the day of injury

Chart 2: Days to Initial Treatment for Open Wound Cases

Median, Mean, and 85th Percentile by Accident Quarter



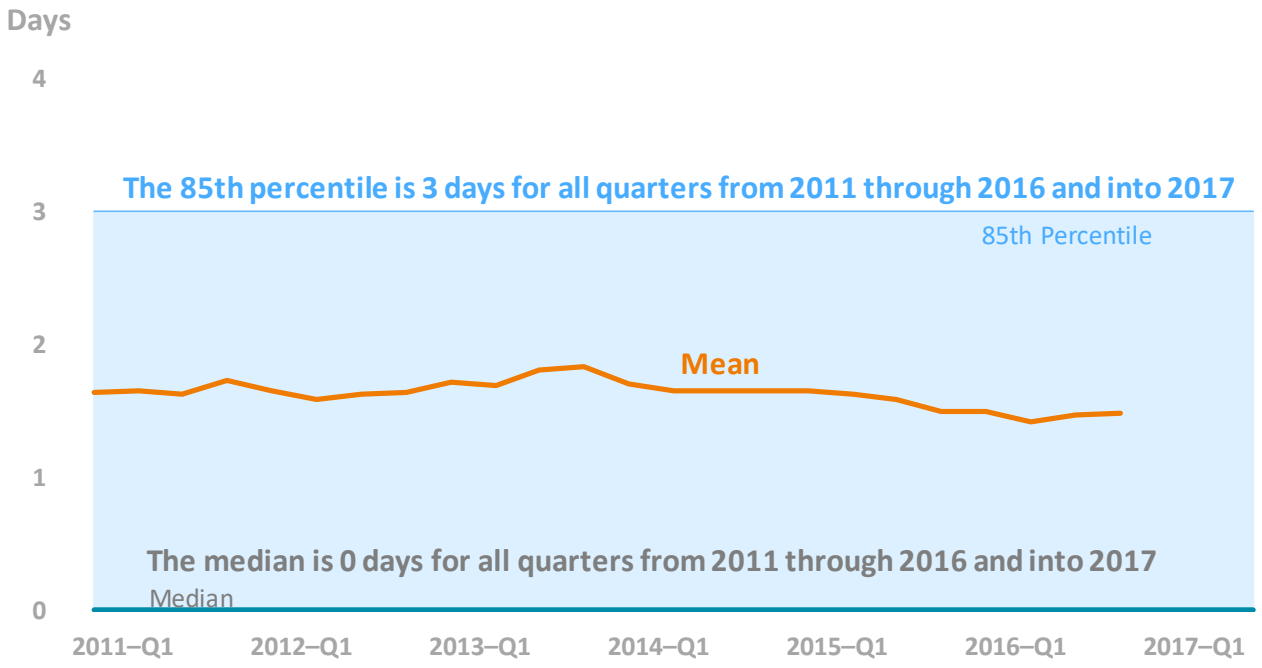
[8] Appendix A.1 shows a declining maximum time in the later years that suggests sensitivity to the timing of data reporting. Appendix A.1 shows no such sensitivity for the 75th percentile but a strong influence of the maximum on the mean. This argues against showing the mean for accident quarters in 2017 but not against showing percentiles. Moreover, the accident quarter 50th and 85th percentiles in Chart 1 are stable from 2016 into 2017, which argues that, with a short 90-day window, they are not overly influenced by late reporting and are worth including. Similar observations apply to Charts 2 and 3.

Chart 3 plots the median, the mean, and the 85th percentile time to initial encounter for contusion cases from 2011 to 2016 by accident quarter.

- The mean again peaks in the last two quarters of 2013, remains flat for 2014, and then declines into 2016
- The median time is at 0 days for every accident quarter from 2011 to the third quarter of 2017, meaning that most contusion injuries were treated on the day of injury
- The 85th percentile also stays constant over that time, holding at 3 days

Chart 3: Days to Initial Treatment for Contusion Cases

Median, Mean, and 85th Percentile by Accident Quarter



Time to Treatment by Provider Type

We select five nonfacility provider types and consider their times to treat workers over recent years. Of course, when patients receive treatment in an emergency room or urgent care, they are very likely treated by a medical doctor. About one-third of services delivered on the day of a traumatic injury are provided by those emergency care venues, while about one-fourth are provided by the five selected provider types. However, as indicated in Table 1, for encounters in those emergency care venues, we regard the facility as the provider and not the treating physician. Accordingly, the time to see one of the selected physician provider types need not measure the time from injury to first being seen by a medical doctor. In contrast to the previous section on initial encounters of any kind, this section focuses on encounters that establish a doctor-patient relationship.

Chart 4 shows the median, mean, and 85th percentile of the time, by accident year, from a traumatic injury to see an orthopedist. The pattern in Chart 4 suggests that 2014, the year the main provisions of the ACA were implemented, was a transitional year:

- The mean increased from 37.5 to 41.6 days from 2011 to 2014, dropping back to 38.8 days in 2015 and further to 37.4 in 2016
- The median time was also at a maximum in 2014, at 16 days, compared with 14 days for 2011 and 2016
- Similarly, the 85th percentile increased more than a week and a half, from 74 to 85 days, from 2011–2014, dropping back to 74 days in 2016

Chart 4: Days to Treatment by an Orthopedist

Median, Mean, and 85th Percentile by Accident Year

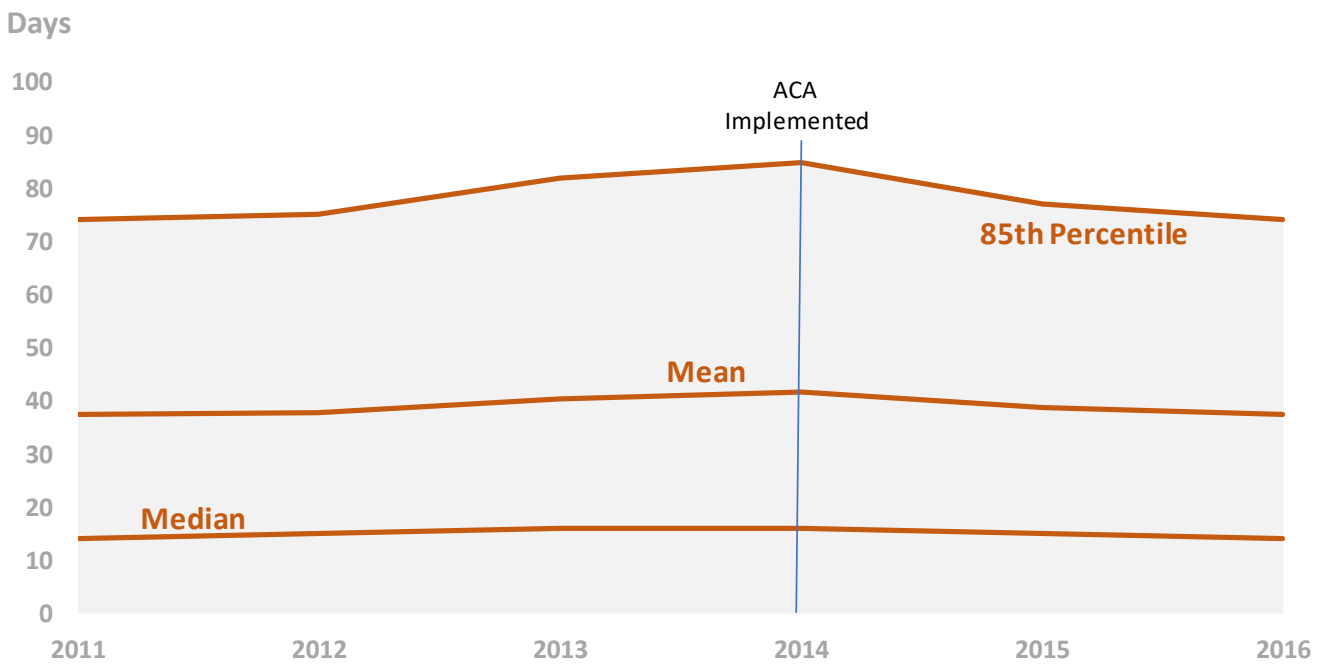


Chart 5 shows the median, the mean, and the 85th percentile of the time, by accident year, from being injured to seeing a chiropractor. The pattern in Chart 5 also shows 2014 as a transition year:

- Prior to 2014, the mean time had been on the rise
- The mean then stabilized, increasing by only half a day from 2014 to 2016

Patterns for the median and 85th percentiles also suggest that 2014 was a transitional year:

- The median stayed at 7 days from 2012 to 2014 and then increased by a day each year to 9 days in 2016
- At somewhat less than twice the mean, the 85th percentile increased from 47 to 61 days from 2011 to 2014, staying near 60 days from 2014–2016

Chart 5: Days to Treatment by a Chiropractor

Median, Mean, and 85th Percentile by Accident Year

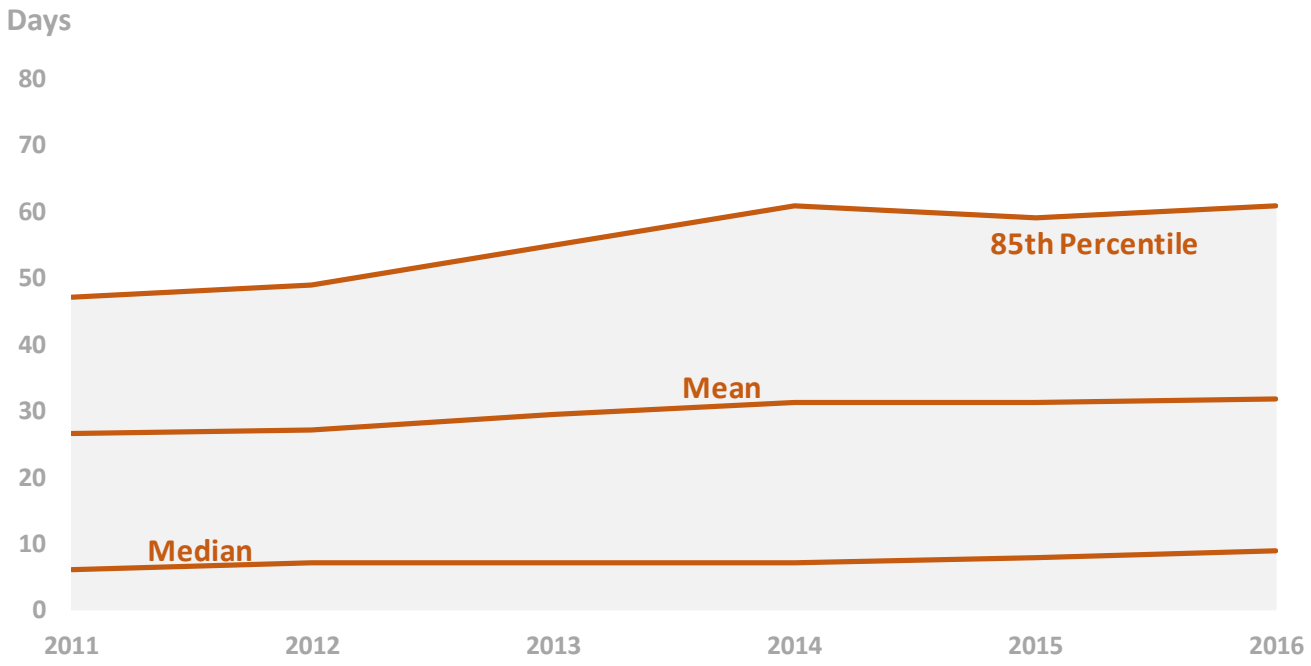


Chart 6 shows a different time to treatment pattern for surgeons other than orthopedic:

- Rather than reverse in 2014, the mean stabilized, increasing from 2011 to 2013, with only slight changes after 2013
- The median was 0 days for 2011–2012, increasing to 1 day for 2013–2016
- The 85th percentile increased from 30 to 38 days from 2011 to 2013 and peaked at 39 days in 2014 and 2015 before dropping slightly in 2016

Chart 6: Days to Treatment by a Surgeon NOC

Median, Mean, and 85th Percentile by Accident Year

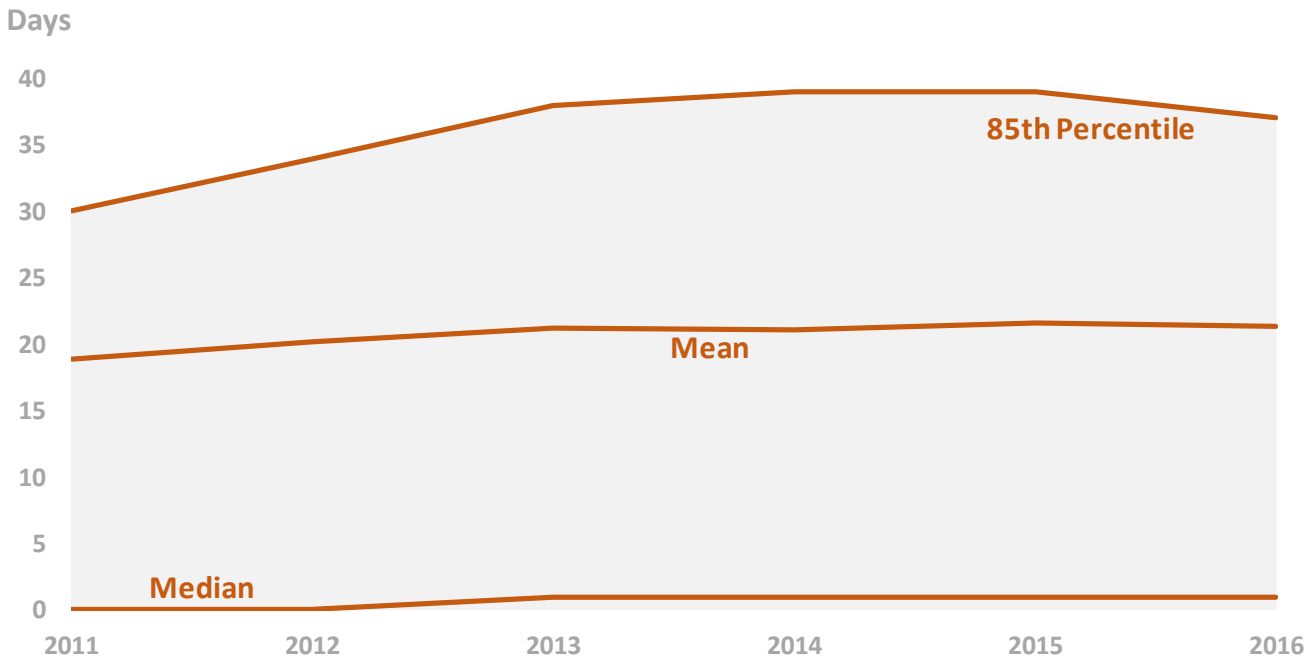
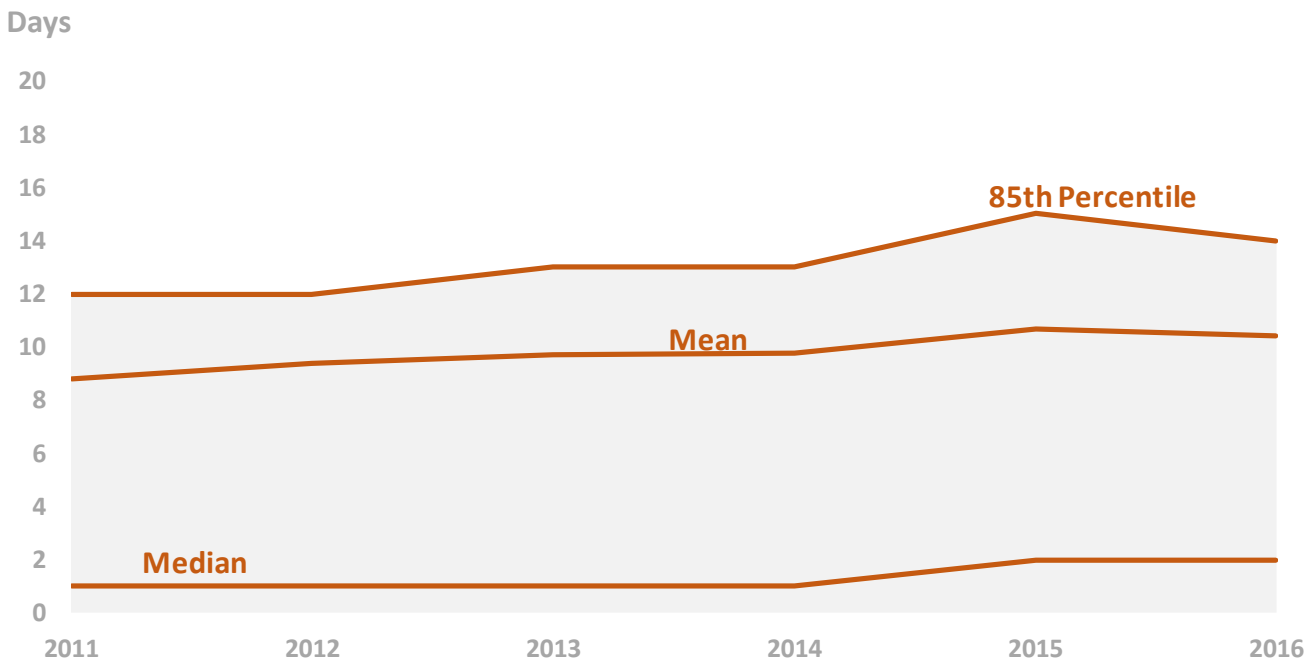


Chart 7 shows a pattern for physicians other than surgeons that parallels the pattern for surgeons other than orthopedic (Chart 6).

- The mean for physician NOC is about half that for nonorthopedic surgeons
- The mean time for physicians other than surgeons increased steadily from 8.8 to 10.7 days from 2011 to 2015, with 2014–2015 showing the biggest annual increase
- Considering the large volume of observations used to calculate the mean, we conclude that these increases are not due solely to random fluctuations
- The median was 1 day for 2011–2014, increasing to 2 days in 2015 and 2016
- The 85th percentile also increased steadily over the 2011–2015 period, from 12 to 15 days, then dropped to 14 days in 2016

Chart 7: Days to Treatment by a Physician NOC

Median, Mean, and 85th Percentile by Accident Year

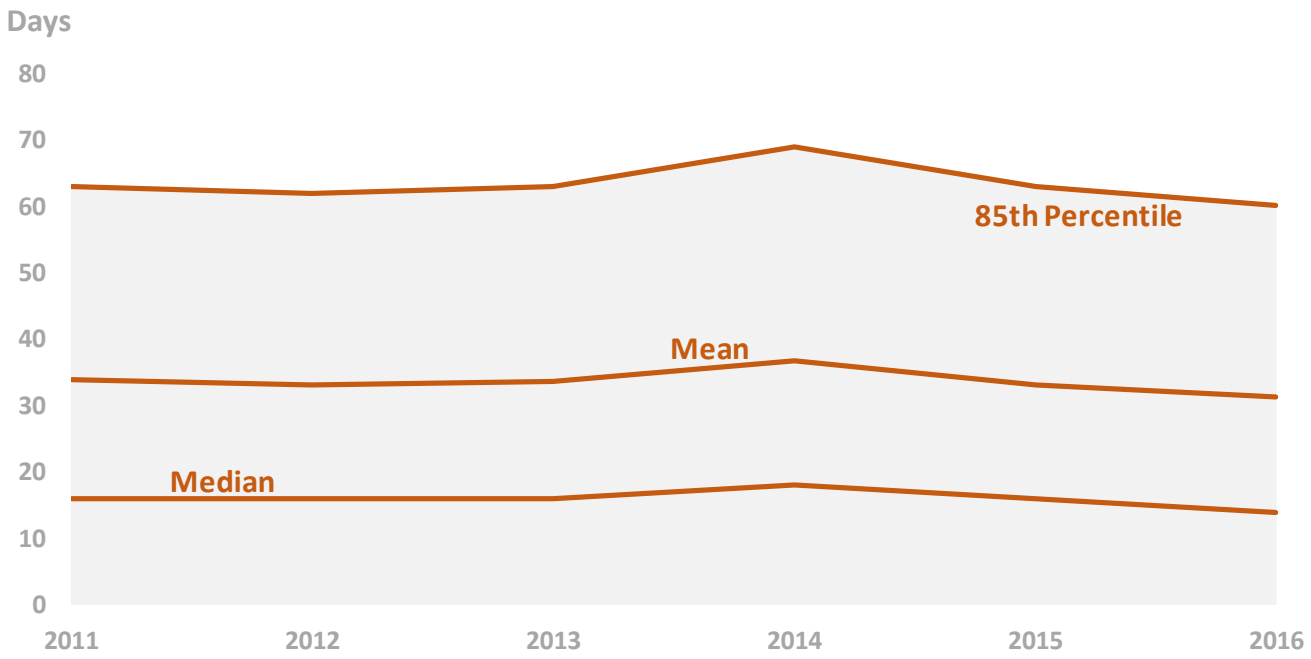


The pattern for therapists in Chart 8 shows little movement prior to 2014, with an increase in 2014 followed by decreases in 2015 and 2016.

- That pattern holds for the mean, the median, and the 85th percentile
- As with orthopedists, 2014 appears to be a transitional year
- The mean was near 33 days for each year from 2011 to 2015, except for 2014, when it jumped to almost 37 days
- The year 2014 was also exceptional for the median time, which was 16 days from 2011 to 2015, except for 2014, when it increased to 18 days
- Similarly, the 85th percentile was 62 or 63 days from 2011 to 2015, except for 2014, when it spiked to 69 days

Chart 8: Days to Treatment by a Therapist

Median, Mean, and 85th Percentile by Accident Year



Movement in the time to treatment for an injured worker shows different patterns for different provider types, although 2014 commonly emerges as a transitional year. This suggests competing factors are at play with no one simple explanation for the movements. For example, for medical care, generally we would expect increases in the proportion of people with health insurance to act toward increasing the demand. However, all else equal, for WC we would expect decreases in claim frequencies to lessen the demand for providers specializing in work-related injuries.

STRAIN AND SPRAIN CASES

Looking at first encounters of any kind (Charts 1–3), we found that, compared with other trauma cases, strain and sprain cases have longer times to initial treatment that are more responsive to change. Strains and sprains are also among the most common WC injuries. When monitoring time to treatment and seeking to control for injury mix, strains and sprains are, therefore, a natural subset for study. The discussion focuses on treatment by two provider types naturally associated with such injuries: orthopedic surgeons and physical therapists. We again look at the mean, median, and 85th percentile.

Time to Treatment by Provider Type

Chart 9 plots the annual mean, median, and 85th percentile time to treatment by an orthopedist for strain and sprain cases.

- The times were longer than what was seen for all trauma cases in Chart 5 (around two weeks longer for the mean and median and three weeks for the 85th percentile)
- But the movement in the times for strain and sprain cases was similar
- The time to see an orthopedist again had ACA implementation year 2014 as a transitional year; i.e., times had been increasing and then began decreasing

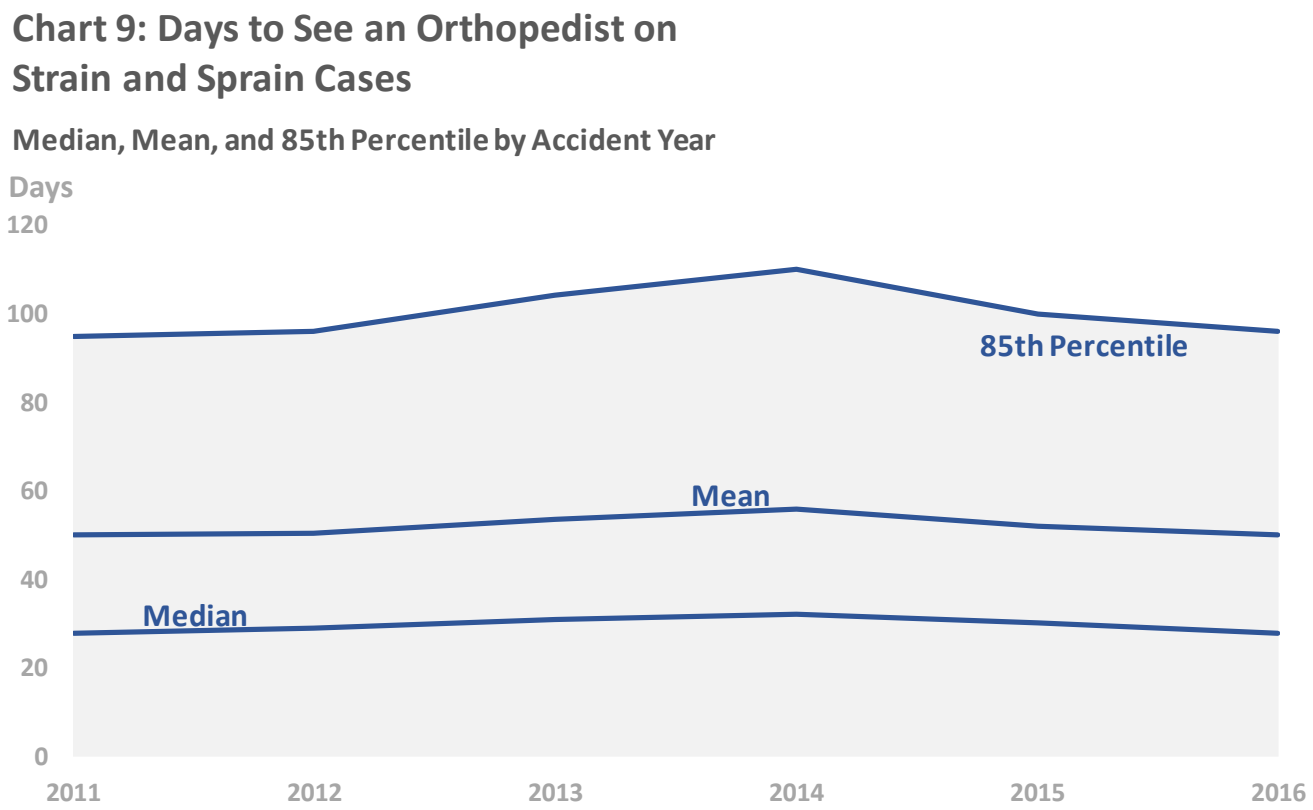
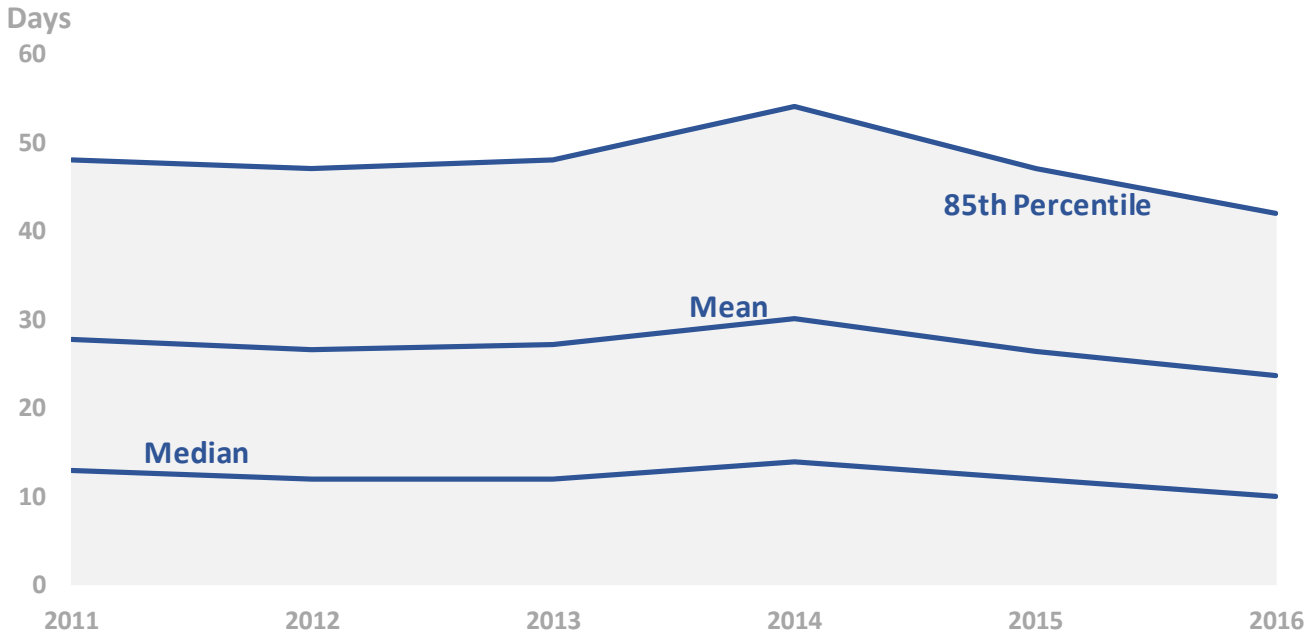


Chart 10 shows the annual mean, median, and 85th percentile times for therapists on strain and sprain cases.

- While the means are a little less than a week shorter than for all trauma cases, the patterns for strain and sprain cases are like those in Chart 8
- Here, ACA implementation year 2014 appears as a transitional year beginning a downward movement in time to treatment after being more stable for 2011–2013

Chart 10: Days to See a Therapist on Strain and Sprain Cases

Median, Mean, and 85th Percentile by Accident Year



Restricting to strain and sprain cases revealed movements in time to treatment that parallel the changes already found more generally for trauma cases. Although the patterns are not new, the longer times for strain and sprain cases make for larger, more noticeable changes.

PROVIDER NETWORKS

By their nature, medical provider networks affect access to care. So, it is natural to ask whether the time to treatment differs when a claim is handled within a network. In this study, a WC claim is classified as "in-network" when 80% or more of the payments are made to in-network providers and classified as "out-of-network" when 20% or less are made to in-network providers. States vary widely in their use of provider networks, due to statutes and geography, among other differences. We compare time to treatment between the in-network and out-of-network claim subsets. We do this by state and for two referral provider types: orthopedists and therapists.

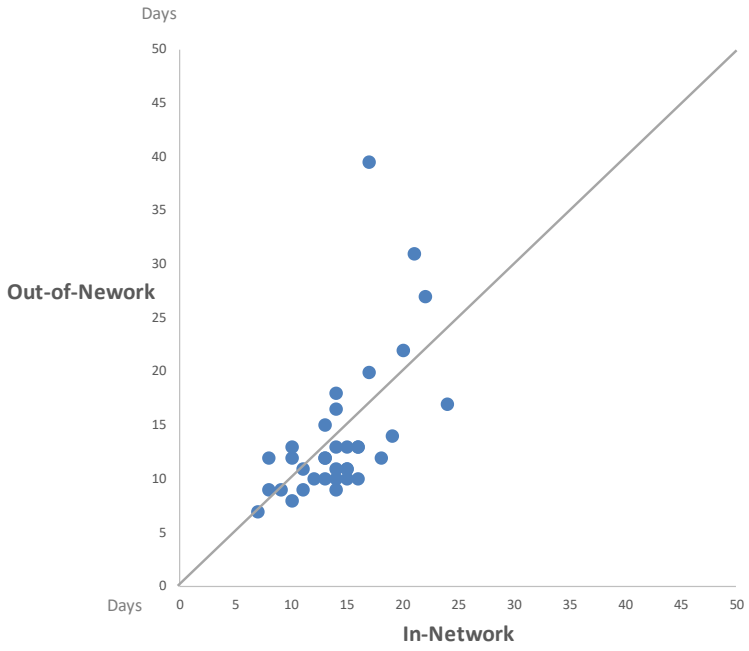
Among claims with encounters with an orthopedist, 53% are classified as in-network and 15% as out-of-network. About one-third of claims with such encounters are not classified as either in- or out-of-network. Those shares vary a lot by state. Not all services on in-network claims are performed by in-network providers. And that includes the encounter used to determine the time to treatment for an in-network claim, which may be with an out-of-network orthopedist. Referrals outside the network may occur when there is no readily available specialist within the network.

Chart 11 plots the in-network and out-of-network median times to treatment as an XY-scatterplot. Each point represents a state. For each state, the x-coordinate is the median time to first treatment by an orthopedist for in-network claims with at least one encounter with an orthopedist, the y-coordinate the median for out-of-network claims (c.f. Appendix B.6).

A state lies below the diagonal when in-network claims have a longer median time in the state. The points in Chart 11 do not all cluster close to the diagonal, indicating that there are differences in times between the in-network and out-of-network claims in many states.

- Even including the three "outliers" with out-of-network times of more than 25 days (Nevada, Oklahoma, and Oregon), there are a few more points below than above the diagonal in Chart 11
- More states below the diagonal suggest that provider networks may increase times to see an orthopedist
- The analogous plot for the 85th percentile has an equal number of states above and below the diagonal
- The pooled state medians are similar, at 14 and 12 days for in-network and out-of-network claims, respectively
- The 85th percentiles are also close, but in the opposite order, at 71 and 75 days

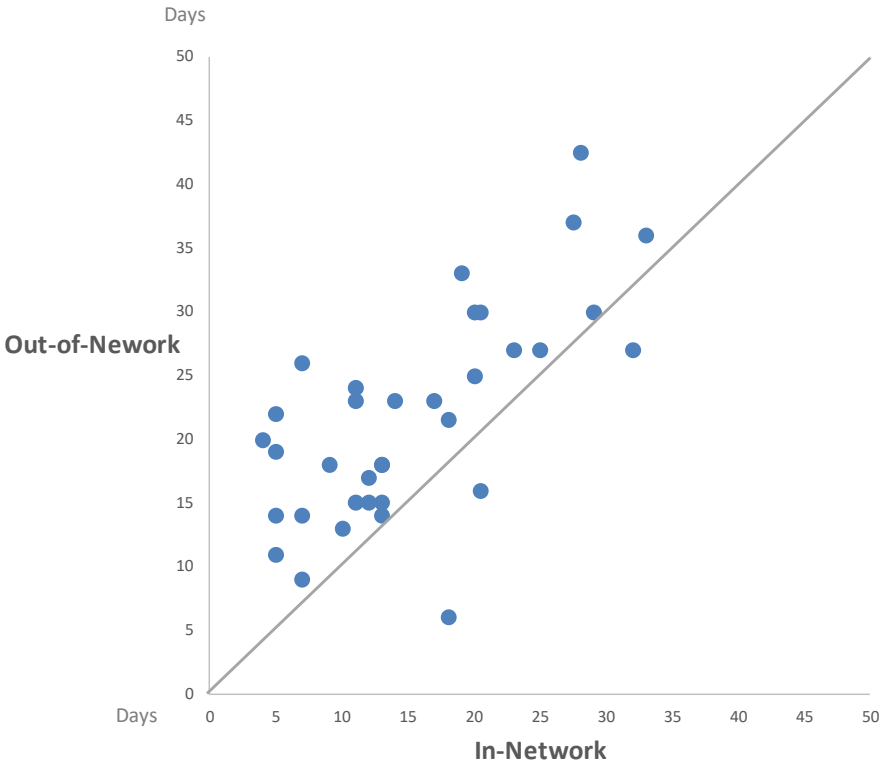
Chart 11: Median Days to See an Orthopedist by State
In-Network vs. Out-of-Network Claims
2011–2016, 360-Day Window



In-network and out-of-network median times to treatment by a therapist are plotted in Chart 12, again as an XY-scatterplot with each point representing a state. Among initial encounters with a therapist:

- 61% of claims with an encounter with a therapist are classified as in-network and 13% as out-of-network; a little more than one-fourth of such claims are not classified as either in- or out-of-network
- Most points lie above the diagonal in Chart 12, suggesting that provider networks often lower the time to see a (physical) therapist
- The pooled state medians are less for in-network claims, at 13 days, compared with 21 days for out-of-network
- The pooled in-network 85th percentile is also lower: 53 compared with 76 days

Chart 12: Median Days to See a Therapist by State
In-Network vs. Out-of-Network Claims
2011–2016, 360-Day Window



More efficient processing of WC cases within a network may help explain the faster referral to physical therapy. In the case of orthopedists, more efficient referrals in-network may be countered by more adherence to treatment guidelines that suggest alternatives before resorting to surgery.

MEDICAID EXPANSION

Perhaps the most significant ACA provision is Medicaid expansion, even though that expansion was not adopted in all states. We divide the states into expanders and nonexpanders to relate time to treatment metrics with ACA implementation. The states that adopted Medicaid expansion as of the beginning of 2015 are classified as expanders.[9] Typically, expander states saw greater increases in the proportion of their populations with health coverage. Assuming Medicaid expansion acts as a proxy for ACA implementation, then experience would reveal whether ACA implementation strained resources and lengthened the times for WC claimants to receive medical attention.

We look at changes by state from 2013 to 2015, thereby bracketing the implementation year 2014. Changes in median times for strains and sprains are paired with changes in the proportion of the state population with health coverage. We again focus on strain and sprain cases as being more responsive and, with that, more revealing of change than for all trauma cases pooled together.

For orthopedists, we plot pairs of changes with an XY-scatterplot (Chart 13). Each point represents a state. The y-coordinate is the change in the median time (regard as the dependent variable), while the x-coordinate is the percentage change in the proportion of the population with medical coverage (regard as the explanatory variable). Chart 13 illustrates that the expander states (the red triangles) typically saw greater proportional increases in the covered population, being positioned more toward the right.

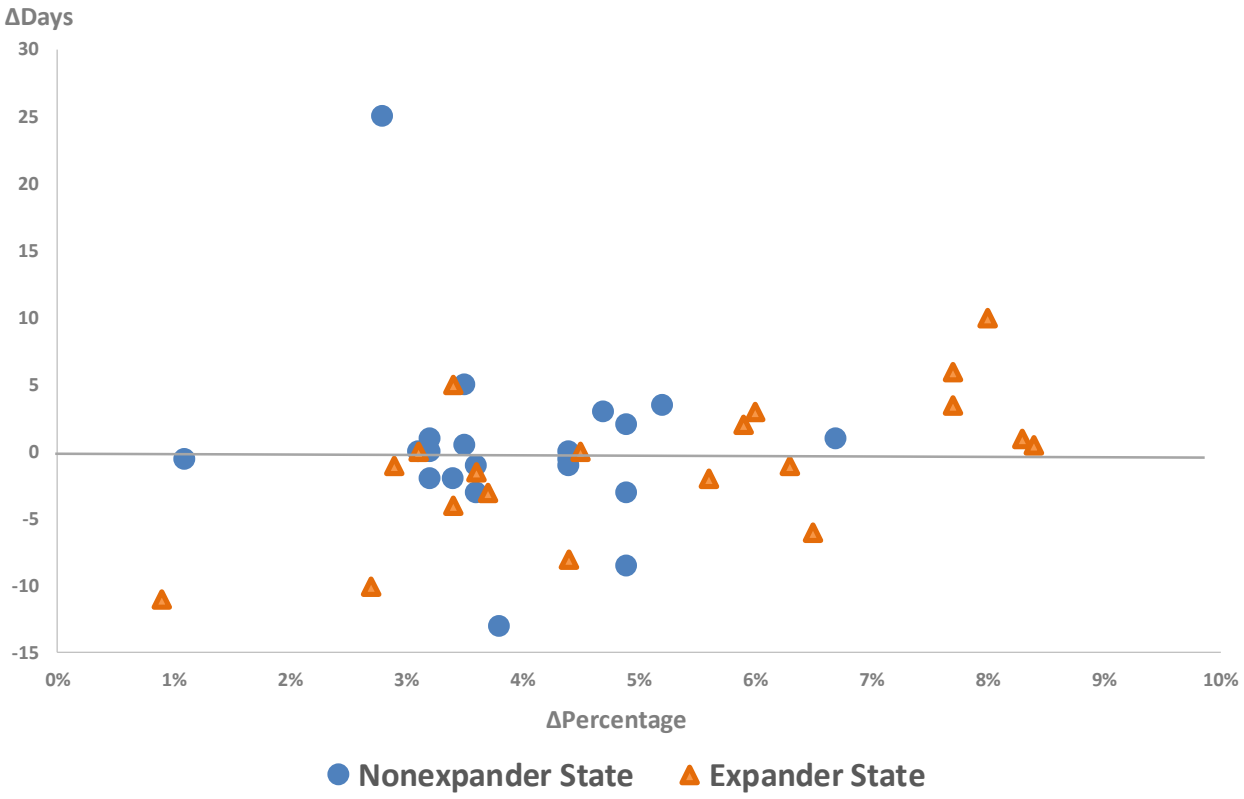
If the prediction that ACA-driven increases in the covered population would tax the supply of care and result in longer times for injured workers to see an orthopedist were correct, that would suggest a positive correlation between time to treatment and the share of the population with insurance coverage.

[9] Appendix C.3.A reproduces a US Census table showing the state assignments used here together with the percentage decline from 2013 to 2015 in the percentage uninsured (J. C. Barnett and M. S. Vornovitsky, "Health Insurance Coverage in the United States: 2015, Current Population Reports," September 2016, P60-257[RV]). Appendix C.3.B shows the amounts plotted in Charts 13 and 14.

As both expander and nonexpander states had consistent increases in coverage, the prediction would also suggest a pattern of consistent increases in the times to see an orthopedist. However, the pattern in Chart 13 is very different, with more decreases in times positioned below the line representing no change in median time.

- With all states considered, there may be a positive, but weak, correlation between changes in times and changes in the proportion covered by health insurance (coefficient = +0.218 with p-value = 0.170)
- The relationship is stronger and significant for the expander states (coefficient = +0.619 with p-value = 0.004), but there is no evidence of a positive correlation for the nonexpander states (coefficient = –0.159 with p-value = 0.492)
- The picture is similar for both the mean and 85th percentile of the time
- This is counter to the prediction, which would suggest a positive relationship for both expander and nonexpander states because the share of coverage consistently increased for both groups of states
- Chart 13 does not provide consistent or convincing evidence that implementation of the ACA Medicaid expansion impacted the time to see an orthopedist

Chart 13: Strain and Sprain Cases
Difference in the Median Days to See an Orthopedist vs. Increase in the Insured Percentage by State, 2015 vs. 2013



For therapists, Chart 14 provides the analogue to Chart 13. As with Chart 13, the red triangles of the expander states are more toward the right.

- The expander state group does not show any meaningful correlation between expansion of coverage and time to treatment (coefficient = –0.057 with p-value = 0.812)
- The nonexpander state group shows a negative correlation (coefficient = –0.473 with p-value = 0.030)
- The pattern for both groups of states is counter to an overtaxed supply of care resulting in longer times
- Chart 14 does not provide consistent or convincing evidence that implementation of the ACA adversely impacted the time to see a therapist

Chart 14: Strain and Sprain Cases
Difference in the Median Days to See a Therapist vs.
Increase in the Insured Percentage by State, 2015 vs. 2013

INTERPRETING THE FINDINGS

While we find some upward movement in time to treatment from 2011 to 2014 (Charts 4–6), we also find that implementation of the main ACA provisions in 2014 did not accelerate the long-term trend. This finding suggests that increasing times are due to systemic changes—for example, changing treatment protocols—that predate the ACA and whose effects are continuing still. Certain provisions in the ACA do incentivize structural changes in healthcare markets that may indirectly produce either higher prices or longer times. For example, the ACA's support for value-based medicine via accountable care organizations and population wellness initiatives incentivizes consolidation among medical service providers, which can increase their market power.[10] However, we find no evidence to date that the ACA has directly impacted time to treatment in workers compensation.

We have seen, in the time to treatment for different provider types, increases that persist through ACA implementation (physicians other than orthopedists), that reverse (orthopedists), and even that revert (therapist). We have seen cases where ACA implementation year 2014 acted as a transitional year; i.e., times had been increasing and then began decreasing (Charts 9 and 10). However, those observations are insufficient to attribute the transition to ACA implementation (Charts 13 and 14).

Compared with many emergency room patients, WC trauma claimants may be more likely to be triaged ahead of some other patients due to bleeding, potential for infection, or pain. They may also receive similar priority when being seen in a doctor's office. WC medical coverage is also very comprehensive and open-ended compared with other insurance plans. That, combined with reimbursements at levels above Medicaid, may help WC claimants experience shorter times. Such considerations may delay any impact that changing healthcare regulations may have on the access to care for WC claimants. Consequently, the impacts on access to care may emerge sooner and be more apparent for group health, exchanges, Medicare, and especially Medicaid patients. This may especially hold true for primary care. Some survey data indicates that Medicaid expansion increased time to get an appointment as a new primary care patient.

CONCLUSION

Access to the initial medical care for an injury is rarely an issue because there are many providers to deliver prompt care. This is evidenced by the high proportion of claimants treated on or near the date of injury. In general terms, we find that the healthcare delivery system continues to have enough capacity to provide prompt access to professional medical care. The ACA and consolidation of medical providers have not changed that fact. However, we identify some movement in the time to be seen by some specialized nonfacility providers.

This study finds that, from 2011 to 2016:

- Time from injury to initial medical care has remained stable (Charts 1–3)
- Times for referral care have changed modestly
  - Changes occurred prior to ACA implementation
  - The pattern of changes varies with the medical specialty (Charts 4–10)
- The use of medical provider networks impacts the timing of follow-up care (Charts 11–12)
- Changes in time to treatment have not correlated to post-ACA changes in the proportion of the population with medical coverage (Charts 13–14).

[10] The article "The Impact of Hospital Consolidation on Medical Costs," NCCI Quarterly Economics Briefing—Q3 2018, says, "The movement toward hospital consolidation since 2010 has been largely motivated by the Affordable Care Act (ACA), the Medicare Access and CHIP Reauthorization Act (MACRA), and changing financial models." Article available at www.ncci.com/Articles/Pages/II_Insights_QEB_Impact-of-Hospital-Consolidation-on-Medical-Costs.aspx.

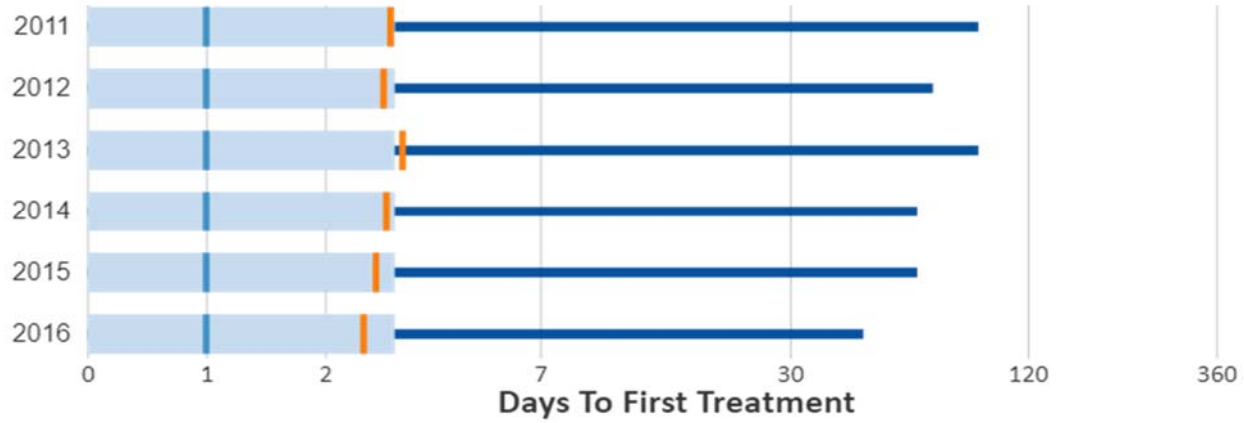
APPENDIX

A. First Encounter of Any Kind (90-day window)
   1. Strain and Sprain
   2. Open Wound
   3. Contusion
B. Time to Treatment by Provider Type (360-day window)
   1. Orthopedist
   2. Chiropractor
   3. Surgeon NOC
   4. Physician NOC
   5. Therapist
   6. Table by State and Network (Orthopedist, Therapist)
C. Strains and Sprains (360-day window)
   1. Orthopedist
   2. Therapist
   3. Medicaid Expansion
      a. US Census
      b. Table (Orthopedist, Therapist)

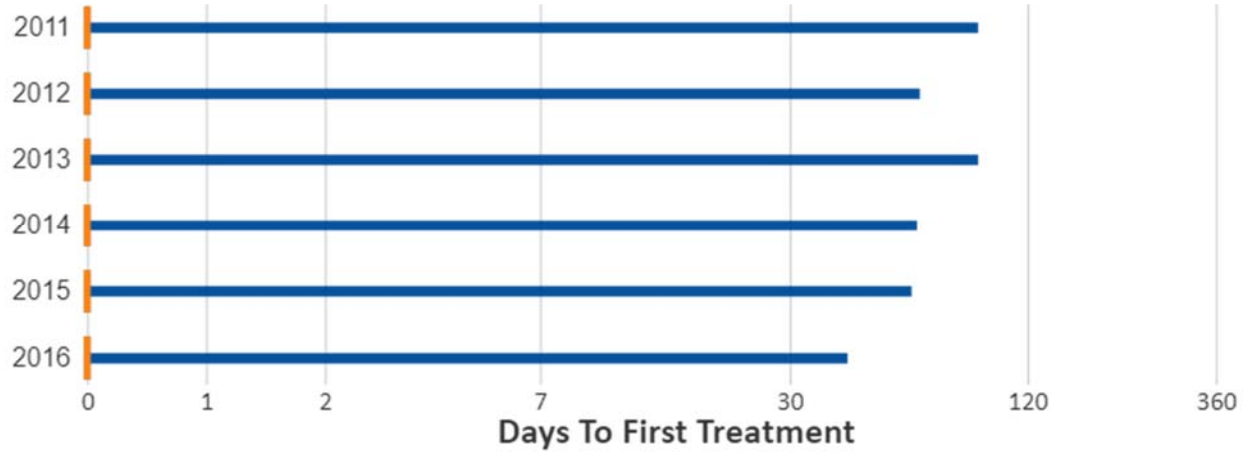
Legend for A.1–A.3, B.1–B.5, and C.1–C.2:

Note the use of a logarithmic scale with a 90-day window for first encounters (A.1–A.3) and a 360-day window for provider type encounters (B.1–B.5 and C.1–C.2). The log scale may require more care to interpret than is needed for Charts 1–10 in the paper; however, it helps depict change in the entire distribution. For example, it can be instructive to compare movement in the mean with movement in the maximum time to treatment.

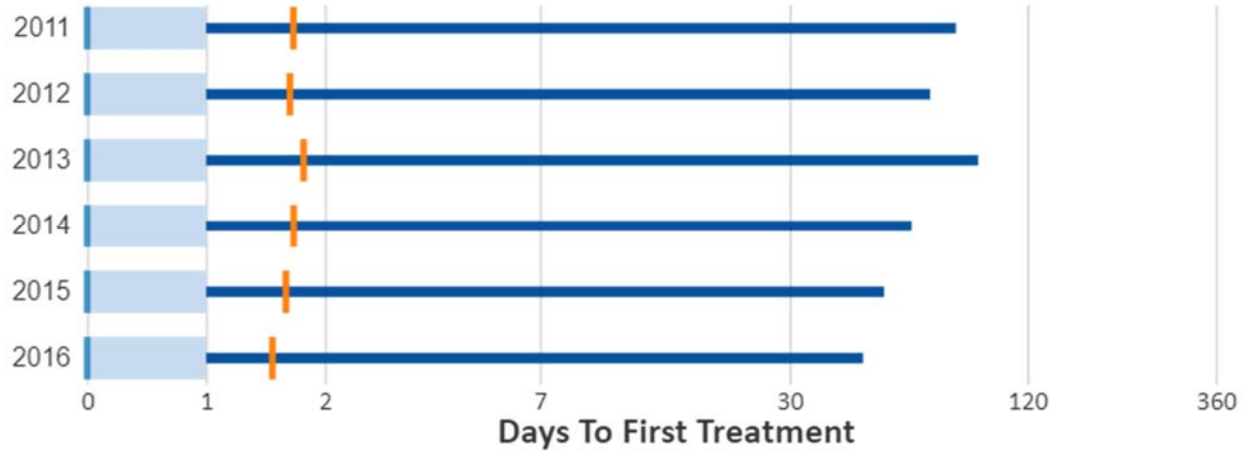
A.1 FIRST ENCOUNTER OF ANY KIND: STRAIN AND SPRAIN



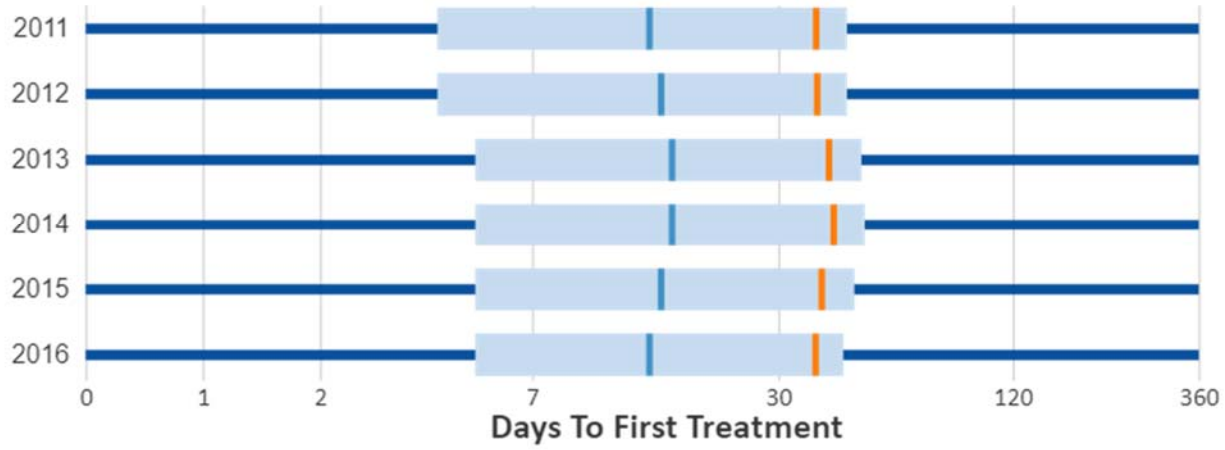
A.2 FIRST ENCOUNTER OF ANY KIND: OPEN WOUND



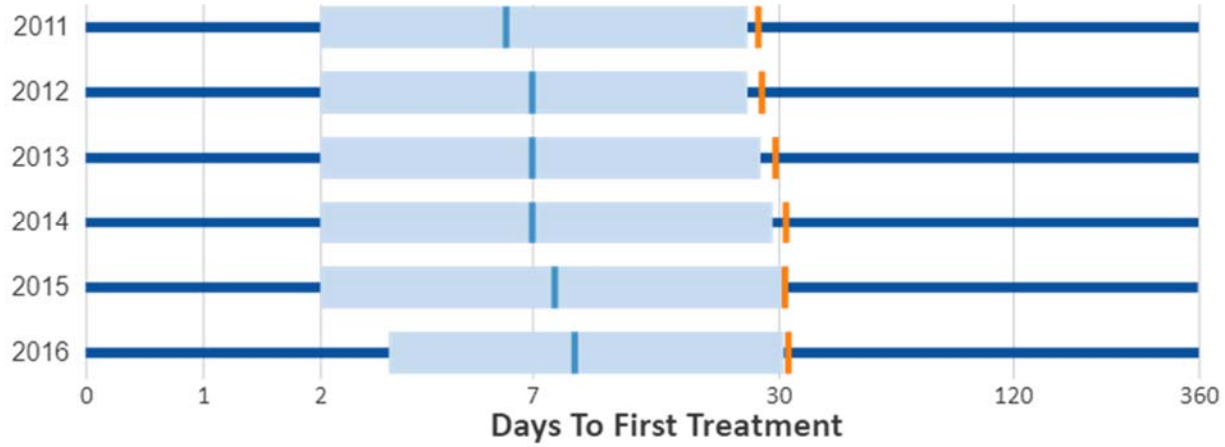
A.3 FIRST ENCOUNTER OF ANY KIND: CONTUSION



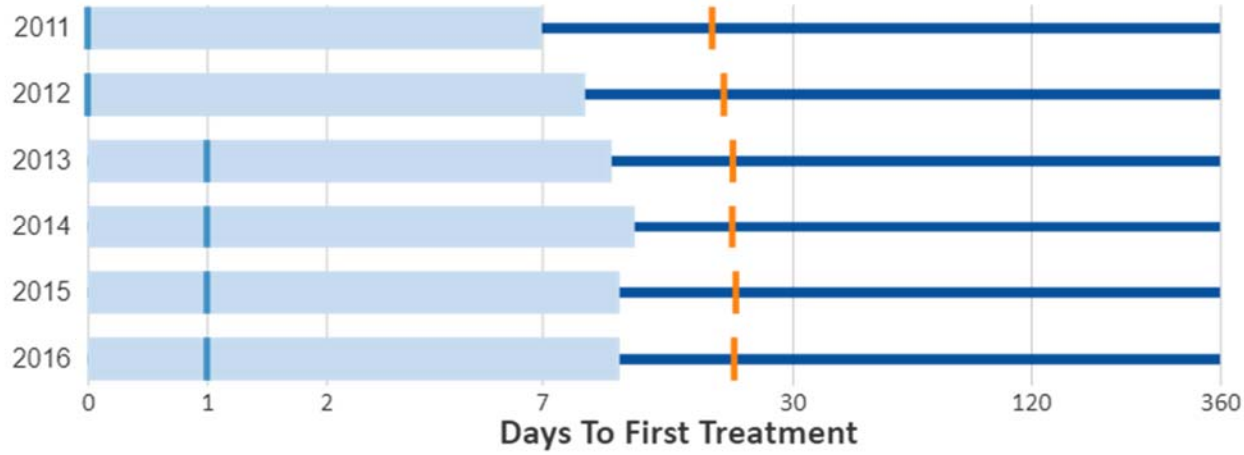
B.1 TIME TO TREATMENT BY PROVIDER TYPE: ORTHOPEDIST



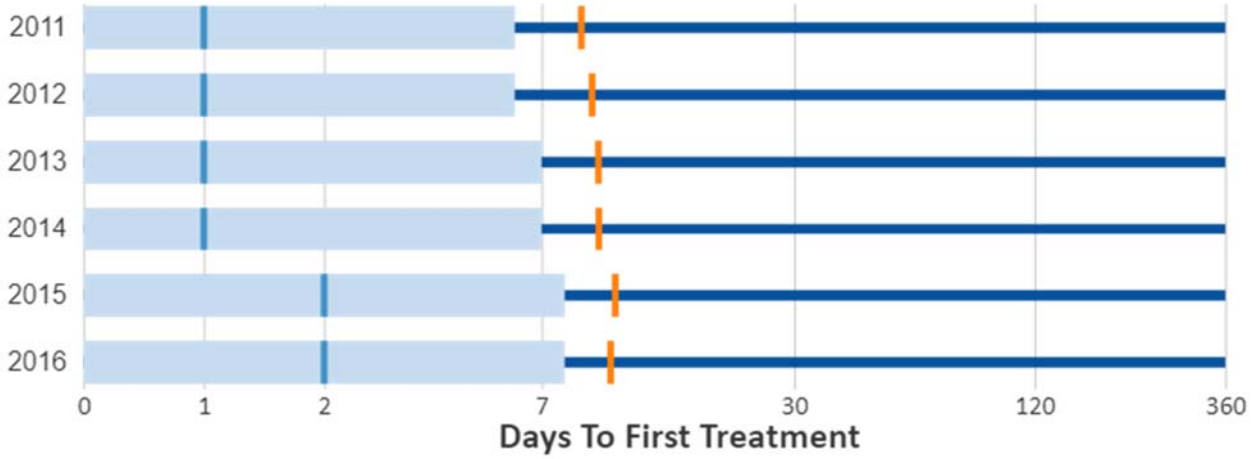
B.2 TIME TO TREATMENT BY PROVIDER TYPE: CHIROPRACTOR



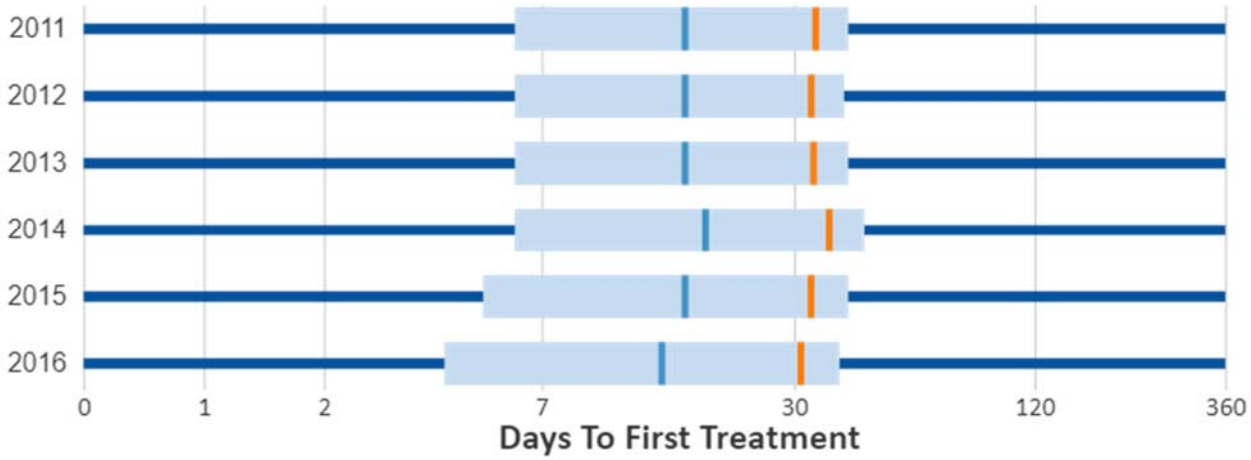
B.3 TIME TO TREATMENT BY PROVIDER TYPE: SURGEON NOC



B.4 TIME TO TREATMENT BY PROVIDER TYPE: PHYSICIAN NOC



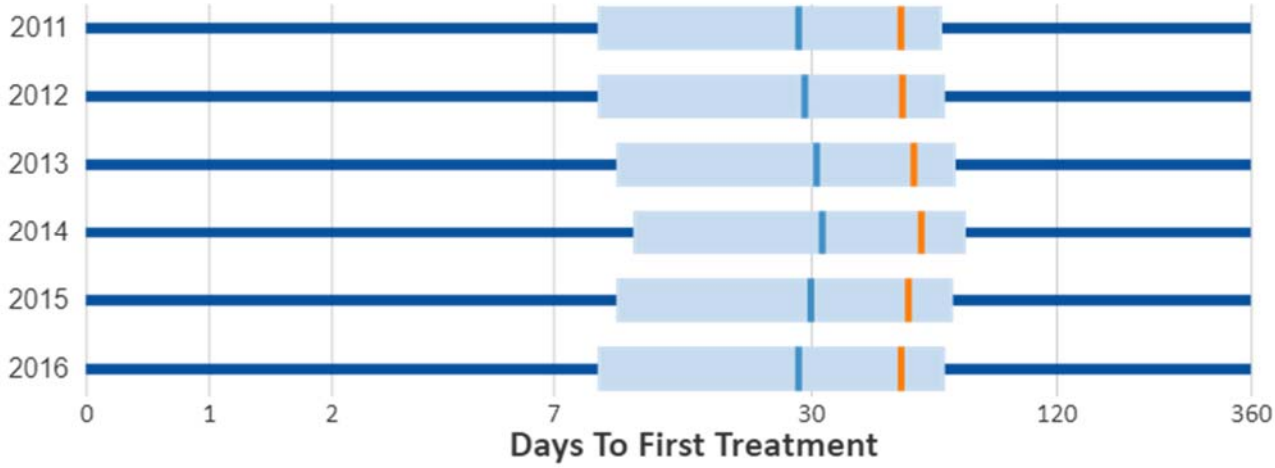
B.5 TIME TO TREATMENT BY PROVIDER TYPE: THERAPIST



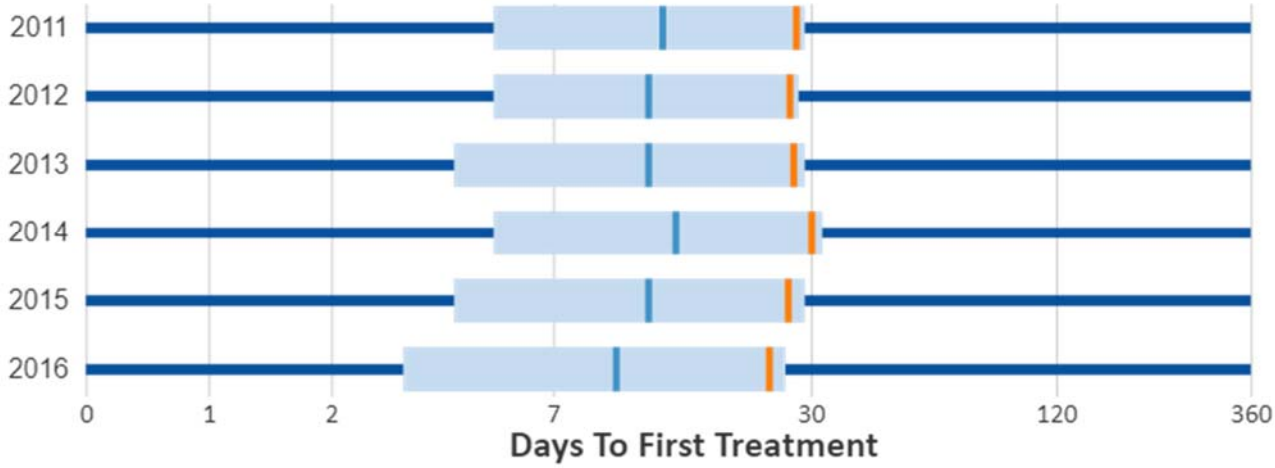
B.6 TIME TO TREATMENT BY PROVIDER TYPE: TABLE BY STATE AND NETWORK

State	Median Wait Time in Days			
	Orthopedist		Therapist	
	In-Network	Out-of-Network	In-Network	Out-of-Network
AK	15.0	10.0	29.0	30.0
AL	10.0	8.0	32.0	27.0
AR	10.0	12.0	13.0	18.0
AZ	14.0	11.0	5.0	14.0
CO	16.0	13.0	10.0	13.0
CT	15.0	11.0	7.0	9.0
DC	14.0	13.0	17.0	23.0
FL	24.0	17.0	20.0	25.0
GA	14.0	9.0	11.0	24.0
HI	14.0	18.0	11.0	23.0
IA	14.0	16.5	14.0	23.0
ID	19.0	14.0	25.0	27.0
IL	11.0	9.0	13.0	18.0
KS	16.0	13.0	18.0	21.5
KY	10.0	13.0	11.0	15.0
LA	8.0	9.0	20.0	30.0
MD	13.0	12.0	5.0	11.0
ME	8.0	12.0	5.0	19.0
MO	17.0	20.0	12.0	15.0
MS	12.0	10.0	27.5	37.0
MT	16.0	10.0	20.5	30.0
NE	13.0	10.0	9.0	18.0
NH	7.0	7.0	7.0	14.0
NM	20.0	22.0	7.0	26.0
NV	21.0	31.0	13.0	15.0
OK	17.0	39.5	19.0	33.0
OR	22.0	27.0	20.5	16.0
RI	18.0	12.0	5.0	22.0
SC	15.0	13.0	28.0	42.5
SD	9.0	9.0	18.0	6.0
TN	14.0	10.0	12.0	17.0
UT	15.0	11.0	13.0	14.0
VA	11.0	11.0	23.0	27.0
VT	13.0	12.0	4.0	20.0
WV	13.0	15.0	33.0	36.0

C.1 STRAINS AND SPRAINS: ORTHOPEDIST



C.2 STRAINS AND SPRAINS: THERAPIST



C.3.A MEDICAID EXPANSION: US CENSUS*

Table A-1.
Population Without Health Insurance Coverage by State: 2013 to 2015
(Numbers in thousands. Civilian noninstitutionalized population. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see www2.census.gov/programs-surveys/acs/tech_docs/accuracy/ACS_Accuracy_of_Data_2015.pdf.)

State	Medicaid Expansion State? Yes (Y) or No (N)[1]	2013 Uninsured				2014 Uninsured				2015 Uninsured				Difference in Uninsured (2015 less 2014)				Difference in Uninsured (2015 less 2013)			
		Number	Margin of Error[2] (±)	Percent	Margin of Error[2] (±)	Number	Margin of Error[2] (±)	Percent	Margin of Error[2] (±)	Number	Margin of Error[2] (±)	Percent	Margin of Error[2] (±)	Number	Margin of Error[2] (±)	Percent	Margin of Error[2] (±)	Number	Margin of Error[2] (±)	Percent	Margin of Error[2] (±)
United States		**45,181**	**200**	**14.5**	**0.1**	**36,670**	**190**	**11.7**	**0.1**	**29,758**	**179**	**9.4**	**0.1**	***-6,913**	**261**	***-2.3**	**0.1**	***-15,423**	**269**	***-5.1**	**0.1**
Alabama	N	645	579	13.6	0.4	579	17	12.1	0.4	494	16	10.1	0.3	*-95	23	*-2.0	0.5	*-161	23	*-3.4	0.5
Alaska	N	132	122	18.5	1.0	122	6	17.2	0.9	106	5	14.9	0.7	*-16	8	*-2.3	1.1	*-26	9	*-3.7	1.2
Arizona	Y	1,118	903	17.1	0.4	903	18	13.6	0.3	728	21	10.8	0.3	*-175	28	*-2.8	0.4	*-390	32	*-6.3	0.5
Arkansas	Y	465	343	16.0	0.5	343	13	11.8	0.4	278	12	9.5	0.4	*-66	18	*-2.3	0.6	*-187	18	*-6.5	0.6
California	Y	6,500	4,767	17.2	0.2	4,767	47	12.4	0.1	3,317	34	8.6	0.1	*-1,449	58	*-3.9	0.2	*-3,183	66	*-8.6	0.2
Colorado	Y	729	543	14.1	0.3	543	16	10.3	0.3	433	15	8.1	0.3	*-110	22	*-2.2	0.4	*-297	23	*-6.0	0.4
Connecticut	Y	333	245	9.4	0.4	245	11	6.9	0.3	211	13	6.0	0.4	*-35	17	*-1.0	0.5	*-122	20	*-3.4	0.6
Delaware	Y	83	72	9.1	0.7	72	6	7.8	0.7	54	6	5.9	0.6	*-17	8	*-1.9	0.9	*-29	8	*-3.3	0.9
District of Columbia	Y	42	34	6.7	0.6	34	4	5.3	0.7	25	4	3.8	0.6	*-9	6	*-1.5	0.9	*-17	5	*-2.9	0.8
Florida	N	3,853	3,245	20.0	0.2	3,245	43	16.6	0.2	2,662	40	13.3	0.2	*-584	59	*-3.2	0.3	*-1,191	59	*-6.7	0.3
Georgia	N	1,846	1,568	18.8	0.3	1,568	28	15.8	0.3	1,388	26	13.9	0.3	*-180	38	*-2.0	0.4	*-458	39	*-5.0	0.4
Hawaii	Y	91	72	6.7	0.4	72	5	5.3	0.4	55	4	4.0	0.3	*-18	7	*-1.3	0.5	*-36	7	*-2.8	0.5
Idaho	N	257	219	16.2	0.8	219	11	13.6	0.7	180	10	11.0	0.6	*-38	15	*-2.5	0.9	*-77	16	*-5.1	1.0
Illinois	Y	1,618	1,238	12.7	0.2	1,238	22	9.7	0.2	900	22	7.1	0.2	*-338	31	*-2.6	0.2	*-718	35	*-5.6	0.3
Indiana	N	903	776	14.0	0.3	776	22	11.9	0.3	628	17	9.6	0.3	*-148	28	*-2.3	0.4	*-275	26	*-4.3	0.4
Iowa	N	248	189	8.1	0.3	189	8	6.2	0.3	155	8	5.0	0.3	*-34	12	*-1.1	0.4	*-93	12	*-3.1	0.4
Kansas	N	348	291	12.3	0.4	291	11	10.2	0.4	261	11	9.1	0.4	*-31	16	*-1.1	0.6	*-88	17	*-3.1	0.6
Kentucky	Y	616	466	14.3	0.3	366	11	8.5	0.3	261	11	6.0	0.2	*-105	15	*-2.4	0.4	*-355	18	*-8.3	0.4
Louisiana	N	751	672	16.6	0.4	672	16	14.8	0.3	546	17	11.9	0.4	*-126	23	*-2.8	0.5	*-206	24	*-4.7	0.5
Maine	N	147	134	11.2	0.5	134	8	10.1	0.6	111	7	8.4	0.5	*-23	11	*-1.7	0.8	*-37	10	*-2.8	0.8
Maryland	Y	593	463	10.2	0.3	463	16	7.9	0.3	389	11	6.6	0.2	*-74	19	*-1.3	0.3	*-204	20	*-3.6	0.3
Massachusetts	Y	247	219	3.7	0.2	219	8	3.3	0.1	189	9	2.8	0.1	*-29	12	*0.5	0.2	*-57	14	*-0.9	0.2
Michigan	+Y	1,072	837	11.0	0.2	837	18	8.5	0.2	597	14	6.1	0.1	*-240	23	*-2.5	0.2	*-475	24	*-4.9	0.2
Minnesota	Y	440	317	8.2	0.3	317	12	5.9	0.2	245	11	4.5	0.2	*-72	16	*-1.4	0.3	*-195	18	*-3.7	0.3
Mississippi	N	500	424	17.1	0.5	424	14	14.5	0.5	372	12	12.7	0.4	*-53	18	*-1.8	0.6	*-128	20	*-4.4	0.7
Missouri	N	773	694	13.0	0.3	694	19	11.7	0.3	583	15	9.8	0.3	*-111	24	*-1.9	0.4	*-190	24	*-3.3	0.4
Montana	N	165	143	16.5	0.8	143	6	14.2	0.6	119	7	11.6	0.7	*-25	9	*-2.6	0.9	*-46	10	*-4.8	1.0
Nebraska	N	209	179	11.3	0.5	179	7	9.7	0.4	154	9	8.2	0.5	*-25	11	*-1.4	0.6	*-55	13	*-3.1	0.7
Nevada	Y	570	427	20.7	0.6	427	15	15.2	0.5	351	12	12.3	0.4	*-76	19	*-2.9	0.7	*-219	21	*-8.4	0.7
New Hampshire	+Y	140	120	10.7	0.5	120	7	9.2	0.5	83	6	6.3	0.4	*-37	9	*-2.8	0.7	*-57	9	*-4.4	0.7
New Jersey	Y	1,160	965	13.2	0.2	965	19	10.9	0.2	771	22	8.7	0.2	*-194	29	*-2.2	0.3	*-389	31	*-4.5	0.3
New Mexico	Y	382	298	18.6	0.6	298	10	14.5	0.5	224	9	10.9	0.5	*-74	14	*-3.6	0.7	*-158	16	*-7.7	0.8
New York	Y	2,070	1,697	10.7	0.2	1,697	28	8.7	0.1	1,381	25	7.1	0.1	*-316	37	*-1.6	0.2	*-689	39	*-3.6	0.2
North Carolina	N	1,509	1,276	15.6	0.3	1,276	25	13.1	0.3	1,103	23	11.2	0.2	*-173	34	*-1.9	0.3	*-406	35	*-4.5	0.4
North Dakota	Y	73	57	10.4	0.8	57	5	7.9	0.7	57	5	7.8	0.7	1	7	0.1	0.9	*-16	7	*-2.6	1.0
Ohio	Y	1,258	955	11.0	0.2	955	20	8.4	0.2	746	19	6.5	0.2	*-209	27	*-1.8	0.2	*-511	28	*-4.5	0.2
Oklahoma	N	666	584	17.7	0.3	584	11	15.4	0.3	533	12	13.9	0.3	*-51	16	*-1.5	0.4	*-133	17	*-3.8	0.5
Oregon	Y	571	383	14.7	0.4	383	13	9.7	0.3	280	12	7.0	0.3	*-102	18	*-2.7	0.4	*-291	20	*-7.6	0.5
Pennsylvania	+Y	1,222	1,065	9.7	0.2	1,065	21	8.5	0.2	802	17	6.4	0.1	*-263	27	*-2.1	0.2	*-420	28	*-3.4	0.2
Rhode Island	Y	120	77	11.6	0.7	77	6	7.4	0.6	59	6	5.7	0.6	*-18	8	*-1.7	0.8	*-61	9	*-5.9	0.9
South Carolina	N	739	642	15.8	0.4	642	17	13.6	0.4	523	14	10.9	0.3	*-118	22	*-2.7	0.5	*-216	23	*-4.9	0.5
South Dakota	N	93	82	11.3	0.7	82	4	9.8	0.5	86	5	10.2	0.6	4	7	0.4	0.8	-7	8	*-1.1	0.9
Tennessee	N	887	776	13.9	0.3	776	19	12.0	0.3	667	19	10.3	0.3	*-109	27	*-1.8	0.4	*-219	28	*-3.6	0.4
Texas	N	5,748	5,047	22.1	0.2	5,047	43	19.1	0.2	4,615	55	17.1	0.2	*-432	69	*-2.0	0.3	*-1,133	77	*-5.0	0.3
Utah	N	402	366	14.0	0.5	366	13	12.5	0.5	311	14	10.5	0.5	*-54	19	*-2.1	0.6	*-91	19	*-3.5	0.6
Vermont	Y	45	31	7.2	0.6	31	3	5.0	0.4	24	2	3.8	0.4	*-7	4	*-1.1	0.6	*-21	5	*-3.4	0.7
Virginia	N	991	894	12.3	0.3	894	22	10.9	0.3	746	23	9.1	0.3	*-137	32	*-1.7	0.4	*-244	32	*-3.2	0.4
Washington	Y	960	643	14.0	0.3	643	17	9.2	0.2	468	13	6.6	0.2	*-175	21	*-2.6	0.3	*-492	25	*-7.4	0.4
West Virginia	Y	255	156	14.0	0.5	156	8	8.6	0.4	108	6	6.0	0.4	*-48	10	*-2.6	0.6	*-147	12	*-8.0	0.6
Wisconsin	N	518	418	9.1	0.2	418	12	7.3	0.2	323	10	5.7	0.2	*-95	15	*-1.7	0.3	*-195	17	*-3.5	0.3
Wyoming	N	77	69	13.4	0.9	69	5	12.0	0.8	66	6	11.5	1.0	-2	7	-0.4	1.3	*-11	7	*-1.9	1.3

*Statistically different from zero at the 90 percent confidence level.
+ Expanded Medicaid eligibility between January 1, 2014, and January 1, 2015.
Z Represents or rounds to zero.

[1]Medicaid expansion status as of January 1, 2015. For more information, see <www.medicaid.gov/Medicaid-CHIP-Program-Information/By-State/By-State.html>
[2]Data are based on a sample and are subject to sampling variability. A margin of error is a measure of an estimate's variability. The larger the margin of error is in relation to the size of the estimate, the less reliable the estimate. This number, when added to and subtracted from the estimate, forms the 90 percent confidence interval.

Note: Differences are calculated with unrounded numbers, which may produce different results from using the rounded values in the table.

Source: U.S. Census Bureau, 2013, 2014, and 2015 1-Year American Community Surveys.

*J. C. Barnett and M. S. Vornovitsky, "Health Insurance Coverage in the United States: 2015, Current Population Reports," September 2016.

C.3.B MEDICAID EXPANSION TABLE

Medicaid Expansion?	State	Change in Percentage Covered From 2013 to 2015	Change in Median Days to Treatment From 2013 to 2015-Strain/Sprain Cases	
			Orthopedist	Therapist
No	AK	3.6%	-3.0	5.0
	AL	3.5%	0.5	3.5
	FL	6.7%	1.0	0.0
	GA	4.9%	2.0	-3.0
	ID	5.2%	3.5	-5.0
	IN	4.4%	0.0	0.0
	KS	3.2%	-2.0	-1.0
	LA	4.7%	3.0	1.0
	ME	2.8%	25.0	0.0
	MO	3.2%	0.0	1.0
	MS	4.4%	-1.0	0.0
	MT	4.9%	-8.5	-0.5
	NC	4.4%	-0.5	-2.0
	NE	3.1%	0.0	0.0
	OK	3.8%	-13.0	-4.0
	SC	4.9%	-3.0	1.0
	SD	1.1%	-0.5	6.0
	TN	3.6%	-1.0	-3.0
	UT	3.5%	5.0	2.0
	VA	3.2%	1.0	2.0
	WI	3.4%	-2.0	-1.0
Yes	AR	6.5%	-6.0	2.0
	AZ	6.3%	-1.0	0.0
	CO	6.0%	3.0	0.0
	CT	3.4%	5.0	2.0
	DC	2.9%	-1.0	6.0
	HI	2.7%	-10.0	-3.0
	IA	3.1%	0.0	-0.5
	IL	5.6%	-2.0	0.0
	KY	8.3%	1.0	-1.0
	MA	0.9%	-11.0	0.0
	MD	3.6%	-1.5	1.0
	MN	3.7%	-3.0	1.0
	NH	4.4%	-8.0	0.0
	NJ	4.5%	0.0	0.0
	NM	7.7%	3.5	-1.0
	NV	8.4%	0.5	0.0
	OR	7.7%	6.0	3.0
	RI	5.9%	2.0	1.0
	VT	3.4%	-4.0	0.5
	WV	8.0%	10.0	1.0