Preliminary results of the evaluation of the California Hub and Spoke Program

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ABSTRACT

In August 2017, California launched the Hub and Spoke Program to address the growing number of opioid overdose deaths in the state. The program connects opioid treatment programs ("hubs") with office based opioid treatment settings, like primary care clinics ("spokes") to build a network of treatment expertise and referral resources. A key objective of this program is to expand access to medications for opioid use disorders (MOUD), with a particular focus on getting more buprenorphine into spokes. This article describes the preliminary results of the evaluation of the California Hub and Spoke program. Using a mixed methods approach, this portion of the evaluation measures changes in numbers of MOUD patients and providers, and barriers and facilitators to implementation. Findings reveal that, in the first 15 months of the program, 3480 new patients started buprenorphine in 118 spokes, increasing treatment initiations by 94.7% over baseline. The number of waivered spoke providers also increased 52.4% to 268. Although these data demonstrate promising growth in the network, challenges to expanding treatment access remain. Provider activity was among the most notable. Despite growth in the number of spoke providers with waivers to prescribe buprenorphine, only 68.7% (n = 184) were actively prescribing to patients. A survey of providers found that those who were not yet using their waivers lacked the confidence and mentorship they needed to prescribe. Provider knowledge and attitudes toward MOUD, fear of legal consequences, and limited patient outreach were also contributing factors. Recommendations for strengthening Hub and Spoke program implementation include facilitating mentor linkage for prescribers, expanding the support offered to spoke providers, and offering additional training and technical assistance aimed at provider stigma. Efforts to address these recommendations are described in a companion paper (Miele et al., under review).

1. Introduction

Although access to medications for opioid use disorders (MOUD) has been increasing in California, there remain between 165,977 and 245,093 people with opioid use disorders who lack access to treatment (Clemans-Cope, Epstein, & Wissoker 2018). In 2013, California ranked 24th of all states in the per capita number of waivered prescribers, and lacked any prescribers in much of its rural northern region (Knudsen, 2015; Rosenblatt, Andrilla, Catlin, & Larson, 2015). The number of California health care providers with a Drug Addiction Treatment Act of

2000 (DATA 2000) waiver to prescribe buprenorphine has since grown, with over 1000 DATA waivered practitioners newly certified in 2018 alone (Substance Abuse and Mental Health Services Administration (SAMHSA), 2019). However, barriers persist to prescribing buprenorphine and other forms of MOUD, including methadone and extended-release naltrexone, at the level needed to address the continued increase in opioid overdose death rates. Lack of provider training on addiction, provider stigma, time and staffing limitations, and insurance and regulatory barriers all create obstacles to actively prescribing (Andraka-Christou & Capone, 2018). To address gaps in treatment

access, reduce barriers to prescribing and, ultimately, decrease opioid overdose related deaths statewide, the California Department of Health Care Services (DHCS) has implemented the California Medication Assisted Treatment (MAT) Expansion Project. Funded through the SAMHSA State Targeted Response (STR) initiative, a chief component of the MAT Expansion Project is the California Hub and Spoke (H&S) System, which aims to expand the availability of MOUD in health care settings by increasing the number and activity of buprenorphine prescribers statewide. This article describes the preliminary results of the evaluation of the California H&S program.

The H&S model for expanding access to MOUD, first developed in Vermont, focuses on building a network of expertise and referral resources between specialty substance use disorder treatment programs (i.e., OTPs) and other health care settings (Brooklyn & Sigmon, 2017). The model is designed to reach those who may not have a local OTP available, or who do not otherwise seek treatment in specialty care, by making MOUD available in office-based opioid treatment (OBOT) settings, like primary care clinics. California has adapted the H&S model to fit its unique geographic, demographic and clinical landscape (Miele et al., 2019). This paper examines preliminary evaluation data from the first fifteen months of implementation activities (August 2017–October 2018). Data include an overview of network growth, changes in numbers of hub and spoke patients and providers, as well as results of the first annual survey of providers, with an emphasis on provider activity.

2. Methods

This program evaluation uses a mixed methods approach, with a convergent parallel design (Creswell & Clark, 2017). This design was chosen for its pragmatism. Although all participating agencies are required by DHCS to adhere to the H&S model program theory, implementation efforts vary across the state (see Miele et al., in review). When evaluating fidelity to a model for program innovation, as Mowbray, Holter, Teague, and Bybee (2003) describe, adaptations of the model are acceptable, provided that the general "cognitive blueprint" remains the same. In such instances, it is best to identify critical elements of the model that are essential to the expected outcomes of the program innovation, and evaluate agencies' fidelity to each. The anticipated outcomes of the California H&S program, have been determined using the key elements of the original Vermont model along with requirements set by DHCS (California Department of Health Care Services, 2019). These key elements include: 1) the expansion of buprenorphine availability in both hub and spoke settings, 2) screening and severity assessment of OUDs in hubs and spokes, 3) the development of a network of referral resources and knowledge sharing about best practices for treating OUD and other co-occurring health conditions, 4) the provision of "MAT teams" to support waivered providers in spoke settings and to offer care coordination between hubs and spokes, and 5) the facilitation of Learning Collaboratives focused on evidence based practices for treating OUD. To assess the quality and impact of the implementation of these key elements, this program evaluation will measure their outcomes within the RE-AIM evaluation framework (reach, effectiveness, adoption, implementation, maintenance) (Glasgow, Vogt, & Boles, 1999; Gaglio, Shoup, & Glasgow, 2013; http://www.re-aim.org/). Data on the number of participating programs, the number of patients starting MOUD, the number of providers waivered to prescribe, provider activity, barriers and facilitators to implementation, and the H&S system's effectiveness in reaching the population in need of treatment will be analyzed within the RE-AIM framework in full as more data are collected.

This program evaluation was approved by the California Office of Statewide Health Planning and Development (OSPHD) Committee for the Protection of Human Subjects. In addition, the research use of data obtained from this evaluation was approved by the UCLA Institutional Review Board.

2.1. Patient and provider numbers

All data presented here are preliminary, and reflect only the first fifteen months of implementation activities, which began in H&S sites in August 2017. Data on the number of patient medication initiations (methadone, buprenorphine and extended-release naltrexone), number of DATA 2000 waivered providers, and number of patients per prescriber were collected through monthly reports submitted to UCLA by staff at the hubs and spokes. To measure the impact of the H&S program, and account for MOUD adoption that was already in place prior to the start of implementation, baseline data were collected, dating back seven months prior to the start of program implementation (January 2017). Given that a goal of the program is to continually expand the number of settings involved in the network, not all spokes began implementation activities during the same month (see Results for further details). However, all spokes were required to submit baseline data dating back to January 2017, to make possible an evaluation of the overall impact of the H&S program on patient numbers, system wide, regardless of individual agencies' start dates.

UCLA ISAP developed and maintains an online data entry system for baseline and monthly reports, through its data management center. Coordinators at each hub and spoke input monthly counts, drawn from their organizations' health records. All coordinators received training in data collection methods and data entry at the start of the program. In addition, UCLA audits and delivers ongoing feedback to coordinators to ensure data quality, to the extent possible. However, because data is reported by coordinators, rather than drawn directly from health records by UCLA, it is possible that reports contain some errors (see Limitations). Data on provider waiver limits were abstracted from the DEA Controlled Substances Registrants Database (National Technical Institute Information Service, 2018), access to which was provided by IBM Watson Health.

2.2. Provider surveys

In order to examine provider perspective on the impact of the H&S system, as well as perceived barriers and facilitators, UCLA conducted surveys of service providers working in H&S sites. Three surveys were administered in May and June of 2018, based on the type of respondent as either: 1) DATA 2000 waivered providers, 2) supportive "MAT Team" staff (e.g., nurses, counselors, care navigators), or 3) administrative leadership in hubs. Each of the three surveys included questions on provider knowledge and attitudes about MOUD, the impact of the H&S model, barriers and facilitators to successful implementation, and training and technical assistance needs. The surveys were developed with feedback from DHCS, a selection of H&S provider champions, and Mark McGovern, PhD and Richard Rawson, PhD, who participated in the implementation and evaluation of the Vermont H&S program. The content of the surveys was primarily drawn from subjects arising during H&S Steering Committee meetings and Learning Collaboratives, but also included topics covered by the Agency for Health Care Research and Quality's (Moran, Snyder, Noftsinger, & Noda, 2017) "Implementing Medication-Assisted Treatment for Opioid Use Disorder in Rural Primary Care: Environmental Scan Volume 1," and the Center for Advancing Health Policy and Practice (2017) "Integrating Buprenorphine Treatment for Opioid Use Disorder in Primary Care" manual. Items were developed based on concepts of existing tools including the Criminal Justice Drug Abuse Treatment Studies (CJ-DATS) Baseline Survey of Organizational Characteristics (Welsh et al., 2016), the Drug and Drug Problems Perceptions Questionnaire (DDPPQ; Watson, Maclaren, & Kerr, 2007), and the SAMHSA Opioid State Targeted Response (STR) Evaluation Community/Program Director Baseline Interview Protocol (2017). All items were modified for relevance to the H&S program. The online surveys were distributed to all known providers in the H&S System as of May 2018, via SurveyMonkey. Respondents were each offered a $30 electronic gift card incentive.
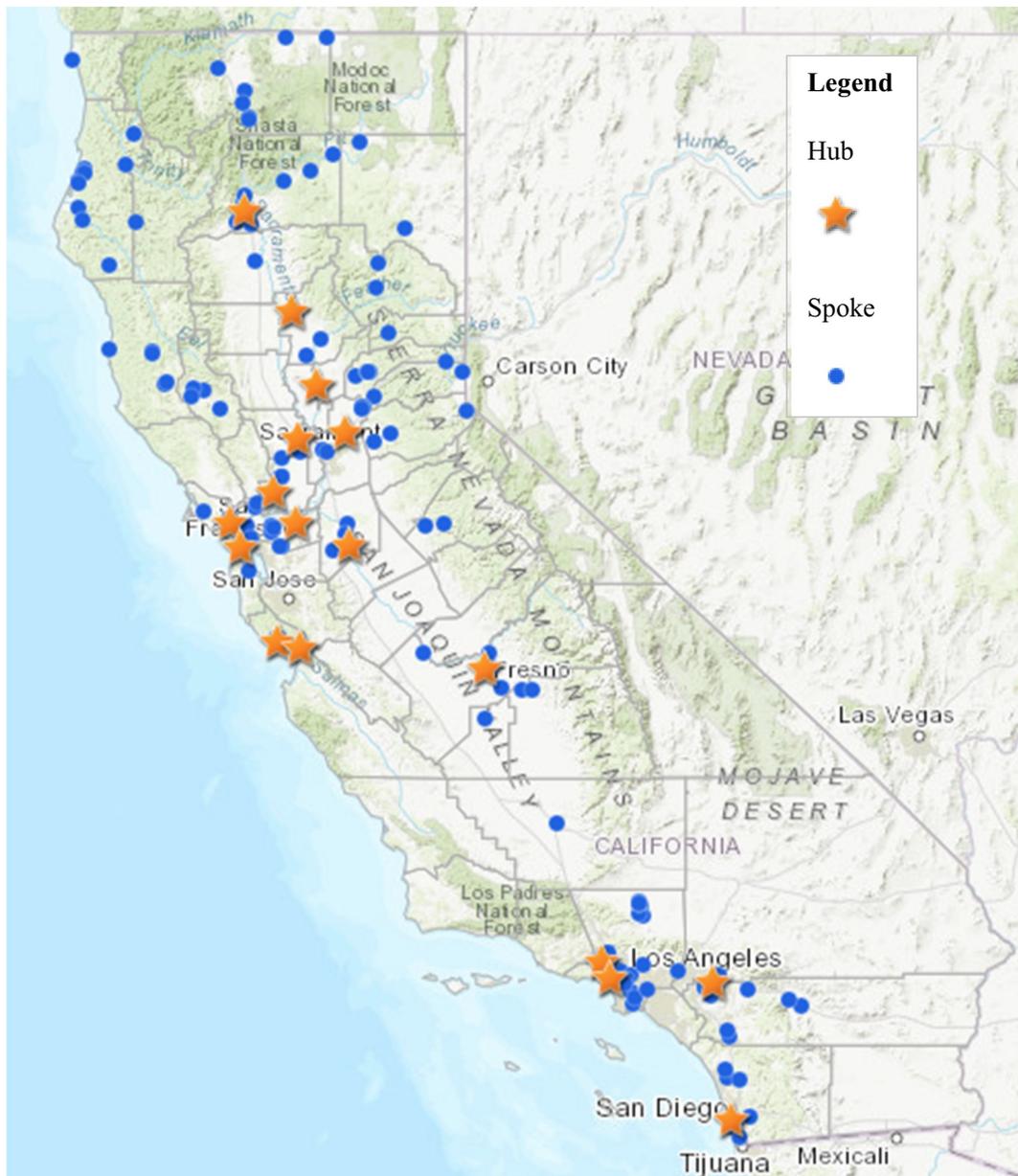
Fig. 1. Map of California Hub and Spoke locations.

3. Results

3.1. Network development

At the start of program implementation activities, in August 2017, there were 57 spokes among the 18H&S networks. By October 2018, 166 spoke treatment locations had joined the California H&S system (see Fig. 1). Spokes were considerably diverse in their stages of MOUD adoption at the time implementation began. Among all spokes reporting data (N = 118),[1] about one-third (32.2%, n = 38) started prescribing buprenorphine after the H&S system was implemented. An additional 34.7% (n = 41) were already prescribing buprenorphine prior to joining the system. Nearly half (48.8%, n = 20) of those that were

already prescribing had at least five new buprenorphine patients during any baseline month (Jan–July 2017), indicating that their MOUD programs were previously well established. The remaining 39 spokes (33.1%) had not yet started prescribing buprenorphine to any patients. The majority of these (61.4%, n = 24) had joined the system within the last six months (April–October 2018).

Consistent with the H&S model, most spoke locations (58.4%, n = 97) were health centers, 68 of which were Federally Qualified Health Centers (FQHCs). There were also 11 hospitals, 6 private practitioners, 6 behavioral health centers, 5 Indian Health Centers, 2 pain clinics, 4 telehealth programs, and 1 university health center. However, deviating from the model, 19.3% (n = 34) of spoke locations were SUD treatment programs.

The majority (74.1%, n = 123) of spoke locations were in metropolitan core-based statistical areas, with at least one urban cluster with ≥50,000 residents (US Census Bureau, 2010). In addition, 19.3% (n = 32) were located in micropolitan counties, with at least one urban area with 10,000–50,000 residents. The remaining 6.6% of spoke locations (n = 11) were in rural counties (these included Trinity,

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[1] Due to practical difficulties extracting data from health records by location, 44 spoke organizations report data for multiple treatment locations together, by organization, leaving 134 reporting spokes. Among these, 16 were excluded from analyses due to never having submitted any data.

Siskiyou, Plumas and Sierra Counties). Many spokes were also located a fair distance from hubs. The mean driving distance between spokes and their respective hubs was 34.6 miles ($SD = 36.5$), with a maximum distance of 163 miles. These distances made care coordination between hubs and spokes challenging, particularly for spokes located in rural areas, which had a mean driving distance of 88.2 miles ($SD = 27.9$) from their hubs. As a result, many rural spokes served in similar roles to hubs, inducing patients on buprenorphine and providing treatment to those with more complex OUD (see Provider survey results).

3.2. Patient numbers

As of October 2018, 9511 new patients had started MOUD (methadone, buprenorphine, and extended-release naltrexone) in H&S treatment locations, including 5511 in hubs and 4000 in spokes. The majority (n = 4667, 84.7%) of hub patients started treatment with methadone. However, over the course of program implementation, 740 patients started treatment with buprenorphine in hubs, leading to a 335.7% increase in the mean monthly number of buprenorphine inductions in all 17 hubs over baseline.[2] This growth in patients starting buprenorphine in OTP settings is an important component of expanding access to MOUD, as it offers patients greater choice in treatment planning.

Given the aims of the program to expand access to MOUD in health care settings, particularly in rural areas lacking OTPs, the primary focus of this evaluation is on the expansion of buprenorphine in spoke settings. Between baseline and the most recent seven months, there was a 97.4% increase in the mean monthly number of buprenorphine initiations in all 118 reporting spokes. In total, 3479.5[3] spoke patients started buprenorphine during the program implementation period (see Fig. 2).

Nearly one-third (26.3%, n = 39) of reporting spokes had no patient inductions in any month as of October 2018. As noted previously, most of these spokes had only recently joined the program. Spokes that started with well-established MOUD programs (> 5 patients in any baseline month) saw the smallest growth in patient numbers over the course of program implementation, followed by spokes that had smaller numbers of patients (between one and four in any given month) during baseline. The spokes that saw the greatest growth were those that adopted MOUD during the implementation period (August 2017–October 2018).

In addition to patients starting methadone and buprenorphine, 104 patients started extended release naltrexone in hubs and 520.5 started in spokes. There was little growth in these numbers over baseline.

3.3. Spoke provider numbers

At the start of program implementation, there were a total of 176 waivered providers in all spokes. By October 2018, that number had increased by 52.4%, to 268 providers. In addition, 27 of these providers increased their waiver limits over the previous February (eighteen providers increased their limits from 30 to 100 patients, and nine increased from 100 to 275). However, only 184 (68.7%) were prescribing MOUD to any spoke patients. This gap in the number of providers who actively prescribe has persisted throughout program implementation. Although there has been some growth in active prescribers over the course of the program, on average, only 60.6% of waivered spoke providers had prescribed MOUD to any patients in a given month (see. Fig. 3). The reasons for this gap are still under exploration, and will be compared to statewide rates of prescriber activity when these data become available. Several possible explanations were revealed by

provider surveys.

3.4. Provider survey results

In total, UCLA received 149 completed responses to the provider surveys. Response rates per survey were as follows: waivered provider survey, 58.5% (n = 72); "MAT team" survey, 85.0% (n = 51); and hub leadership, 93.1% (n = 27). Results from each of the three surveys were analyzed separately. Two responses to the waivered provider surveys were analyzed with the "MAT team" survey, as respondents were not waivered. The final sample size of the waivered provider survey was therefore 70 providers. Because each survey had a relatively low sample size, results should be interpreted with caution. Results presented here focus on the waivered provider survey.

Most respondents to the waivered provider survey worked in spoke locations (71.4%, n = 50) and were certified medical doctors (71.4%). However, 12.9% were physicians assistants (n = 9), 10.0% were doctors of osteopathic medicine (n = 7), and 5.7% were nurse practitioners (n = 4). Most respondents specialized in primary care (55.7%, n = 39), and an additional 20.0% (n = 14) were addiction specialists. Respondents had been waivered for an average of 3.6 years ($SD = 4.2$), and 22.7% (n = 15) were in their first year of being waivered at the time of the survey. Among all respondents who were waivered, 14.3% (n = 10) indicated that they had not yet prescribed buprenorphine to any patients.[4]

Reasons for not prescribing were complex, and included provider knowledge and attitudes, provider stigma toward OUD, reticence to start patients on buprenorphine, concerns over legal ramifications and other regulatory barriers. A lack of certainty around prescribing practices was one major barrier. Those who were waivered but had never prescribed buprenorphine to any patients ($M = 2.44$, $SD = 0.53$) were less likely to feel confident prescribing than those who had prescribed ($M = 4.45$, $SD = 0.60$), $p < .001$. Although this is unsurprising, this indicates a need for further training and technical assistance, beyond the waiver training. Mentorship from MOUD champions was revealed as a potential means to address this need, as non-prescribing waivered providers ($M = 3.33$, $SD = 1.22$) were also less likely than active prescribers ($M = 4.18$, $SD = 0.95$) to feel that they had the mentorship they needed to effectively treat patients with OUD ($p = .02$).

Another likely barrier to prescribing buprenorphine was provider stigma toward MOUD and OUD patients, in general. Among all waivered providers responding to the survey, 15.7% (n = 11) disagreed or strongly disagreed with the statement, "I feel equally comfortable working with patients with OUD as I do working with other patient groups." Highlighting several areas of concern voiced by providers, one respondent noted:

> This is fairly new. I am not sure if people [with] possible gang affiliation or other issues will become angry as we stop supplying them [with] methadone or other pills as we tighten up our system. Perhaps people in the waiting room will be nervous seeing homeless or opioid addicted patients in the waiting room.

Stigma was also present even among "MAT team" members providing support to prescribers, 17.7% (n = 9) of whom agreed or strongly agreed with the statement, "methadone is just substituting one addiction for another." Helping providers to build a culture of social inclusion and community integration (Carter et al., 2013; Pescosolido et al., 2010) should remain an important target for H&S training and technical assistance efforts.

Concerns about undertaking buprenorphine inductions may be

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[2] When comparing the average monthly number of patients in the baseline seven months (January–July 2017) to that of the latest seven months (April–October 2010).

[3] Total calculated using mean imputation for months missing data.

[4] The percentage of survey respondents who had never prescribed buprenorphine was an under representation of the number of non-prescribing waivered providers in the system overall. Non-prescribing providers might have been less likely to respond to a survey about MOUD prescribing.
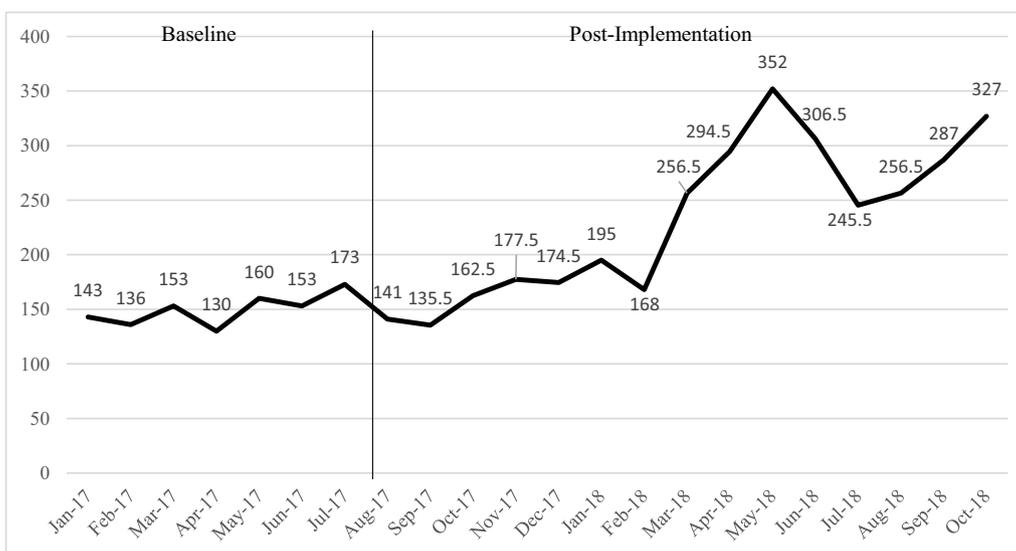
Fig. 2. Total monthly number of patients starting buprenorphine in spokes (N = 118).
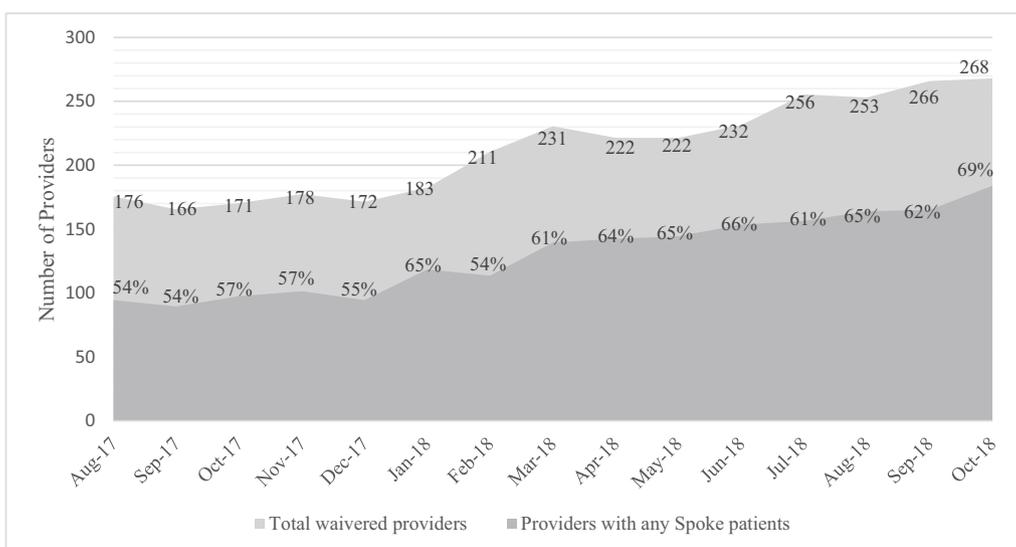

Fig. 3. Number of waivered providers vs. number actively prescribing.

another reason that some waivered providers had never prescribed. Most respondents to the waivered provider survey (91.3%, n = 63)[5] reported providing buprenorphine maintenance. Fewer (85.7%, n = 60) reported providing any method of induction (58.0% provided office-based, and 60.9% provided at-home induction). In describing the challenges in offering induction, one provider commented:

I feel that we have some resources available at our hub but no providers in our office that have done induction. We need to observe some inductions and we [need] some staff from a hub to look at our clinic setup and help advise us on scheduling and infrastructure for inductions, and/or work with us in clinic for several patients so we can directly observe some proper inductions and dose adjustments.

One respondent to the hub leadership survey confirmed these concerns, stating, "[There is] reticence to do inductions at Spokes. Our Hub director does not offer to handle inductions prior to [referral] to Spokes

– this request has been unmet." There was a clear need for technical assistance from hubs in providing inductions. Increasing the number of providers who feel comfortable starting patients on MOUD could serve as an important method of continuing to increase patient numbers.

In addition, providers may be hesitant to prescribe buprenorphine due to concerns about potential legal ramifications. Anecdotally, several waivered providers and H&S administrators mentioned fears about Drug Enforcement Agency (DEA) clinic inspections during H&S Steering Committee meetings and regional Learning Collaboratives. When surveyed about such worries, 10.1% (n = 7) of waivered providers agreed that they felt fearful of the legal consequences of prescribing, and a further 17.4% (n = 12) neither agreed nor disagreed. In discussions at Steering Committee meetings, several providers suggested that one way to alleviate these fears would be to distribute more information about what to expect from a DEA visit and how often they occur.

Limited patient outreach may also have contributed to the gap in the number of providers with waivers who actively prescribe. Patients, or their referring clinics, may not know where to find treatment, because many waivered providers have not elected to list themselves as buprenorphine providers online. Over one-third (39.0%) of all spoke providers are not currently listed on SAMHSA's Buprenorphine

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[5] Three survey respondents who had never prescribed buprenorphine endorsed providing maintenance. These respondents most likely offered the service, but had not yet begun prescribing.

Treatment Practitioner Locator. On average, spoke providers who had chosen to list their names on the SAMHSA website were prescribing to 14.06 (SD = 24.85) patients, while those who did not only had an average of 5.45 patients (SD = 10.21), p = .004.[6,7] Use of the website, in itself, is probably a useful tool for both providers and patients seeking treatment. However, its use may also be indicative of a general emphasis on new patient outreach on the part of providers or clinics. Enhancing H&S patient outreach activities could help providers without patients to become active buprenorphine prescribers.

In addition, a lack of community resources emerged as a reason some providers had difficulty prescribing. Difficulty in finding pharmacies to work with in prescribing buprenorphine came up in several H &S meetings. And in response to waivered provider surveys, 13.0% (n = 9) did not find pharmacies in the community to be effective in serving the needs of patients with OUD. Further, 23.0% of hub leadership agreed or strongly agreed that behavioral health care providers in their community were unwilling or reluctant to provide therapy to patients receiving MOUD. Building relationships with pharmacies and behavioral health providers in the communities local to H&S networks could help waivered providers to feel that they have the resources they need to prescribe buprenorphine.

4. Discussion

4.1. Lessons learned

Overall, California's H&S system has had some success in increasing the number of patients started on buprenorphine and the number of waivered providers. However, California's experience also provides lessons learned that might be helpful for other states contemplating similar programs. The early findings of the evaluation of California's implementation efforts suggest that H&S network expansion efforts should focus primarily on health care settings. This is where the bulk of the increases in buprenorphine prescriptions were found, and promises the easiest path toward increasing access to MOUD. It is critical to offer support to these spoke settings, to facilitate inductions and treat patients with complex OUD. Although these functions can be performed in OTP hubs, treatment access can be improved where spokes are able to perform these functions without transferring patients. Hub leadership should be encouraged to build formalized communication mechanisms with their spoke providers and administrators to allow for this level of expertise sharing. This is particularly important in rural communities, where spokes are located far away from hubs and may have difficulty with referrals. Rural spokes would also benefit from additional material supports such as, for example, transportation resources and/or tele-health infrastructure.

In addition to these network building efforts, providing buprenorphine prescribers with ongoing training and technical assistance after they become waivered is important to ensuring that they serve as treatment access points. In-depth technical assistance around buprenorphine induction has proven to be particularly necessary. In the California H&S system, more providers offer maintenance than do induction, and hub leaders have described a reticence, especially on the part of spoke providers to induce. Didactic training on this topic should be supplemented with linkage to peer mentors. Providers, especially waivered providers who are not prescribing, indicated a need for

further mentorship. Comments in surveys suggest a desire for on-site mentoring related to clinical skills. Encouragingly, two-thirds of waivered providers in hubs and spokes who are prescribing are willing to mentor others. A need for additional training to address provider stigma toward MOUD and patients with OUD in general has also emerged. Surveys suggest stigma exists even among H&S MAT team members, so it cannot be assumed that stigma is not an issue in providers that are participating in MOUD efforts. Finally, providers have fears and concerns related to DEA inspections and 42 CFR, part 2 regulations. For example providers have questioned whether being listed on the SAMHSA treatment locator means a waivered prescriber is holding themselves out as a SUD treatment provider and thus invoking 42 CFR, part 2 regulations. Official clarification from SAMHSA on this issue could have a large impact on provider willingness to be identified as a waivered prescriber, and could in turn improve access to MOUD.

Although beyond the scope of the official H&S program, limitations in community resources, like pharmacy availability of buprenorphine and naloxone, should also be considered in implementation planning. The potential sustainability of the H&S model in California will be further assessed as the evaluation progresses and more data become available.

4.2. Future of the evaluation

In addition to the data sources described here, this program evaluation includes patient interviews, which examine the efficacy of the program in terms of individual treatment outcomes and treatment experience. Although patient interviews began in August 2018, results were not reported here, as analyses require additional data. By the end of the evaluation, an estimated 437 patients will be interviewed at both treatment initiation and 3-months post-intake, to evaluate treatment retention and outcomes over time. Interview results will be analyzed at the level of the H&S networks. To further assess barriers and facilitators to implementation, a second set of annual provider surveys will be conducted to measure changes in service availability, and provider knowledge and attitudes. All known waivered providers in hubs and spokes, MAT team members, and hub leadership will also be surveyed at this point. In addition, site visits will be conducted with a sample of spokes to qualitatively assess their performance and system-level needs, and examine the potential for sustainability of the model. Further, the efficacy of the program for the state overall will be analyzed using statewide administrative data sources, including CalOMS-Tx, Medi-Cal claims data, and CURES 2.0 prescription data. As data for the program period become available, changes in overdose death rates, buprenorphine prescribing rates, and naloxone distribution will be analyzed.

In addition to the evaluation of the overall H&S program, the treatment needs of indigenous communities in California are being assessed by a research team, led by Claradina Soto, PhD, at the University of Southern California (Soto el al., under review). Although the national conversation about opioid overdose deaths typically focuses on the high death rates among white Americans, in California, death rates are highest among Native Americans (California Department of Public Health, 2018). This needs assessment will inform efforts to expand access to culturally relevant treatment services, including MOUD.

4.3. Limitations

Limitations of this evaluation include data reported directly by hubs and spokes, and the small sample size of the first annual provider survey. Given the scale of this program, extracting data directly from each participating agency's health record was not practical. The data analyzed in this report are comprised of aggregate data reported by coordinators at each H&S site. To ensure data was of the highest feasible quality, UCLA conducted a series of three training webinars and generated a handbook of data reporting guidelines. UCLA also audits

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[6] This difference remains nearly the same when excluding prescribers who have never had patients (M = 19.00, SD = 27.24 vs. M = 9.28, SD = 11.94, respectively) p = .021.

[7] When these data were presented at the Steering Committee, several providers noted that administrators had asked them to remove their names from the website due to concerns over becoming subject to 42 CFR Part 2 regulations. They stated that hat increased guidance from enforcing agencies would help to quell their fears.

and returns reported data to coordinators each month to address errors and missing data. However, inaccuracies due to entry errors, misreporting, or limitations of health record systems may be possible. UCLA will match reported data to the California Outcomes Measurement System (California's Treatment Episode Dataset) and Medi-Cal (Medicaid) claims data to confirm accuracy, when these administrative datasets become available.

In addition, 61 of 118 reporting spokes had failed to submit reports for at least one of the fifteen required months of data collection. To account for these missing data points, mean imputation of missing values was used (Engels & Diehr 2003). Where new data has become available to replace imputed data, it has had little effect, suggesting the imputed numbers are largely accurate. For example, in a sample of 8 spokes' monthly reports that had been submitted after imputation was performed, the number of buprenorphine patients decreased by an average of 0.2 patients, and the number of providers increased by an average of 0.6 providers. The majority (n = 6) of these late reports confirmed imputed data showing 0 patients had started treatment. Of the 61 spokes missing reports, 40 were imputed to show 0 patient medication initiations, indicating that they had likely not yet adopted MOUD. However, it is possible that this method produced an underestimate of both MOUD inductions and waivered provider numbers. In addition, although data reporting is a requirement of the program, 16 spokes had not yet reported any data at the time this article was written. These spokes were excluded from analyses.

The sample size of the first annual waivered provider survey (N = 70) was small, and the number of waivered providers who had never prescribed buprenorphine was an under representation (n = 10). Additionally, the first annual survey did not reflect all providers who eventually became part of the H&S system, as new spokes joined the program. As a result, and in addition to staff turnover, the second annual survey may not capture the same providers sampled in the first.

It is also important to highlight the impact of contemporaneous statewide programs that are also combating the OUD crisis in the state of California. This paper would be remiss if it did not acknowledge programs that have both enhanced and increased access to MOUD across California. The Drug Medi-Cal Organized Delivery System (DMC-ODS) and other grants and programs funded by the Centers for Disease Control and Prevention (CDC), and the extensive work of the California Health Care Foundation (CHCF), California Society of Addiction Medicine (CSAM) and DHCS have all created a strong assemblage of MOUD expansion efforts. Data presented on statewide or county-level outcomes therefore cannot be solely credited as direct outcomes of the H&S program.

4.4. Conclusions and recommendations

To date, the evaluation of the California H&S program has found encouraging growth in the availability of MOUD. The number of OBOT programs connected into the H&S System has more than doubled since the start of program implementation activities, and hub and spoke sites experienced increases in both the number of waivered providers and the number of new patients starting MOUD. To further improve access, the program should continue its focus on increasing the number of waivered providers, but should also concentrate on overcoming barriers to prescribing, including provider knowledge and attitudes and mentorship opportunities. The H&S system should also offer increased support to spokes, especially those located in rural areas, which may need to offer more induction services and function like hubs.

Declaration of competing interest

None.

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