California County Fact Sheets: Treatment Gaps in Opioid-Agonist Medication-Assisted Therapy (OA-MAT) and Estimates of How Many Additional Prescribers Are Needed

Methodological Appendix

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November 11, 2019

Summary of Methods

This file presents the methodology used to produce county-level estimates of opioid use disorder (OUD) and treatment needs in California counties, for a project funded by the California Health Care Foundation (CHCF). The main objective was to estimate additional buprenorphine-waivered prescribers needed per county to achieve capacity to treat all people with OUD. This analysis is subject to several assumptions and limitations, as described below.

To estimate the demand for treatment, we calculated county rates of OUD by averaging two estimates based on different methodological approaches. For the first, we started with substate estimates of past-year nonmedical use of prescription pain relievers for 26 substate regions in California from the National Survey on Drug Use and Health (NSDUH) (Lipari et al. 2017) and adjusted these estimates for recent trends, the share of those with past-year prescription pain reliever nonmedical use who have prescription pain reliever OUD, and additional NSDUH estimates of heroin use disorder. For the second substate estimates, we multiplied the estimated 2017 California substate estimates from NSDUH by a scalar representing the relationship between an NSDUH-based OUD rate, known to be biased downwards, and an OUD rate for Massachusetts based on a capture-recapture analysis of seven administrative databases linked at the person level (Barocas et al. 2018). We used the 2015 OUD rates from the Massachusetts study because fentanyl-related opioid deaths rates in 2015 and the relationship between opioid-related deaths and OUD rates in Massachusetts in 2015 are similar to those in California in 2017. We averaged these two estimates to compute substate OUD rates. We then

used regression models to predict county-level rates as a function of explanatory variables that have an empirical relationship with OUD (Alzeer et al. 2017; Paulozzi et al. 2017). We tested a variety of models that produced similar patterns of results. We applied county-level estimates of the population from the Centers for Disease Control and Prevention to create county-level counts, which were adjusted to match the NSDUH substate counts. To estimate buprenorphine medication-assisted therapy (MAT) capacity, we drew on buprenorphine patient counts from the California Controlled Substance Utilization Review and Evaluation System (CURES) prescription drug monitoring database and the DEA Active Controlled Substances Act Registrants Database, which includes all DATA-waived buprenorphine prescribers. We mapped prescriber addresses to county using a zip-code-to-county crosswalk from UDS Mapper and the US Census Bureau.

We calculated a lower bound of county buprenorphine treatment capacity as the number of patients currently receiving any buprenorphine treatment in the past year, including patients who receive buprenorphine out of county, plus the current number of methadone and buprenorphine patients at opioid treatment programs (OTPs). We compute an upper-bound estimate based on a projected increase in patient counts for buprenorphine prescribers from the current average of 16 patients per prescriber to 30 patients for prescribers with a 30-patient limit and half of their maximum patient waiver limit for prescribers with high limits (i.e., 50 patients for prescribers with a 100-patient limit and 137 patients for prescribers with a 275-patient limit). Treatment capacity related to patients who receive buprenorphine from a prescriber out of their county, buprenorphine patients at OTPs, and total methadone slots at OTPs in the county were added to the upper bound estimate. To compute the treatment gap—the number of people with OUD who do not have access to MAT in their county—we assumed that all people with OUD are likely to seek MAT. We calculated the treatment gap by subtracting the low and high estimated range of the treatment capacity in each county from the estimated number with OUD. We computed the estimated number of additional 30-waivered buprenorphine prescribers needed per county to achieve capacity to fill the lower and upper bound estimates of the treatment gap, assuming new prescribers treat 16 patients each for the lower estimate and 30 patients each for the higher estimate. We present strategies to meet demand for treatment, showing a range using lower and upper estimates of the treatment gap and the treatment capacity. In cases where the number of new prescribers needed would be more than double the number of current buprenorphine prescribers, we present an alternative, more feasible strategy of doubling the number of prescribers. In these cases, we present the percent of the treatment gap that would be filled.

Data Sources and Key Variables

Our estimates are based on several data sources. For several opioid-related county-level indicators, we used estimates available from the California Opioid Overdose Surveillance Dashboard (CDPH 2017). We used data for 57 counties—all counties except Los Angeles—and seven Los Angeles service planning areas (SPAs), which are sub-county estimates based on census tracts. Staff from the California Department of Public Health provided us with counts for zip codes within the relevant Dashboard estimates for Los Angeles service planning areas, which are not available publicly.

We drew on the following county-level Dashboard estimates (levels and crude rates[1]) for counties and counts for service planning areas:

- buprenorphine prescriptions by patient location, 2018, from Controlled Substance Utilization Review and Evaluation System 2.0
- all opioid overdose deaths, 2018, from death certificate data from California Department of Public Health vital statistics Multiple Cause of Death file
- midyear county populations from Centers for Disease Control and Prevention WONDER Bridge-Race Population Estimates, produced by the US Census Bureau and the National Center for Health Statistics

We used the same 2018 midyear population estimates used in the California Opioid Overdose Surveillance Dashboard for all further estimates of rates. Population estimates are from the Bridged-race Population Estimates published by the Centers for Disease Control and Prevention. Los Angeles service planning area 2018 population counts were provided to us by staff from the California Department of Public Health and were aggregated from California Department of Finance Population Data and the American Community Survey.

We used past-year estimates of nonmedical use of prescription pain relievers for 26 substate regions in California (Lipari et al. 2017). These estimates were produced by Substance Abuse and Mental Health Services Administration, combining 2012 to 2014 data from the National Survey on Drug Use and Health, which provides estimates of the use of alcohol, tobacco, and drugs by the US civilian, noninstitutionalized population ages 12 years or older. The substate regions, created in consultation with the California Department of Health Care Services, are defined by aggregations of California's 58 counties, except Los Angeles, which is split into 7 service planning areas. Additionally, we used the 2016–17 measure of prescription pain reliever misuse in California, the comparable measure to prescription

pain reliever nonmedical use in the 2014 NSDUH, from the 2016–17 NSDUH state prevalence tables; more detailed geographic data are not publicly available.

Nonmedical use of prescription pain relievers is defined as the use without a prescription that occurred simply for the experience or feeling it caused. Misuse of prescription pain relievers is defined in the NSDUH as use in any way not directed by a doctor, including use without a prescription of one's own, use in greater amounts, more often, or longer than told, or use in any other way not directed by a doctor. Prescription pain relievers do not include over-the-counter drugs.

We used the NSDUH 2016–17 estimated share of opioid use disorder among those who misuse opioids in California to calculate county OUD rates. This estimate was produced by Substance Abuse and Mental Health Services Administration, using 2016-2017 state data from the NSDUH. Opioid use disorder is defined as self-report of heroin use or opioid abuse or dependence consistent with Diagnostic and Statistical Manual of Mental Disorders criteria. We inflate prescription pain reliever OUD rates to account for the share of people who have heroin use disorder and not prescription pain reliever OUD, using the national share from the 2017 NSDUH detailed tables.

As a measure of buprenorphine treatment prescribers, we used the Drug Enforcement Administration (DEA) Active Controlled Substances Act Registrants Database from the National Technical Information Service. The Drug Enforcement Administration database contains information on all registered prescribers across all types (doctor of medicine and doctor of osteopathic medicine, nurse practitioner, physician assistant), including prescriber name and address, whether the prescriber has obtained a DATA-waiver, authorized patient limit (30, 100, 275), and DATA-waiver expiration date. We mapped prescriber addresses to county using a zip-code-to-county crosswalk from UDS Mapper and the US Census Bureau. These data are valid as of July 2019, and were purchased through National Technical Information Service.

According to Drug Enforcement Administration policy concerning Locum Tenens, prescribers who prescribe at multiple locations are required to obtain a separate registration for each location. The Drug Enforcement Administration Registrants Database contains data for three prescribers in California who each contain DATA-waivers in two separate counties, all for 30-patient limits. For these three prescribers, we assumed that they have a patient limit of 15 in each of the two counties they are registered in, though we include them in both counties as having 30-patient limits in summary prescriber counts.

We used counts of buprenorphine patients and prescribers, by prescriber and patient location, from the Controlled Substance Utilization Review and Evaluation System prescription drug monitoring program. This aggregate data were provided to us by the California Department of Public Health.

We received data on the methadone treatment providers by county, the total number of slots at each facility, and the number of methadone and buprenorphine patients at each facility through a California Public Records Act data request.

Methods

Prevalence of Opioid Use Disorder by County

To estimate treatment need, we calculated estimated rates of past-year opioid abuse or dependence by county by averaging two estimates. For the first estimates, we started with the estimates of past-year nonmedical use of prescription pain relievers for people ages 12 and older, for 26 substate regions in California from the combined 2012 to 2014 NSDUH data. We adjusted this 2012 to 2014 rate downward to account for the decreased prevalence of pain reliever misuse, the comparable measure to nonmedical use in later years of the NSDUH, observed from the 2012 to 2014 period to the most recent period available, 2016 to 2017, by multiplying rates by 0.9 to account for recent trends. We then calculate prescription pain reliever OUD as 11.9% of those who misuse prescription pain relievers. Since the substate estimate includes only Rx OUD and not heroin use disorder, we make an additional upward adjustment to account for the approximately 20.5% of people with an opioid use disorder who have heroin use disorder but not also Rx OUD. We multiply each sub-state rate by 1.26 (i.e., 1 ÷ (1 - 0.205)) to adjust for these individuals with heroin use disorder, resulting in estimated substate OUD rates for people ages 12 and older.

For the second substate estimates, we multiplied the estimated 2017 substate OUD estimates from NSDUH by a scalar representing the relationship between an NSDUH-based OUD rate, known to be biased downwards, and an OUD rate for Massachusetts based on a capture-recapture analysis of seven administrative databases linked at the person level (Barocas et al. 2018). This scalar was computed as the ratio of the estimated OUD rate in Massachusetts in 2015 as computed by Barocas and coauthors (2018) to the estimated 2015 rate from the NSDUH. We used the 2015 OUD rates from the Massachusetts study because fentanyl-related opioid deaths rates in 2015 and the relationship between opioid-related deaths and OUD rates in Massachusetts in 2015 are similar to those in California in 2017. We averaged the two substate OUD estimates to compute final substate OUD rates.

Using these estimated substate OUD rates,[33] we used ordinary least squares regression models to predict county-level OUD rates as a function of explanatory variables that have an empirical relationship with OUD. We used existing research to select independent variables (Alzeer, Jones, and Bair 2017; Paulozzi et al. 2011), presumed to capture variation in counties' underlying OUD rates, as independent variables in the model. We tested a variety of models that produced similar patterns of results, and very good performance for predicting OUD rates. We chose the following parsimonious model: morphine milligram equivalent crude rates by patient location in 2018, opioid overdose hospitalizations rates by facility location in 2018, and the proportion of the population that was between the ages of 20 and 24 in 2018, (R-squared 0.5413). We used this model to predict county-level OUD rates. County-level estimates of the population from the Centers for Disease Control and Prevention were applied to these rates to create county-level counts, which were aggregated to the substate regions and adjusted to match the NSDUH substate counts.

Estimated Buprenorphine MAT Treatment Capacity by County

To estimate buprenorphine MAT treatment capacity or treatment "slots," we used a lower bound of the number of patients currently in treatment and an upper bound projection if prescribers increased their number of patients. For the lower bound, we used the number of patients currently receiving buprenorphine treatment in the past year, including patients who receive treatment from a prescriber in a different county, from CURES data. We also included the number of buprenorphine and methadone patients at OTPs, based on state data. For the upper bound projection, we assume that prescribers increase their number of patients from the current average of 16 unique in-county patients per prescriber, calculated from CURES data, to 30 patients for 30-waivered prescribers and 150 and 137 patients for 100- and 275-waivered prescribers, respectively, or half of their waiver limit. The upper bound estimate also includes patients who receive buprenorphine from a prescriber out of their county, total methadone slots, and buprenorphine patients at OTPs in the county.

Estimated Buprenorphine MAT Treatment Gap, Assuming All People with OUD Seek Opioid Agonist Medication-Assisted Treatment

To compute the number of people with OUD who do not have access to treatment in their county, we started with the county-level counts of the number of people with OUD. We assume that all people with opioid use disorder will seek treatment. Recent literature describing treatment in the US suggests that roughly one-fifth (19.4 percent) of people with OUD received opioid-related treatment in the past year (Wu, Zhu, and Swartz 2016).

We compute a lower and upper bound treatment gap estimate by subtracting the number of people estimated to have OUD per county by the lower and upper bound treatment capacity estimates in each county. The lower bound treatment gap estimates the number of people with OUD who are not currently receiving treatment. The upper bound treatment gap estimates the number of people with OUD who would not have access to treatment if current prescribers increased the number of patients to 30 for 30-waivered prescribers and half their waiver limit for those with higher waivers and if all methadone slots were filled.

Estimated Additional Buprenorphine Prescribers Needed to Fill the Treatment Gap

We computed the estimated number of additional buprenorphine prescribers needed per county to achieve capacity to treat all people with OUD, following the lower and upper bound assumptions. We computed a maximum estimate of the number of new 30-waivered prescribers needed based on the current treatment gap, assuming that new prescribers follow the current average of 16 patients per prescriber. We computed a minimum estimate of the number of new 30-waivered prescribers needed based on the treatment gap projection if current prescribers with a 30-waiver treated 30 patients each, those with higher waiver limits treated half their waiver limit, and all methadone slots were filled, assuming that new prescribers treat 30 patients each.

The main recommendations include a "cap" on the recommendations to ensure that the estimates of new providers needed are feasible for counties. These recommendations limit the number of new prescribers recommended to the number of current prescribers. This ensures that at a maximum, we recommend that a county double their number of prescribers. In these cases, we also present the percent of the treatment gap that the new prescribers would fill.

We conducted all analyses with Stata version 15 (StataCorp 2015).

Limitations and Considerations

This study has several limitations. First, the NSDUH survey data used to estimate the first set of substate estimate rates of OUD have important limitations. The NSDUH rates are based on self-reported information and are thus subject to recall and social-desirability biases. In addition, the survey excludes some populations likely to have relatively higher rates of OUD, such as people who are homeless and do not use shelters and people who are in institutional settings such as people in jails. Previous research found NSDUH OUD rates to be substantially lower than OUD rates based on linked administrative datasets (Barocas et al. 2018), and this research was used to develop the final OUD rate

estimates used in this analysis. Second, the substate NSDUH estimates used to estimate rates of OUD are model-based small area estimates, with limitations described elsewhere (SAMHSA 2015). Third, the scalar used to create the second set of substate OUD estimates assumes that the relationship between the Barocas and coauthors (2018) Massachusetts estimates of OUD (based on administrative data including mortality data) and the Massachusetts NSDUH OUD rates in 2015 is similar to such a computation for California in 2017. Fourth, the average treatment duration for buprenorphine MAT treatment is likely less than one year; thus, a prescriber could potentially use each of their waivered slots to treat multiple patients sequentially over the course of a year. Fifth, the treatment gap could be filled under alternative scenarios, for example, by shifting some providers who are already waivered to higher patient limits than we use in our projected upper bound estimate. Sixth, not all people with OUD are likely to seek treatment. Lastly, we note that the clinical impact of increasing the number of buprenorphine-waivered prescribers in a county or any particular area has not yet been documented in the literature, although buprenorphine MAT treatment has been shown to be highly effective. However, some people with OUD need access to supportive services, more intensive treatment, treatment for co-occurring mental health conditions, and services to address other substance use problems—and these additional services may not be available in a typical outpatient MAT treatment setting.

Notes

[1] Because age plays a major role in predicting OUD, we use crude rates rather than age-adjusted rates in the regression model so that the effects of age are included in the predictions.

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Acknowledgments

This report was funded by California Health Care Foundation. We are grateful to them and to all our funders, who make it possible for Urban to advance its mission.

The views expressed are those of the authors and should not be attributed to the Urban Institute, its trustees, or its funders. Funders do not determine research findings or the insights and recommendations of Urban experts. Further information on the Urban Institute's funding principles is available at urban.org/fundingprinciples.

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