



Drug Formulary Implementations—A Look at Impacts on Workers Compensation Prescription Drug Experience

Prescription drug payments comprise a substantial portion of medical expenditures in workers compensation (WC), representing approximately 8% of total medical payments in Service Year 2020¹. However, it is worth noting that recent trends in drug spending in WC point to an overall decline in costs associated with certain drugs, including opioids.

These recent changes in drug costs should come as little surprise given the increased attention in many states toward reducing the impact of prescription drugs on overall WC costs, with a continued focus on improving outcomes for injured workers. These recent changes have included the following:

- Increased awareness of the opioid crisis and corresponding attempts to manage opioid misutilization
- Greater use of pharmacy benefit managers by insurers

While injured workers rely on medications to help relieve the effects of work-related injuries, employers and insurers continue to look for ways to manage costs and rely on evidence-based treatment protocols. Regulation of prescription drug prices and utilization continues to be a focus of legislative activity in WC.

As more and more states look for opportunities to manage prescription drug utilization in their WC systems, closed drug formularies² continue to get increased attention as a utilization management tool to provide evidence-based guidance to physicians when prescribing drug treatments for injured workers. One such formulary, which has been implemented in several states,³ is the Official Disability Guidelines Workers' Compensation Drug Formulary (ODG Formulary).

This report investigates post-implementation prescription drug experience for several states which have recently adopted mandatory use of the ODG Formulary. Various metrics are used to trace prescription drug utilization and cost trends in each state's WC system.

KEY FINDINGS—INITIAL IMPLEMENTATION EFFECTS (IN, KY, MT)

- Decreased utilization of drugs contributed to overall cost declines in each of the three states in the period immediately after formulary implementation.
- Post-reform decreases in drug costs for each state were comparable to post-reform decreases to overall drug costs observed in nonformulary states.

¹ NCCI's Medical Data Call

² A "closed" formulary indicates that reimbursement for nonpreferred drugs is not permitted without prior payor authorization. An "open" formulary permits reimbursement for drugs regardless of formulary status.

³ As of year-end 2020, 15 states had adopted mandatory use of a closed-drug formulary. NCCI is a licensed rating/advisory organization in eight of these states (AR, AZ, IN, KY, MT, OK, TN, and TX); all except Arkansas have adopted the ODG Formulary. While Arizona adopted the ODG Formulary, preauthorization is not required.

- Post-reform changes in utilization of N-drugs, which require prior authorization, were mixed among the three states. For example, while there was a significant post-reform decline in N-drug utilization in Indiana and moderate post-reform decline in Kentucky, N-drug utilization increased slightly in Montana.
- Opioid utilization declined between 8% and 16% in the three states in the post-reform period; however, greater declines in opioid utilization were observed in nonformulary states for the same period.

KEY FINDINGS—CONTINUED IMPLEMENTATION EFFECTS (AZ, TN)

- Overall drug costs decreased in each of the subsequent post-reform periods for both states. Overall cost declines were driven by decreased utilization of drugs, with a more significant decline in the utilization of N-drugs relative to Y-drugs, which do not require prior authorization.
- Opioid utilization declined by more than 20% in each post-reform period for both states; however, similar declines in opioid utilization were observed in nonformulary states for the same periods.
- Utilization of topicals continued to decrease in Tennessee in the post-formulary periods while the share of topicals increased in Arizona.

BACKGROUND

The use of drug formularies has grown in recent years. Early formulary adopters such as Ohio, North Dakota, and Washington relied on proprietary state-specific closed formularies. In more recent years, however, there has been increased interest in the ODG Formulary as a tool to limit the impact of prescription drugs on WC.

The ODG Formulary is a detailed list of prescription drugs that are frequently used in the treatment of injured workers. Within this list, there is a status indicator that identifies whether each drug requires prior authorization. Drugs with a status indicator of “N” (N-drugs) require prior authorization by the employer or workers compensation insurer, while drugs with a status indicator of “Y” (Y-drugs) do not require prior authorization.⁴ As will be described in a later section, states differ with respect to authorizations required for drugs that are not on the formulary (NA-drugs). Additional information on NA-drugs is included in Appendix A.

The ODG Formulary is often accompanied by evidence-based treatment guidelines (the ODG Guidelines) to be used by the physician in treating injured workers. The use of the ODG Guidelines is intended to serve as a complement to the formulary in guiding physicians when prescribing.

Early adopters of the ODG Formulary included Texas (2011) and Oklahoma (2014), followed by Arizona and Tennessee (2016), Indiana (2018) and, most recently, Kentucky and Montana (2019). As more states contemplate adoption of a formulary, stakeholders are looking to better understand the possible cost and utilization impacts of such implementation on the WC system.

In 2019, NCCI published research on the initial cost impacts associated with the implementation of the ODG Formulary [1]. However, the small number of states available for study and the presence of nonformulary effects on drug utilization prevented us from making conclusive inferences from the data examined.

This report investigates post-implementation prescription drug experience for two different sets of states. We first look at three states which have recently adopted mandatory use of the ODG Formulary: Indiana, Kentucky, and Montana. For these states, we look at pharmacy utilization trends in each state before and after the formulary implementation. We then take a second look at two states, Arizona and Tennessee, where the initial impacts of formulary implementation were first studied by NCCI in 2019. For these states, we focus only on post-implementation trends to observe longer-term impacts of the drug formulary. Utilization of N-drugs is investigated in detail for each state using Fisher quantity indexes. Changes in prices and total cost of N-drugs are also examined.

⁴ While most states typically adhere to the approval status as determined by the ODG, individual states may provide flexibility in how strictly the formulary is applied. For example, although Arizona technically adopted the ODG Formulary along with their medical treatment guidelines, preauthorization is not required.

Here are two considerations regarding the results contained in this analysis:

- Data used for this report extends through Calendar Year 2019. Thus, due to the recency of the Indiana, Kentucky, and Montana formulary implementations, post-reform data does not fully reflect the longer-term impacts of the ODG Formulary on prescribing patterns.
- The findings in this report are largely observational, rather than inferential. To the extent possible, post-reform experience in each state is compared against a control group of nonformulary states to isolate any effects specific to the ODG Formulary. However, there are several confounding factors that could not be controlled for, preventing statistically rigorous inferences. Such factors include:
 - Impacts of other legislative changes affecting the WC system, such as House Bill 2 in Kentucky and Senate Bill 200 in Tennessee
 - The degree to which settlement of future medical benefits⁵ occurs in each state
 - The presence and effectiveness of nonformulary prescription drug management measures, such as fee schedules, required use of generic drugs, pharmacy benefit managers, and medical provider networks
 - Restrictions on repackaging and physician dispensing of prescription drugs
 - Types of injuries and the associated severity

DATA

The data source used in this report is NCCI's Medical Data Call (MDC). The MDC is a database of paid medical transactions reported by all WC carriers that write at least 1% of the market share in any one state for which NCCI provides ratemaking services. Medical transactions are reported for each WC claim until the claim is closed or until 30 years from the accident date. However, lump-sum payments or payments in bulk are not systematically reported, and self-insured data is not included.

MDC data used in this report is subject to the following limitations:

- Services provided in Calendar Years 2016 to 2019
- NCCI states except Arkansas, Texas, and Oklahoma⁶
- Drug transactions reported with a valid National Drug Code (NDC) or with a code indicating a compound drug

The appropriate status indicator (Y or N) for each prescription drug is identified based on Appendix A of the ODG Formulary and/or NDC Crosswalk, both in effect as of March 2021.⁷ The NDC Crosswalk, as provided by the ODG, provides a list of NDCs along with drug class, generic name, brand name, drug strength, and formulary status. NCCI reviewed drugs whose status had changed during the time frame studied, as well as those drugs that either did not appear on the formulary or whose NDC did not appear on the crosswalk (i.e., NA-drugs). This review resulted in the following:

- The most significant change in formulary status occurred for certain formulations of Diclofenac Sodium (i.e., gel and delayed release) whose status was changed from "N" to "Y" in 2018. To avoid misinterpreting the impact of the formulary due to midterm changes in drug status, a status of "Y" is used for these formulations of Diclofenac Sodium for all time frames in this analysis.
- There are certain drugs whose formulary status can either be "N" or "Y," depending on the diagnosis and/or reason for prescribing. Because there is no sufficient data to determine the status for any specific observation, NCCI is excluding these drugs from this analysis. These drugs account for between 1.3% (Indiana) and 3.5% (Montana) of total drug payments for the states and time periods included in this analysis.

⁵ Lump-sum payments are not reported in NCCI's Medical Data Call. In states where a significant portion of medical benefits are paid as lump-sum settlements, the data available for this report is censored. Indiana allows the settlement of medical benefits. Tennessee, Kentucky, and Montana permit settlement of future medical benefits with some exceptions and/or restrictions. Arizona historically did not permit medical settlements, but recent legislation has eased this restriction.

⁶ AK, AL, AZ, CO, CT, DC, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MD, ME, MO, MS, MT, NC, NE, NH, NM, NV, OR, RI, SC, SD, TN, UT, VA, VT, and WV. AR, TX, and OK are excluded due to implementation of mandatory closed formularies prior to, or during, the period studied. IN and NC are independent bureau states.

⁷ The ODG Formulary and NDC Crosswalk are both regularly updated. Drug statuses contained in this report are from the ODG Formulary and NDC Crosswalk as of 3/31/2021. While some metrics could change over time due to changes in status for certain drugs between updates to the formulary, only a minimal proportion of drug scripts were affected by a change in status indicator during the period studied for this report (except where noted).

- Drugs that were not on the formulary or are not in the NDC Crosswalk are referred to as “NA-drugs.” The total payments for drugs identified as “NA-drugs” increased significantly over the time periods studied (SY 2016 to SY 2019) accounting for a relatively high percentage of total prescription drug costs in SY 2019. For the most recent post-reform period in each state, the percent of drug costs associated with “NA drugs” was approximately 34% for Arizona, 29% for Tennessee, 39% for Indiana, 35% for Kentucky, and 32% for Montana. These percentages were the highest of any other previous time period for each state.
- In this analysis, certain information (e.g., formulary status for comparable drug and strength, drug formulation, etc.) was used to assign a status of “Y” or “N” to certain “NA-drugs” in each state. The drugs whose status was estimated via this approach accounted for approximately 70% of the payments for such “NA-drugs” over the states and periods being studied. Status for the remaining drugs (i.e., those accounting for approximately 30% of payments for “NA-drugs”) was based on the following guidelines for such drugs:
 - Kentucky and Montana both require prior authorization for drugs not on the formulary
 - Tennessee treats any classes of drugs that are not listed or are not specifically called out in the regulations as “Y” drugs.
 - Arizona and Indiana treat drugs that are not on the formulary as “Y” drugs since there is no requirement for prior authorization.

See Appendix A for a list of the top 25 “NA-drugs” based on paid amounts in the states and time frames studied as part of this analysis, along with the rationale for how the status for each drug was determined.

Additionally, for drug formulations that were identified as powders (POW), it was assumed that these were used for compounding and were assigned a status of “N” in all states (i.e., prior authorization was needed in all such cases).

METHODOLOGY

Throughout this analysis, prescription drug experience in the study states is compared against all NCCI states without a mandatory closed formulary during the various time periods studied. Various metrics will be observed to help understand the impact of the drug formulary in each state. The following are some of the terms and metrics that are used:

- **Active Claim**—A workers compensation claim for which there is at least one medical service provided during a specified time period.
- **Fisher Index**—The index used to measure price and utilization changes between periods. This is constructed from Paasche and Laspeyres indexes. See Appendix B for more info on these indexes.
- **Mix Intensity**—A measurement to reflect changes in the mix of drugs. Includes changes in the number of units and mix of prescription drugs (e.g., Oxycontin® versus Ibuprofen).
- **Price change**—The portion of the total cost change that can be attributed to changes in prescription drug prices of the drugs relative to the previous time period. The change in prices is computed as the difference between the change in costs per claim and the change in utilization of prescription drugs.
- **Service Year**—The year in which a medical service was provided.
- **Utilization change**—The change in intensity of prescription drug use. The change in utilization includes changes in the quantity (number of prescriptions) per claim and the impact of changes in the mix of prescription drugs (e.g., from previously used prescription drugs to alternatives).

To analyze changes in prescribing patterns over time resulting from the formulary implementation, post-implementation changes are also compared to preexisting trends within the state. To establish a baseline for comparison, statistics contained in this report are calculated in one of two ways:

- For Indiana, Kentucky, and Montana, a pre-formulary period is used as a baseline, which is compared against the pre-implementation and post-implementation periods.
- For Arizona and Tennessee, the initial post-implementation period is used as the baseline, which is then compared to subsequent post-reform time frames that are further removed from the initial date of implementation.
- For the nonformulary states,⁸ the drug status used is the same as the state being studied. For example, in the Tennessee analysis, because topicals require prior authorization (i.e., an “N-drug”) in Tennessee, preauthorization is also assumed for topical drugs for nonformulary states in the Tennessee analysis. For the analyses for Arizona, Indiana, Kentucky, and Montana, the authorization status for topicals for nonformulary states is what is indicated by the formulary.

To avoid any seasonal effects in the nature of injuries or prescribing patterns, corresponding calendar months are observed for the pre- and post-reform periods.

Once the timelines are established, prescription drug data is aggregated by period, state grouping, and derived status. The analysis, which was conducted separately for each state, begins with an exploration of price and utilization trends over time among prescription drugs. Price and utilization are measured by Fisher indexes (see Appendix B for further explanation of the Fisher price and utilization indexes). Changes in prescribing patterns are compared during the aforementioned time periods by state and are compared to the baseline period.

During the time periods studied in this report, several factors other than the ODG Formulary were likely to have affected trends in prescribing patterns, including:

- Increased awareness of the opioid crisis and corresponding attempts to lessen opioid use in the WC system
- Greater use of pharmacy benefit managers
- Restrictions on physician-dispensing of prescription drugs

⁸ Nonformulary states include AK, AL, CO, CT, DC, FL, GA, HI, IA, ID, IL, KS, LA, MD, ME, MO, MS, NC, NE, NH, NM, NV, OR, RI, SC, SD, UT, VA, VT, and WV.

- The average maturity of active claims⁹
- The nature and severity of injuries
- Legislative changes to benefit levels or compensability standards
- Changes in future medical benefit settlement patterns

When determining how a formulary is applied in a particular state, it is also important to understand that there are several stakeholders involved when determining the need for preauthorization of certain drugs. These stakeholders, each of whom may apply the formulary differently, include employers, payors (e.g., insurers), and pharmacy benefit managers (PBMs). For example:

- While a formulary cannot be applied more restrictively as per the preferred drug status on the formulary, a payor may decide to apply the formulary less restrictively and may therefore authorize certain “N” drugs depending on certain circumstances (e.g., acute versus chronic injury).
- Additionally, payors may also seek prior authorization for certain drugs that are not on the formulary (NA-drugs) despite state guidance that prior authorization is not required, depending on the circumstances of the claim.

For purposes of this analysis, however, state guidance (or interpretation of such guidance) is being assumed. Any differences in the authorization of certain drugs based on the formulary versus what occurs in practice are not likely to affect the overall trends as described in this research but may affect the distribution between N-drugs and Y-drugs. For example, Voltaren® gel (or the generic form, Diclofenac Sodium gel) has a status of “Y” on the formulary, is treated as a preferred first-line treatment and, as such, does not require prior authorization. However, Tennessee’s rules state that “topical and compound drugs require prior authorization regardless of status on the formulary.” Voltaren® gel (and its generic equivalent, Diclofenac Sodium gel) are treated as “N” drugs in Tennessee for purposes of this research.

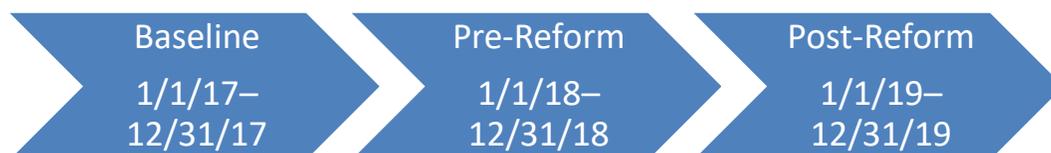
⁹ Claim maturity is important because a WC claim receives a changing mix of medical services over the claim’s life cycle. Medical care immediately following an accident is more likely to focus on return to work; the focus shifts to post-acute or ancillary care later after the worker reaches medical stability. Drugs constitute over 40% of WC medical payments 10 or more years after injury.

DATA ANALYSIS—INDIANA

Senate Bill 369 amended the Indiana Code to require the use of the ODG Formulary in Indiana. The applicability of the formulary in Indiana is as follows:

- Reimbursements for N-drugs required prior authorization beginning January 1, 2019
- If an employee began use of an N-drug before July 1, 2018, reimbursement was permitted for the N-drug until January 1, 2020
- All compound medications were classified as “N” class drugs effective January 1, 2019
- Indiana did not adopt the ODG treatment guidelines in conjunction with the ODG Formulary

The timeline for Indiana is relatively straightforward: the formulary first applies to a subset of prescriptions on or after January 1, 2019, so the subsequent calendar year of data is used as the post-reform period; the year prior to January 1, 2019, represents the pre-reform period, and the year before that forms the baseline period.



The analysis of Indiana experience begins with a summary of a number of prescription drug price and utilization metrics in Indiana in Exhibit 1. There are several noteworthy observations from Exhibit 1:

- Almost all prescription drug utilization metrics decreased after the formulary implementation, continuing the decreases that had been observed prior to the formulary implementation
- The most notable post-formulary change was the 19% decline in the share of claims with at least one N-drug script
- The average prices for both Y-drugs and N-drugs decreased slightly, although both had decreased prior to the formulary implementation
- The average price per script for all drugs combined decreased due to a change in mix of drugs toward less-costly Y-drugs

Exhibit 1
KEY OBSERVATIONS—INDIANA

	Baseline	Pre-Reform	Post-Reform	Percent Change	
				Baseline to Pre-Reform	Pre-Reform to Post-Reform
Share of Claims With at Least One Prescription Drug	33.3%	32.6%	30.8%	-2%	-6%
Share of Claims With at Least One N-Drug Script	3.3%	3.0%	2.4%	-9%	-19%
Share of Claims With at Least One Y-Drug Script	32.9%	32.3%	30.5%	-2%	-5%
Scripts per Claim With at Least One Prescription Drug	3.4	3.3	3.3	-4%	—
N-Drug Scripts per Claim With at Least One N-Drug Script	3.0	3.0	2.9	+1%	-4%
Y-Drug Scripts per Claim With at Least One Y-Drug Script	3.1	3.0	3.0	-4%	+1%
Price per Script	\$93	\$90	\$86	-4%	-5%
Price per N-Drug Script	\$289	\$261	\$252	-10%	-3%
Price per Y-Drug Script	\$74	\$74	\$73	-1%	-1%
Drug Cost per Claim With at Least One Prescription Drug	\$319	\$295	\$281	-7%	-5%

Based on MDC data for prescriptions paid between 1/1/17 and 12/31/19

The next two subsections will address the following:

- Changes in drug costs
- Changes in drug utilization

CHANGES IN DRUG COSTS—INDIANA

Exhibit 2 shows the changes in overall drug costs in Indiana from the baseline to pre-reform period and from the pre-reform to post-reform period, as well as a breakdown of the overall drug cost changes into price and utilization components. Changes in drug prices in Indiana, adjusted for the mix of prescriptions, decreased slightly from the pre-reform to post-reform period. Note that for changes in this section which reference the nonformulary states, the drug status used is the same as that used for Indiana. Along with a 2% decrease in average drug price in Indiana during the post-reform period, there was a 10% decrease in total drug costs during the post-reform period; this decrease in total drug costs was attributable to a 9% decrease in overall drug utilization. Note that in Exhibit 1, a 5% decrease in average price per script was observed between the pre-reform and post-reform periods. This is due to relatively more expensive drugs being replaced by relatively less expensive substitutes; adjusted for substitution, drug prices decreased by 2%.

Exhibit 2

Changes in Overall Drug Costs, Prices, and Utilization—Indiana

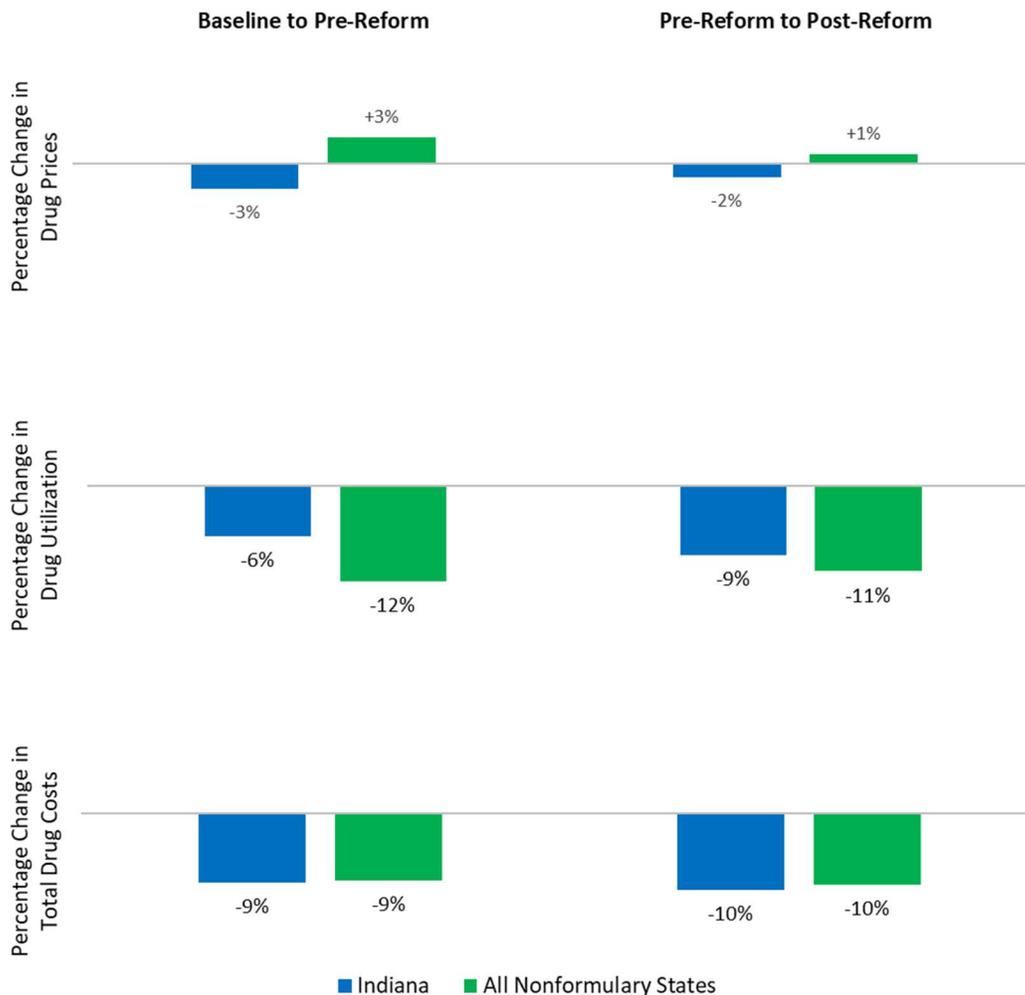
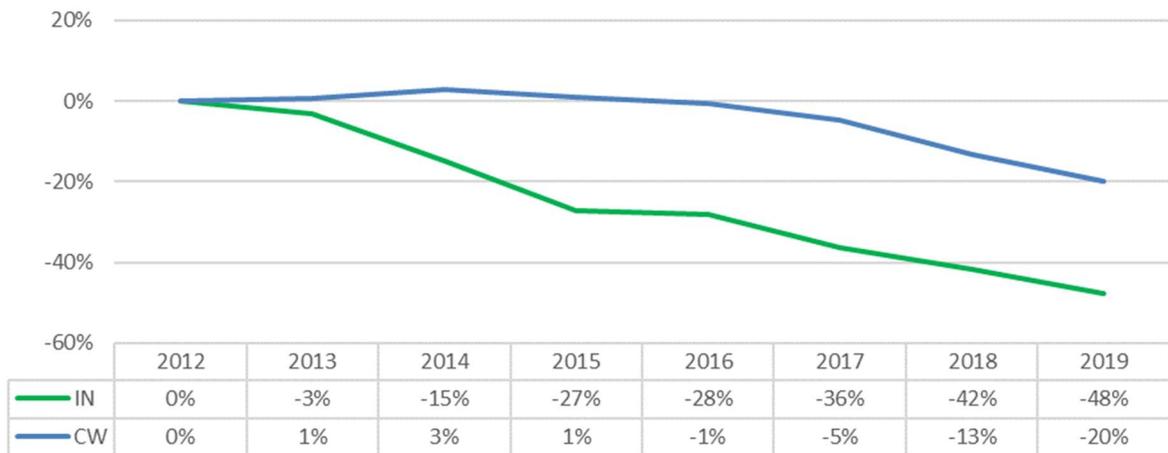


Exhibit 3 shows an index which measures the cumulative change in the paid drug amount per active claim in Indiana across Service Years (SYs). Specifically, the index measures the relative change in the paid drug amount per active claim in Indiana for a particular SY indexed to SY 2012. Unlike the changes shown above, the values underlying this index are not adjusted for changes in utilization or mix of drugs. While the index indicates that drugs paid per active claim in Indiana had decreased since 2012, the overall decrease observed in Indiana since 2015 is consistent with the countrywide¹⁰ decline in drugs paid per active claim during the same time frame. Overall, the average drug payment per active claim in Indiana is 48% lower for Service Year 2019 than for Service Year 2012.

Exhibit 3

Change in Drugs Paid per Active Claim by SY — Indiana
Indexed to Service Year 2012



CHANGES IN DRUG UTILIZATION—INDIANA

Because one of the main purposes of a drug formulary is to introduce evidence-based guidelines for prescribing drugs in the WC system, it is instructive to look at post-formulary implementation changes in utilization of prescription drugs, particularly those that require prior authorization (i.e., N-drugs). During the pre-reform period, N-drugs constituted 8% of all prescription drug scripts and 25% of prescription drug payments in the Indiana WC system—the lowest percentages for states included in this analysis.

¹⁰ Countrywide data includes AK, AL, AR, AZ, CO, CT, DC, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MD, ME, MO, MS, MT, NC, NE, NH, NM, NV, OK, OR, RI, SC, SD, TN, TX, UT, VA, VT, and WV.

Exhibit 4 shows the percentage change in utilization between time periods, with observed decreases for Indiana and all nonformulary states across all time periods. The rate of decrease for N-drug utilization accelerated from the pre-reform to post-reform period, with N-drug utilization in Indiana decreasing by a greater amount compared to the decline observed in nonformulary states. Even though the formulary was not applicable by rule for refills of N-drugs prescribed in Indiana prior to July 1, 2018, we observe a significant post-formulary drop in N-drug use, consistent with previous findings that the formulary may have been used by practitioners regardless of the date of applicability.

Exhibit 4

The Decrease in N-Drug Utilization Accelerated After Implementation

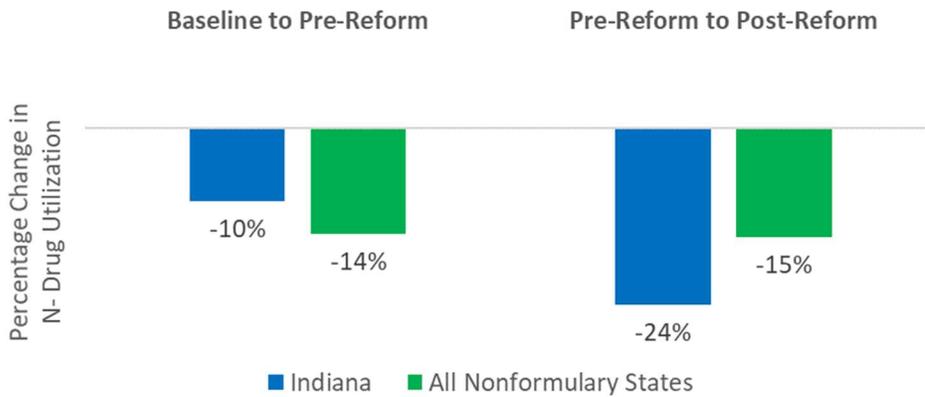
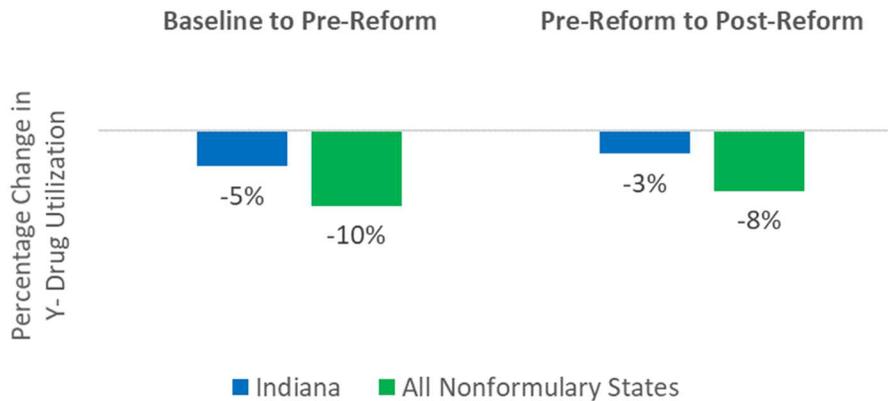


Exhibit 4 suggests that the ODG Formulary implementation intensified the pre-reform downward trend in N-drug utilization in Indiana. As N-drugs are not recommended by the ODG Formulary and require prior authorization, this result is expected. However, it is also possible that there was an overall shift in utilization patterns for all drugs independent of the formulary implementation. To evaluate this possibility, trends in Y-drug utilization must also be investigated. Exhibit 5 below shows changes in overall Y-drug use.

As with N-drugs, Y-drug utilization shows a downward trend, though the rate of decrease is lower than for N-drugs and is lower than the decrease in Y-drug utilization in nonformulary states.

Exhibit 5

Y-Drug Utilization Shows a Small Post-Implementation Decline



Having observed the changes in utilization for both N-drugs and Y-drugs in Indiana, the next step is to break down N-drug utilization into components because N-drugs are thought to be most impacted by the use of a drug formulary. As described in Appendix B, overall utilization of N-drugs is tracked by a Fisher index adjusted for changes in claim volume. Changes in this utilization index can be further broken down into three components:

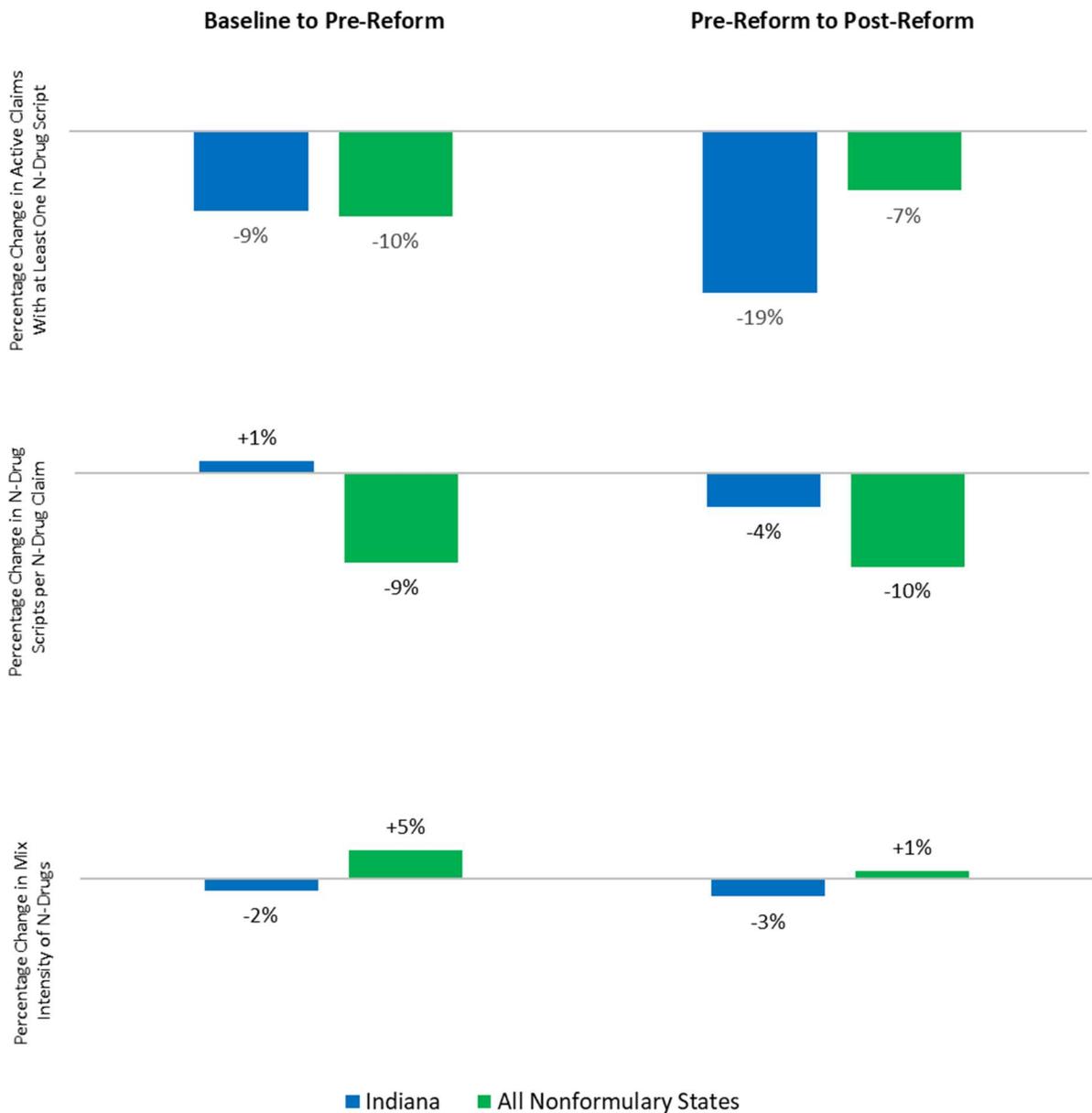
- Change in the number of active claims receiving at least one N-drug script
- Change in the average number of N-drug scripts for claims with at least one N-drug script
- Shifts within the mix of N-drugs prescribed

Exhibit 6 shows the breakdown of the three components of utilization. The following observations regarding utilization components may be made:

- There was a marked decrease in the share of active claims receiving an N-drug script during the post-reform period; this was the main contributor to the significant post-reform decrease in overall N-drug utilization noted in Exhibit 4
- The average number of N-drug scripts per claim with at least one N-drug in Indiana declined during the post-reform period, although the decrease was lower than that observed for nonformulary states
- Mix intensity of N-drugs declined in Indiana both before and after formulary implementation, with comparable changes in both periods

Exhibit 6

N-Drug Utilization Shift Was Driven by a Decrease in Active Claims With at Least One N-Drug Script



Implementation of a closed formulary could potentially impact any of the three utilization components, revealing potential variation in the way that the formulary is used. For example,

- A large decrease in the proportion of active claims receiving at least one N-drug could indicate that the formulary is being used as a “blanket” tool to redirect treatment away from N-drug usage
- A decrease in the average number of N-drug scripts per claim with an N-drug could indicate that either
 - The formulary is being used as a tool to gradually wean injured workers away from N-drugs, or
 - Insurers are granting prior authorization more readily for the first fills of an N-drug but exercising greater restraint in authorizing subsequent refills
- A shift in the mix of N-drugs prescribed could indicate that insurers are providing prior authorization more readily for some N-drugs than for others

To illustrate the changing N-drug utilization patterns in Indiana, Exhibit 7 shows the top 5 N-drugs by number of scripts during the pre-reform period along with utilization statistics. The ranks of these top 5 N-drugs had minimal movement in the post-reform period, demonstrating the stability in the mix of N-drugs. The formulary implementation does not appear to have had a disproportionate effect on any of the top N-drugs. Because the formulary did not yet apply to refills of N-drugs prescribed prior to July 1, 2018, in Indiana, the results in Exhibit 7 could be impacted by the formulary’s limited applicability to drugs prescribed between January 1, 2019, and December 31, 2019.

Lidocaine is a prime example of the minimal changes among the top N-drugs (by number of scripts) pre-reform as it retains the same rank post-reform with no change to the number of claims receiving the drug (per 1,000 active claims) and minimal change to the average number of scripts per claim receiving at least one script.

Exhibit 7

Changes in N-Drug Utilization Were Relatively Uniform for Top Indiana Drugs

Drug Name	Pre-Reform Statistics			Post-Reform Statistics		
	Claims Receiving Drug per 1,000 Active Claims ¹¹	Average Scripts per Claim Receiving Drug	Rank (By Script Count)	Claims Receiving Drug per 1,000 Active Claims ¹²	Average Scripts per Claim Receiving Drug	Rank (By Script Count)
Lidocaine	3.2	2.2	1	3.2	2.0	1
Diazepam	3.0	1.7	2	2.9	1.6	2
Trazodone Hydrochloride	1.2	4.4	3	1.0	4.2	3
Topiramate	1.0	4.2	4	0.8	3.6	6
Ketorolac Tromethamine	3.7	1.1	5	2.2	1.1	9

¹¹ There were 80,187 active claims in the pre-reform period for Indiana.

¹² There were 76,729 active claims in the post-reform period for Indiana.

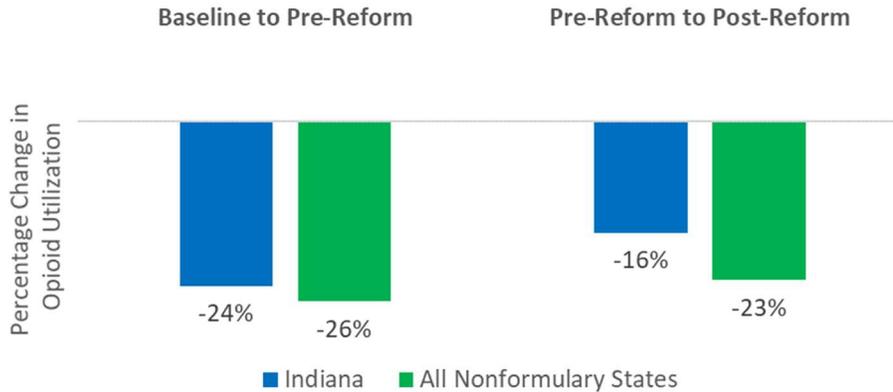
In recent years, stakeholders in the WC system have become increasingly cognizant of the nationwide opioid epidemic and have taken steps to limit the use of opioids within the WC system. As the ODG Formulary is intended to address dispensing of potentially harmful medications in the WC system, it has been suggested that the ODG Formulary may have a role in curbing opioid utilization. However, the composition of opioids prescribed in Indiana suggests that the ODG Formulary, used in isolation, may have a limited effect on opioid utilization in the Indiana WC system.

- Of the top 10 drugs in Indiana by script count during the pre-reform period, three¹³ were opioids; all three of these top opioids were Y-drugs
- In total, prior to formulary implementation, 94% of opioid scripts in Indiana were for Y-drugs; Y-drugs constituted 74% of opioid utilization as measured by average morphine milligram equivalents (MME)¹⁴ prescribed per active claim

Exhibit 8 shows a significant decline in the overall utilization of opioids in Indiana both pre-reform and post-reform, although at a lower rate than in nonformulary states in both periods.

Exhibit 8

Opioid Utilization Decreased Significantly in Indiana



Prior to formulary implementation, opioids represented 13.2% of total drugs costs in Indiana. In the post-reform period, opioids represented approximately 11.6% of total drug costs—a decrease of about 12%.

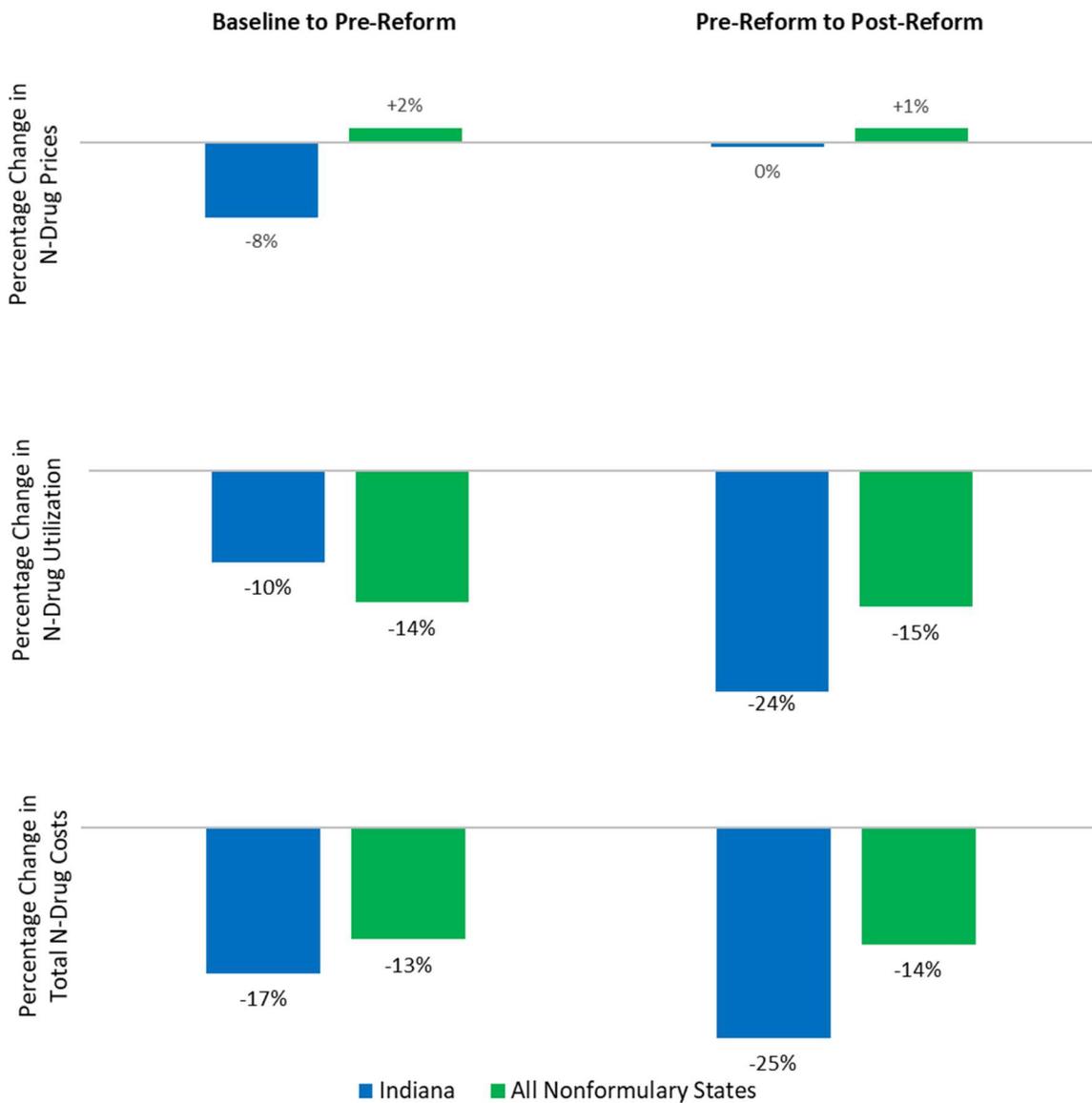
¹³ Three drugs—hydrocodone bitartrate-acetaminophen, tramadol HCl, and oxycodone HCl-acetaminophen—accounted for 86% of opioid scripts during the pre-reform period.

¹⁴ The CDC provides a way to convert daily—or hourly—doses of opioids to an equivalent daily dose of morphine by assigning a conversion factor to each type of drug, thus deriving the Morphine Milligram Equivalents (MME) for any opioid prescription, based on the number of units (pills, for example) prescribed and the drug formulation. One milligram per day of oxycodone, for instance, is assigned an MME factor of 1.5; one milligram per day of codeine, on the other hand, is assigned an MME factor of 0.15.

Exhibit 9 breaks down overall N-drug cost changes into price and utilization components. Changes in prices paid in Indiana for N-drugs, adjusted for the mix of prescriptions, were unchanged in the post-reform period. However, there was a 25% decrease in total N-drug costs during the post-reform period; this decrease was attributable to a 24% decrease in N-drug utilization. Note that in Exhibit 1, a 3% decrease in average N-drug prices was observed between pre-reform and post-reform periods. This is due to relatively more expensive drugs being replaced by relatively less expensive substitutes; adjusted for substitution, N-drug prices were unchanged.

Exhibit 9

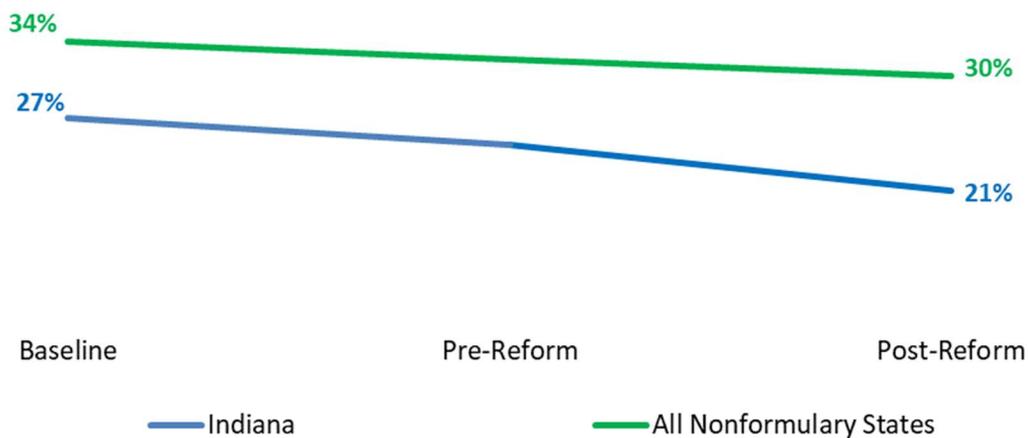
Post-Reform Decreases in Indiana N-Drug Costs Were Driven by Decreased Utilization of N-Drugs



As seen in Exhibit 10, the decrease in the N-drug share of prescription payments in Indiana tracked closely with the nonformulary states from the baseline period to the pre-reform period, and this rate of decrease in Indiana accelerated after formulary implementation. The post-reform decline in N-drug utilization identified in Exhibit 4 accelerated the downward trend in Indiana N-drug cost share. Overall, N-drugs constituted 21% of prescription drug costs in Indiana after the formulary implementation; this was the lowest percentage of N-drugs among the states studied.

Exhibit 10

Post-Implementation, N-Drug Share of Prescription Costs Declined More Markedly in Indiana Than in Nonformulary States



The implementation of the ODG Formulary in Indiana appears to have resulted in a continued decline in total drug costs that had been observed even prior to the formulary implementation. Overall, the significant decline in N-drug utilization was the main driver behind the post-reform decline in total drug costs in Indiana. However, to the extent that refills of N-drugs for older claims may not yet have been impacted by the formulary, the full impact of the formulary may not be recognized until data for drugs prescribed after January 1, 2020, can be observed.

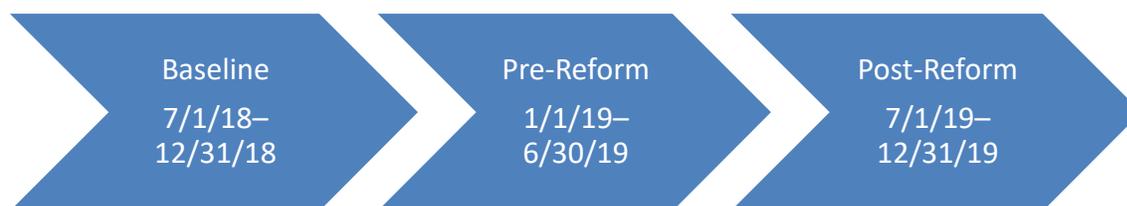
DATA ANALYSIS—KENTUCKY

In Kentucky, for claims arising on or after January 1, 2019, the ODG Formulary is applicable to drugs prescribed or dispensed on or after July 1, 2019. For claims arising before January 1, 2019, the application of the ODG Formulary depends on whether the prescription is a refill:

- For a prescription that is not a refill, the ODG Formulary is applicable to drugs prescribed or dispensed on or after July 1, 2019
- For a refill prescription initially prescribed before July 1, 2019, the ODG Formulary is applicable to drugs prescribed and dispensed on or after January 1, 2020.
- ODG treatment guidelines were also selected for use in Kentucky, which was intended to serve as a complement to the formulary in guiding physician prescribing practices

In addition, administrative regulations promulgated by the Kentucky Department of Workers' Claims specify that prior authorization is required for any prescription drug not listed on the formulary (NA-drugs). This treatment differs from rules in other states that have implemented the ODG Formulary in that NA-drugs typically would not require prior authorization.

The timeline for Kentucky is determined as follows: because the formulary first applies to a subset of prescriptions on or after July 1, 2019, the subsequent 6 months of calendar year data is used as the post-reform period; the 6 months prior to July 1, 2019, represents the pre-reform period, and the 6 months prior to that forms the baseline period.¹⁵



Potential distortions exist due to the enactment of Kentucky House Bill (HB) 2, which implemented significant changes to WC benefits applicable to accidents occurring after July 14, 2018. In particular, HB 2 terminates an employer's liability for medical treatment for all work-related permanent partial disability (PPD) claims after 780 weeks (15 years) from the date of injury or date of last exposure. This does not apply to PPD claims involving the amputation of limbs, loss of hearing, enucleation of an eye, loss of teeth, or permanent total or permanent partial paralysis for which medical treatment must continue for the duration of the claim. However, HB 2 permits medical treatment to continue beyond 780 weeks if the employee files a timely request and can demonstrate that continued medical treatment is reasonably necessary.

For purposes of this analysis, it is worth noting that the provisions of HB 2 would have no effect on current prescribing practices and would not impact the observations for any of the time periods being studied for Kentucky.

¹⁵ For Kentucky, we also reviewed the pre-formulary period from 1/1/18 to 6/30/18 to determine if there were any effects due to seasonality but did not observe any material differences in this time frame compared with the 7/1/18 to 12/31/18 period.

The analysis of Kentucky experience begins with a summary of several prescription drug price and utilization metrics in Kentucky in Exhibit 11. There are several noteworthy observations from Exhibit 11:

- Almost all prescription drug utilization metrics decreased between the pre-reform and post-reform periods.
- While the share of claims with at least one N-drug script decreased by 7% after formulary implementation, the impact was largely offset by a 5% increase in the N-drug scripts per claim with at least one N-drug script.
- The average drug cost per claim with at least one prescription drug declined by 9% after formulary implementation. This was due to a decline in the prices for N-drug scripts (–6%) and Y-drug scripts (–12%).

Exhibit 11
Key Observations—Kentucky

	Percent Change				
	Baseline	Pre-Reform	Post-Reform	Baseline to Pre-Reform	Pre-Reform to Post-Reform
Share of Claims With at Least One Prescription Drug	32.1%	33.3%	32.0%	+4%	–4%
Share of Claims With at Least One N-Drug Script	14.2%	14.7%	13.6%	+4%	–7%
Share of Claims With at Least One Y-Drug Script	27.9%	29.0%	28.0%	+4%	–4%
Scripts per Claim With at Least One Prescription Drug	7.2	6.7	6.7	–6%	–1%
N-Drug Scripts per Claim With at Least One N-Drug Script	4.3	4.0	4.2	–6%	+5%
Y-Drug Scripts per Claim With at Least One Y-Drug Script	5.9	5.6	5.5	–6%	–1%
Price per Script	\$153	\$148	\$135	–3%	–9%
Price per N-Drug Script	\$253	\$237	\$223	–7%	–6%
Price per Y-Drug Script	\$117	\$117	\$103	—	–12%
Drug Cost per Claim With at Least One Prescription Drug	\$1096	\$999	\$905	–9%	–9%

Based on MDC data for prescriptions paid between 7/1/18 and 12/31/19

The next two subsections will address the following:

- Changes in drug costs
- Changes in drug utilization

CHANGES IN DRUG COSTS—KENTUCKY

Exhibit 12 includes the changes in overall drug costs in Kentucky during the pre-reform and post-reform time frames, as well as a breakdown of the overall drug cost changes into price and utilization components. Changes in drug prices in Kentucky, adjusted for the mix of prescriptions, decreased by 1% in the post-reform period. Note that for changes in this section which reference the nonformulary states, the drug status used is the same as that used for Kentucky. While the average drug price in Kentucky decreased by 1% during the post-reform period, there was a 12% decrease in drug utilization which contributed to the 13% decline in overall drug costs. Also note that in Exhibit 11, a 9% decrease in average drug prices was observed between the pre-reform and post-reform period. This is due to relatively more expensive drugs being replaced by relatively less expensive substitutes; adjusted for substitution, drug prices decreased by 1%.

Exhibit 12

Changes in Overall Costs, Prices, and Utilization—Kentucky

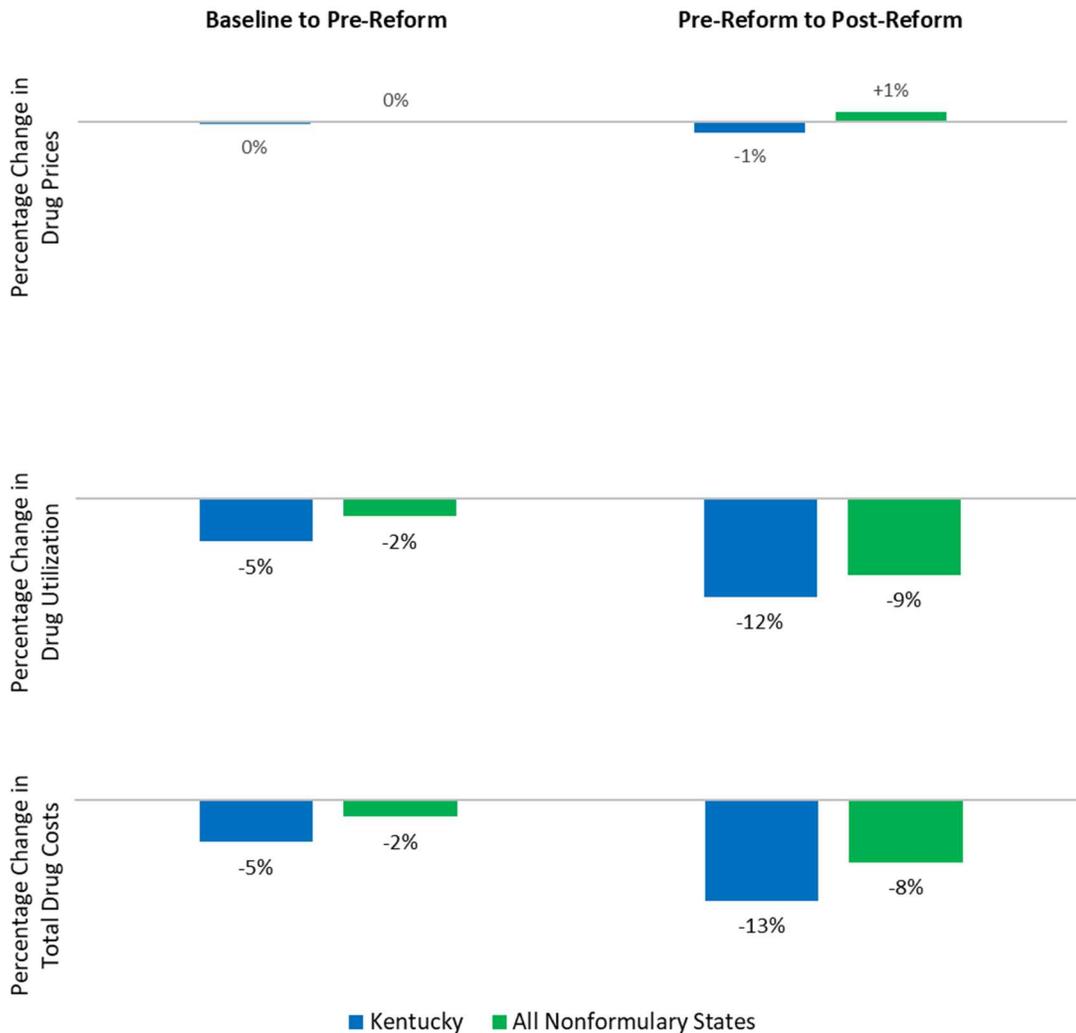
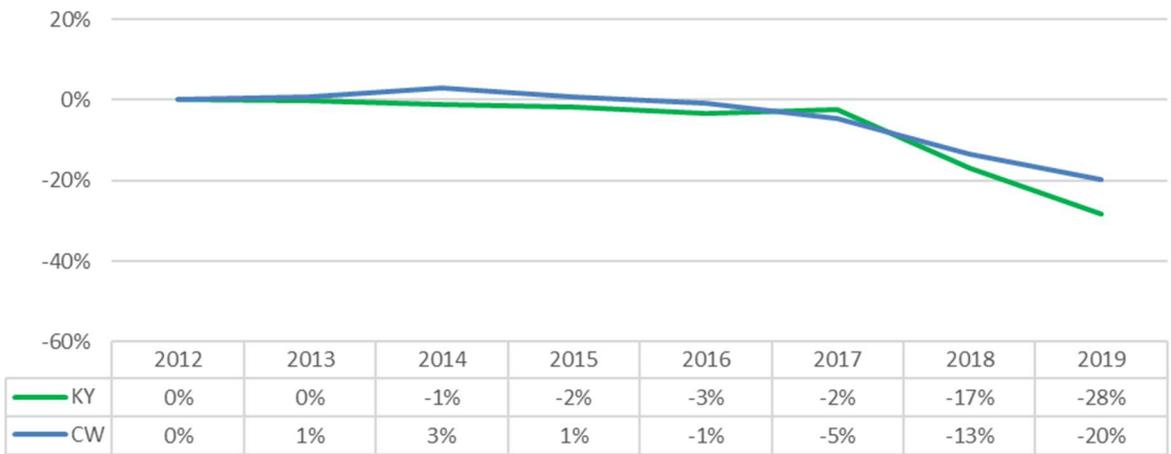


Exhibit 13 shows an index which measures the cumulative change in the paid drug amount per active claim in Kentucky across SYs. Specifically, the index measures the relative change in the paid drug amount per active claim in Kentucky for a particular SY indexed to SY 2012. Unlike the changes shown above, the values underlying this index are not adjusted for changes in utilization or mix of drugs. While we can observe that drugs paid per active claim had decreased significantly in Kentucky beginning in SY 2018, the drug formulary implementation in July 2019 appeared to have resulted in the continued decrease in paid amount per active claim. Overall, the average drug payment per active claim in Kentucky is 28% lower for Service Year 2019 than for Service Year 2012.

Exhibit 13

Change in Drugs Paid per Active Claim by SY — Kentucky
Indexed to Service Year 2012



CHANGES IN DRUG UTILIZATION—KENTUCKY

Because one of the main purposes of a drug formulary is to introduce evidence-based guidelines for prescribing drugs in the WC system, it is instructive to look at post-formulary changes in utilization for prescription drugs, particularly those that require prior authorization (i.e., N-drugs). During the pre-reform period, N-drugs constituted 26% of all prescription drug scripts and 42% of prescription drug payments in the Kentucky WC system. These are among the highest percentages for N-drug shares among the states studied and are likely influenced by Kentucky rules regarding the categorization of drugs that are not on the formulary as N-drugs.

Exhibit 14 shows the percentage change in overall N-drug utilization between time periods. This exhibit shows that N-drug utilization has decreased across all time periods and states included in the chart. The decrease in N-drug utilization in Kentucky represented a greater rate of decrease than in nonformulary states from the baseline period to the pre-reform period. However, the rate of decrease for N-drug utilization from the pre-reform to post-reform period in Kentucky was comparable to that observed in nonformulary states.

Exhibit 14

N-Drug Utilization in Kentucky Decreased in Pre- and Post-Reform Periods

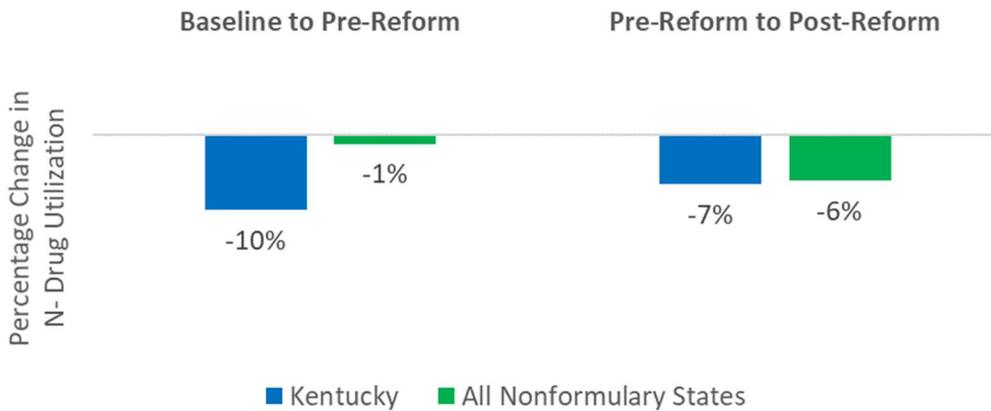
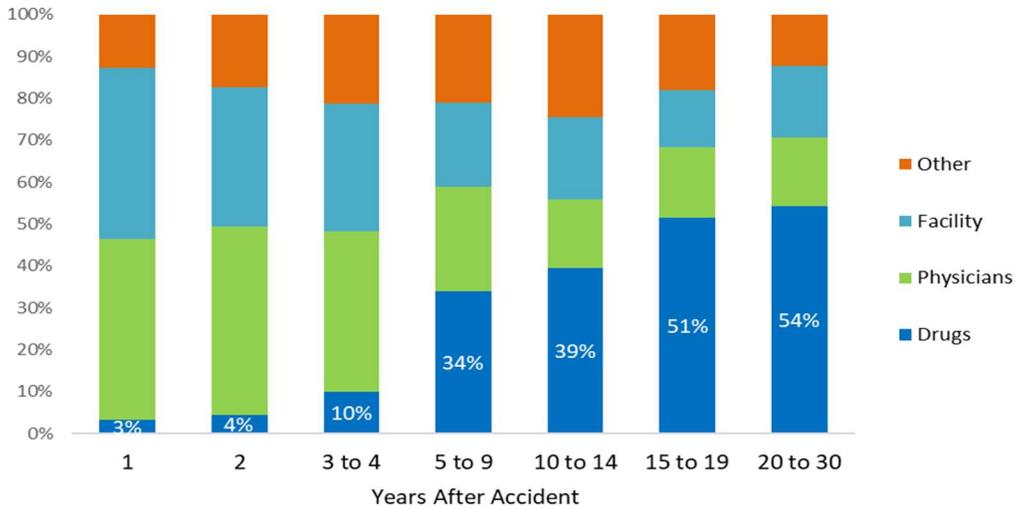


Exhibit 14 suggests that, in the short term, the ODG Formulary implementation did not have a significant impact on the downward trend in N-drug utilization in Kentucky. As N-drugs are not recommended by the ODG Formulary and require prior authorization, one might have expected a more dramatic decrease in N-drug utilization in the post-formulary time frame relative to what had been observed prior to implementation. However, the formulary did not yet apply to refills of N-drugs prescribed prior to July 1, 2019, in Kentucky, which may have impacted the results in Exhibit 14. In fact, almost 80% of drug payments in Kentucky for SY 2019 were for claims that were more than 3 years after the accident date.

As shown in Exhibit 15, the older the claim is, the greater the percentage of medical payments for prescription drugs—accounting for more than 50% of medical payments for Kentucky WC claims that are more than 15 years after the accident date. To the extent that refills of N-drugs for older claims were not yet being impacted by the formulary, the full impact of the formulary may not be recognized until data for drugs prescribed after January 1, 2020, can be observed.

Exhibit 15

Incremental Share of Medical Payments

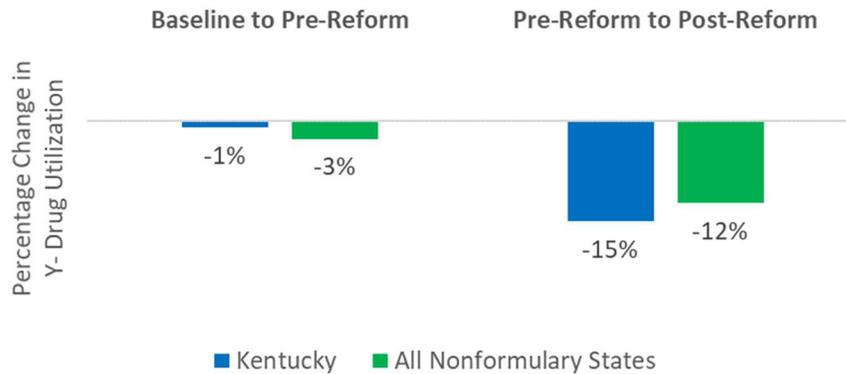


Based on MDC data for medical services in Service Year 2019

It is also possible that there was an overall shift in utilization patterns for all drugs independent of the formulary implementation. To evaluate this possibility, trends in Y-drug utilization are investigated. In Exhibit 16 below, Y-drug utilization shows a significant decrease in the post-reform time frame which followed a modest decrease prior to implementation. Overall, Kentucky experienced a slightly larger decrease in Y-drug utilization compared to that observed in nonformulary states for the post-reform period.

Exhibit 16

Y-Drug Utilization in Kentucky Decreased Significantly After Implementation

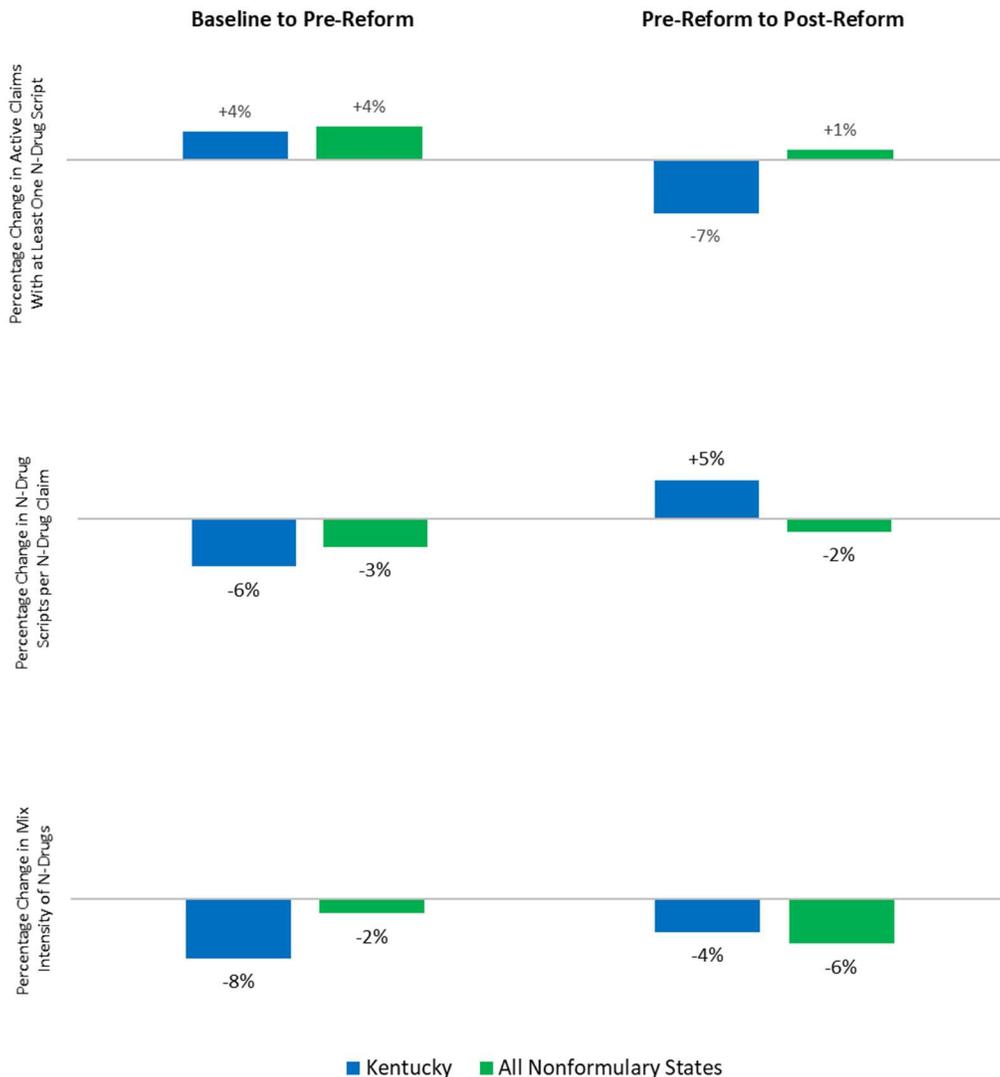


Having observed the changes in utilization for both N-drugs and Y-drugs in Kentucky, the next step is to break down N-drug utilization into components since N-drugs are thought to be most impacted by the use of a drug formulary. Exhibit 17 shows the breakdown of the three components of utilization. Several observations regarding utilization components may be made:

- While the share of active claims in Kentucky with an N-drug decreased by 7% in the post-reform period, it was partially offset by a 5% increase in the average number of N-drug scripts per claim with at least one N-drug
- Mix intensity of N-drugs showed a moderate decline in Kentucky, both before and after formulary implementation
- The moderate decrease in both the share of active claims receiving an N-drug script and the mix intensity of N-drugs during the post-reform period contributed to the post-reform decline in N-drug utilization noted in Exhibit 14

Exhibit 17

N-Drug Utilization Shift Was Driven by a Decrease in Claims Receiving an N-Drug and Decrease in Mix Intensity of N-Drugs



To illustrate the changing N-drug utilization patterns in Kentucky, Exhibit 18 shows the top 5 N-drugs by number of scripts during the pre-reform period along with utilization statistics. As we had observed earlier for the top 5 N-drugs in Indiana, the rankings of these top 5 N-drugs had minimal movement in the post-reform period, demonstrating the stability in the mix of N-drugs. The formulary implementation does not appear to have had a disproportionate effect on any of the top N-drugs. Because the formulary did not yet apply to refills of drugs prescribed prior to July 1, 2019, in Kentucky, the results in Exhibit 18 could be impacted by the formulary's limited applicability to drugs prescribed between July 1, 2019, and December 31, 2019.

The average number of prescriptions for each drug per claim receiving that drug remained relatively steady except for Oxycontin® which had a notable increase of 23% ($= 5.3 / 4.3 - 1$). However, the proportion of active claims receiving at least one script decreased across the board. As was the case in Indiana, Lidocaine is a prime example of the trend—the top N-drug (by number of scripts) pre-reform—as it retains the same rank post-reform with no change to the average number of scripts per claim receiving at least one script. However, there was a -13% ($= 10.5 / 12.1 - 1$) change in the average number of claims with a Lidocaine script.

Exhibit 18

Changes in N-Drug Utilization Were Relatively Uniform for Top Kentucky Drugs

Drug Name	Pre-Reform Statistics			Post-Reform Statistics		
	Claims Receiving Drug per 1,000 Active Claims ¹⁶	Average Scripts per Claim Receiving Drug	Rank (By Script Count)	Claims Receiving Drug per 1,000 Active Claims ¹⁷	Average Scripts per Claim Receiving Drug	Rank (By Script Count)
Lidocaine	12.1	2.7	1	10.5	2.7	1
Gabapentin	8.6	2.5	2	8.2	2.8	2
Oxycontin®	4.2	4.3	3	3.1	5.3	3
Trazodone Hydrochloride	5.2	3.4	4	4.2	3.6	5
Morphine Sulfate	4.3	4.1	5	3.5	4.4	4

¹⁶ There were 28,960 active claims in the pre-reform period for Kentucky.

¹⁷ There were 28,831 active claims in the post-reform period for Kentucky.

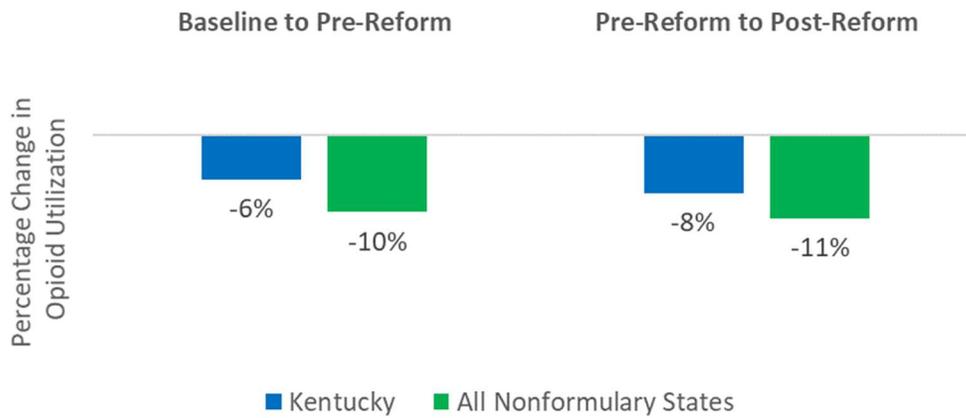
The composition of opioids prescribed in Kentucky suggests that the ODG Formulary, even when used in conjunction with the ODG treatment guidelines, may have a limited effect on opioid utilization in the Kentucky WC system.

- Of the top 10 drugs in Kentucky by script count during the pre-reform period, three¹⁸ were opioids; all three of these top opioids were Y-drugs
- In total, prior to formulary implementation, 86% of opioid scripts in Kentucky were for Y-drugs; Y-drugs constituted 66% of opioid utilization as measured by MME

Exhibit 19 shows the overall utilization of opioids in Kentucky declining at a slightly lower rate than in nonformulary states, both pre-reform and post-reform.

Exhibit 19

Decreases in Kentucky Opioid Utilization Were Slightly Lower Than in Nonformulary States



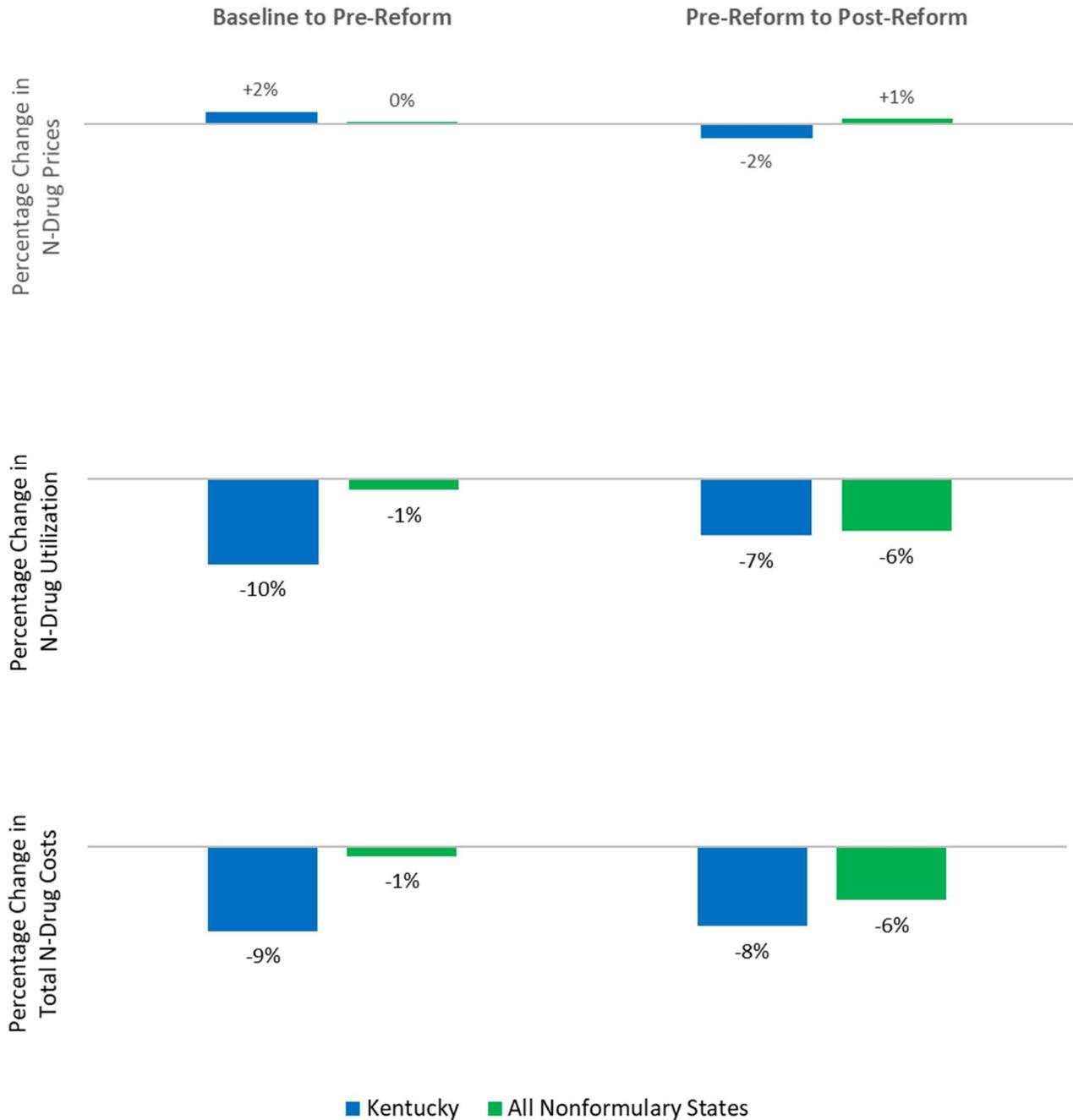
Prior to formulary implementation, opioids represented 21.1% of total drugs costs in Kentucky. In the post-reform period, opioids represented 20.6% of total drug costs. Given the moderate decline in opioid utilization as shown in Exhibit 19, one might have expected to see a larger decline in the share of opioids between the pre-and post-reform periods. However, while there was a moderate decline in the utilization of opioids in the post-reform period, these changes coincided with decreases in overall drug costs during the same time period, thus leading to a minimal change in the share of costs associated with opioids.

¹⁸ Three drugs—hydrocodone bitartrate-acetaminophen, oxycodone HCl-acetaminophen, and tramadol HCl—accounted for 76% of opioid scripts during the pre-reform period.

Exhibit 20 breaks down overall N-drug cost changes into price and utilization components. Prices paid for N-drugs in Kentucky, adjusted for the mix of prescriptions, decreased by 2% in the post-reform period. This decrease, along with a 7% decrease in N-drug utilization, contributed to an 8% decrease in overall costs of N-drugs. Note that in Exhibit 11, a 6% decrease in average N-drug prices was observed. This may be due to relatively more expensive drugs being replaced by relatively less expensive substitutes; adjusted for substitution, N-drug prices decreased by 2%.

Exhibit 20

Post-Reform Decreases in Kentucky N-Drug Costs Were Driven by Decreased Utilization of N-Drugs

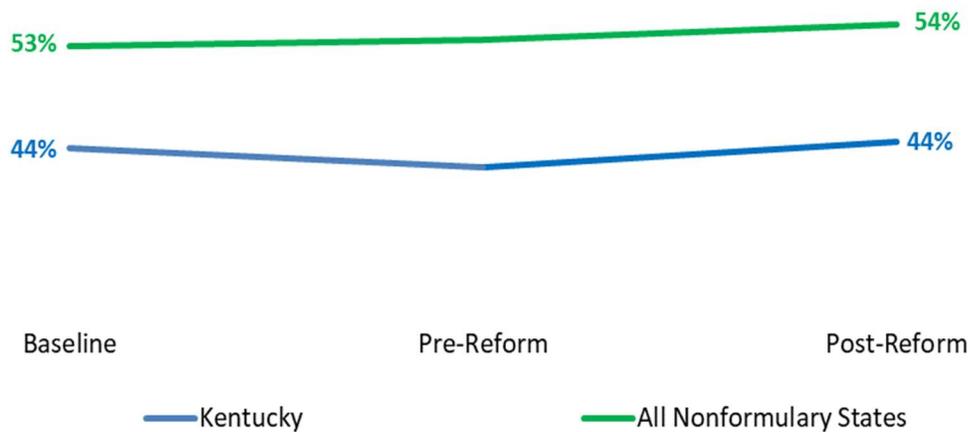


While there was a moderate decrease in post-reform N-drug utilization as observed in Exhibit 14, this did not appear to affect the percentage of prescription drug costs attributable to N-drugs in Kentucky. As seen in Exhibit 21, N-drugs constituted 44% of prescription drug costs in Kentucky after the formulary implementation, which was unchanged from the 44% baseline percentage. This high share of N-drug costs is likely attributable to the preauthorization needed in Kentucky for drugs not on the formulary, as well as limited applicability of the formulary to refills (until 1/1/2020), resulting in a greater percentage of drugs being categorized as N-drugs in Kentucky.

Note that this report describes only the short-term impact of the ODG Formulary. In the long-term, there may be a decrease in the N-drug utilization as the formulary is applied more generally in Kentucky. It is clear that there has not yet been as large a shift away from N-drugs in the Kentucky WC system as was observed after the formulary implementation in several other states; thus, comparisons to post-reform experience in other states should be made with caution.

Exhibit 21

N-Drug Share of Prescription Drug Costs Was Unchanged in Kentucky Post-Implementation



The implementation of the ODG Formulary in Kentucky appears to have resulted in a continued decline in total drug costs that had been observed even prior to the formulary implementation. However, there does not yet appear to be a similar impact on N-drug share of drug costs, which was impacted by an increase in the number of N-drug scripts per claim. This is likely due to the limited applicability of the drug formulary to N-drugs in Kentucky that were prescribed prior to July 1, 2019. To the extent that refills of N-drugs for older claims may not yet have been impacted by the formulary, the full impact of the formulary may not be recognized until data for drugs prescribed after January 1, 2020, can be observed.

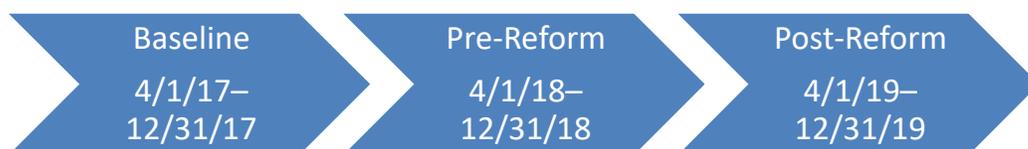
DATA ANALYSIS—MONTANA

When observing the results in this section, it is important to note the applicability of the formulary in Montana:

- Reimbursements for N-drugs requires prior authorization for claims arising on or after April 1, 2019
- Prior authorization was not required until April 1, 2020, for claims arising before April 1, 2019
- Prior authorization is not needed for N-drugs if written within 7 days of the occurrence of the workplace injury and the quantity prescribed is limited to a maximum of a 7-day supply
- Montana has its own treatment and utilization guidelines, which became effective in 2011, and therefore opted to not adopt the ODG treatment guidelines in conjunction with the ODG Formulary

In addition, per the Montana Department of Labor and Industry rules, a drug that is not on the ODG Formulary (i.e., NA-drugs) also requires prior authorization.

The timeline for Montana is straightforward: the formulary first applies to a subset of prescriptions on or after April 1, 2019, so the subsequent 9 months of calendar year data is used as the post-reform period; the same 9-month time frame for 2018 represents the pre-reform period, with the same 9-month time frame for 2017 forming the baseline period.¹⁹



The analysis of Montana experience begins with a summary of several prescription drug price and utilization metrics in Montana in Exhibit 22. There are several noteworthy observations from Exhibit 22:

- Aside from the share of claims with at least one N-drug script, all other prescription drug utilization metrics decreased between the pre-reform and post-reform periods
- The stable share of claims with at least one N-drug script could be due to the provision in Montana that prior authorization is required for drugs not on the formulary which, according to Montana rules, are treated as N-drugs
- Of the five states studied, Montana has the lowest share of claims with at least one prescription drug

Exhibit 22
Key Observations—Montana

				Percent Change	
	Baseline	Pre-Reform	Post-Reform	Baseline to Pre-Reform	Pre-Reform to Post-Reform
Share of Claims With at Least One Prescription Drug	27.9%	26.2%	25.8%	–6%	–2%
Share of Claims With at Least One N-Drug Script	11.4%	11.2%	11.4%	–1%	+1%
Share of Claims With at Least One Y-Drug Script	25.2%	23.0%	22.5%	–9%	–2%
Scripts per Claim With at Least One Prescription Drug	10.0	9.7	9.4	–3%	–3%
N-Drug Scripts per Claim With at Least One N-Drug Script	6.8	6.5	6.5	–4%	–1%
Y-Drug Scripts per Claim With at Least One Y-Drug Script	7.7	7.6	7.2	–2%	–4%
Price per Script	\$142	\$135	\$132	–4%	–3%
Price per N-Drug Script	\$230	\$219	\$214	–4%	–2%
Price per Y-Drug Script	\$107	\$101	\$95	–6%	–6%
Drug Cost per Claim With at Least One Prescription Drug	\$1416	\$1315	\$1242	–7%	–6%

Based on MDC data for prescriptions paid between 4/1/17 and 12/31/19

¹⁹ For Montana, use of the same relative time frames for each year reduces the impact of any seasonality on observed results.

The next two subsections will address the following:

- Changes in drug costs
- Changes in drug utilization

CHANGES IN DRUG COSTS—MONTANA

Exhibit 23 includes the changes in overall drug costs in Montana during the pre-reform and post-reform time frames, as well as a breakdown of the overall drug cost changes into price and utilization components. Changes in drug prices in Montana, adjusted for the mix of prescriptions, decreased slightly in the post-reform period. Note that for changes in this section, which reference the nonformulary states, the drug status being used is the same as that used for Montana. While there was a 1% decrease in drug prices in Montana during the post-reform period, the 6% decrease in drug utilization was the main contributor to the 7% post-reform decrease in overall drug costs. Also note that in Exhibit 22, a 3% decrease in average drug prices was observed between the pre-reform and post-reform period. This is due to relatively more expensive drugs being replaced by relatively less expensive substitutes; adjusted for substitution, drug prices decreased by 1%.

Exhibit 23

Changes in Overall Drug Costs, Prices, and Utilization—Montana

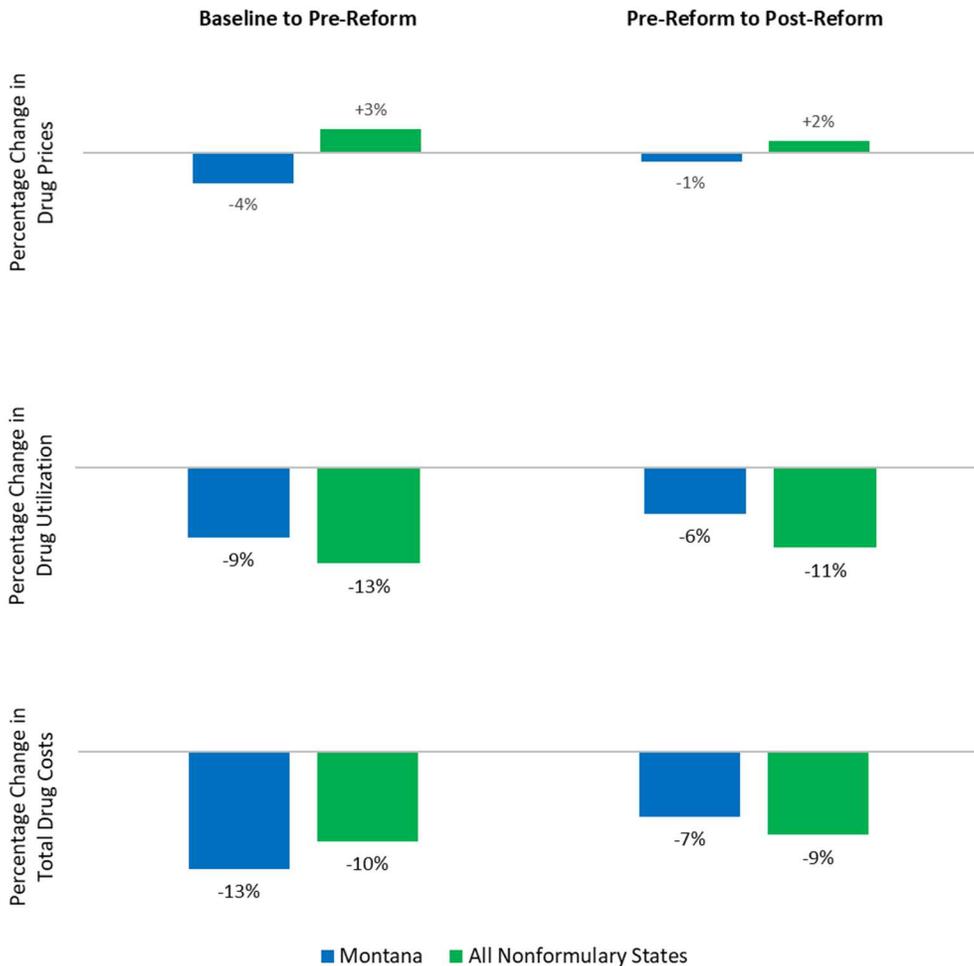
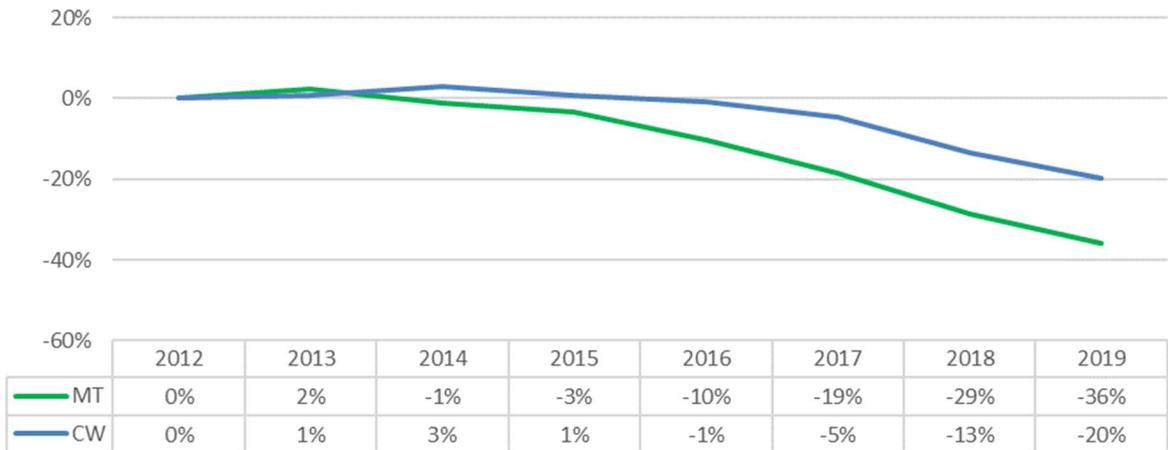


Exhibit 24 shows an index which measures the cumulative change in the paid drug amount per active claim in Montana across SYs. Specifically, the index measures the relative change in the paid drug amount per active claim in Montana for a particular SY indexed to SY 2012. Unlike the changes shown above, the values underlying this index are not adjusted for changes in utilization or mix of drugs. While we can observe that drugs paid per active claim had been decreasing prior to the implementation of the drug formulary in 2019, the drug formulary appeared to help continue the decrease in paid amount per active claim. Overall, the average drug payment per active claim in Montana was 36% lower for SY 2019 than for SY 2012.

Exhibit 24

Change in Drugs Paid per Active Claim by SY — Montana
Indexed to Service Year 2012



CHANGES IN DRUG UTILIZATION—MONTANA

Because one of the main purposes of a drug formulary is to introduce evidence-based guidelines for prescribing drugs in the WC system, it is instructive to look at post-formulary changes in utilization for prescription drugs, particularly those that require prior authorization (i.e., N-drugs). During the pre-reform period, N-drugs constituted 29% of all prescription drug scripts and 47% of prescription drug payments in the Montana WC system. These are the highest percentages for N-drug shares among the states studied and are likely influenced by Montana rules regarding the categorization of drugs that are not on the formulary as N-drugs.

Exhibit 25 shows the percentage change in overall utilization between time periods, as measured by a utilization index for N-drugs. This exhibit shows that while N-drug utilization decreased prior to the formulary implementation, N-drug utilization *increased* after formulary implementation. This increase in N-drug utilization could be attributable to several of the limitations of the formulary in Montana, as noted earlier, specifically:

- Prior authorization was not required until April 1, 2020, for claims arising before April 1, 2019
- Prior authorization is not needed for N-drugs if written within 7 days of the occurrence of the workplace injury, and the quantity prescribed is limited to a maximum of a 7-day supply

The post-formulary increase of 3% in N-drug utilization is particularly noteworthy when compared with the 9% *decrease* in N-drug utilization in nonformulary states in the same time frame. Because the formulary did not yet apply to drugs for claims that arose prior to April 1, 2019, in Montana, the results in Exhibit 25 could be impacted by the formulary’s limited applicability to drugs prescribed between April 1, 2019, and December 31, 2019. The impact from the limited applicability of the formulary during this time frame is further reinforced when considering that just over 80% of drug payments in SY 2019 for Montana were for claims that were more than 3 years after the accident date.

Exhibit 25

N-Drug Utilization Increased in Montana After Implementation

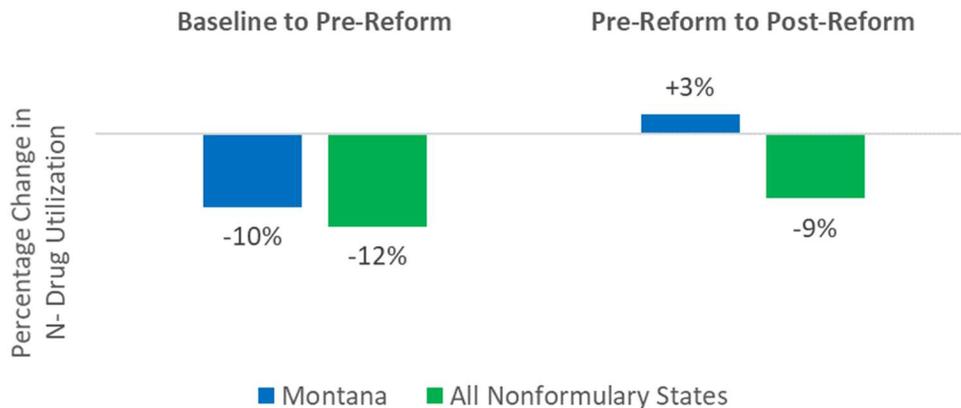
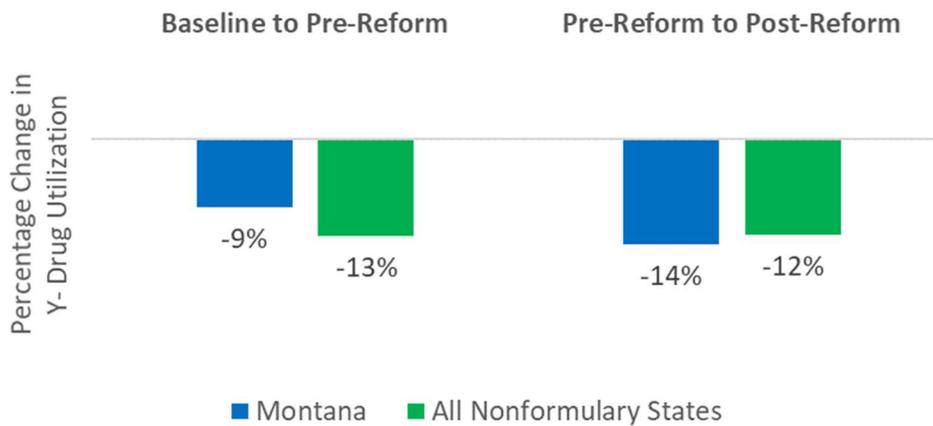


Exhibit 25 suggests that, in the short term, the ODG Formulary implementation did not result in a continuation of the pre-reform downward trend in N-drug utilization in Montana. As N-drugs are not recommended by the ODG Formulary and require prior authorization, this small post-reform increase is unexpected, especially given the 9% decrease in N-drug utilization observed in nonformulary states. However, the results are likely influenced by the limited applicability of the formulary during the initial post-reform period being observed here, as well as short-term changes in prescribing practices in response to the formulary implementation.

Additionally, it is possible that there was an overall shift in utilization patterns for all drugs independent of the formulary implementation. To evaluate this possibility, trends in Y-drug utilization must also be investigated. In Exhibit 26, changes in overall Y-drug utilization are shown. Contrary to what was observed for N-drugs, Y-drug utilization shows a clear downward trend. In Montana, there was a slight acceleration in the rate of decrease in Y-drug utilization, with a decrease slightly larger than that observed in nonformulary states.

Exhibit 26

Decreases in Montana Y-Drug Utilization Were Similar to Nonformulary States

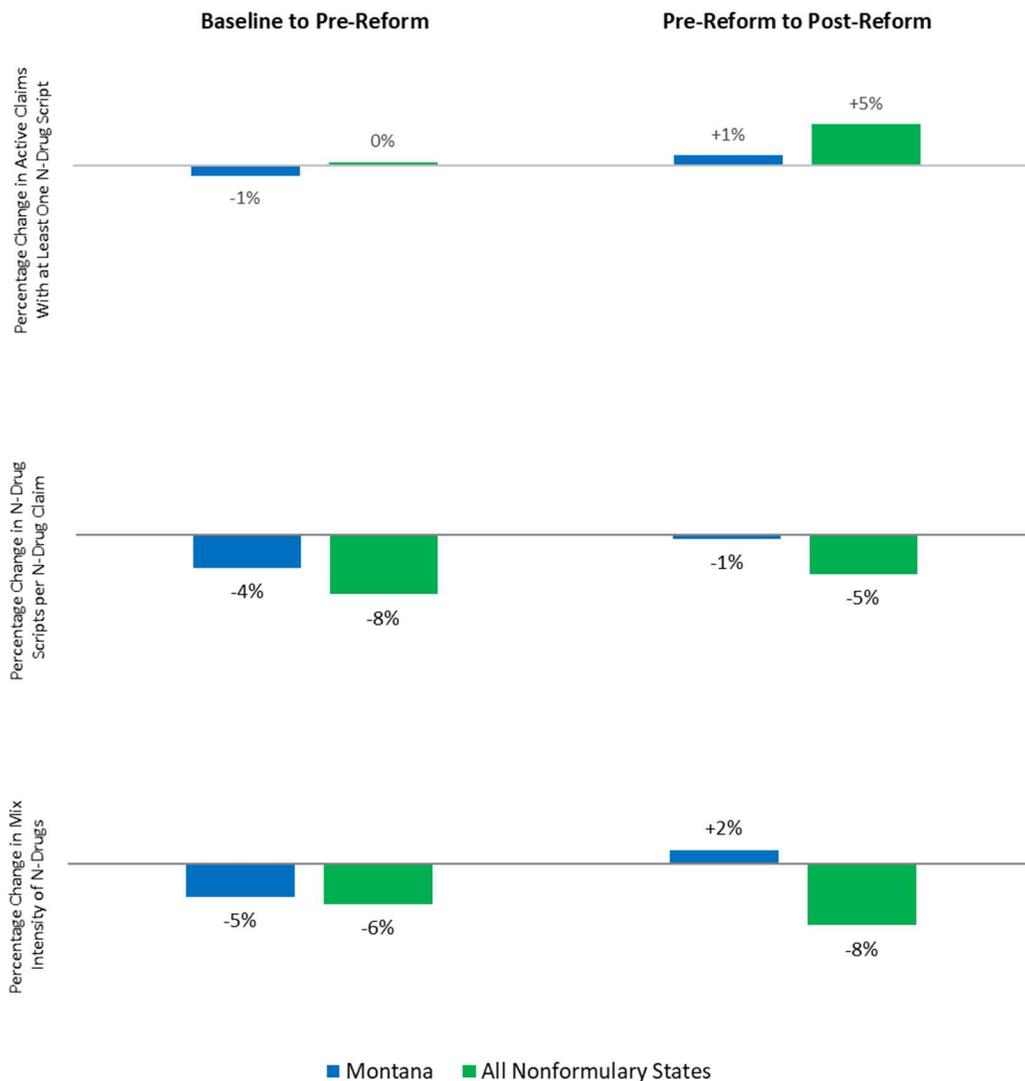


Having observed the changes in utilization for both N-drugs and Y-drugs in Montana, the next step is to break down N-drug utilization into components because N-drugs are thought to be most impacted by the use of a drug formulary. Exhibit 27 shows the breakdown of the three components of utilization. Several observations regarding utilization components may be made:

- There were minimal changes in the share of active claims receiving an N-drug script during the pre- and post-reform periods in Montana
- The average number of N-drug scripts per claim with at least one N-drug showed modest decreases in pre- and post-reform time periods in Montana, with lower decreases than those observed in nonformulary states
- Mix intensity of N-drugs increased by 2% in Montana after formulary implementation; this is the key contributor to the overall increase in N-drug utilization in Montana noted in Exhibit 25 and is notably different than the 8% decrease in mix intensity in nonformulary states during the same period

Exhibit 27

Post-Implementation Increase in N-Drug Utilization Was Driven by an Increase in Mix Intensity of N-Drugs



To illustrate the changing N-drug utilization patterns in Montana, Exhibit 28 shows the top 5 N-drugs by number of scripts during the pre-reform period along with utilization statistics. The ranks of these top 5 N-drugs show relatively limited rearrangement post-reform, demonstrating the stability in the mix of N-drugs. Because the formulary did not initially apply to claims submitted prior to April 1, 2019, in Montana and also allowed for limited prescribing of N-drugs without the need for prior authorization, the results in Exhibit 28 show no changes in the ranking of the top 3 N-drugs between the pre- and post-reform periods. The formulary implementation does not appear to have had a disproportionate effect on any of the top N-drugs. In fact, the proportion of active claims receiving at least one N-drug script remained relatively steady across the board.

Exhibit 28

Changes in N-Drug Utilization Were Relatively Uniform for Top Montana Drugs

Drug Name	Pre-Reform Statistics			Post-Reform Statistics		
	Claims Receiving Drug per 1,000 Active Claims ²⁰	Average Scripts per Claim Receiving Drug	Rank (By Script Count)	Claims Receiving Drug per 1,000 Active Claims ²¹	Average Scripts per Claim Receiving Drug	Rank (By Script Count)
Oxycontin®	7.3	8.1	1	7.1	8.6	1
Morphine Sulfate	7.0	7.8	2	6.4	7.7	2
Trazodone Hydrochloride	4.9	5.3	3	4.6	5.5	3
Clonazepam	3.5	5.8	4	2.9	5.7	8
Diazepam	6.0	3.2	5	5.9	3.1	6

²⁰ There were 16,669 active claims in the pre-reform period for Montana.

²¹ There were 15,684 active claims in the post-reform period for Montana.

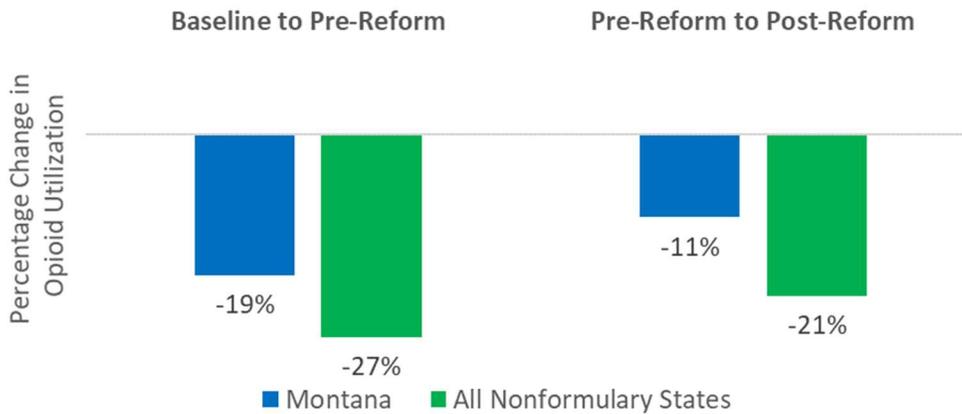
The composition of opioids prescribed in Montana suggests that the ODG Formulary, even when used in conjunction with Montana’s treatment guidelines, may have a limited effect on opioid utilization in the Montana WC system.

- Of the top 10 drugs in Montana by script count during the pre-reform period, four²² were opioids; all four of these top opioids were Y-drugs
- In total, prior to formulary implementation, 74% of opioid scripts in Montana were for Y-drugs; Y-drugs constituted 53% of opioid use as measured by MME

Exhibit 29 shows that the overall utilization of opioids in Montana declined at a lower rate compared to nonformulary states, both pre-reform and post-reform.

Exhibit 29

Decreases in Opioid Utilization in Montana Were Smaller Than Those Observed for Nonformulary States



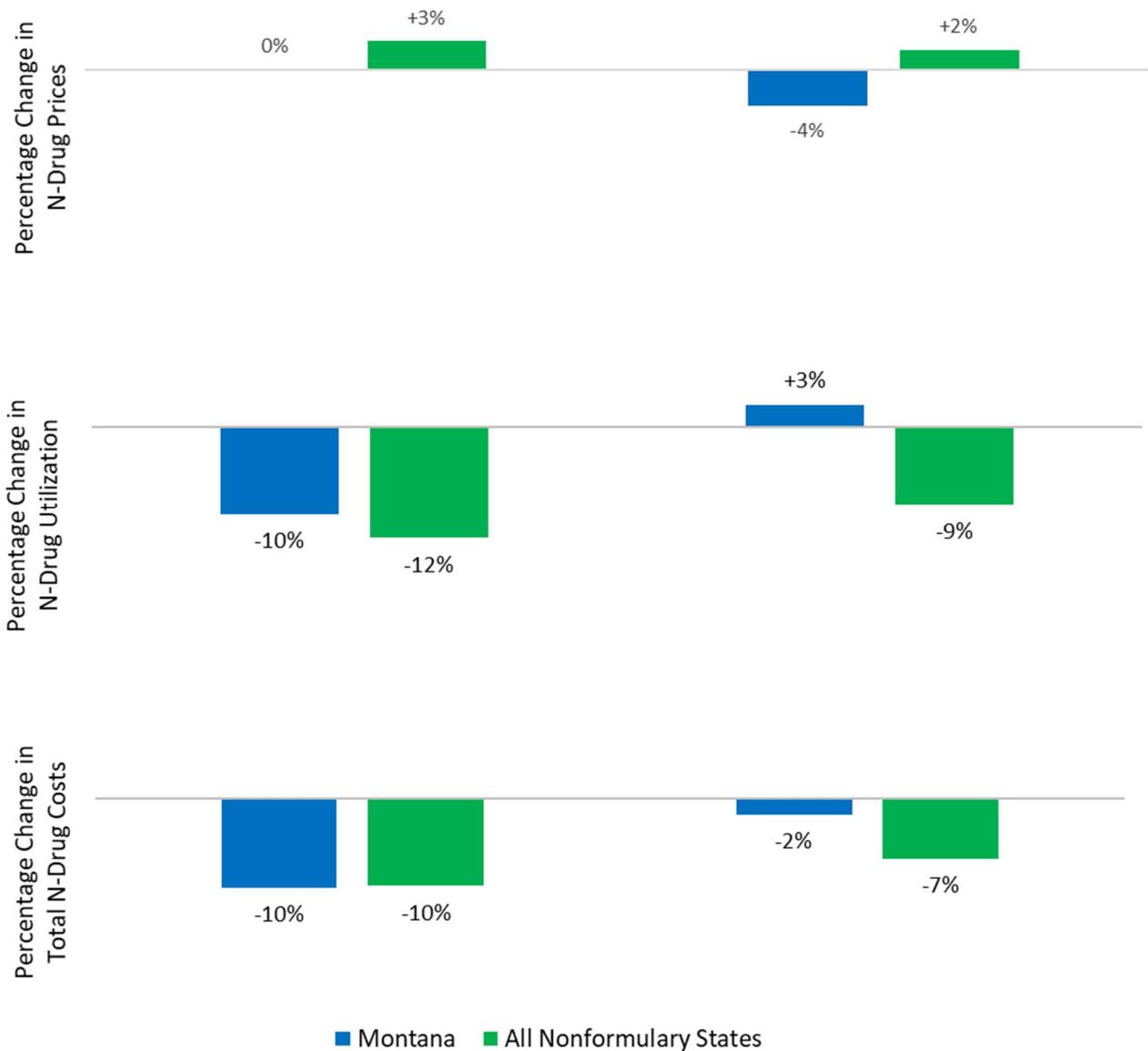
Prior to formulary implementation, opioids represented 27.4% of total drug costs in Montana. In the post-reform period, the share of opioids was unchanged at 27.4% of total drug costs. While there have been moderate declines in the utilization of opioids in the pre- and post-reform periods, these changes coincided with decreases in overall drug costs during the same time periods, thus leading to no change in the share of costs associated with opioids.

²² Four drugs—hydrocodone bitartrate-acetaminophen, oxycodone HCl, tramadol HCl, and oxycodone HCl-acetaminophen—accounted for 65% of opioid scripts during the pre-reform period.

Exhibit 30 breaks down overall N-drug cost changes into price and utilization components. Drug prices for N-drugs in Montana, adjusted for the mix of prescriptions, decreased by 4% in the post-reform period. The 4% decrease in average price during the post-reform period was partially offset by a 3% increase in N-drug utilization in Montana, resulting in a modest 2% decrease in total N-drug costs. Note that in Exhibit 22, a 2% decrease in average N-drug prices was observed. After adjusting for substitution, N-drug prices decreased by 4%.

Exhibit 30

**Overall N-Drug Costs Declined Slightly in Montana Post-Reform;
Decrease in Prices Was Offset Partially by Increase in N-Drug Utilization**

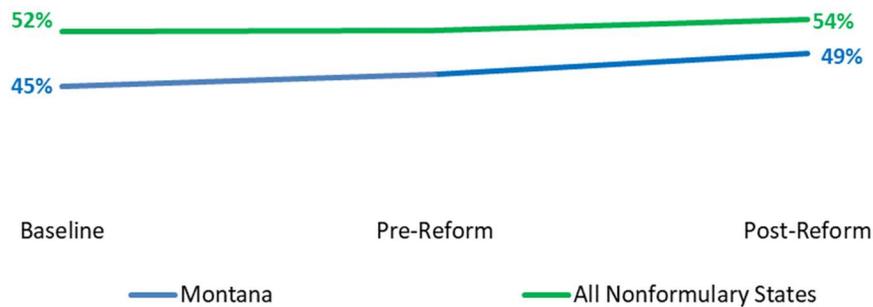


Driven by rapid declines in utilization, N-drug costs as a share of total prescription costs have fallen across the country. In Montana, as shown in Exhibit 31, this was not the case as the share of N-drugs increased over the time periods studied. The post-reform increase in N-drug utilization identified in Exhibit 25 contributed to the upward trend in Montana N-drug cost share. In fact, the share of N-drugs in Montana increased from 45% of prescription drug costs in the baseline period to 49% after the formulary implementation. This change, along with the relatively high share of N-drug costs compared with other states, is likely attributable to Montana’s categorization of drugs not on the formulary as N-drugs as well as the limited prescribing of N-drugs without the need for prior authorization.

Note that this report describes only the short-term impact of the ODG Formulary and, in the long term, there may be a decrease in the N-drug utilization as the formulary is applied more generally in Montana. It is clear that there has not yet been a shift away from N-drugs in Montana’s WC system as was observed after the formulary implementation in several other states. Thus, comparisons to post-reform experience in other states should be made with caution.

Exhibit 31

N-Drug Share of Prescription Drug Costs Increased in Montana Post-Implementation



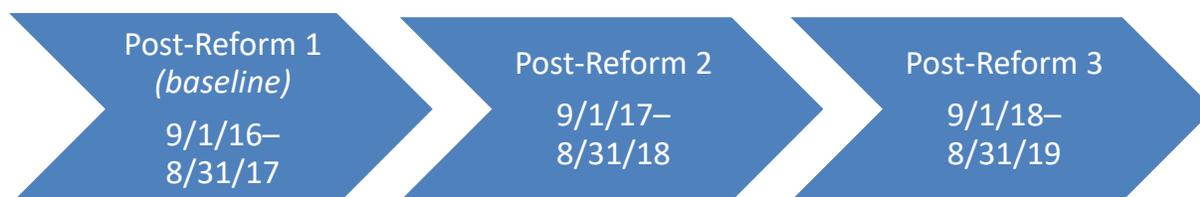
While there was a small decline in overall drug costs between the pre-reform and post-reform periods in Montana, it is not clear to what extent the formulary implementation contributed to that decline in drug costs, particularly with respect to the small increase in N-drug utilization that occurred over the same time frame. To the extent that prescriptions for claims submitted prior to April 1, 2019, may not yet have been impacted by the formulary in Montana, the full impact of the formulary may not be recognized until data for drugs prescribed after April 1, 2020, can be observed.

DATA ANALYSIS—TENNESSEE

When observing the results in this section, it is important to note the applicability of the formulary in Tennessee:

- The ODG Formulary became effective for newly written WC prescriptions dispensed on or after August 28, 2016, and was applied to all prescriptions as of February 28, 2017
- Topical and compound drugs require prior authorization in all cases, regardless of status on the formulary
- Tennessee adopted the ODG treatment guidelines in conjunction with the ODG Formulary

Because earlier research was able to observe preliminary impacts of formulary implementation in Tennessee, the analysis here focuses on longer-term impacts of the formulary. As such, the base period is the initial post-reform period²³ which is then compared to results from subsequent post-formulary time periods for Tennessee.



While potential distortions exist due to the enactment of Tennessee SB 200, which implemented significant changes²⁴ to WC benefits applicable to accidents occurring after 7/1/2014, approximately 60% of the Tennessee drug transactions studied in this report are associated with pre-SB 200 claims, and no significant distortions due to SB 200 are observed.

Previous research on the impact of the drug formulary implementation in Tennessee resulted in the following observations:

- There were significant decreases in the use of N-drugs, compounds, and topicals after the formulary implementation when compared with changes observed in nonformulary states for the same drugs
- While a significant decrease in opioid use was observed, the decrease was comparable to that observed in all nonformulary states
- The N-drug share of prescription costs in Tennessee declined between the pre- and post-reform time periods; the decline was greater than that observed in nonformulary states

²³ Due to changes in drug status for some drugs, as described earlier, results for the first post-reform period here may differ when compared to earlier research. Additionally, the post-reform1 time period here is from 9/1/16 to 8/31/17, whereas the post-reform time period from the earlier research was from 3/1/17 to 8/31/17. The longer post-reform1 time frame in this research will result in larger number of scripts per claim and higher drug cost per claim compared to the same metrics shown in earlier research.

²⁴ Among other changes, SB 200 created a distinct Court of Workers Compensation Claims and a medical billing dispute resolution system, altered the criteria for a compensable claim, modified the intended interpretation of the WC statutes, and changed the determination of the treating physician.

The analysis of Tennessee experience begins with a summary of several prescription drug price and utilization metrics in Tennessee in Exhibit 32. Here are a few noteworthy observations from Exhibit 32:

- Aside from minimal changes in prices per script, all prescription drug utilization metrics decreased since the initial post-reform period.
- Most notably, the share of claims with at least one N-drug script and the number of N-drug scripts per claim with at least one N-drug script both decreased by 8% or more during each post-reform period.
- The average drug cost per claim decreased by 6% in all post-reform periods. This can be attributable to a shift in the types of drugs being prescribed as well as a decline in the scripts per claim for all types of scripts.

**Exhibit 32
Key Observations—Tennessee**

	(Baseline)	Post-Reform1	Post-Reform2	Post-Reform3	Percent Change	
					Post-Reform1 to Post-Reform2	Post-Reform2 to Post-Reform3
Share of Claims With at Least One Prescription Drug	37.2%	35.7%	34.2%		-4%	-4%
Share of Claims With at Least One N-Drug Script	9.0%	8.3%	7.7%		-8%	-8%
Share of Claims With at Least One Y-Drug Script	36.0%	34.5%	33.1%		-4%	-4%
Scripts per Claim With at Least One Prescription Drug	7.8	7.4	7.0		-6%	-6%
N-Drug Scripts per Claim With at Least One N-Drug Script	5.8	5.1	4.7		-12%	-8%
Y-Drug Scripts per Claim With at Least One Y-Drug Script	6.5	6.3	6.0		-3%	-5%
Price per Script	\$163	\$163	\$163		—	—
Price per N-Drug Script	\$320	\$323	\$323		+1%	—
Price per Y-Drug Script	\$127	\$131	\$134		+3%	+2%
Drug Cost per Claim With at Least One Prescription Drug	\$1,274	\$1,204	\$1,134		-6%	-6%

Based on MDC data for prescriptions paid between 9/1/16 and 8/31/19

Because the early results of the formulary in Tennessee had only considered the initial application of the formulary to newly written prescriptions as well as partial application to refills from older claims (i.e., refills were phased in during the post-reform1 period), the broader application of the formulary during the time periods studied here could explain the post-reform decreases in many metrics observed above. More specifically, the changes observed in Exhibit 32, particularly between post-reform1 and post-reform2 periods, include the full phasing in of refills for all prescriptions.

The next two subsections will address the following:

- Changes in drug costs
- Changes in drug utilization

CHANGES IN DRUG COSTS—TENNESSEE

Exhibit 33 includes the changes in overall drug costs in Tennessee during the various post-reform time frames as well as a breakdown of the overall drug cost changes into price and utilization components. Changes in drug prices in Tennessee, adjusted for the mix of prescriptions, have tracked closely with nonformulary states in the post-reform periods. Note that for changes in this section which reference the nonformulary states, the drug status being used is the same as that used for Tennessee. While changes in drug prices in Tennessee were mixed during the post-reform periods, there were significant decreases in overall drug utilization in both post-reform periods. These declines in utilization were the biggest contributors to the overall decline in drug costs during the post-reform periods. Note that in Exhibit 32, no change in average drug prices was observed for all post-reform periods. This is due to relatively more expensive drugs being replaced by relatively less expensive substitutes; adjusted for substitution, drug prices increased by 5% during the initial post-reform period, followed by a modest decrease in the subsequent period.

Exhibit 33

Changes in Overall Drug Costs, Prices, and Utilization—Tennessee

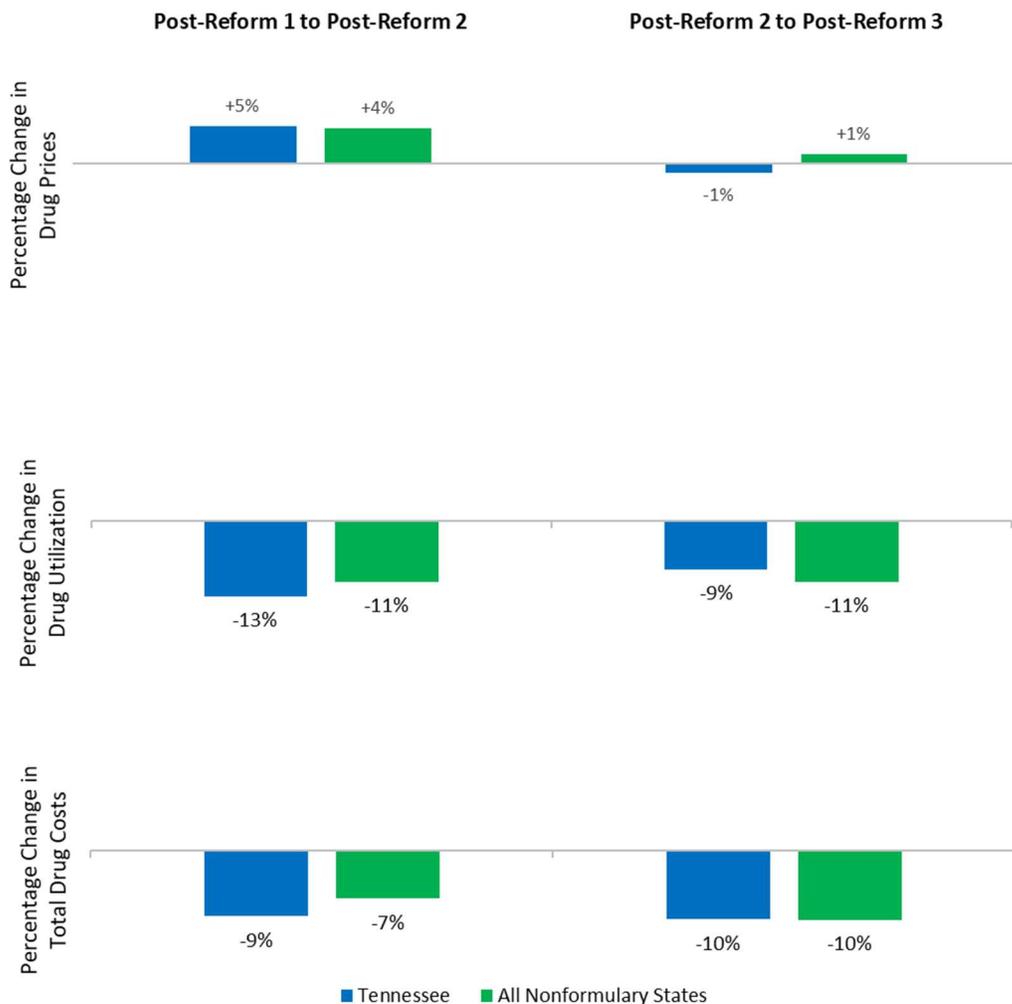
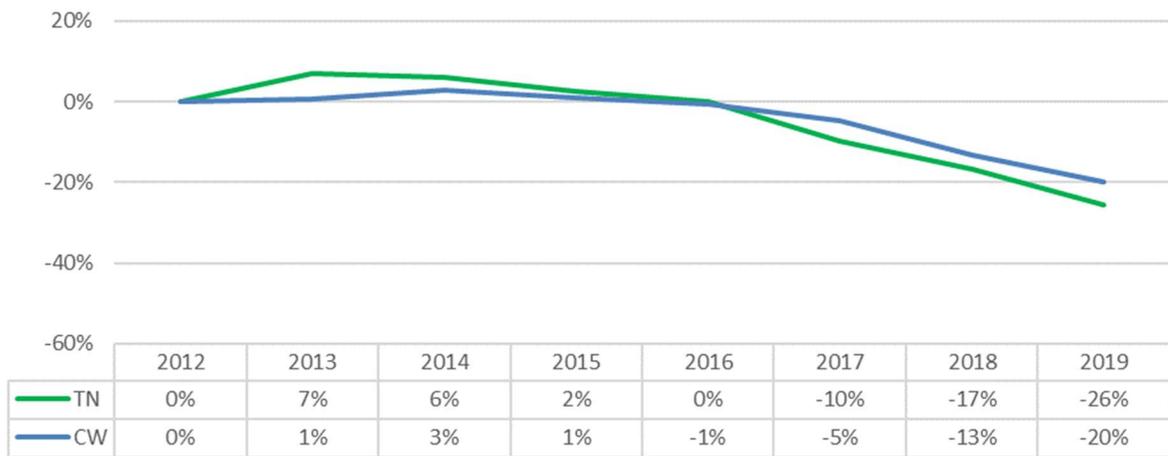


Exhibit 34 shows an index which measures the cumulative change in the paid drug amount per active claim in Tennessee across SYs. Specifically, the index measures the relative change in the paid drug amount per active claim in Tennessee for a particular SY indexed to SY 2012. Unlike the changes shown above, the values underlying this index are not adjusted for changes in utilization or mix of drugs. While we can observe that drugs paid per active claim had been relatively flat just prior to the implementation of the drug formulary in August 2016, the implementation of the drug formulary coincided with a decrease in paid amount per active claim beginning in 2017. Overall, the average drug payment per active claim in Tennessee is 26% lower for SY 2019 than for SY 2016.

Exhibit 34

Change in Drugs Paid per Active Claim by SY — Tennessee
Indexed to Service Year 2012



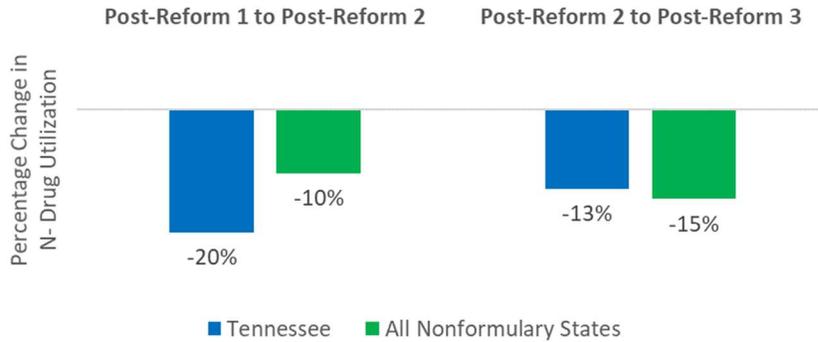
CHANGES IN DRUG UTILIZATION—TENNESSEE

Because one of the main purposes of a drug formulary is to introduce evidence-based guidelines for prescribing drugs in the WC system, it is instructive to look at post-formulary changes in utilization for prescription drugs, particularly those that require prior authorization (i.e., N-drugs). During the post-reform1 period, N-drugs constituted 18% of all prescription drug scripts and 35% of prescription drug payments in the Tennessee WC system.

Exhibit 35 shows the percentage change in overall utilization between time periods as measured by a utilization index for N-drugs. This chart shows significant declines in N-drug utilization several years after the formulary was implemented, with a more significant decline between the post-reform1 and post-reform2 time periods. This may have been due to the more general application of the formulary that began in the middle of the post-reform1 period (i.e., the need for prior authorization for refills for older claims).

Exhibit 35

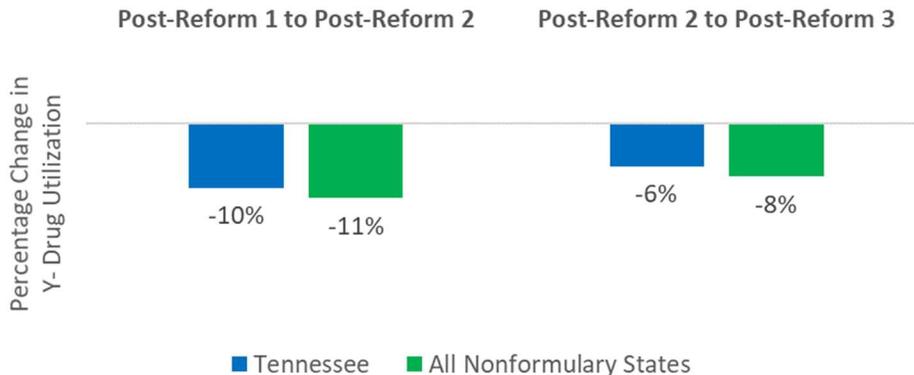
The Decrease in N-Drug Utilization in Tennessee Continued Well After Implementation



While the decreases in N-drug utilization shown above may have been expected, it is also possible that there was an overall shift in utilization patterns for all drugs independent of the formulary implementation. To evaluate this possibility, trends in Y-drug utilization must also be investigated. In Exhibit 36 below, changes in overall Y-drug utilization are shown. As with N-drugs, Y-drug utilization shows a clear downward trend, though the rate of decrease is lower than for N-drugs. In Tennessee, the rate of decrease in Y-drug utilization is comparable to that observed in nonformulary states, but the effect for Y-drugs in Tennessee is about half of that observed for N-drugs.

Exhibit 36

Changes in Y-Drug Utilization Were Similar to Nonformulary States

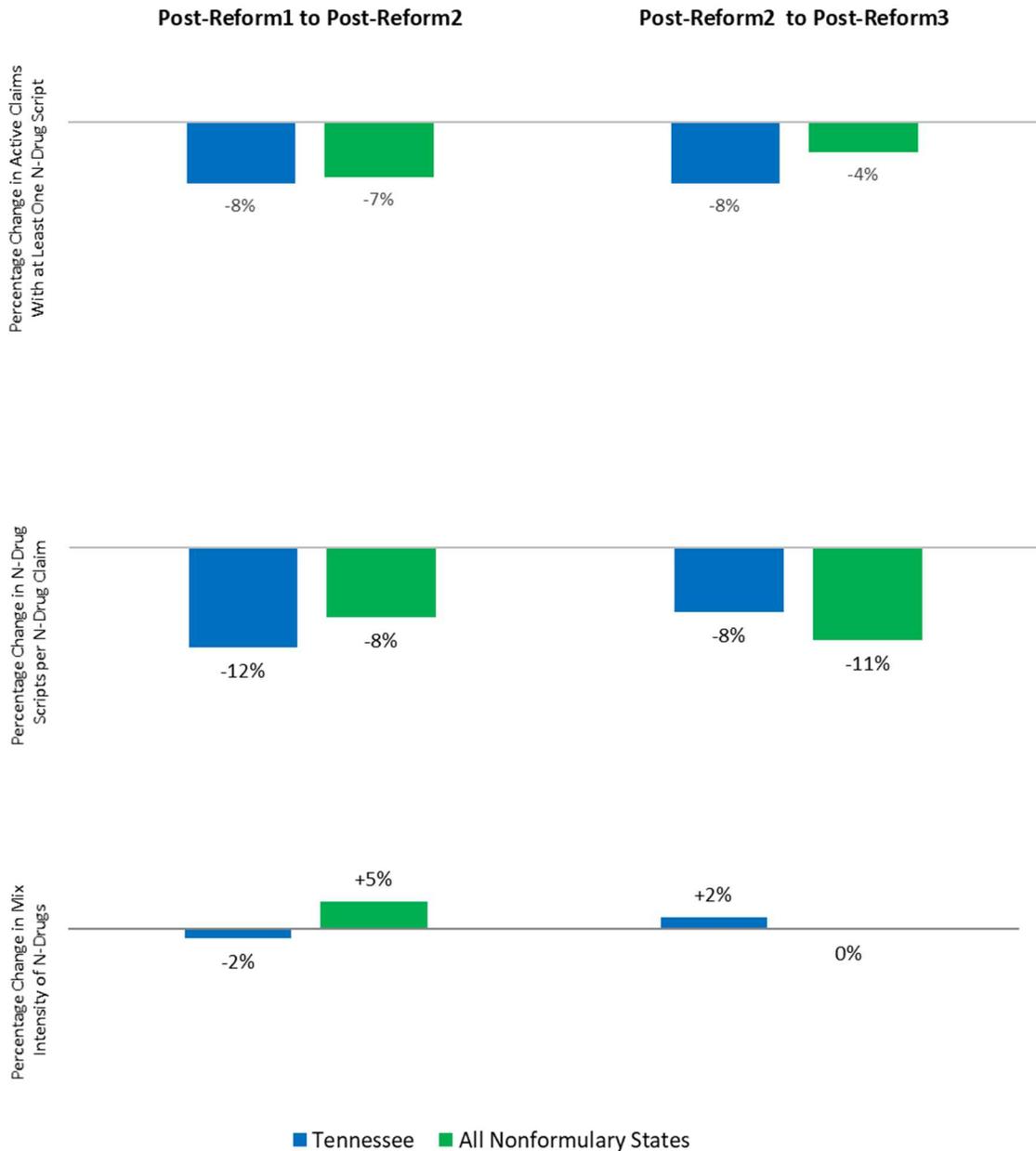


Having observed the changes in utilization for both N-drugs and Y-drugs in Tennessee, the next step is to break down N-drug utilization into components since N-drugs are thought to be most impacted by the use of a drug formulary. Exhibit 37 shows the breakdown of the three components of utilization. The following observations regarding utilization components may be made:

- There was a moderate decrease in the share of active claims receiving an N-drug script and in the number of scripts per claim with at least one N-drug script during the post-reform periods; these changes were key contributors to the decreases in N-drug utilization observed in Exhibit 35
- Changes in the mix intensity of N-drugs in Tennessee were relatively modest in the post-reform time periods

Exhibit 37

N-Drug Utilization Shift Was Driven by a Decrease in Number of Claims Receiving an N-Drug and Number of Scripts per N-Drug Claim



To illustrate the changing N-drug utilization patterns in Tennessee, Exhibit 38 shows the top 5 N-drugs by number of scripts during each of the post-reform periods along with utilization statistics. The ranks of these top 5 N-drugs show relatively limited rearrangement post-reform, demonstrating the stability in the mix of N-drugs. The formulary implementation does not appear to have had a disproportionate effect on the average number of scripts per claim for 4 of the top 5 N-drugs (with the exception of Trazodone Hydrochloride which decreased by 22% [= (4.9 / 6.3) – 1]. However, several drugs experienced a notable decrease in the number of claims receiving the drug per 1,000 active claims, including Morphine Sulfate [–33% = (3.1 / 4.6) – 1] and Oxycontin® [–38% = (2.9 / 4.7) – 1]. One result of these changes was the drop in ranking for Morphine Sulfate, which went from #1 in the post-reform1 period to #4 in the post-reform3 period, while Lidocaine moved from #3 to #1.

Diclofenac Sodium²⁵ is the only drug that experienced a significant increase [+37% = (12.9 / 9.4) – 1] in the number of claims receiving the drug over all post-reform time periods, increasing in rank from #4 to #2, although the average number of scripts per claim remained steady. It is worth noting that Tennessee requires prior authorization for topicals, regardless of status on the formulary. However, according to the ODG Formulary, Voltaren® gel and its generic equivalent, Diclofenac Sodium gel, do not require prior authorization as it is viewed as a preferred, frontline drug. The differing recommendations for these drugs (between the ODG Formulary as a Y-drug and the Tennessee Formulary as an N-drug) is a likely contributor to the high ranking of Diclofenac Sodium as an N-drug in Tennessee.

Exhibit 38

Changes in N-Drug Utilization Were Relatively Uniform for Top Tennessee Drugs

Drug Name	Claims Receiving Drug per 1,000 Active Claims ²⁶			Average Scripts per Claim Receiving Drug			Rank (by Script Count)		
	Post-Reform Period			Post-Reform Period			Post-Reform Period		
	#1	#2	#3	#1	#2	#3	#1	#2	#3
Morphine Sulfate	4.6	3.4	3.1	7.8	8.3	7.4	1	3	4
Oxycontin®	4.7	4.1	2.9	7.3	7.8	8.1	2	1	3
Lidocaine	7.9	7.2	7.5	4.2	4.2	4.1	3	2	1
Diclofenac Sodium	9.4	11.5	12.9	2.3	2.3	2.3	4	4	2
Trazodone Hydrochloride	3.0	2.9	2.1	6.3	5.7	4.9	5	5	7

²⁵ There are several formulations of Diclofenac Sodium, some of which are Y-drugs and others which require prior authorization. Those requiring prior authorization (i.e., N-drugs) are included here.

²⁶ There were 77,324, 75,462, and 72,829 active claims in Tennessee in the post-reform1, post-reform2, and post-reform3 time periods, respectively.

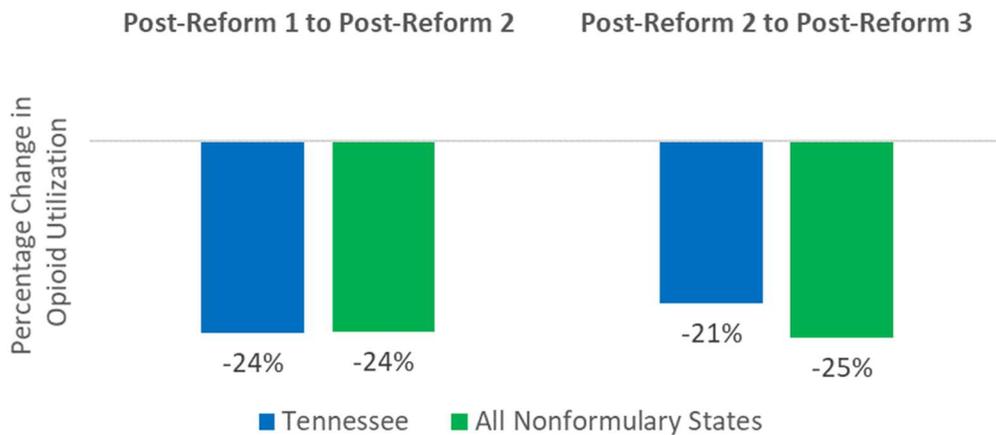
The composition of opioids prescribed in Tennessee suggests that the ODG Formulary, even when used in conjunction with the ODG treatment guidelines, may have had a limited effect on opioid utilization in the Tennessee WC system.

- Of the top 10 drugs in Tennessee by script count during the post-reform1 period, four²⁷ were opioids; all four of these top opioids were Y-drugs
- In total, in the first post-reform period following formulary implementation, 82% of opioid scripts in Tennessee were for Y-drugs; Y-drugs constituted 59% of opioid utilization as measured by MME

Exhibit 39 shows the overall utilization of opioids in Tennessee declining at a similar rate as in nonformulary states, during all post-reform periods.

Exhibit 39

Tennessee Opioid Utilization Changes Were Comparable to Nonformulary States



Prior to formulary implementation, opioids represented 25.9% of total drug costs in Tennessee. In the post-reform1, post-reform2, and post-reform3 periods, opioids represented 24.4%, 21.5%, and 18.5% of total drug costs, respectively. As can be observed from Exhibit 39, there have been significant declines in the utilization of opioids in the post-reform periods, in Tennessee as well as in nonformulary states.

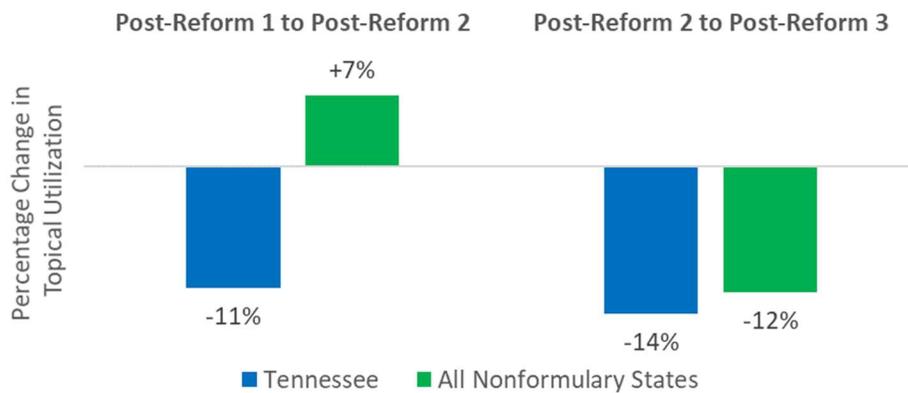
²⁷ Four drugs—hydrocodone bitartrate-acetaminophen, oxycodone HCl-acetaminophen, tramadol HCl, and oxycodone HCl—accounted for 78% of opioid scripts during the post-reform1 period.

For Tennessee, this report also investigates a specific subcategory of N-drugs: drugs requiring topical application. Topicals²⁸ were of particular interest because regulators and insurers in the WC system have become increasingly skeptical about the efficacy of many of these drugs relative to their costs [2]. Under the Tennessee regulations governing the formulary, all topical drugs require prior authorization regardless of status indicator on the ODG Formulary.

As shown in Exhibit 40, utilization of topicals in Tennessee has decreased consistently in the post-reform periods. These drugs, some of which are relatively expensive, were likely to receive more scrutiny in the years after the formulary implementation to assess medical effectiveness.

Exhibit 40

Utilization of Topicals in Tennessee Continued to Decrease After Formulary Implementation



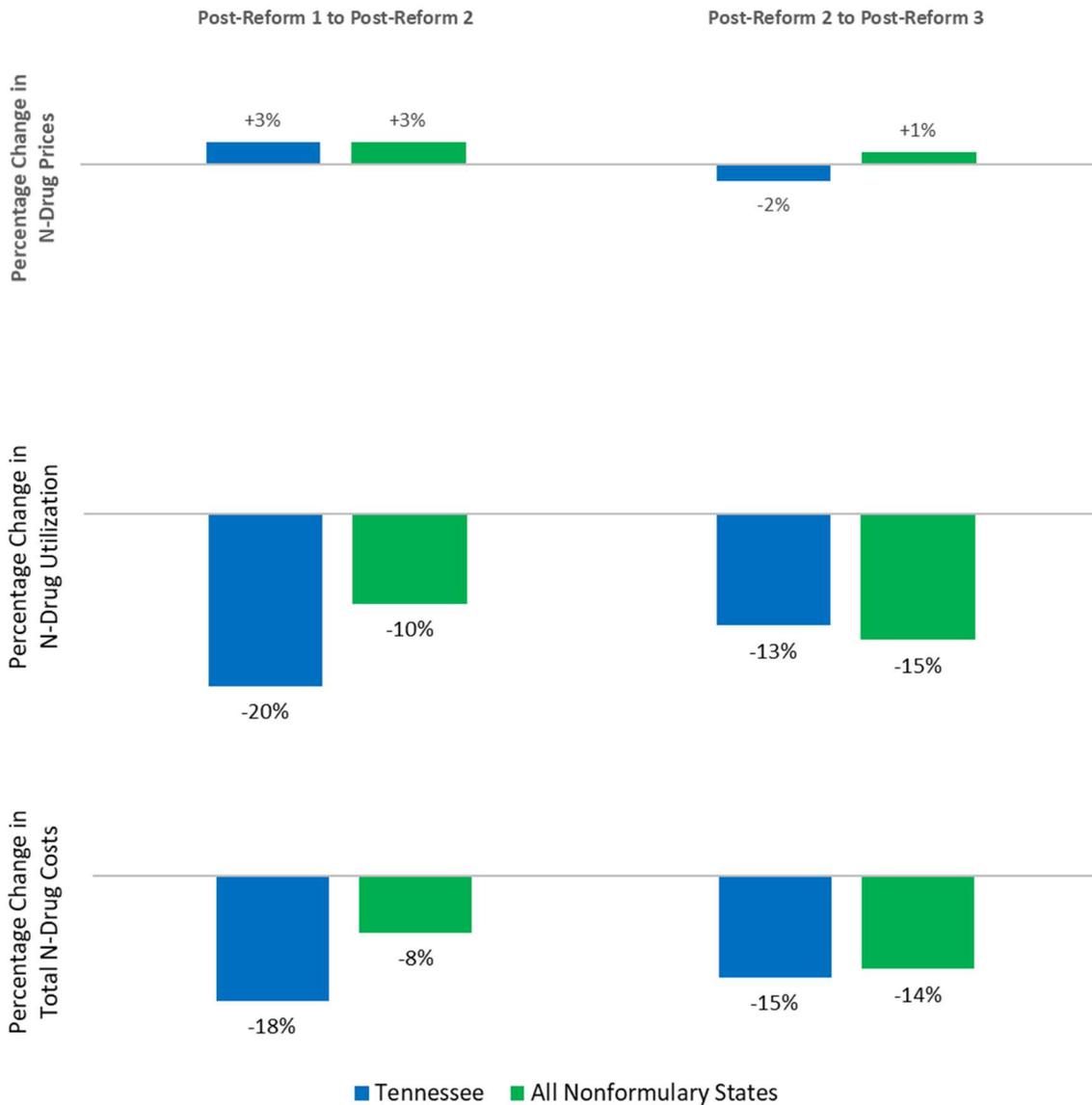
Prior to formulary implementation, topicals represented 3.5% of total drugs costs in Tennessee. In the latest post-reform period, topicals represented 2.6% of total drug costs; this share is significantly lower than the 6.9% share for topicals observed for nonformulary states in the post-reform3 period.

²⁸ Drugs are considered “topicals” in this report if dispensed as a cream, foam, gel, lotion, ointment, shampoo, soap, sponge, or swab.

Exhibit 41 breaks down overall N-drug cost changes into price and utilization components. Changes in prices paid in Tennessee for N-drugs, adjusted for the mix of prescriptions, have been mixed over the post-reform periods. However, despite the relatively small changes in N-drug prices, total N-drug costs decreased significantly during the same periods; this is principally driven by significant decreases in N-drug utilization. Note that in Exhibit 32, the average price per N-drug script was virtually unchanged over all post-reform time periods observed; adjusted for substitution, relatively small changes in N-drug prices were observed.

Exhibit 41

Post-Reform Decreases in Tennessee N-Drug Costs Were Driven by Decreased Utilization

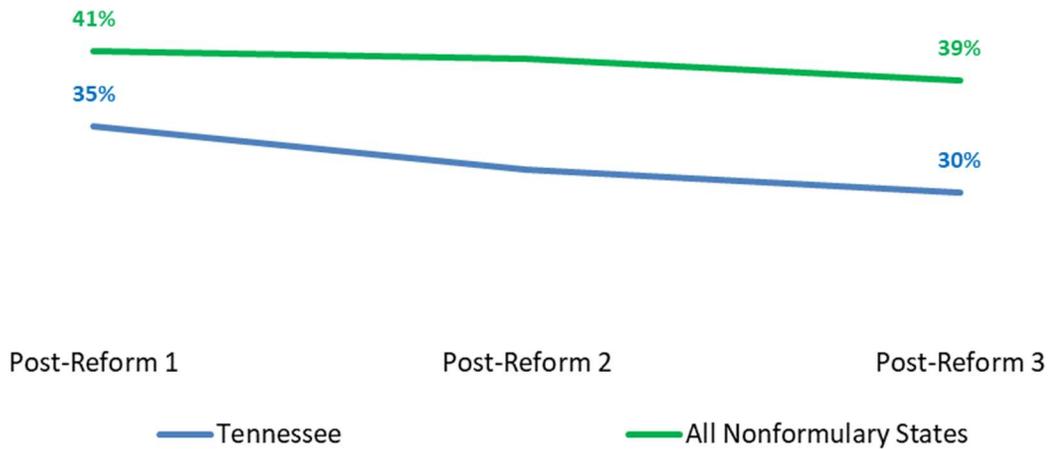


Driven by rapid declines in utilization, N-drug costs as a share of total prescription costs have fallen across the country. In Tennessee, this trend tracked closely with the experience of other states. The post-reform decline in N-drug utilization identified in Exhibit 35 continued the downward trend in Tennessee N-drug cost share. As seen in Exhibit 42, the share of N-drug costs declined from 35% in the first post-reform period to 30% in the most recent post-reform period.

With the greater amount of post-formulary experience available for this update compared to the limited post-reform data available for our first observations of the formulary impacts in 2019, we are now able to observe the longer-term impact of the ODG Formulary, which indicates a pronounced decrease in N-drug utilization.

Exhibit 42

N-Drug Share of Prescription Costs Continued to Decrease in Tennessee Post-Implementation



The implementation of the ODG Formulary in Tennessee appears to have resulted in a continued decline in total drug costs that had first been observed in our 2019 research. Overall, the significant declines in N-drug utilization, opioids, and topicals were the main drivers behind the post-reform decline in total drug costs in Tennessee.

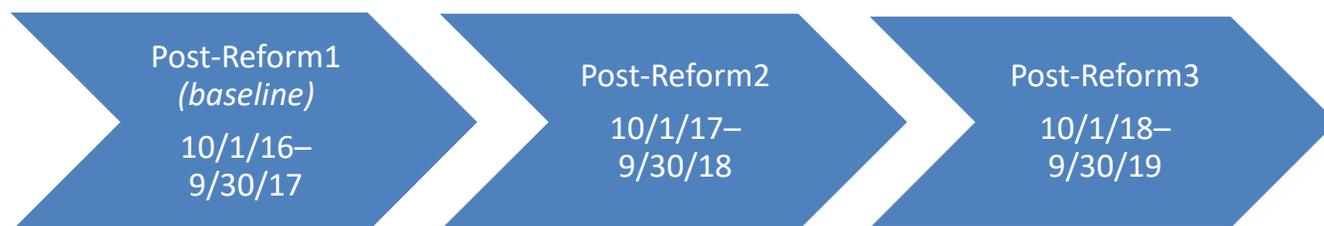
DATA ANALYSIS—ARIZONA

When observing the results in this section, it is important to note the applicability of the formulary in Arizona:

- In Arizona, the ODG Formulary was applicable to opioids and drugs used for chronic pain management beginning 10/1/16
- The application of the ODG Formulary was expanded to all claims and treatments as of 10/1/18²⁹

However, it is worth noting that while Arizona technically adopted the ODG Formulary along with their medical treatment guidelines, preauthorization is not required.

Because earlier research was able to observe preliminary impacts of formulary implementation in Arizona, the analysis here focuses on longer-term impacts of the formulary. The baseline used is the initial 12-month post-reform period,³⁰ which is then compared against subsequent post-reform periods for Arizona.



Previous research on the impact of the drug formulary implementation in Arizona resulted in the following observations:

- There was a relatively greater decrease in the utilization of N-drugs, including opioids and drugs used for chronic pain management, after the formulary implementation when compared with changes observed in nonformulary states for the same drugs
- While a significant decrease in opioid utilization was observed, the decrease was comparable to that observed in all nonformulary states
- The N-drug share of prescription costs in Arizona declined between the pre- and post-reform time periods; the decline was greater than that observed in nonformulary states

²⁹ Changes that became effective October 1, 2019, included revisions that imposed statutory limits on the prescribing and dispensing of Schedule II opioids. Those changes are subsequent to the time periods being studied here.

³⁰ Due to changes in drug status for some drugs, as described earlier, results for the first post-reform period here may differ when compared to earlier research.

The analysis of Arizona experience begins with a summary of several prescription drug price and utilization metrics in Arizona in Exhibit 43. There are several noteworthy observations from Exhibit 43:

- All prescription drug utilization metrics decreased over the post-reform periods studied.
- Most notably, the share of claims with at least one N-drug script and the N-drug scripts per claims with at least one N-drug script decreased by 10% and 12%, respectively, in the latest post-reform period. This continued the strong decreases that were observed during the earlier post-reform period.
- Average drug prices per N-drug script and per Y-drug script were relatively stable throughout the post-reform time periods, while the overall price per script experienced a greater decline. This could be attributable to a shift to lower-cost drugs in post-reform periods.

Exhibit 43
Key Observations—Arizona

	Percent Change				
	(Baseline) Post- Reform1	Post- Reform2	Post- Reform3	Post- Reform1 to Post-Reform2	Post-Reform2 to Post-Reform3
Share of Claims With at Least One Prescription Drug	42.2%	40.4%	39.9%	–4%	–1%
Share of Claims With at Least One N-Drug Script	6.9%	5.7%	5.2%	–17%	–10%
Share of Claims With at Least One Y-Drug Script	41.6%	39.9%	39.4%	–4%	–1%
Scripts per Claim With at Least One Prescription Drug	6.2	5.7	5.3	–7%	–7%
N-Drug Scripts per Claim With at Least One N-Drug Script	6.2	5.7	5.1	–8%	–12%
Y-Drug Scripts per Claim With at Least One Y-Drug Script	5.1	4.8	4.6	–5%	–5%
Price per Script	\$180	\$174	\$166	–3%	–5%
Price per N-Drug Script	\$382	\$387	\$378	+1%	–2%
Price per Y-Drug Script	\$140	\$138	\$135	–1%	–2%
Drug Cost per Claim With at Least One Prescription Drug	\$1108	\$990	\$873	–11%	–12%

Based on MDC data for prescriptions paid between 10/1/16 and 9/30/19

The applications of the formulary to the different subsets of drugs in Arizona could explain the varying impacts observed over the post-reform periods observed in the table above. While the initial impacts of the formulary implementation had considered the formulary's limited application to opioids and drugs used for chronic pain management, the more recent period (i.e., post-reform2 to post-reform3) considers the more expansive application of the formulary to all claims and treatments, which became effective October 1, 2018.

The next two subsections will address the following:

- Changes in drug costs
- Changes in drug utilization

CHANGES IN DRUG COSTS—ARIZONA

Exhibit 44 includes the changes in overall drug costs in Arizona during the various post-reform time frames as well as a breakdown of the overall drug cost changes into price and utilization components. Changes in drug prices in Arizona, adjusted for the mix of prescriptions, have tracked closely when compared with nonformulary states in the post-reform periods. Note that for changes in this section, which reference the nonformulary states, the drug status being used is the same as that used for Arizona. Despite the contrasting changes in average drug prices in Arizona during the post-reform periods, there was a significant decline in total drug costs during both post-reform periods; this decrease was attributable to significant decreases in overall drug utilization. Note that in Exhibit 43, a 3% and 5% decrease in average drug prices was observed over the post-reform periods. This is due to relatively more expensive drugs being replaced by relatively less expensive substitutes; adjusted for substitution, post-reform changes in overall drug prices were mixed.

Exhibit 44

Changes in Overall Drug Costs, Prices, and Utilization—Arizona

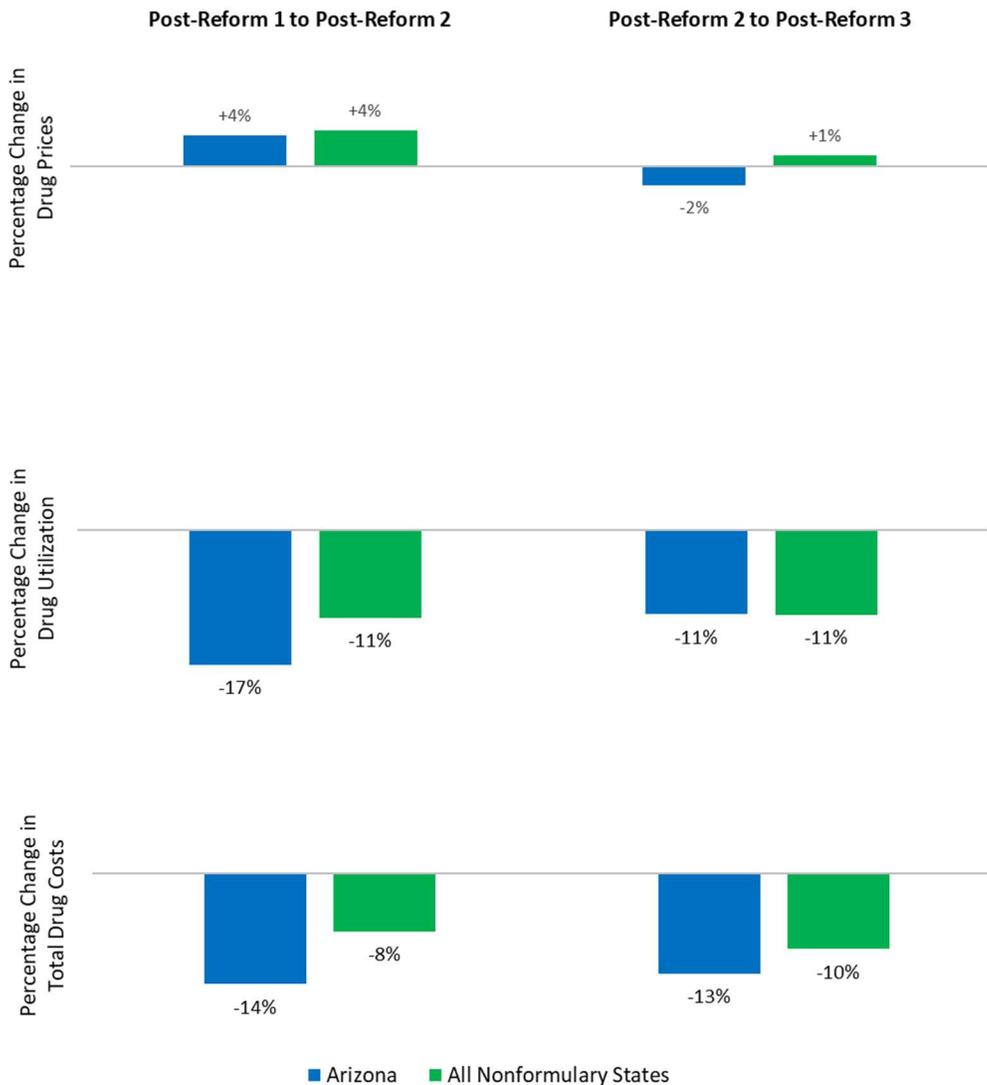
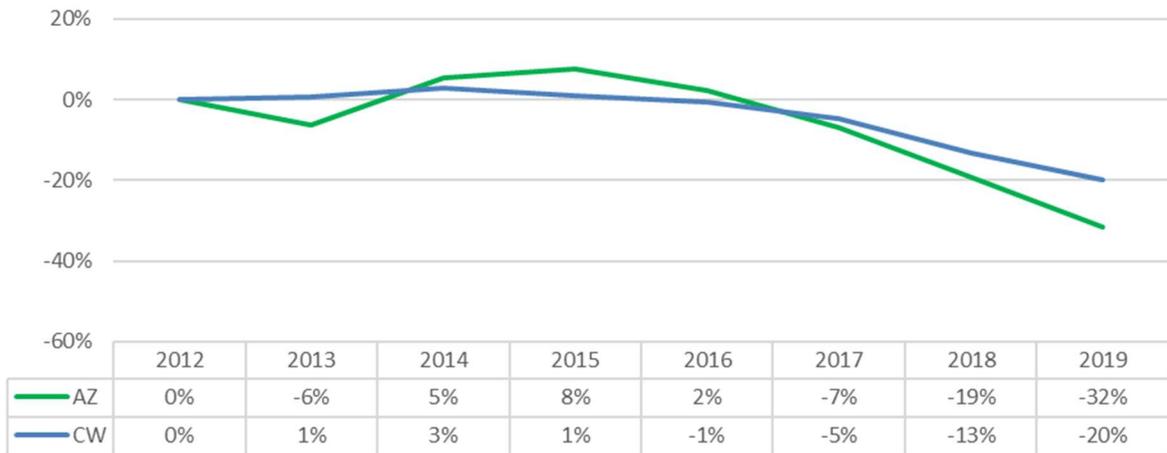


Exhibit 45 shows an index which measures the cumulative change in the paid drug amount per active claim in Arizona across SYs. Specifically, the index measures the relative change in the paid drug amount per active claim in Arizona for a particular SY indexed to SY 2012. Unlike the changes shown above, the values underlying this index are not adjusted for changes in utilization or mix of drugs. From Exhibit 45, we can observe that drugs paid per active claim in Arizona have declined steadily and significantly since 2015, which coincides with the implementation of the formulary in October 2016. More specifically, the implementation of the drug formulary in 2016 precipitated a steady decline in drug payments per active claim, which was accelerated in late 2018 with the broader application of the formulary in Arizona. Overall, the average drug payment per active claim in Arizona is 32% lower for SY 2019 than for SY 2012.

Exhibit 45

Change in Drugs Paid per Active Claim by SY — Arizona
Indexed to Service Year 2012



CHANGES IN DRUG UTILIZATION—ARIZONA

Because one of the main purposes of a drug formulary is to introduce evidence-based guidelines for prescribing drugs in the WC system, it is instructive to look at post-formulary changes in utilization for prescription drugs, particularly those that require prior authorization (i.e., N-drugs). During the post-reform1 period, N-drugs constituted 17% of all prescription drug scripts and 35% of prescription drug payments in the Arizona WC system.

Exhibit 46 shows the percentage change in overall utilization between time periods, as measured by a utilization index for N-drugs. This chart shows that N-drug utilization has continued to decrease significantly across all time periods in Arizona, with a relatively smaller decrease observed in all nonformulary states during the same periods.

Exhibit 46

Significant Decrease in N-Drug Utilization in Arizona Continued Well After Implementation

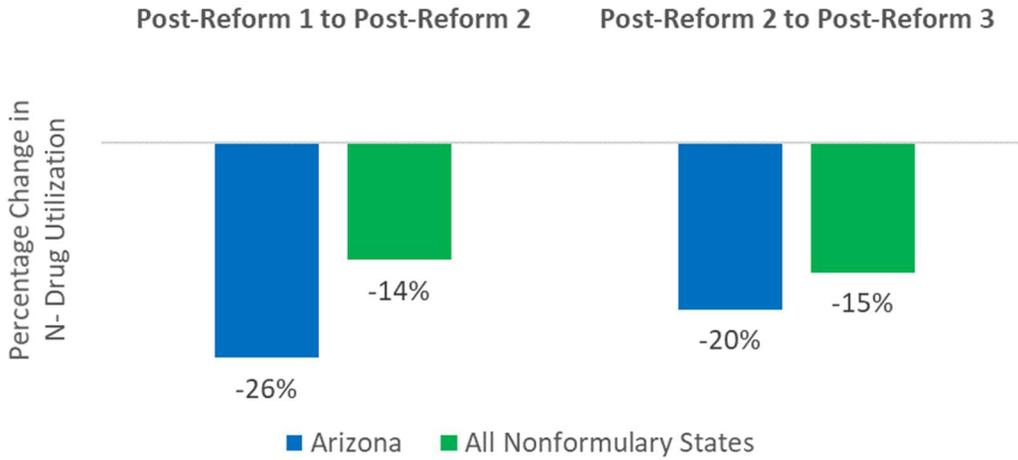
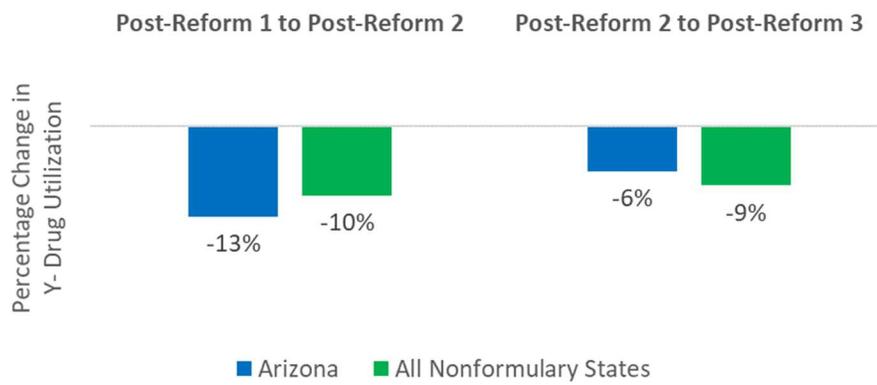


Exhibit 46 suggests that the ODG Formulary implementation resulted in decreased N-drug use in Arizona across all post-reform periods. However, it is worth noting that the 26% decrease in N-drug utilization between the post-reform1 and post-reform2 periods does not yet reflect the application of the formulary to all claims and treatments, as the application at that time was limited to opioids and drugs for chronic pain management.

As N-drugs are not recommended by the ODG Formulary and require prior authorization, the decreases in N-drug utilization are expected. However, it is also possible that there was an overall shift in utilization patterns for all drugs independent of the formulary implementation. To evaluate this possibility, trends in Y-drug utilization must also be investigated. In Exhibit 47 below, changes in overall Y-drug utilization are shown. As with N-drugs, Y-drug utilization shows a clear downward trend, though the rate of decrease is far less pronounced than for N-drugs.

Exhibit 47

Y-Drug Utilization Declined During Post-Reform Periods

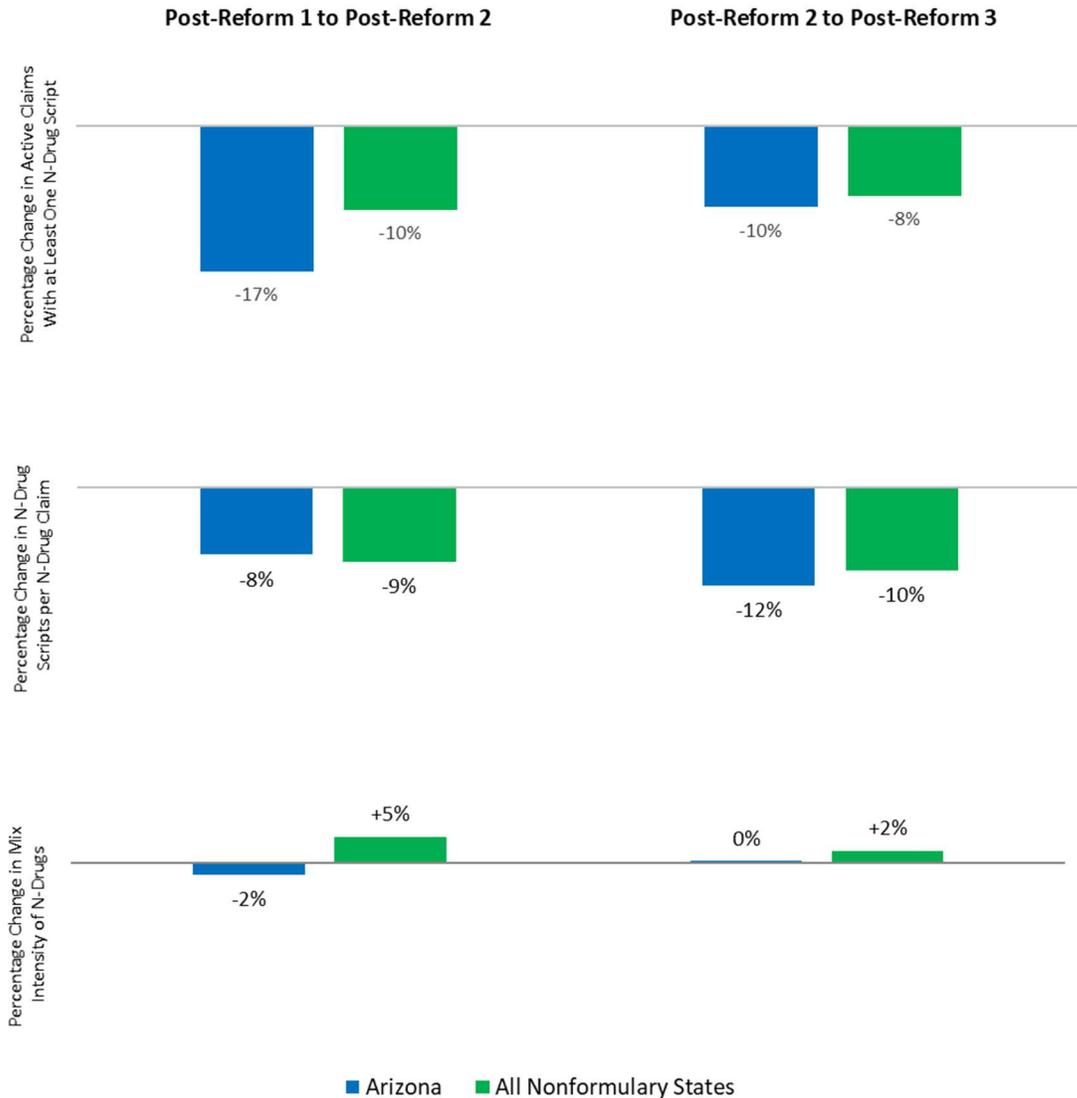


Having observed the changes in utilization for both N-drugs and Y-drugs in Arizona, the next step is to break down N-drug utilization into components because N-drugs are thought to be most impacted by the use of a drug formulary. Exhibit 48 shows the breakdown of the three components of utilization. Several observations regarding utilization components may be made:

- There was a significant decline in the share of active claims receiving an N-drug script during the post-reform periods.
- The average number of N-drug scripts per claim with at least one N-drug experienced a relatively significant decrease in all post-reform periods, with comparable decreases observed in nonformulary states. These decreases in average N-scripts per claim, along with decreases in the share of active claims with an N-drug script, contributed to the significant decreases in N-drug utilization in Arizona observed in Exhibit 46.
- There were modest changes in the mix intensity of N-drugs in both post-reform periods.

Exhibit 48

N-Drug Shift Was Driven by a Decrease in Active Claims With at Least One N-Drug Script and Number of Scripts per N-Drug Claim



To illustrate the changing N-drug utilization patterns in Arizona, Exhibit 49 shows the top 5 N-drugs in Arizona by number of scripts during each of the post-reform periods along with utilization statistics. The ranks of these top 5 N-drugs show relatively limited rearrangement post-reform, demonstrating the stability in the mix of N-drugs in Arizona. The formulary implementation does not appear to have had a disproportionate effect on the average number of scripts per claim for any of the top N-drugs. However, several drugs experienced a notable decrease in the number of claims receiving the drug per 1,000 active claims, including Oxycontin® [$-44\% = (2.9 / 5.2) - 1$], Carisoprodol [$-61\% = (2.3 / 5.9) - 1$], and Morphine Sulfate [$-55\% = (1.8 / 4.0) - 1$].

Lidocaine is the only drug that experienced an increase [$17\% = (13.0 / 11.1) - 1$] in the number of claims receiving the drug over all post-reform periods, increasing in rank from #2 to #1, although the average number of scripts per claim remained steady.

Exhibit 49

Changes in N-Drug Utilization Were Relatively Uniform for Top Arizona Drugs

Drug Name	Claims Receiving Drug per 1,000 Active Claims ³¹			Average Scripts per Claim Receiving Drug			Rank (by Script Count)		
	<i>Post-Reform Period</i>			<i>Post-Reform Period</i>			<i>Post-Reform Period</i>		
	#1	#2	#3	#1	#2	#3	#1	#2	#3
Oxycontin	5.2	4.3	2.9	8.3	7.8	8.4	1	2	2
Lidocaine	11.1	10.5	13.0	3.3	3.8	3.6	2	1	1
Carisoprodol	5.9	3.6	2.3	4.8	3.5	3.2	3	5	6
Morphine Sulfate	4.0	2.9	1.8	6.3	6.5	7.4	4	3	3
Trazodone Hydrochloride	3.2	2.9	2.0	5.2	4.9	4.4	5	4	4

³¹ There were 71,280, 72,407, and 70,168 active claims in Arizona in the post-reform1, post-reform2, and post-reform3 time periods, respectively.

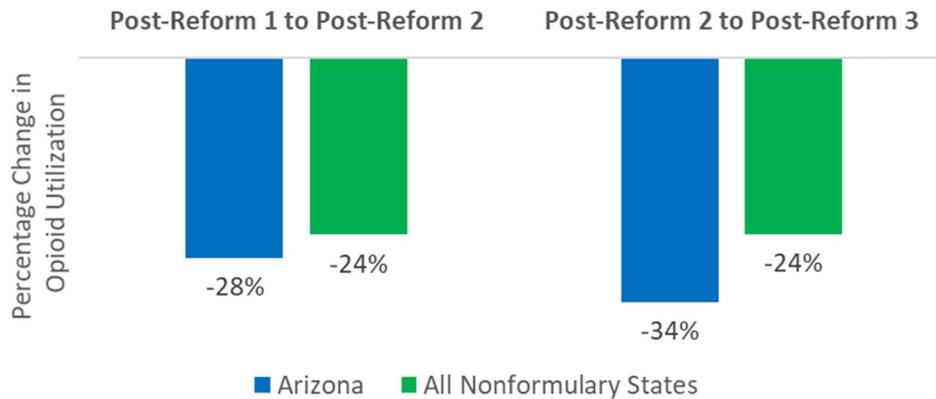
The composition of opioids prescribed in Arizona suggests that the ODG Formulary, used in isolation, may have had a limited effect on opioid utilization in the Arizona WC system.

- Of the top 10 drugs in Arizona by script count during the post-reform1 period, four³² were opioids; all four of these top opioids were Y-drugs
- In total, in the first post-reform period following formulary implementation, 80% of opioid scripts in Arizona were for Y-drugs; Y-drugs constituted 53% of opioid utilization as measured by MME

Exhibit 50 shows a significant decline in the overall utilization of opioids in Arizona during all post-reform periods.

Exhibit 50

Arizona Opioid Utilization Decreases Were Greater Than in Nonformulary States



Prior to formulary implementation, opioids represented 29.3% of total drugs costs in Arizona. In the post-reform1, post-reform2, and post-reform3 periods, opioids represented 25.5%, 22.4%, and 16.5% of total drug costs, respectively. As can be observed from Exhibit 50, there have been significant declines in the utilization of opioids in the post-reform periods, in Arizona as well as in nonformulary states.

³² Four drugs—hydrocodone bitartrate-acetaminophen, tramadol HCl, oxycodone HCl-acetaminophen, and oxycodone HCl—accounted for 73% of opioid scripts during the post-reform1 period.

While the share of topicals has held steady in most states that adopted the formulary, that is not the case in Arizona. Prior to formulary implementation, topicals represented 4.1% of total drugs costs. In the latest post-reform period, topicals represent 6.3% of total drug costs in Arizona, which is slightly lower than the 6.8% share of topicals observed for nonformulary states in the same period.

As can be observed from Exhibit 51, changes in the utilization of topicals has been mixed. While the utilization of topicals increased in the early post-reform period in Arizona and in nonformulary states, these increases were followed by decreases during the most recent post-reform period. While the direction of the changes in Arizona is the same as in the nonformulary states in both post-reform periods, the magnitude of the changes in both periods is quite different for Arizona than for nonformulary states.

Exhibit 51

Utilization Changes for Topicals in Arizona Were Mixed

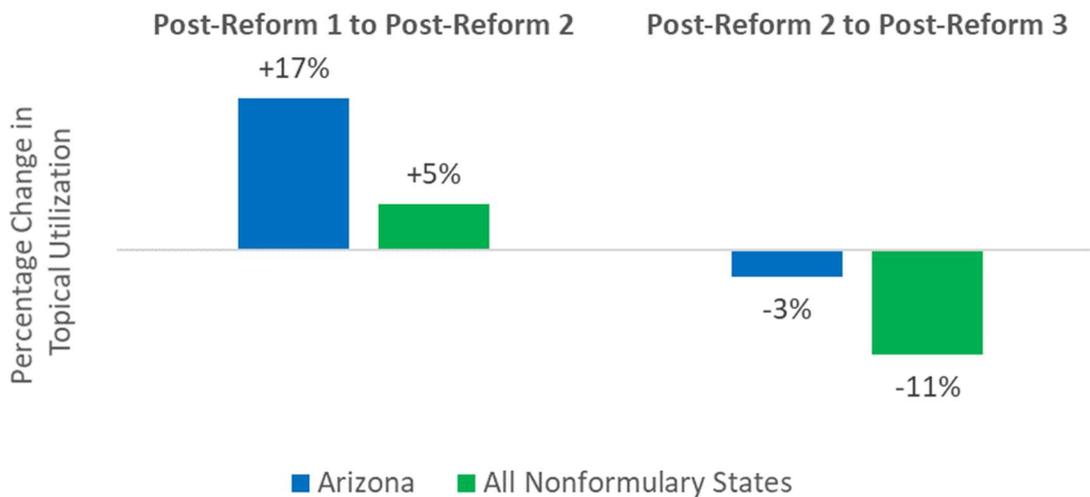
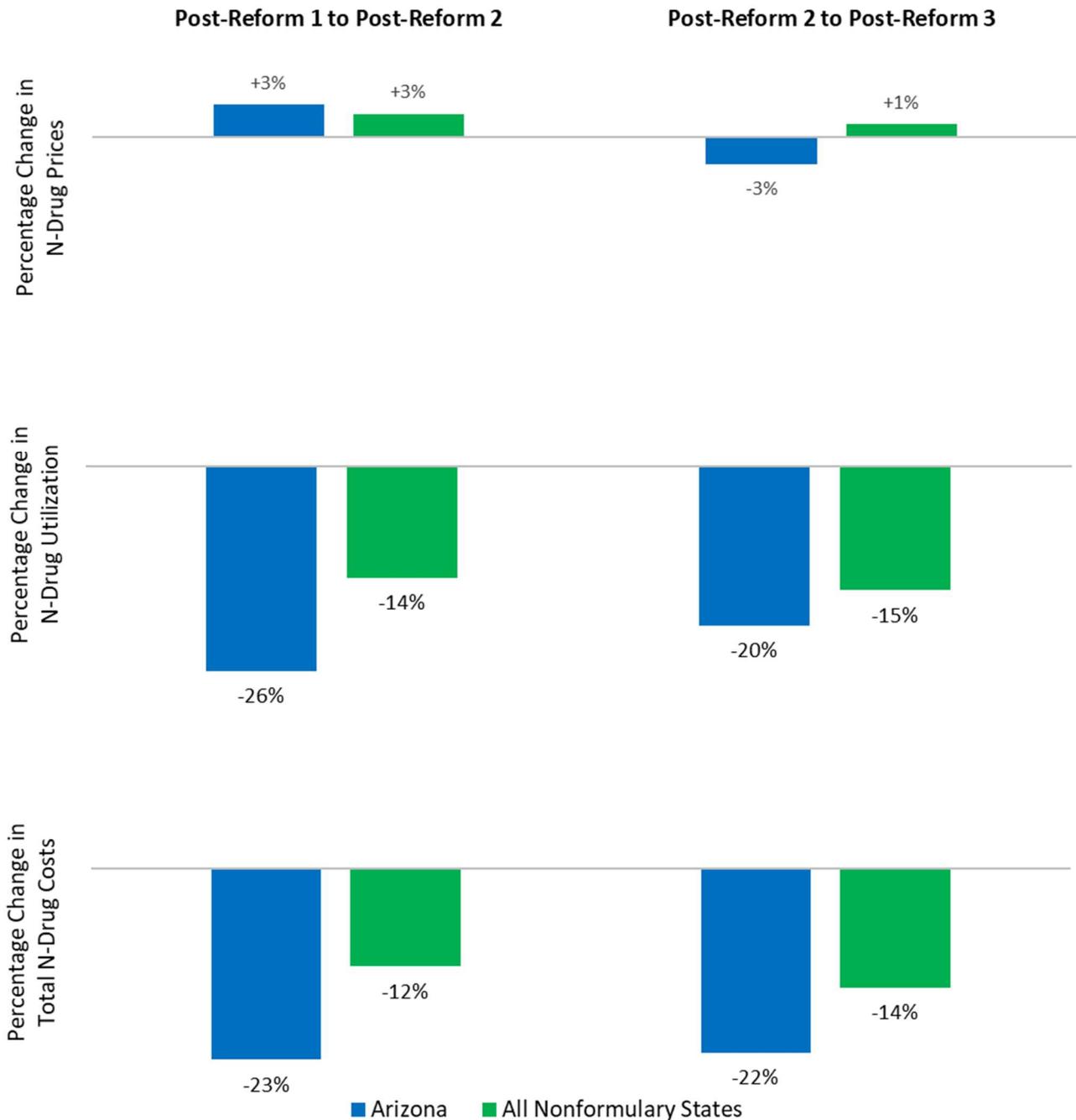


Exhibit 52 breaks down overall N-drug cost changes into price and utilization components. Changes in prices paid in Arizona for N-drugs, adjusted for the mix of prescriptions, have been mixed over the post-reform periods. However, despite the relatively small changes in N-drug prices, total N-drug costs decreased significantly during the same periods; this is principally driven by significant decreases in N-drug utilization. Note that in Exhibit 43, there were very modest changes in N-drug prices over all post-reform time periods observed; adjusted for substitution, relatively small changes in N-drug prices were observed during the same time frame.

Exhibit 52

Post-Reform Decreases in Arizona N-Drug Costs Were Driven by Decreased Utilization

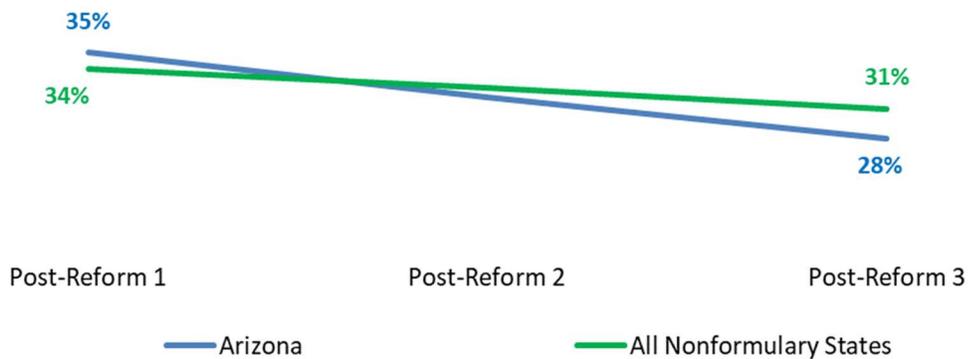


Driven by rapid declines in utilization, N-drug costs as a share of total prescription costs have fallen across the country. In Arizona, this trend tracked closely with the experience of other states in the post-formulary time frame. The significant post-reform decrease in N-drug utilization identified in Exhibit 46 continued the downward trend in Arizona’s N-drug cost share. While the N-drug share of prescription drug costs was 35% in the initial post-reform period, the share of N-drugs declined to 28% during the most recent post-reform period.

With the greater amount of post-formulary experience available for this update compared to the limited post-reform data available for our first observations of the formulary impacts in 2019, we are now able to observe the longer-term impact of the ODG Formulary, which indicates a pronounced decrease in the share of N-drugs.

Exhibit 53

N-Drug Share of Prescription Costs Continued to Decrease in the Years Following Implementation of the Formulary



The implementation of the ODG Formulary in Arizona appears to have resulted in a continued decline in total drug costs that had first been observed in our 2019 research. Two of the main contributors to the decline in drug costs included a continued decline in the overall utilization of N-drugs along with a significant decline in opioid usage, although partly offset by an uptick in the share of topicals.

CONCLUDING REMARKS

This report examined changes in price and utilization trends in WC prescription drug experience following implementation of the ODG Formulary. Despite the small number of states available for study and the similar results for nonformulary effects on drug utilization, this report does observe some overall decrease in N-drug utilization, and hence costs, both immediately following implementation of the formulary and in the years after implementation.

Results vary across each of the states studied with some differences attributable to the amount of post-formulary data available, differing applications of the formulary among states (e.g., refills and topicals), and authorization needed for drugs not on the formulary, among others. Additionally, comparisons between states are difficult, as is the ability to separate impacts of the formulary from other systemic changes and cultural shifts toward the prescribing of drugs that may be resulting in similar changes in states that have not adopted a formulary.

While this report includes observations in several states regarding longer-term impacts of the ODG Formulary implementation, it is unclear if these results are representative of what to expect in other states that have recently implemented formularies or those that are considering implementing a formulary. It remains to be seen if some of the more immediate impacts that were observed in states that have only recently adopted the ODG Formulary will continue as more post-formulary data becomes available.

ACKNOWLEDGMENT

Robert Moss would like to thank David Colón for research, programming, data analysis, and other assistance. Thanks also to Melanie Dufour, Delano Brown, Nicole Garcia, Raji Chadarevian, Dan Clayman, Chun Shyong, and Sean Cooper for their review, assistance, and suggested improvements.

REFERENCES

- [1] Hendrick, Paul, "Formulary Implementations and Initial Impacts on Workers Compensation," NCCI, May 2019.
- [2] *2017 Drug Trends Series Part 4: Topicals, Specialty Medications, & Regulatory Development*, Coventry, October 2018.
- [3] *State of the Line* presentation, *Annual Issues Symposium 2021*, NCCI, May 2021.

Glossary

Accident Year: A loss accounting definition in which experience is summarized by the calendar year in which an accident occurred.

Compound Drug: Compound drugs not otherwise classified are reported in the MDC using Healthcare Common Procedure Coding System code J7999. However, some compound drugs are reported to NCCI using the NDC of the component drugs and are not identifiable as compounded. In this study, NCCI has assumed that certain drug formulations (e.g., POW for powders) are used for purposes of drug compounding and is categorizing such drug formulations as a compound drug, requiring prior authorization in all cases. To the extent all such formulations are not used in compounding, the number of prescriptions and payments associated with compounding may be overstated.

Drugs: Includes any data reported by a National Drug Code (NDC), which is referred to as a prescription drug. Also included are data for revenue codes, the Healthcare Common Procedure Code System (HCPCS), and other state-specific codes that represent drugs.

Healthcare Common Procedure Coding System (HCPCS): Alphanumeric codes that include mostly nonphysician items or services such as medical supplies, ambulatory services, prostheses, etc. These are items and services not covered by Current Procedure Terminology (CPT) procedures.

ICD-10 Codes: The *International Classification of Diseases, Tenth Revision*, is a system used by physicians and other healthcare providers to classify and code all diagnoses, symptoms, and procedures recorded in conjunction with hospital care in the United States.

International Statistical Classification of Diseases and Related Health Problems (ICD-10): A classification of diseases and other health problems based on a diagnosis maintained by the World Health Organization (WHO).

Medical Data Call: Captures transaction-level detail for medical billings that were processed on or after July 1, 2010. All medical transactions with the jurisdiction state in any applicable Medical Data Call state are reportable. This includes all workers compensation claims, including medical-only claims.

National Drug Code (NDC): The National Drug Code is a unique 10- or 11-digit 3-segment number, and a universal product identifier for human drugs in the United States. The 3 segments of the NDC identify: the labeler, the product, and the commercial package size. The NDC Directory is limited to all over-the-counter (OTC) medications, prescription medications, and insulin packages in the US.

Service Year: A loss accounting definition where experience is summarized by the calendar year in which a medical service was provided.

Transaction: A line item of a medical bill.

Units: The number of units of service performed or the quantity of drugs dispensed. For Paid Procedure Codes related to medications, the quantity/units depend on the type of drug:

- For tablets, capsules, suppositories, nonfilled syringes, etc., *units* represent the actual number of the drug provided. For example, a bottle of 30 pills would have 30 units.
- For liquids, suspensions, solutions, creams, ointments, bulk powders, etc., dispensed in standard packages, the units are specified by the procedure code. For example, a cream is dispensed in a standard tube, which is defined as a single unit.
- For liquids, suspensions, solutions, creams, ointments, bulk powders, etc., that are not dispensed in standard packages, the number of units is the amount provided in its standard unit of measurement, such as milliliters, grams, or ounces. For example, codeine cough syrup dispensed by a pharmacist into a four-ounce bottle would be reported as four units.

APPENDIX A: CATEGORIZATION OF NA-DRUGS

Table A (below) includes the top 25 drugs whose status (for either some or all prescriptions) was not identifiable from either the ODG Formulary (e.g., generics) or NDC Crosswalk. The drugs included in Table A are ranked by total paid for all states and time periods in this study, but only include those amounts that were unable to be identified with a formulary status. These drugs are referred to as “NA-drugs.” For some drugs on the list, the total number of prescriptions and paid amounts include different formulations of the drug (e.g., tablet, powder, solution, etc.).

As mentioned in the “Data” section, a formulary status was estimated for a subset of NA-drugs that represented approximately 70% of the total paid for such drugs in the states and time periods used in this study. This was done in order to align the drug authorization with the practical application of the formulary in each state. See Table B for the estimated status of these top 25 drugs for each state, along with the rationale for the selected status. While the list is not exhaustive (i.e., it does not include all drugs for which a status was determined), it helps shed some light on the types of drugs for which authorization status was not available, along with the total combined payments across the five states for such drugs.

The top 25 drugs shown below represent approximately 26% of total scripts and 43% of total payments for “NA-drugs” in all states and time periods in this study.

Rank	Drug Name	Generic (G) or Brand Name (B)	Drug Class	Scripts	Paid
1	Gabapentin	G	Anti-epilepsy	13,438	\$2,390,383
2	Ondansetron HCL	G	Antiemetic	4,185	\$2,140,667
3	Terocin®	B	Topical anesthetic	2,210	\$1,994,783
4	Diclofenac Sodium	G	NSAID	4,288	\$1,843,356
5	Metaxalone	G	Muscle relaxant	5,367	\$1,596,367
6	Ondansetron	G	Antiemetic	3,671	\$1,490,687
7	Duloxetine HCL	G	Anti-depressant	6,271	\$1,417,303
8	LidoPro®	B	Topical anesthetic	1,941	\$1,222,685
9	Nucynta®	B	Opioid	1,992	\$1,208,239
10	Pregabalin	G	Anti-epilepsy	3,383	\$1,108,478
11	LidoPro Patch®	B	Topical anesthetic	788	\$1,078,890
12	Oxycodone HCL-Acetaminophen	G	Opioid	9,612	\$1,045,917
13	Gattex®	B	GLP-2 analog	26	\$1,041,300
14	Cyclobenzaprine HCL	G	Muscle relaxant	20,531	\$902,807
15	Cialis®	B	Vasodilator	1,265	\$885,861
16	Nucynta ER®	B	Opioid	1,147	\$842,613
17	Baclofen	G	Muscle relaxant	5,216	\$757,266
18	Dendracin Neurodendracin®	B	Topical rubefacient	1,020	\$720,400
19	Daptomycin	G	Antibiotic	484	\$668,526
20	Spiriva HandiHaler®	B	Bronchodilator	1,280	\$659,782
21	Viagra®	B	Vasodilator	703	\$635,934
22	Trintellix®	B	Anti-depressant	1,189	\$583,642
23	Oxymorphone HCL	G	Opioid	1,293	\$582,630
24	Latuda®	B	Anti-psychotic	271	\$521,649
25	Bosulif®	B	Kinase inhibitor	40	\$504,534
TOTAL Top 25				91,611	\$27,844,702

Table B includes the selected authorization status and rationale, by state, for drugs in Table A. A similar process was followed for other drugs that were not on the formulary or for which the NDC code was not included in the NDC Crosswalk.

Table B								
Rank	Drug Name	Form	State					Rationale for Selected Status
			AZ ¹	TN ²	IN ³	KY ⁴	MT ⁴	
1	Gabapentin	TAB	Y	Y	Y	Y	Y	Formulary shows "Y" for brand name (Neurontin®)
	Gabapentin	POW	N	N	N	N	N	Assumed for use in compounding
2	Ondansetron HCL		N	N	N	N	N	Formulary shows "N" for brand name (Zofran®, Zuplenz®)
3	Terocin®		Y	N	Y	N	N	State guidance for drugs not on formulary; topicals = "N" for Tennessee
4	Diclofenac Sodium	POW	N	N	N	N	N	Assumed for use in compounding
	Diclofenac Sodium	SOL	N	N	N	N	N	Formulary shows "N" for brand name (Pennsaid®)
	Diclofenac Sodium ⁵	GEL	Y	N	Y	Y	Y	Formulary shows "Y" for Voltaren Gel; topicals = "N" for Tennessee
5	Metaxalone		Y	Y	Y	Y	Y	Formulary shows "Y" for brand name (Skelaxin®) ⁶
6	Ondansetron		N	N	N	N	N	Formulary shows "N" for brand name (Zofran®, Zuplenz®)
7	Duloxetine HCL		Y	Y	Y	Y	Y	Formulary shows "Y" for brand name (Cymbalta®)
8	LidoPro®		Y	N	Y	N	N	State guidance for drugs not on formulary; topicals = "N" for Tennessee
9	Nucynta®		N	N	N	N	N	Formulary shows "N"
10	Pregabalin		Y	Y	Y	Y	Y	Formulary shows "Y" for brand name (Lyrica® IR)
11	LidoPro Patch®		Y	N	Y	N	N	State guidance for drugs not on formulary; topicals = "N" for Tennessee
12	Oxycodone HCL-Acetaminophen		Y	Y	Y	Y	Y	Formulary shows "Y" for brand name (Percocet®)
13	Gattex®		Y	Y	Y	N	N	State guidance for drugs not on formulary
14	Cyclobenzaprine HCL	TAB	Y	Y	Y	Y	Y	Formulary shows "Y" for brand name (Flexeril®, Fexmid™)
	Cyclobenzaprine HCL	POW	N	N	N	N	N	Assumed for use in compounding
15	Cialis®		Y	Y	Y	N	N	State guidance for drugs not on formulary
16	Nucynta ER®		N	N	N	N	N	Formulary shows "N"
17	Baclofen	TAB	Y	Y	Y	Y	Y	Formulary shows "Y" for brand name (Lioresal®)
	Baclofen	POW	N	N	N	N	N	Assumed for use in compounding
18	Dendracin Neurodendracin®		Y	N	Y	N	N	State guidance for drugs not on formulary; topicals = "N" for Tennessee
19	Daptomycin		Y	Y	Y	N	N	State guidance for drugs not on formulary
20	Spiriva HandiHaler®		Y	Y	Y	N	N	State guidance for drugs not on formulary
21	Viagra®		Y	Y	Y	N	N	State guidance for drugs not on formulary
22	Trintellix®		Y	Y	Y	N	N	State guidance for drugs not on formulary
23	Oxymorphone HCL		N	N	N	N	N	Formulary shows "N" for brand name (Opana®)
24	Latuda®		Y	Y	Y	N	N	State guidance for drugs not on formulary
25	Bosulif®		Y	Y	Y	N	N	State guidance for drugs not on formulary

¹ Arizona technically adopted the ODG Formulary along with their medical treatment guidelines; however, preauthorization is not required.

² Tennessee specifically treated topical and compound drugs as "N" drugs in all cases. Only those classes of drugs that contain medications listed as "N" are posted with the formulary. Those classes may contain "Y" drugs as well. Any classes of drugs that are not listed or are not specifically called out in the regulations should be treated similar to "Y" drugs.

³ In Indiana, all compound medications will be classified as "N" class drugs effective 1/1/19. Drugs not allowed on the formulary will require prior authorization as of 1/1/19.

⁴ For Kentucky and Montana, prior authorization will also be required for any prescription drugs not listed on the formulary.

⁵ For Diclofenac Sodium, certain formulations (e.g., delayed release tablet or gel) changed status from "N" to "Y" in 2018. For purposes of this analysis, these specific formulations are categorized as "Y" throughout, except when noted otherwise (e.g., topicals are "N" in Tennessee).

⁶ The formulary status for Skelaxin® was changed from "Y" to "N" in March 2021. Because the status was "N" for all time frames in this analysis, a status of "Y" is being used throughout.

APPENDIX B: FISHER, LASPEYRES, AND PAASCHE PRICE INDICES

Measurement of price and utilization over time requires special care. In particular, it is necessary to account for any “substitution effect” when prices change. For example, suppose Drugs A and B both cost \$1 and are pharmacologically identical. If the price of Drug A increases to \$5, but all Drug A scripts are replaced with Drug B scripts by consumers, there is no actual change in the prices paid for drugs—all scripts actually being purchased still cost \$1. To account for the changing mix of goods purchased, price and utilization should be tracked by indexes that account for this substitution effect. The index used to measure prices and utilization changes between periods in this analysis is the Fisher index, which is constructed from Paasche and Laspeyres indexes.

The Laspeyres price index measures changes in price assuming that quantities are fixed at the prior period’s levels. This index relies on the prior period’s quantities before any substitution effect takes place. Thus, under normal economic circumstances (when consumers substitute relatively more expensive products with less expensive products), the Laspeyres index will overestimate price inflation. The Paasche price index is the reverse of the Laspeyres price index, using the current period’s quantities. This index measures the change in price-holding quantities fixed at their most recent value. Because the Paasche price index relies on quantities after substitution has occurred, it underestimates price inflation under normal circumstances. The Fisher price index is the geometric mean of the Paasche and Laspeyres price indexes. As the Fisher index balances the results of the Paasche and Laspeyres indexes, it is deemed the ideal price index as it corrects the positive price bias in the Laspeyres price index and the negative price bias in the Paasche price index and, as such, best represents the most appropriate index for measuring price changes over time.

In addition to price indexes, Paasche, Laspeyres, and Fisher indexes may also be constructed to measure changes in the quantity of goods over time. This is achieved by switching the terms for price and quantity in the index formulas. Thus, both the Paasche and Laspeyres quantity indexes are calculated by measuring the change in quantity while holding prices fixed and, again, the Fisher quantity index is the geometric mean of the other two indexes. The product of the Fisher price and Fisher quantity indexes represents the total change in expenditure or costs during a period.

One potential distortion in the index calculation involves goods that enter or exit the market entirely. This is of particular concern when measuring drug price and utilization, as new drugs periodically enter the WC system after receiving approval from the US Food and Drug Administration. Because different sets of products are held constant when calculating the Paasche and Laspeyres indexes, the two indexes will be calculated using a different set of drugs. A potential solution to this issue would be to limit the calculation to drugs that have transactions present during both periods in the index calculation. However, in this report, we found that the indexes calculated with this limitation turn out to be extremely similar to the unmodified index values. Hence, no limitation on goods was used in calculating the results shown in this report.

The other potential distortion in these index values arises from changes in the number of active claims over time. The frequency of WC claims has been decreasing for some time [3], and this is reflected in a marked decrease in the total number of active claims in the MDC over the time period studied by this report. Without adjustment, this drop in active claim count would artificially decrease the quantity index values, conflating a decrease in utilization with a decrease in claims in the database over time. Hence, a claim adjustment factor is applied to the value of the Fisher quantity index equal to the active claim count in the current period divided by the active claim count in the baseline period. This adjusted quantity index is referred to as the utilization index in this report.

Index Formulas			
Paasche Price Index:	$\frac{\sum_i P_{i,t} \times Q_{i,t}}{\sum_i P_{i,t-1} \times Q_{i,t}}$	Paasche Quantity Index:	$\frac{\sum_i P_{i,t} \times Q_{i,t}}{\sum_i P_{i,t} \times Q_{i,t-1}}$
Laspeyres Price Index:	$\frac{\sum_i P_{i,t} \times Q_{i,t-1}}{\sum_i P_{i,t-1} \times Q_{i,t-1}}$	Laspeyres Quantity Index:	$\frac{\sum_i P_{i,t-1} \times Q_{i,t}}{\sum_i P_{i,t-1} \times Q_{i,t-1}}$

$$\begin{array}{l} \text{Claim} \\ \text{Adjustment} \\ \text{Factor:} \end{array} = \frac{C_t}{C_{t-1}}$$

Where:

$P_{i,t}$ = Price of product i at period t

$Q_{i,t}$ = Quantity of product i at period t

C_t = Count of active claims in the MDC during period t