

# IMPACT OF PRESCRIBER REPORTS ON RISKY OPIOID PRESCRIBING

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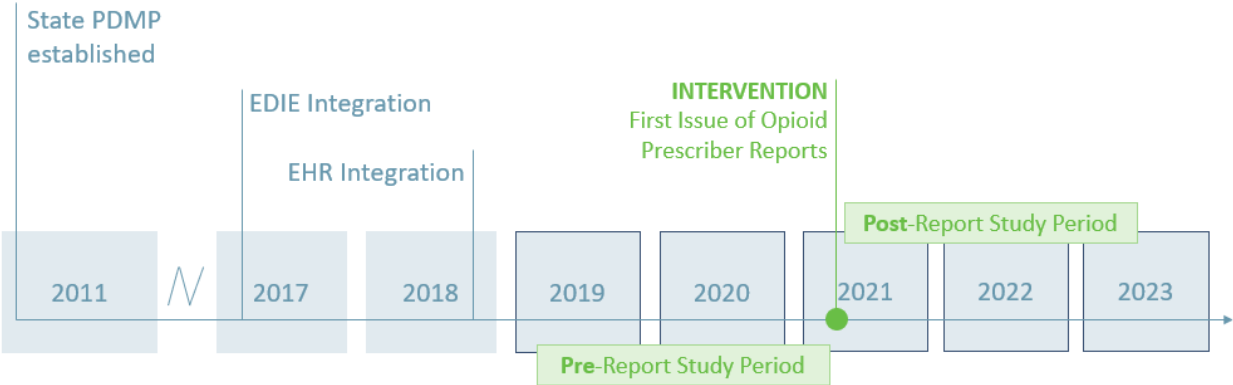
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# BACKGROUND

Legislative changes and funding support have enabled Oregon state to influence clinicians' prescribing practices through Prescriber Reports and to use the Oregon Prescription Drug Monitoring Program (PDMP) data to evaluate prevention and intervention strategies.

Oregon's first **Prescriber Reports** were disseminated in April 2021 and have been disseminated quarterly since (see Figure 1).

Figure 1. Study Timeline

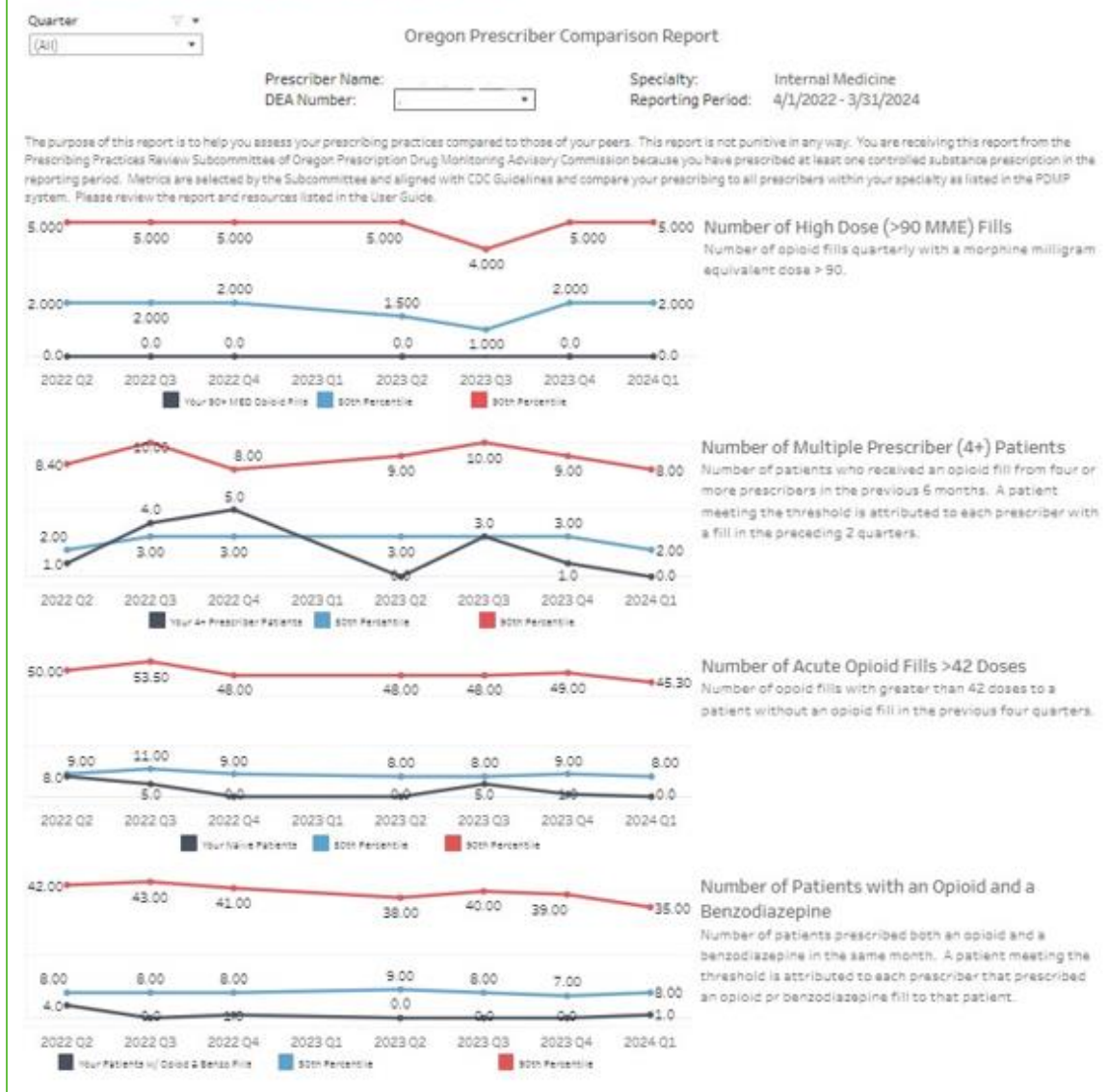


Comagine Health, in partnership with the Oregon Health Authority (OHA), is evaluating the utility and impact of the Prescriber Reports by comparing risky opioid prescribing patterns in the two-years prior to the first prescriber report (pre-report study period) to patterns in the two-years after (post-report study period). **The purpose of this issue brief is to describe the impact of the prescriber report on risky opioid prescribing over time.**

## PRESCRIBER REPORTS

The goal of the Prescriber Report is to give prescribers in Oregon insight into their Opioid prescribing patterns. These quarterly reports are delivered to all registered PDMP users who have an active account, a defined role and specialty, and have written at least one opioid, sedative, or stimulant prescription during the prior 8 quarters. See Figure 2 for a sample Prescriber Report.

**Figure 2. Sample Prescriber Report**



Prescriber reports are personalized and provide a comparison to 50<sup>th</sup> percentile (median) and 90<sup>th</sup> percentile relative to the prescribers’ peer group. Peer groups include prescribers from the same specialty of practice (e.g., family medicine, emergency medicine, etc.). Prescriber reports include **four risky prescribing metrics** described in the section to follow.

# METHODS

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In this section we first define the four risky opioid prescribing metrics that are used in the prescriber reports and as analytic outcomes, then describe the analytic approach.

## RISKY OPIOID PRESCRIBING METRICS

From the PDMP prescribing data, we calculated the following five risky opioid prescribing measures aligning with the metrics presented in the quarterly prescriber reports. Data are calculated at the level of the provider, monthly for 48 months, 24 pre-report and 24 post-report.

**MEASURE 1. High dose opioids** We calculated the percentage of a provider’s opioid prescription fills that are for a high dose opioid, defined as a dosage greater than 90 morphine milligram equivalents (MME). Total MME for each opioid fill was calculated by multiplying the drug strength by the quantity and the MME conversion factor. The MME conversion factor was obtained using Centers for Disease Control (CDC) Conversion Reference Tables<sup>1</sup>. This metric excludes buprenorphine-containing drugs and Tramadol.

**MEASURE 2. Patients with Multiple (4+) Prescribers** Of a prescriber’s patients filling any opioid prescription in a given month, we calculated the percentage of patients who received an opioid fill from four or more prescribers (including the target prescriber for whom we are calculating the metric) in the previous 6 months. Note that one patient may be in multiple prescribers’ numerator. This metric excludes buprenorphine-containing drugs and Tramadol.

**MEASURE 3. Acute Opioid Fills** Of a prescriber’s patients filling any opioid prescription in a given month, we calculated the percentage of patients who were prescribed a quantity of more than 42 pills in the last calendar quarter and did not have an opioid fill in the previous 4 calendar quarters. This metric excludes all “non-pill” opioid fills (liquids, syrups, solutions, lollipops, etc.), all buprenorphine-containing drugs, all anti-tussive agents (codeine-containing drugs, hydrocodone-homatropine, etc.) and Tramadol.

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<sup>1</sup> Dowell, D., Ragan, K. R., Jones, C. M., Baldwin, G. T. & Chou, R. CDC Clinical Practice Guideline for Prescribing Opioids for Pain — United States, 2022. *MMWR Recomm. Rep.* **71**, 1–95 (2022).

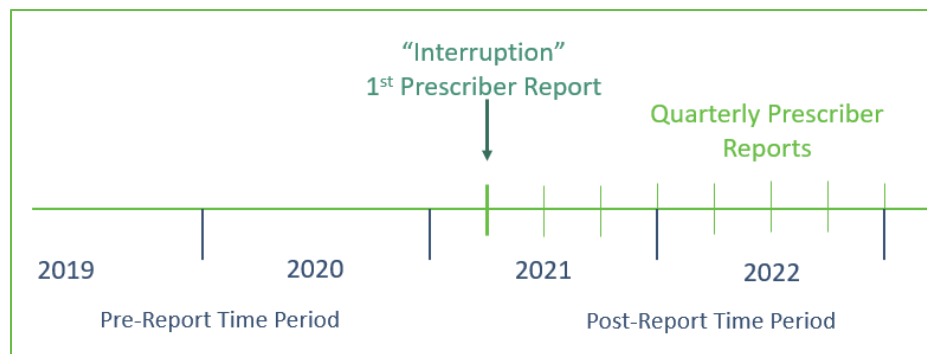
**MEASURE 4. Opioid/benzodiazepine co-prescribing.** Of a prescriber’s patients filling any opioid or benzodiazepine prescription in a given month, we calculated the percentage of patients that have a co-prescribed benzodiazepine. For this metric, the days’ supply of each prescription was used to identify prescribing overlap. Prescriber’s patients with at least one day of opioid/benzodiazepine overlap in the month were counted in the prescriber’s numerator. All the prescriber’s patients filling a controlled substance prescription in the month were counted in the denominator.

In addition to the four metrics included in the reports, we examined the impact on an additional measure of opioid/opioid co-prescribing defines as follows:

**ADDITIONAL MEASURE (M5). Opioid/opioid co-prescribing** Of a prescriber’s patients filling any opioid prescription in a given month, we calculated percentage of patients that have another opioid co-prescribed. The Drug field in the CDC Conversion Reference Tables was used to distinguish different opioid drugs. Co-prescribing was identified in the same manner as the opioid/benzodiazepine co-prescriptions.

## ANALYSIS

We implemented an interrupted time series (ITS) analysis to evaluate the impact of prescriber reports on the four risky prescribing metrics included in the prescriber reports, as well as one additional measure, each described above. The five-outcome measures were evaluated monthly in a time-series over the course of 48 months and is ‘interrupted’ by the first prescriber report at the mid-point, month 24. The major finding that we will present in this report is the difference between



the trends in risky prescribing during the 24 months prior to the first report being implemented (referred to as the pre-report slope) compared to trends in risky prescribing during the 24 months after the first report was received (referred to as the post-report slope).

For each of the five outcomes, we conducted three models to answer the following questions:

**ITS Model**

**Question Answered**

**Basic model**

Did risky prescribing trends improve after the implementation of quarterly prescriber reports, relative to pre-report prescribing trends?

**Adjusted model**

Did risky prescribing trends improve after the implementation of quarterly prescriber reports, relative to pre-report prescribing trends controlling for provider characteristics? Control variables used for adjustment included being a high opioid prescriber (defined: top 4,000 providers with the highest average monthly opioid prescription count prior to intervention) and provider specialty group (dentists, emergency department providers, family medicine providers, and surgeons).

**Investigatory model**

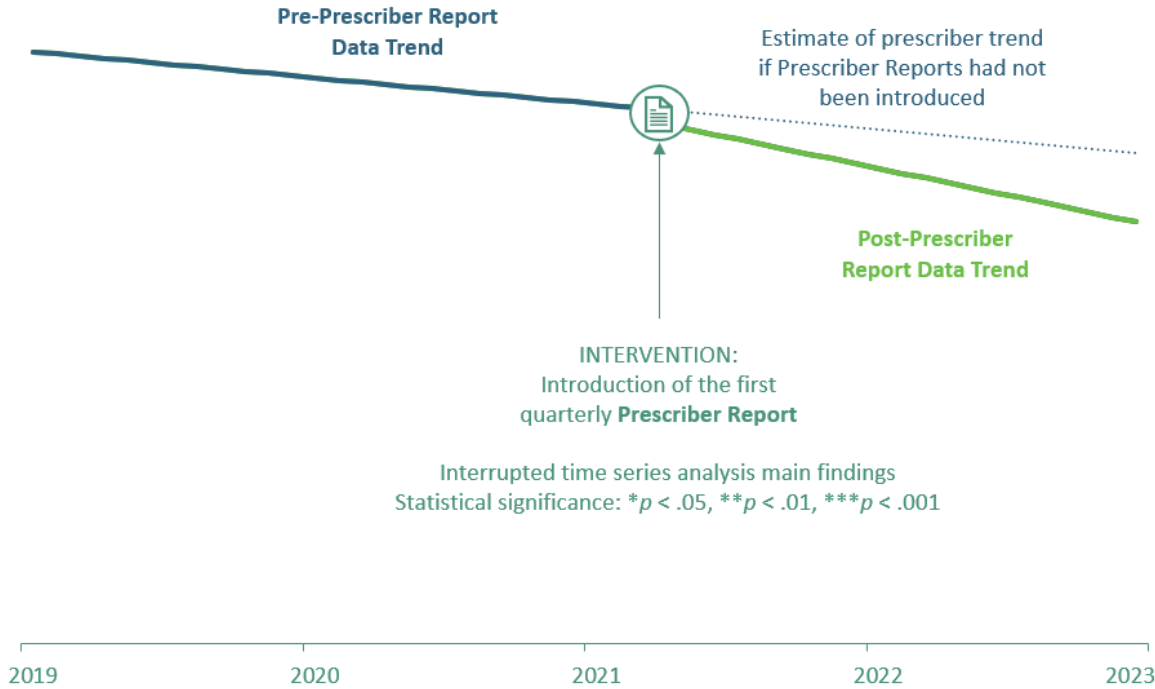
Did risky prescribing trends improve after the implementation of quarterly prescriber reports at different rates for different populations? Provider population groups include high opioid prescribers and provider specialty groups, as defined above for the adjusted model. The providers that did not fall into one of the specialty groups were included in the reference group across all interaction terms.

In the body of the report, we present the main findings from the adjusted model and group differences illuminated in the investigatory models. A full presentation of the results from all models are included in Appendix A.

# FINDINGS

In the following section we describe the main findings for each of the five metrics. First, we describe how the results are presented and a key to interpreting the main findings.

The adjusted model findings are illustrated in a time-series graph (see below) that presents the **pre-prescriber report data trends** and estimated trends had the report not been introduced. The graph also highlights the main finding, the **post-prescriber report data trend**. The "interruption" is illustrated with the report icon to separate the trends into pre- and post-report time segments. The main finding, the extent to which the post-report trend is different from what would be expected given pre-report data trends, is written in the bottom center of the graphic and will include an illustration of the level of statistical significance in asterisk ( $*p < .05$ ,  $**p < .01$ ,  $***p < .001$ ).



The table below will highlight group differences in the main finding -- did each group improve greater / less than average -- and the level of statistical significance.

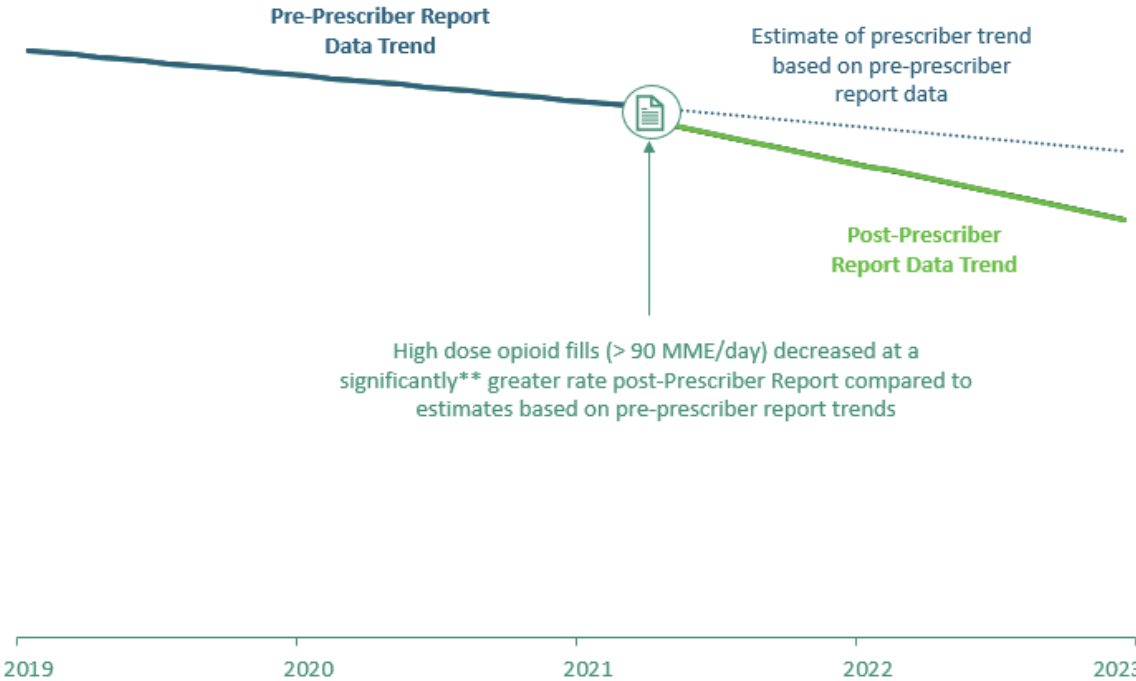
Provider group	Direction, relative to average	p value
High opioid prescribers (at baseline)	Decrease: down arrow (blue) Increase: up arrow (green)	No statistical significance (blank); $*p < .05$ , $**p < .01$ , $***p < .001$
Dentist (specialty)		
Emergency Department (specialty)		
Family Medicine (specialty)		
Surgery (specialty)		



# FINDINGS: M1 - HIGH DOSE OPIOIDS

**Measure 1. High dose opioids** defined as dispensations with dosage greater than 90 morphine milligram equivalents (MME), **decreased at a greater rate post-Prescriber Report** compared to estimates based on pre-prescriber report trends (see Figure 3).

**Figure 3. High Dose Opioids (M1) Findings**



**Group Differences.** Improvements were greater than average for providers in **family medicine** and weaker than average for providers who specialize in **surgery** (see Table 1).

**Table 1. High Dose Opioids (M1) Group Differences**

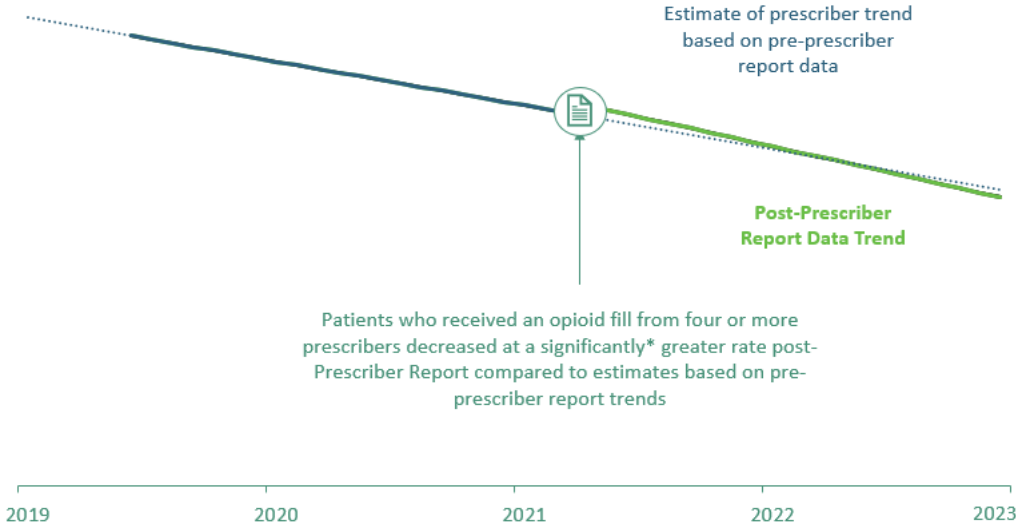
Provider group	Direction, relative to average	p value
High opioid prescribers (at baseline)	↓	
Dentist (specialty)	↑	
Emergency Department (specialty)	↑	
<b>Family Medicine (specialty)</b>	↓	<b>**</b>
<b>Surgery (specialty)</b>	↑	<b>*</b>

Note. \*p < .05, \*\*p < .01, \*\*\*p < .001

# FINDINGS: M2 – MULTIPLE PRESCRIBERS

**Measure 2. Patients with Multiple (4+) Prescribers** defined as percentage of patients who received an opioid fill from four or more prescribers, **decreased at a greater rate post-Prescriber Report** compared to estimates based on pre-prescriber report trends (see Figure 4).

Figure 4. Patients with Multiple (4+) Prescribers (M2) Findings



**Group Differences.** Improvements were weaker than average for **providers who had higher than average opioid prescriptions** in the baseline period (prior to the Prescriber Reports), (see Table 2).

Table 2. Patients with Multiple (4+) Prescribers (M2) Group Differences

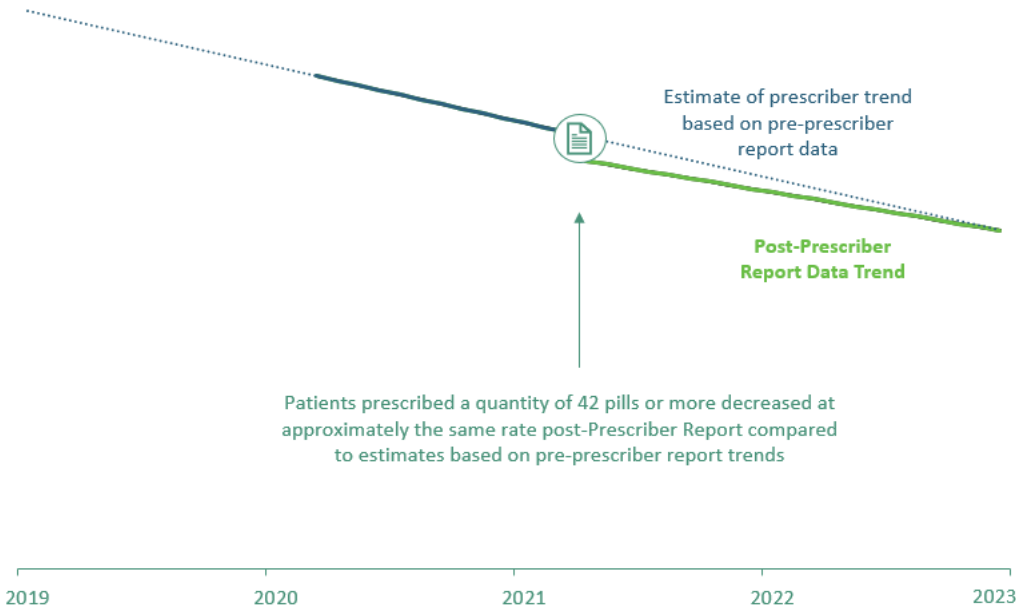
Provider group	Direction, relative to average	p value
High opioid prescribers (at baseline)	↑	*
Dentist (specialty)	↑	
Emergency Department (specialty)	↓	
Family Medicine (specialty)	↑	
Surgery (specialty)	↓	

Note. \*p < .05, \*\*p < .01, \*\*\*p < .001

# FINDINGS: M3 – ACUTE OPIOID FILLS

**Measure 3. Acute opioid fills** defined as percentage of patients prescribed a quantity of more than 42 pills, decreased at approximately the same rate post-prescriber report compared to estimates based on pre-prescriber report trends (see Figure 5).

**Figure 5. Acute Opioid Fills (M3) Findings**



**Group Differences.** Outcomes did not differ significantly between groups (see Table 3).

**Table 3. Acute Opioid Fills (M2) Group Differences**

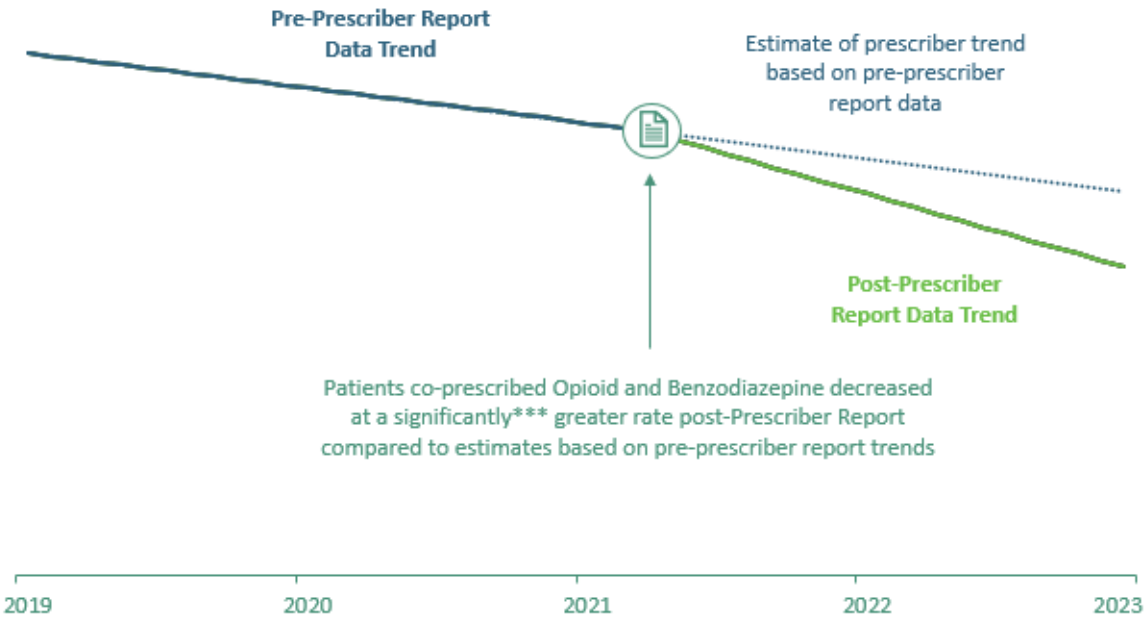
Provider group	Direction, relative to average	p value
High opioid prescribers (at baseline)	↑	
Dentist (specialty)	↑	
Emergency Department (specialty)	↓	
Family Medicine (specialty)	↑	
Surgery (specialty)	↑	

Note. \*p < .05, \*\*p < .01, \*\*\*p < .001

# FINDINGS: M4 – OPIOID/BENZODIAZEPINE

**Measure 4. Opioid/Benzodiazepine Co-Prescribing** defined as percentage of patients filling any benzodiazepine co-prescribed with an opioid, **decreased at a greater rate post-Prescriber Report** compared to estimates based on pre-prescriber report trends (see Figure 6).

Figure 6. Opioid/Benzodiazepine Co-Prescribing (M4) Findings



**Group Differences.** Improvements were greater than average for **providers who had higher than average opioid prescriptions in the baseline period** and providers in **family medicine**, but weaker than average for providers who specialize in **dentistry** (see Table 4).

Table 4. Opioid/Benzodiazepine Co-Prescribing (M4) Group Differences

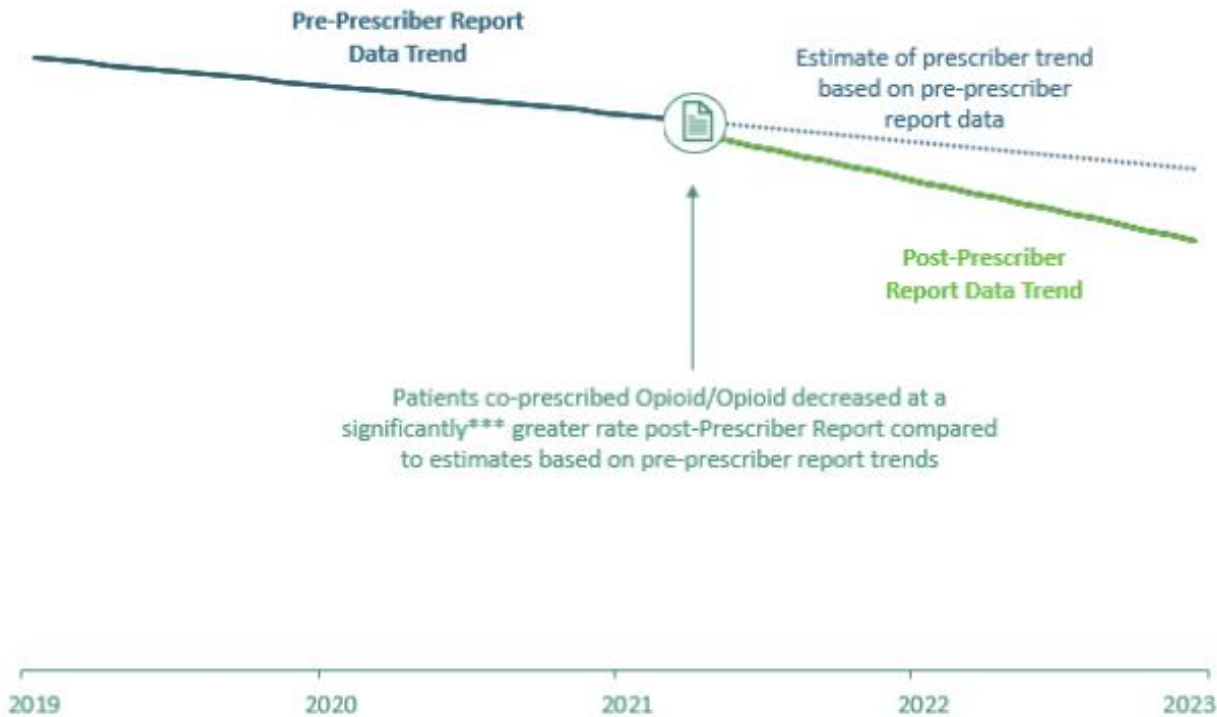
Provider group	Direction, relative to average	p value
High opioid prescribers (at baseline)	↓	***
Dentist (specialty)	↑	*
Emergency Department (specialty)	↓	
Family Medicine (specialty)	↓	***
Surgery (specialty)	↓	

Note. \*p < .05, \*\*p < .01, \*\*\*p < .001

# FINDINGS: M5 – OPIOID/OPIOID

**Measure 5. Opioid/Opioid Co-Prescribing** defined as patients who filled any opioid prescription that had another opioid co-prescribed, **decreased at a greater rate post-Prescriber Report** compared to estimates based on pre-prescriber report trends (see Figure 7).

Figure 7. Opioid/Opioid Co-Prescribing (M5) Findings



**Group Differences.** Improvement did not differ significantly between groups (see Table 5).

Table 5. Patients with Multiple (4+) Prescribers (M2) Group Differences

Provider group	Direction, relative to average	p value
High opioid prescribers (at baseline)	↓	
Dentist (specialty)	↑	
Emergency Department (specialty)	↓	
Family Medicine (specialty)	↑	
Surgery (specialty)	↓	

Note. \*p < .05, \*\*p < .01, \*\*\*p < .001

# DISCUSSION

Prescriber reports, introduced in Oregon in April 2021 and disseminated quarterly thereafter, had a positive impact on decreasing risky opioid prescribing. Specifically, risky opioid prescribing has decreased at a greater rate post-Prescriber Report relative to pre-Prescriber Report trends for four of the five metrics assessed: (M1) prescribing of high dose opioid fills, (M2) multiple opioid prescribers per patient, (M4) co-prescribed benzodiazepines and opioids, and (M5) co-prescribed opioids & opioids. Prescriber Reports did not significantly impact acute opioid fills (M3) (see Table 6).

**Table 6. Summary of Adjusted Model Main Findings**

Outcome Model	Improve (decline)	p value
<b>M1. High Dose Opioids</b>	↓	***
<b>M2. Patients with Multiple (4+) Prescribers</b>	↓	*
M3. Acute Opioid Fills		
<b>M4. Opioid/Benzodiazepine</b>	↓	***
<b>M5. Opioid/Opioid Co-Prescribing</b>	↓	***

Improvement varied by provider group. Family Medicine providers reduced their high dose opioid (M1) and Opioid Benzodiazepine co-prescriptions more than other providers combined. No patterns were detected across outcome measures (see Table 7).

**Table 7. Summary of Adjusted Models: Differences by Groups**

Outcome Model	High Dose Opioid Prescribers at Baseline	Dentist (specialty)	Emergency Department (specialty)	Family Medicine (specialty)	Surgery (specialty)
M1. High Dose Opioids				<i>Greater improvement</i>	<i>Weaker improvement</i>
M2. Patients with Multiple (4+) Prescribers	<i>Weaker improvement</i>				
M3. Acute Opioid Fills					
M4. Opioid/Benzodiazepine	<i>Greater improvement</i>	<i>Weaker improvement</i>		<i>Greater improvement</i>	
M5. Opioid/Opioid Co-Prescribing					

# APPENDIX

Table 1. Descriptive statistics by Measure (Metrics defined as percentages)

	Mean	StdDev	Median	Min	Max	Q1	Q3
<i>M1. High Dose Opioids</i>	4.53	12.98	0	0	100	0	0.00
<i>M2. Patients with Multiple (4+) Prescribers</i>	5.87	14.16	0	0	100	0	5.26
<i>M3. Acute Opioid Fills</i>	13.37	23.20	0	0	100	0	18.75
<i>M4. Opioid/Benzodiazepine</i>	8.12	15.15	0	0	100	0	11.11
<i>M5. Opioid/Opioid Co-Prescribing</i>	9.57	16.57	0	0	100	0	13.33

Table 2. Number of Providers by Measure

	All Providers	Anesthesiology & Surgery	Dentist	Emergency Medicine	Family Medicine & Internal Medicine	High Opioid Prescriber
<i>M1. High Dose Opioids</i>	11,964	1,007	1,730	835	3,660	3,480
<i>M2. Patients with Multiple (4+) Prescribers</i>	11,863	999	1,720	831	3,635	3,480
<i>M3. Acute Opioid Fills</i>	9,053	934	592	709	3,197	3,364
<i>M4. Opioid/Benzodiazepine</i>	14,394	1,037	1,782	863	4,065	3,525
<i>M5. Opioid/Opioid Co-Prescribing</i>	12,759	1,025	1,740	853	3,935	3,502

Table 3. Basic Model Results by Measure

Summary of the estimate of Impact: Post-slope relative to pre-slope.

	Estimate	Std. Error	P value	95% CI (L)	95% (U)
<i>M1. High Dose Opioids</i>	<b>-0.02</b>	<b>0.006</b>	<b>&lt;0.001</b>	<b>-0.03</b>	<b>-0.01</b>
<i>M2. Patients with Multiple (4+) Prescribers</i>	<b>-0.02</b>	<b>0.007</b>	<b>0.024</b>	<b>-0.03</b>	<b>-0.002</b>
<i>M3. Acute Opioid Fills</i>	0.01	0.023	0.749	-0.04	0.05
<i>M4. Opioid/ Benzodiazepine</i>	<b>-0.07</b>	<b>0.006</b>	<b>&lt;0.001</b>	<b>-0.08</b>	<b>-0.06</b>
<i>M5. Opioid/Opioid Co-Prescribing</i>	<b>-0.05</b>	<b>0.007</b>	<b>&lt;0.001</b>	<b>-0.06</b>	<b>-0.03</b>

**Table 4. Adjusted Model Results by Measure**

Summary of the estimate of Impact: Post-slope relative to pre-slope, controlling for provider characteristics (e.g., high opioid prescribers pre-report, dentist, emergency department, family medicine, and surgery specialty groups).

	Estimate	Std. Error	P value	95% CI (L)	95% (U)
<i>M1. High Dose Opioids</i>	<b>-0.02</b>	<b>0.006</b>	<b>&lt;0.001</b>	<b>-0.03</b>	<b>-0.01</b>
<i>M2. Patients with Multiple (4+) Prescribers</i>	<b>-0.01</b>	<b>0.007</b>	<b>0.045</b>	<b>-0.03</b>	<b>-0.0003</b>
<i>M3. Acute Opioid Fills</i>	0.01	0.022	0.587	-0.03	0.06
<i>M4. Opioid/ Benzodiazepine</i>	<b>-0.07</b>	<b>0.006</b>	<b>&lt;0.001</b>	<b>-0.08</b>	<b>-0.06</b>
<i>M5. Opioid/Opioid Co-Prescribing</i>	<b>-0.05</b>	<b>0.007</b>	<b>&lt;0.001</b>	<b>-0.06</b>	<b>-0.04</b>

**Table 4. Investigatory Model Results by Measure**

Summary of the estimate of Impact: Post-slope relative to pre-slope, exploring for differences by provider characteristics (e.g., high opioid prescribers pre-report, dentist, emergency department, family medicine, and surgery specialty groups). Estimates (p values) presented for each three-way interaction.

**Table 4a. High Dose Opioid Prescribers at Baseline**

	Estimate	Std. Error	P value	95% CI (L)	95% (U)
<i>M1. High Dose Opioids</i>	-0.02	0.012	0.140	-0.04	0.01
<i>M2. Patients with Multiple (4+) Prescribers</i>	<b>0.04</b>	<b>0.015</b>	<b>0.017</b>	<b>0.01</b>	<b>0.07</b>
<i>M3. Acute Opioid Fills</i>	0.02	0.045	0.609	-0.07	0.11
<i>M4. Opioid/ Benzodiazepine</i>	<b>-0.05</b>	<b>0.014</b>	<b>&lt;.001</b>	<b>-0.07</b>	<b>-0.02</b>
<i>M5. Opioid/Opioid Co-Prescribing</i>	-0.003	0.015	0.830	-0.033	0.027

**Table 4b. Dentist (specialty)**

	Estimate	Std. Error	P value	95% CI (L)	95% (U)
<i>M1. High Dose Opioids</i>	0.02	0.017	0.168	-0.01	0.06
<i>M2. Patients with Multiple (4+) Prescribers</i>	0.01	0.021	0.675	-0.03	0.05
<i>M3. Acute Opioid Fills</i>	0.03	0.104	0.778	-0.17	0.23
<i>M4. Opioid/ Benzodiazepine</i>	<b>0.05</b>	<b>0.019</b>	<b>0.014</b>	<b>0.01</b>	<b>0.08</b>
<i>M5. Opioid/Opioid Co-Prescribing</i>	0.001	0.021	0.961	-0.041	0.043

**Table 4c. Emergency Department (specialty)**

	Estimate	Std. Error	P value	95% CI (L)	95% (U)
<i>M1. High Dose Opioids</i>	0.03	0.022	0.253	-0.02	0.07



<i>M2. Patients with Multiple (4+) Prescribers</i>	-0.02	0.027	0.563	-0.07	0.04
<i>M3. Acute Opioid Fills</i>	-0.07	0.084	0.395	-0.24	0.09
<i>M4. Opioid/ Benzodiazepine</i>	-0.01	0.025	0.762	-0.06	0.04
<i>M5. Opioid/Opioid Co-Prescribing</i>	-0.03	0.028	0.316	-0.08	0.03

Table 4d. Family Medicine (specialty)

	Estimate	Std. Error	P value	95% CI (L)	95% (U)
<i>M1. High Dose Opioids</i>	<b>-0.04</b>	<b>0.012</b>	<b>0.003</b>	<b>-0.061</b>	<b>-0.012</b>
<i>M2. Patients with Multiple (4+) Prescribers</i>	0.02	0.015	0.122	-0.01	0.05
<i>M3. Acute Opioid Fills</i>	0.05	0.046	0.311	-0.04	0.14
<i>M4. Opioid/ Benzodiazepine</i>	<b>-0.06</b>	<b>0.013</b>	<b>&lt;.001</b>	<b>-0.08</b>	<b>-0.03</b>
<i>M5. Opioid/Opioid Co-Prescribing</i>	0.004	0.015	0.775	-0.026	0.034


Table 4e. Surgery (specialty)

	Estimate	Std. Error	P value	95% CI (L)	95% (U)
<i>M1. High Dose Opioids</i>	<b>0.05</b>	<b>0.020</b>	<b>0.019</b>	<b>0.01</b>	<b>0.09</b>
<i>M2. Patients with Multiple (4+) Prescribers</i>	-0.02	0.025	0.459	-0.07	0.03
<i>M3. Acute Opioid Fills</i>	0.08	0.072	0.278	-0.06	0.22
<i>M4. Opioid/ Benzodiazepine</i>	0.03	0.023	0.209	-0.02	0.07
<i>M5. Opioid/Opioid Co-Prescribing</i>	-0.01	0.025	0.650	-0.06	0.04



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