Prescription Monitoring Program & Data

Washington State Department of
Health

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Washington D.C

The PMP as a Prevention Strategy

- What it is
  - Repository of dispensing records

- How it works
  - Information in-information out
  - Dispensing data submitted to PMP
  - Users view/query PMP

- Why it's important
  - Helps inform prescriptive decision-making
  - Improves patient care, reduces prescription drug misuse
  - Component in integrated approach to reducing prescription opioid overdose and related harms

# What is Not Required to be Reported to the Washington PMP

- Prescriptions dispensed outside the state

- Prescriptions prescribed for ≤ 24 hours

- Prescriptions prescribed/administered to a patient in a hospital

- Prescriptions dispensed from Department of Corrections pharmacy unless offender is released with a prescription

- Prescriptions dispensed from an Opioid Treatment Program

- Prescriptions dispensed from federally-operated pharmacies (Indian Health Services and Veterans Affairs report voluntarily)

- Prescriptions from treatment and methadone programs are not required under current Washington state law.

State Opioid and Overdose Response Plan

- Goal 1: Prevent Opioid Misuse

- Goal 2: Identify and Treat Substance Use Disorder

- Goal 3: Ensure and Improve the Health and Wellness of Individuals That Use Drugs

- Goal 4: Use Data and Surveillance to Detect Drug Use Trends, Monitor the Health and Wellness of Individuals Who Use Drugs, and Evaluate Interventions

State Plan Link:
https://www.hca.wa.gov/assets/program/WashingtonStateOpioidandOverdoseResponsePlan-final-2021.pdf

Washington State
2021–2022
Opioid and Overdose Response Plan
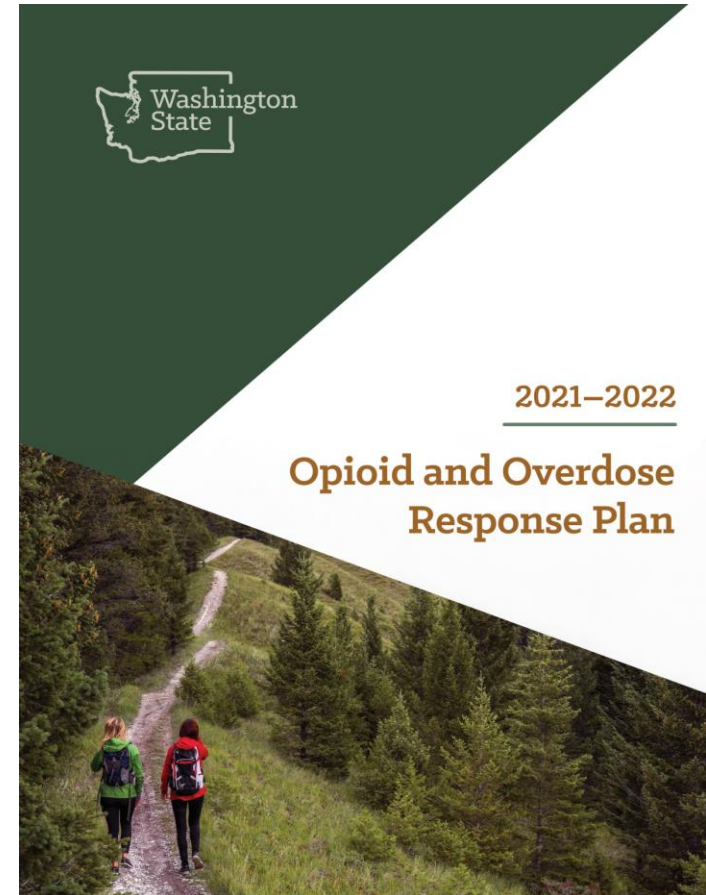
Goal 4 Work Group

- Use Data and Surveillance to Detect Drug Use Trends, Monitor the Health and Wellness of Individuals Who Use Drugs, and Evaluate Interventions
  - Improve quality and timeliness of the data submitted to the PMP from pharmacies
  - Increase integration of PMP data with electronic medical records.
  - Provide quarterly updates to the six Bree-based PMP metrics on the DOH Opioid Data Dashboard.
  - Explore buprenorphine prescribing practices to assess adequacy of treatment for different models of care, develop standardized metrics, document care patterns and determine impacts of system level interventions.

Goal 4 Work Group (cont.)

- Use Data and Surveillance to Detect Drug Use Trends, Monitor the Health and Wellness of Individuals Who Use Drugs, and Evaluate Interventions
  - Analyze linked PMP and death data to assess the relationship between prescription history and risk of death.
  - Develop buprenorphine prescribing rate metric and begin reporting to DOH Opioid Data Dashboard.
    - Dashboard Link: https://doh.wa.gov/data-statistical-reports/washington-tracking-network-wtn/opioids/county-prescriptions-dashboard

Improvements in Data Sources

- PMP data
  - On average, we followed up with 70–200 pharmacies each week regarding reporting compliance (timeliness and frequency).
  - Quarterly data checks (e.g., unverifiable prescriber DEA #) (since 2016q3)
  - Weekly calls with PMP Vendor
  - ASAP 4.2A submission guidelines to dispensers/uploaders
 - Education outreach to dispensers via PQAC

State Audit Results

- Selected State Audit Results
  - Develop a more comprehensive compliance process
  - Expand Better Prescribing and Better Treatment Program (BPBT) to include more providers other than physicians and physician assistants
  - Required date sold as 'date of distribution' instead of date filled.
  - Develop a process to validate that pharmacies have submitted all controlled substance prescription records promptly.
    - May not be feasible if it requires a full pharmacy audit.
  - Auditors recommend that auditing agencies have access to the PMP data for auditing purposes.
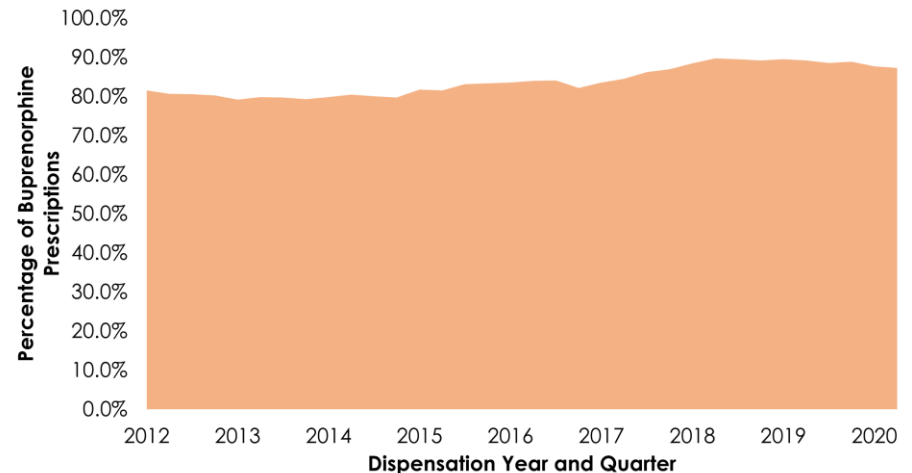
Buprenorphine Prescribing in Washington State

The **rate of buprenorphine prescriptions** has **increased** significantly.

Sex-Age Adjusted Buprenorphine
Prescriptions by All Healthcare
Providers per 100 population
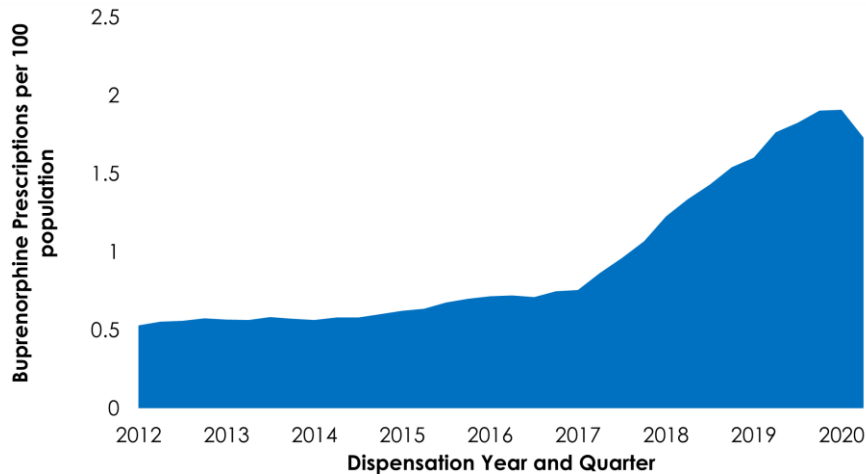
Percentage of Buprenorphine
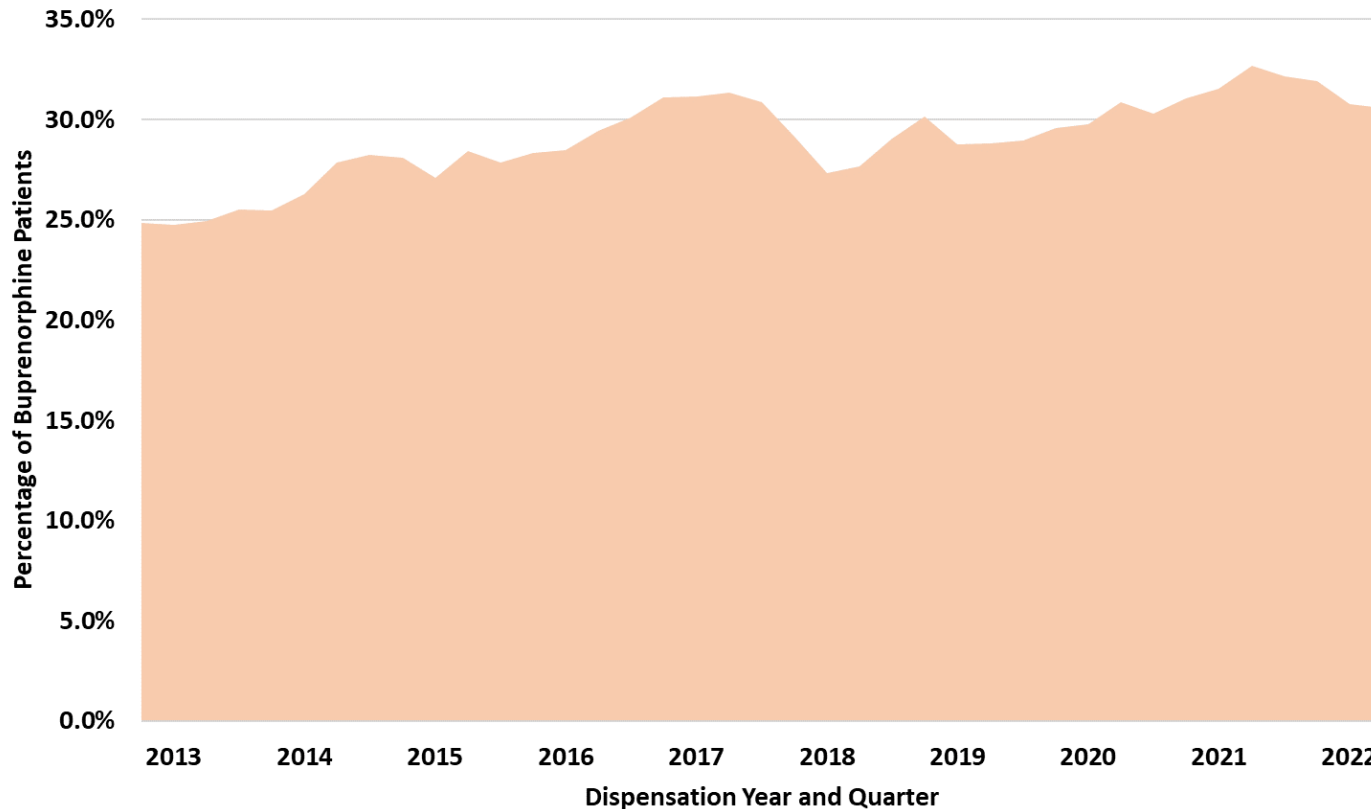Prescriptions Prescribed by Waivered
Healthcare Providers

Presented at the 2021 WSPHA Conference.
Data Source: Washington Prescription Monitoring Program and SAMHSA.

Buprenorphine Retention Metrics
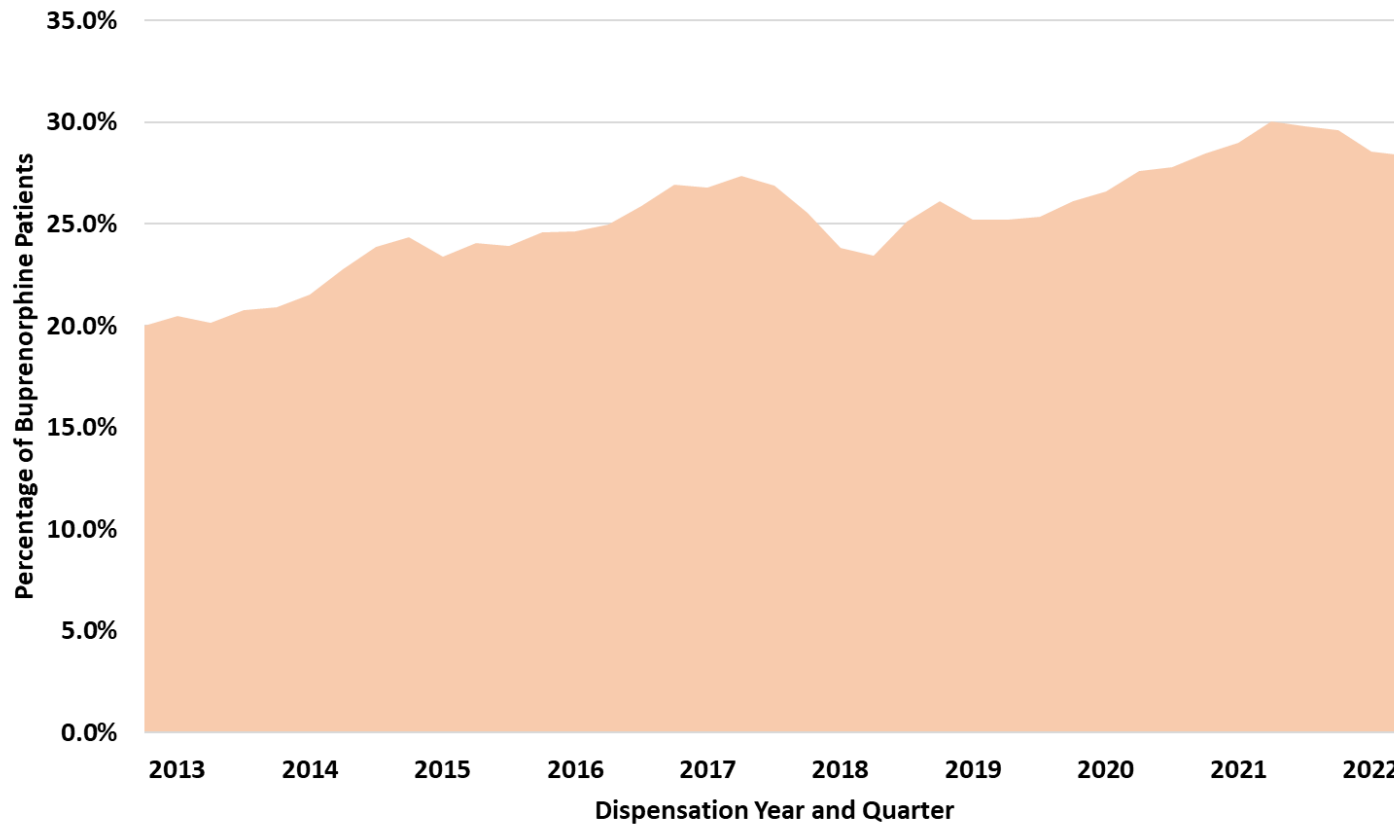
Percentage of patients with buprenorphine prescription for 90 continuous days has increased from ~25% to ~31%.

Data Source: Washington PMP. Patients 18+ years of age with a buprenorphine prescription labeled for OUD treatment.

Buprenorphine Retention Metrics

Percentage of patients with buprenorphine prescription for 180 continuous days has increased from ~20% to ~30%.

Data Source: Washington PMP. Patients 18+ years of age with a buprenorphine prescription labeled for OUD treatment.

Public Health Surveillance Projects

- Washington Tracking Network (WTN) Public Health Opioid Prescribing Metrics Dashboard
  - Opioid Prescriptions and Drug Overdoses County Data :: Washington State Department of Health
  - Data is updated quarterly (latest data is for 2021Q4).
  - Provides BREE-based opioid metrics by state, ACH, and county.
  - Recently, we added a metric for buprenorphine dispensation trend.

- Socrata Open Data Portal
  - Prescription Monitoring Program (PMP) Public Use Data | Data.WA | State of Washington
  - Provides prescription-record level data for public use.
  - All identifiers are removed.
  - Data is updated quarterly (latest data is for 2021Q4).

Public Health Surveillance Projects

- PMP – Death Data Linkage
  - The linked data is used to fulfill data requests from various surveillance systems or projects through a DSA:
    - Maternal Mortality Review Board (MMR)
    - Deaths with Dignity
    - State Unintentional Drug Overdose Reporting System (SUDORS)
    - WSIRB-approved Research Projects
  - The process is conducted annually with the finalized death data or semi-annually with the preliminary death data file.

Public Health Surveillance Projects

- PMP – Birth Data Linkage
  - In development
  - The goal is to examine potential associations between prescription drug and maternal/birth factors/outcomes.

- PMP – Hospital Discharge Linkage
  - The goal is to examine potential associations between prescription drug and non-fatal drug overdoses.
  - There has been some expressed interest, but we are currently assessing the capacity level needed to complete this project.

- Monitoring the impact of COVID19 on opioid prescribing
  - Except during the March 2020 COVID19 stay-at-home order, no other substantial changes were noticed for opioid prescribing.
  - Psychostimulant prescribing did change during and as a result of the COVID19 pandemic.

Prescription Opioid Trends During Covid19 Pandemic

Patients with opioid prescriptions did decline during 2020Q2 due to the pandemic.

For graph legend, please the dashboard at this link: https://doh.wa.gov/data-statistical-reports/washington-tracking-network-wtn/opioids/opioid-prescriptions-dashboard

Data Source: 2011-2022 Washington PMP.

Age-Sex Adjusted All Opioid Patient Rate per 1,000 population by ACH Region, 2011-2022
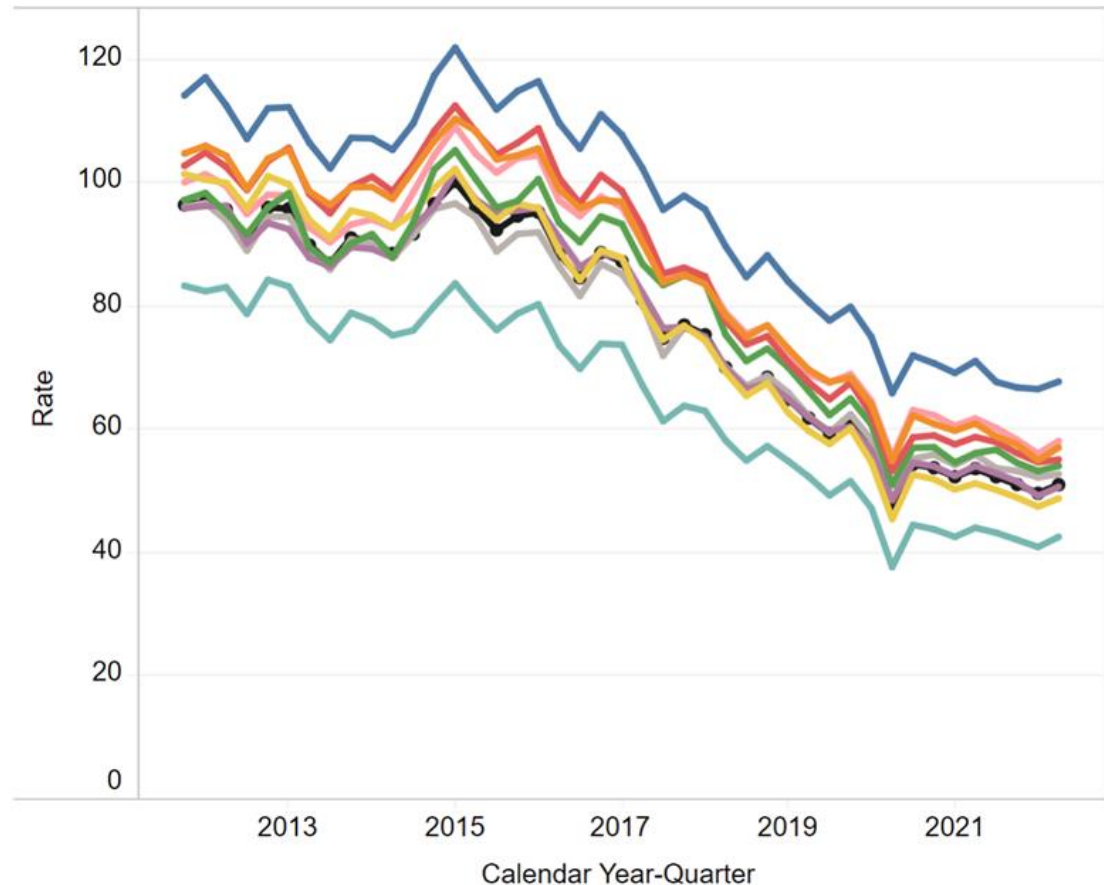
Prescription Opioid Trends During Covid19 Pandemic

Patients with chronic opioid prescriptions (>= 60 days) did NOT seem to decline during 2020Q2 due to the pandemic.

For graph legend, please the dashboard at this link: https://doh.wa.gov/data-statistical-reports/washington-tracking-network-wtn/opioids/opioid-prescriptions-dashboard

Data Source: 2011-2022 Washington PMP.

Age-Sex Adjusted Chronic Opioid Patient Rate per 1,000 population by ACH Region, 2011-2022
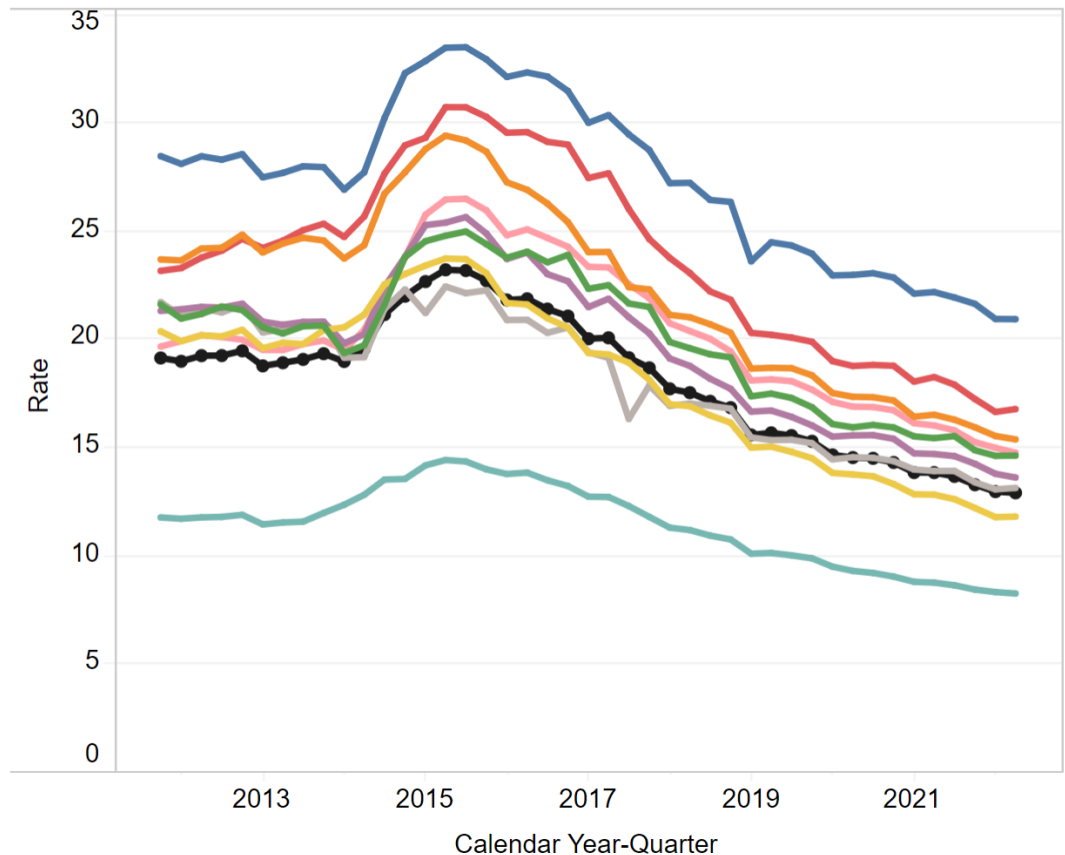
Prescription Psychostimulant Trends

Sex/gender age-adjusted prescription rate per 100 population for all major drug classes
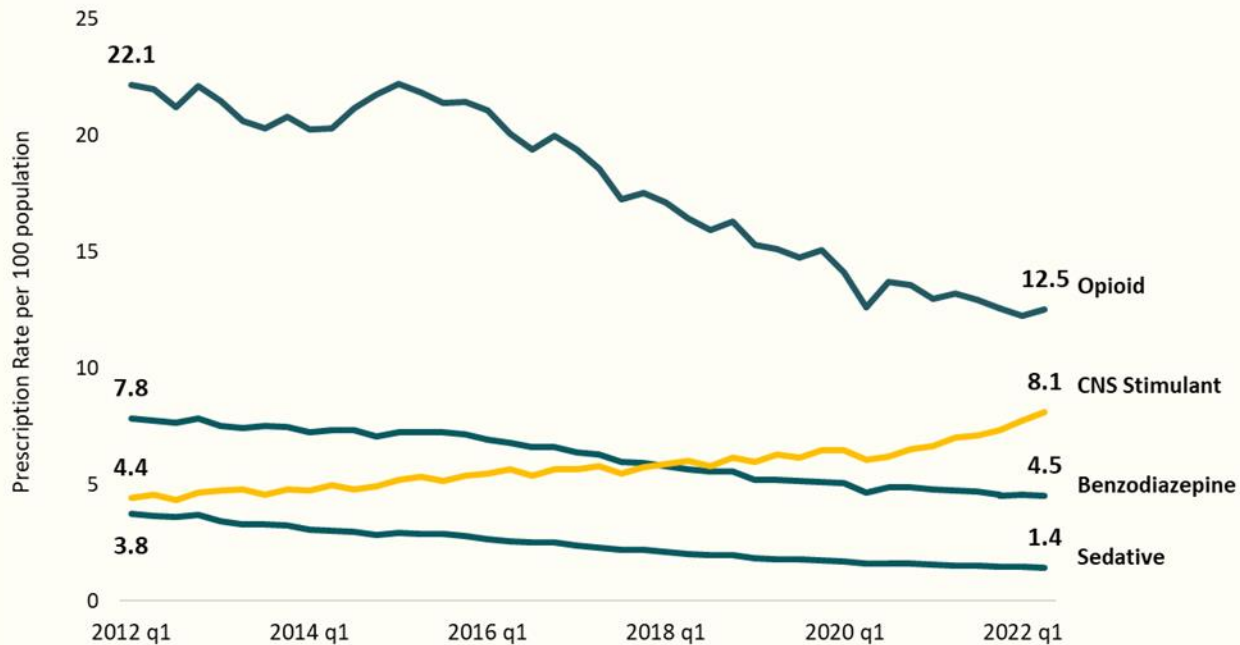
Data Source: 2012 - 2022 Washington PMP.

Prescription Psychostimulant Trends

Psychostimulant prescription varies by sex/gender and age.
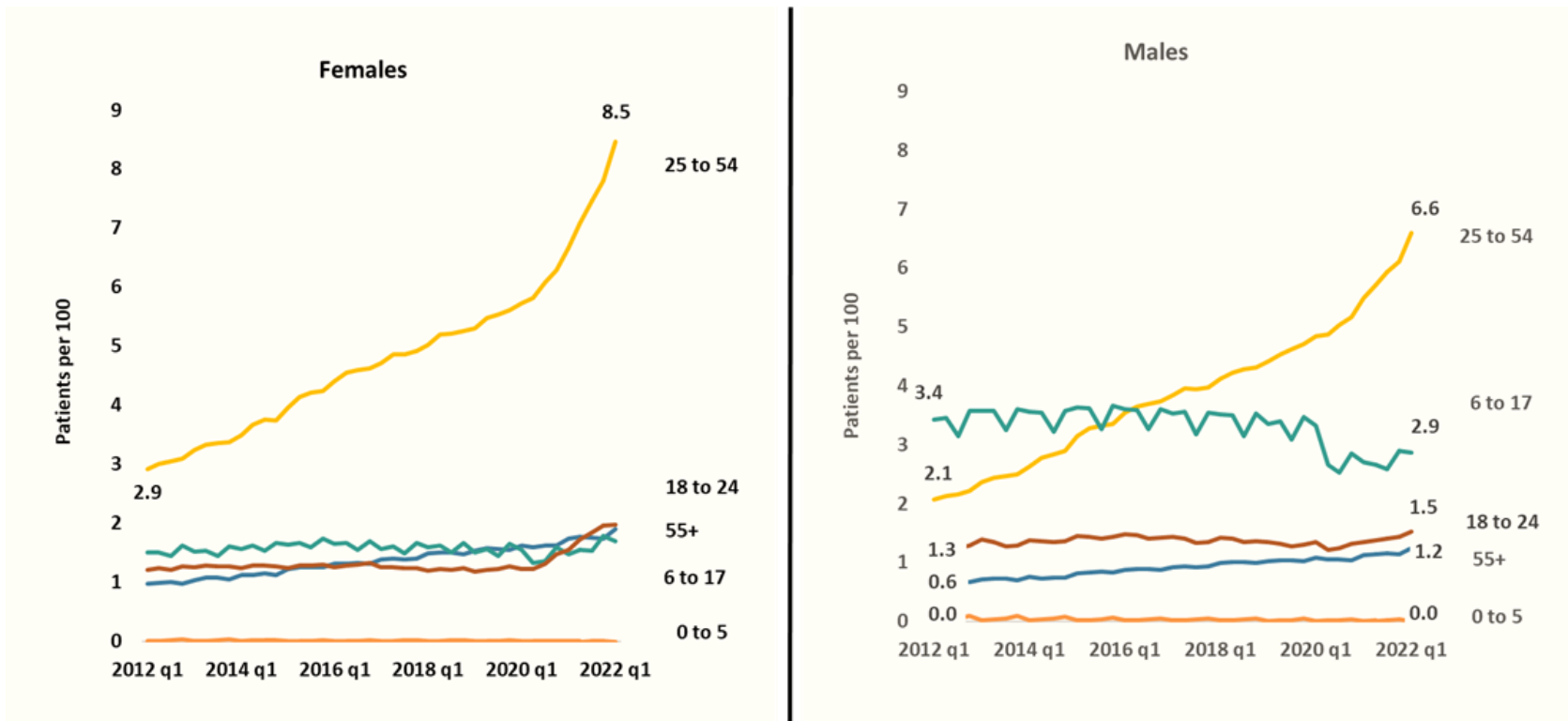
Data Source: 2012 - 2022 Washington PMP.

Other Public Health Research Projects

- Identifying Risk Factors for Prescription Opioid Overdose
  - The goal was to identify and document risk factors for a prescription opioid overdose using linked Washington PMP – Death Data.
  - The results were presented at a state public health conference.

- Predicting the Risk of a Fatal Prescription Opioid Overdose
  - The goal was to build model(s) that can predict and classify whether individuals are at risk of a fatal prescription opioid overdose using linked Washington PMP – Death Data.
  - The results were presented to a national PMP epidemiologist workgroup.

Prescription Opioid Fatal Overdose Risk Factors Analysis

There is an increased risk of a fatal prescription opioid overdose death with increasing days of opioid use.

Hazard Rate for Risk of Prescription Opioid Overdose Death by Duration of Prescription Opioid Usage
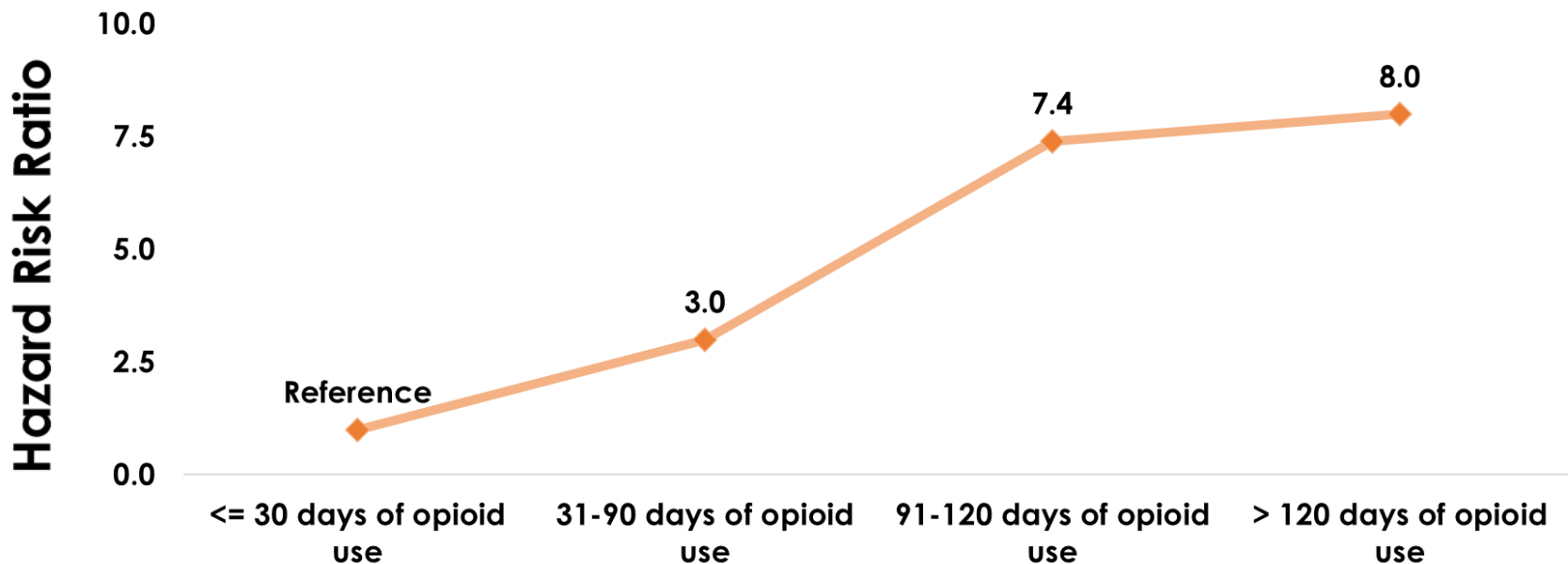
Presented at the 2020 WSPHA Conference.
Data Source: 2013-2015 Washington PMP and Washington Death Data.

Prescription Opioid Fatal Overdose Risk Factors Study

There is an increased risk of a fatal prescription opioid overdose death with increasing dosage of opioid use.

Hazard Rate for Risk of Prescription Opioid Overdose Death by Dosage of Prescription Opioid Usage
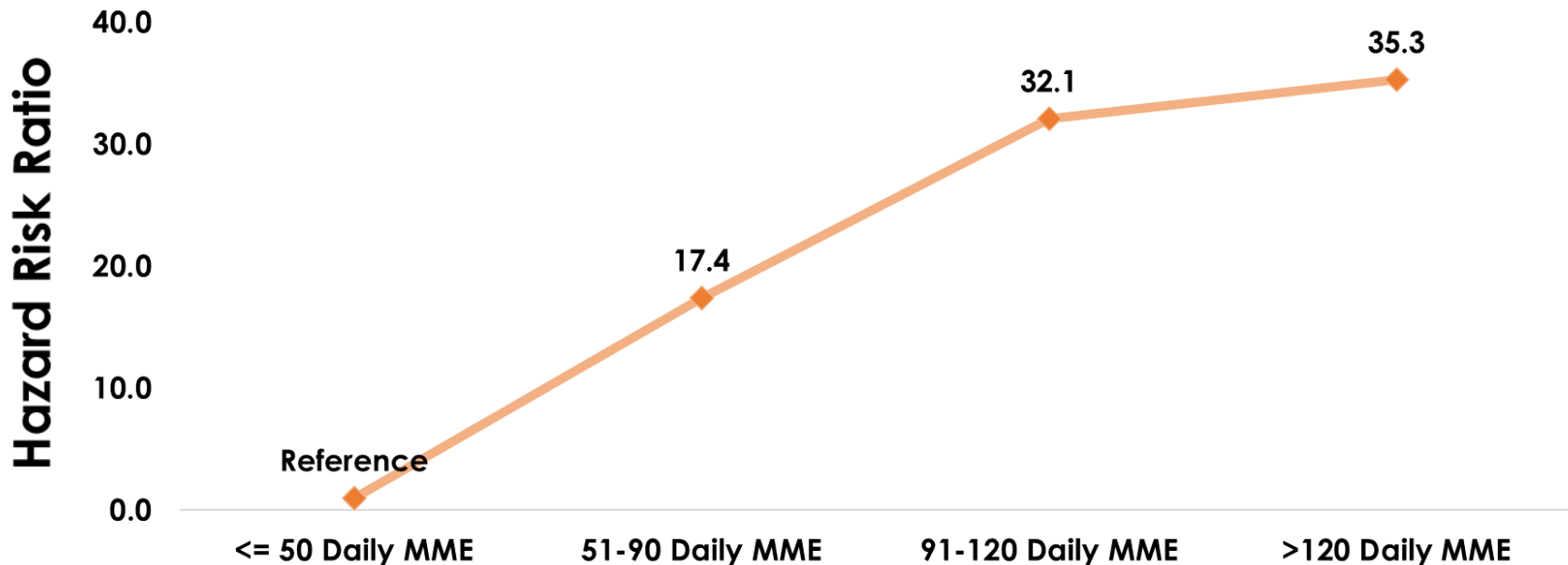
Presented at the 2020 WSPHA Conference.
Data Source: 2013-2015 Washington PMP and Washington Death Data.

Predicting Patients at High Risk of Fatal Opioid Rx Overdose

A high AUC means the model correctly predicts those who survived as surviving and those with an overdose as having an overdose. Fatal Rx opioid overdose is a rare event (relatively), so interpret it with caution since more than 99% of the data are for patients who did not overdose.

■ AUC - Test Data   ■ AUC - Training Data

Model	AUC - Test Data	AUC - Training Data
RNN - 2 layers	92.0%	94.7%
RNN - 1 layer	91.7%	94.6%
Gradient Boosting Machine	87.9%	99.9%
DNN - 3 layers	86.3%	95.7%
DNN - 1 layer	86.0%	91.3%
Distributed Random Forest	85.3%	98.3%
DNN - 2 layers	84.6%	96.6%
Logistic Regression Model	84.5%	85.2%

C-Statistic
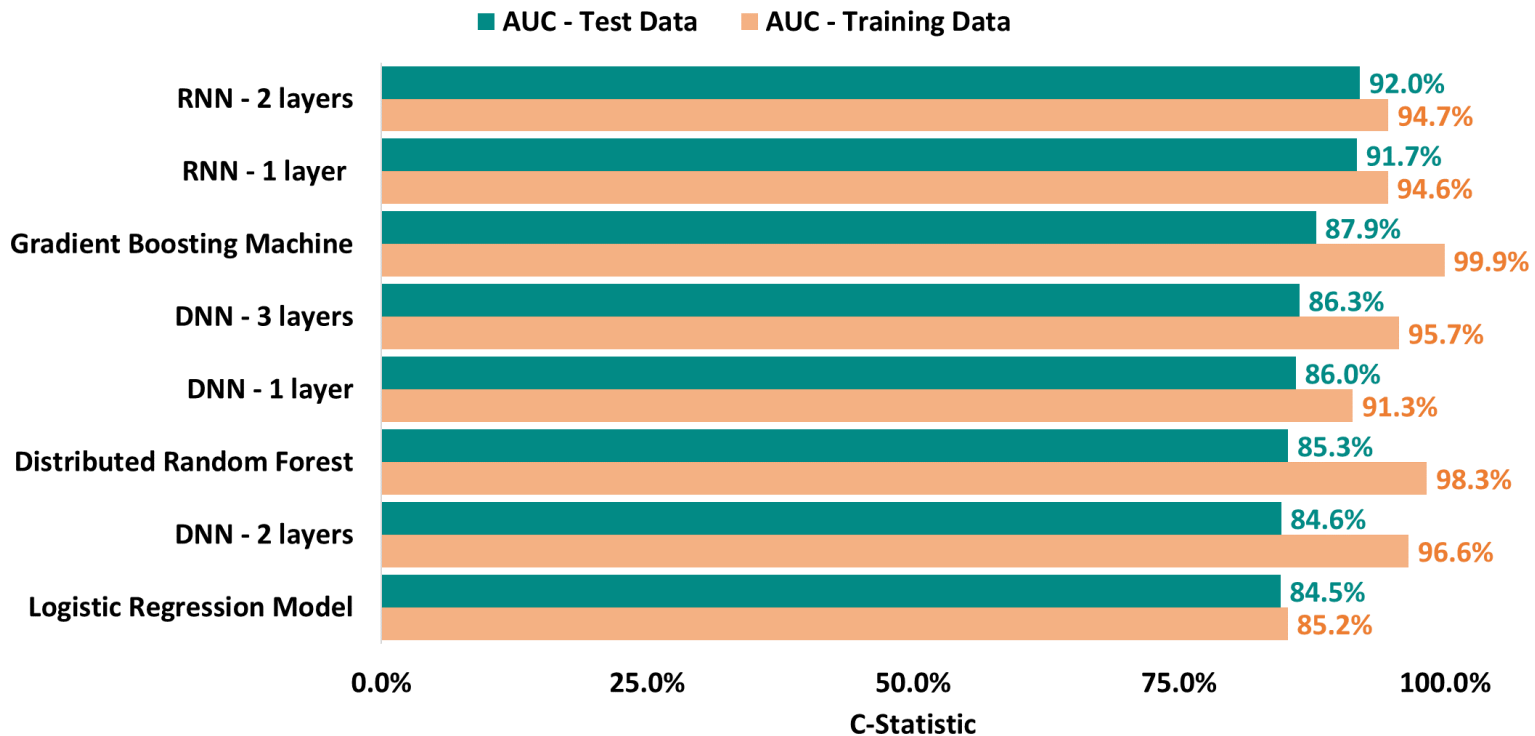
RNN: Recurrent Neural Network. We used bidirectional gated recurrent units and dropouts.
DNN: Deep Neural Network. We used batch normalization and dropouts to reduce overfitting.

Predicting Patients at High Risk of Fatal Opioid Rx Overdose – Precision (Positive Predictive Value)

Precision - Test Data ■ | **Precision - Training Data** ■

Model	Precision - Test Data	Precision - Training Data
RNN - 2 layers	0.5%	0.5%
RNN - 1 layer	0.5%	0.5%
Gradient Boosting Machine	1.6%	5.0%
DNN - 3 layers	0.2%	0.2%
DNN - 1 layer	0.1%	0.2%
Distributed Random Forest	0.8%	2.0%
DNN - 2 layers	0.2%	0.2%
Logistic Regression Model	0.4%	0.4%

x-axis: 0.0% 2.5% 5.0% 7.5% 10.0%

Percentage of Predicted Overdoses with Actual Overdose Status
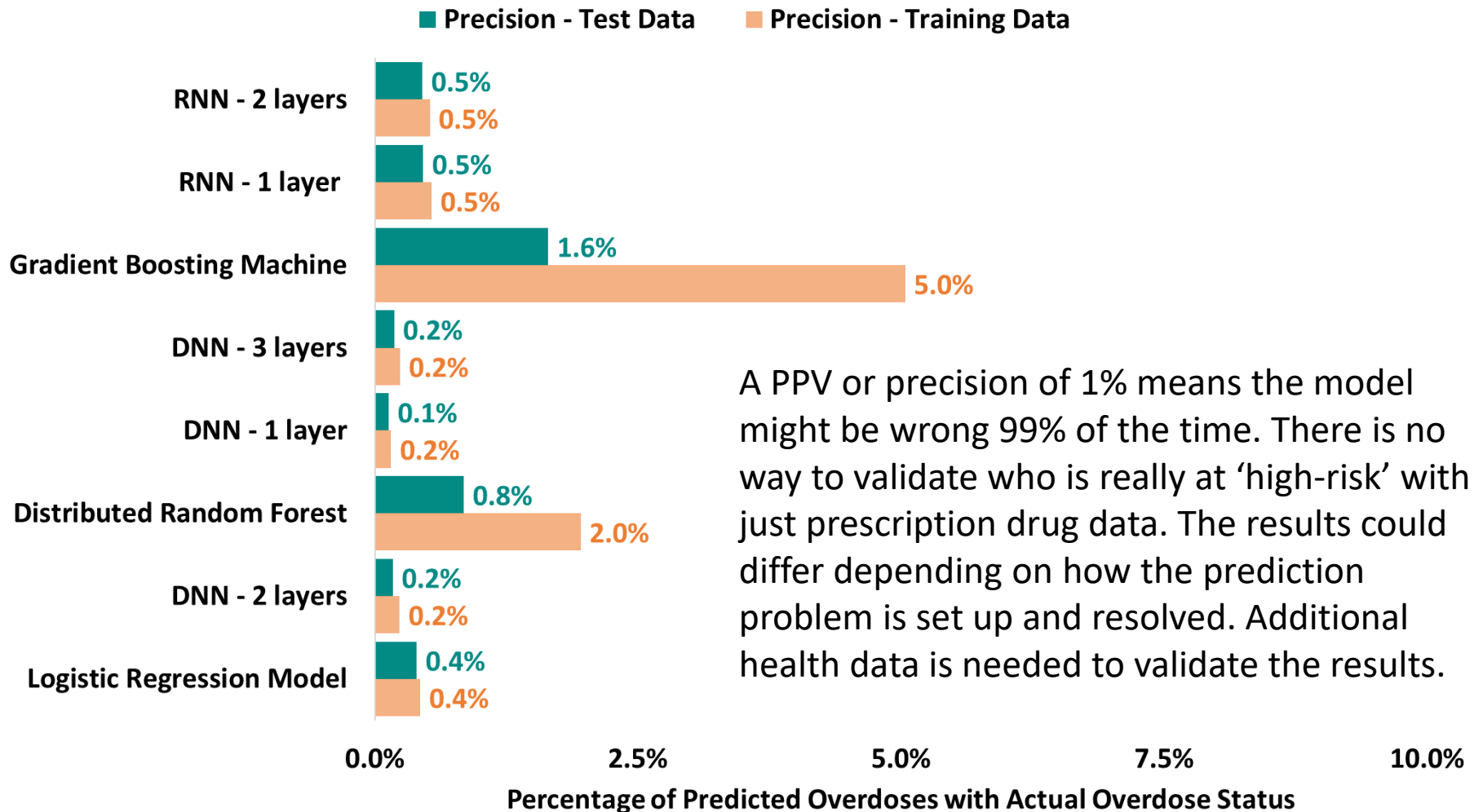
A PPV or precision of 1% means the model might be wrong 99% of the time. There is no way to validate who is really at 'high-risk' with just prescription drug data. The results could differ depending on how the prediction problem is set up and resolved. Additional health data is needed to validate the results.

Predicting Patients at High Risk of Fatal Opioid Rx Overdose – Recall (Sensitivity)

Recall - Test Data ▪ **Recall - Training Data**

Model	Recall - Test Data	Recall - Training Data
RNN - 2 layers	72.7%	80.7%
RNN - 1 layer	70.9%	80.1%
Gradient Boosting Machine	33.6%	99.9%
DNN - 3 layers	73.2%	91.8%
DNN - 1 layer	77.1%	86.7%
Distributed Random Forest	38.6%	85.5%
DNN - 2 layers	70.8%	93.8%
Logistic Regression Model	46.4%	48.5%

Percentage of Actual Overdoses with Predicted Overdose Status
(0.0%, 25.0%, 50.0%, 75.0%, 100.0%)

A recall of 72.7% means about 73% of patients who had a prescription opioid overdose was captured in the predictions.

Top 15 Predictors Selected by Gradient Boosting Machine

Predictor	Scaled Variable Importance
Opioid and Benzodiazepine Overlapping Days	100.0%
Opioid - Total MME	50.5%
Benzodiazepine Dispensers	20.0%
Opioid Overlapping Days	11.1%
Total Episode Days	11.1%
Hydrocodone Dispensers	10.8%
Opioid Dispensers	10.7%
Opioid Prescribers	10.4%
Mean Age	9.9%
Oxycodone Dispensers	9.2%
Benzodiazepine Prescribers	8.8%
Birthyear	8.6%
Hydrocodone Prescribers	8.6%
Oxycodone Prescribers	8.4%

Interpretation: Total opioid MME was half as important as overlapping days of opioid/benzo in predicting whether patients will overdose. Interpret with caution due to a low PPV. There may be more important predictors not captured in the PMP.

Conclusion

- Washington PMP substance use and treatment work is related to the State Opioid and Overdose Response Plan

  o HCA partner and others have managed to increase utilization of buprenorphine as a treatment option for opioid use disorder.

  o Data is provided to providers as an aggregated summary.

  o WA PMP is actively looking at innovative ways to share aggregated data to partners and help researchers obtain PMP data for evaluation or research.

  o Psychostimulant prescribing trends seems to have changed significantly since the COVID19 pandemic has started.

Contact

Questions?

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