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# Impact of an opioid use disorder medication implementation intervention on hospitalization and emergency department utilization in the Veterans Health Administration

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## Abstract

**Background** It is important to evaluate how medication for opioid use disorder (MOUD) implementation interventions impact downstream outcomes, however little is known about impact on hospitalization and emergency department (ED) utilization. Stepped Care for Opioid Use Disorder Train the Trainer (SCOUTT) is a national United States Veterans Health Administration (VHA) effort initially implemented at 18 facilities that increased MOUD receipt in primary care, mental health, and pain clinics. This evaluation assessed SCOUTT's impact on hospitalization and ED utilization.

**Methods** This evaluation used a controlled interrupted time series analysis. We extracted electronic health record data for patients with OUD and ≥ 1 visit in an intervention clinic ($N=35$) or matched comparison clinic ($N=35$) in the post-implementation year. We examined monthly measures of hospitalization and ED utilization in the pre-implementation (9/1/2017-8/31/2018) and post-implementation (9/1/2018-8/31/2019) years. Segmented regression models estimated pre-post immediate and trend changes in intervention relative to comparison clinics, adjusting for pre-implementation trends and patient characteristics. Sensitivity analyses were conducted among patients with ≥ 1 visit in both the pre-/post-implementation years, and post-hoc secondary analyses were conducted among patients with OUD and ≥ 1 other SUD vs. OUD only.

**Results** Patients with OUD in both intervention ($N=7,488$) and comparison ($N=7,558$) clinics had a mean age of 53 years, and the majority were male, White, and not married. During the pre-implementation period, hospitalization and ED utilization increased over time in both intervention and comparison clinics; during the post-implementation period, hospitalization and ED utilization decreased over time in intervention clinics and remained stable in comparison clinics. There was no significant difference in pre-post changes between intervention and comparison

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clinics for most analyses. In sensitivity analyses the pre-to-post decrease in monthly trend for ED visits was larger in intervention clinics and, in secondary analyses, the pre-to-post decrease in monthly trend for hospitalizations was larger in intervention clinics among patients with OUD and ≥ 1 other SUD.

**Conclusions** This evaluation did not find evidence that SCOUTT substantially impacted hospitalization or ED utilization relative to comparison clinics, though there may have been positive impacts for patients with longer engagement in SCOUTT clinics and patients with OUD and ≥ 1 other SUD.

**Keywords** Opioid use disorder, Buprenorphine, Naltrexone, Implementation, Hospitalization, Emergency department, Utilization, Veterans

## Introduction

There are multiple effective medications to treat opioid use disorder (MOUD), and receipt of these medications reduces risk of overdose and death [1–3]. However, in the United States the majority of people with OUD do not receive MOUD [4]. In response to this treatment gap and an ongoing overdose crisis [5, 6], a variety of new care models and implementation interventions have been developed to increase MOUD provision across multiple U.S. healthcare settings, including statewide models and national healthcare system initiatives [7–10]. Prior research suggests that many U.S. patients experience barriers to accessing care in substance use disorder (SUD) specialty settings [11, 12], therefore these interventions often focus on increasing provision of buprenorphine and naltrexone in general medical settings such as primary care.

To fully evaluate the impact of MOUD implementation interventions, it is important to examine whether these interventions affect downstream outcomes—such as hospitalization and emergency department (ED) utilization—in addition to MOUD receipt. Many studies have examined the patient-level association between MOUD receipt and hospitalization and/or ED utilization among patients with OUD, with most finding that receiving MOUD is associated with lower hospitalization and ED utilization [13–19]. However, fewer studies have examined whether MOUD implementation interventions have impacted these outcomes at a broader population level in participating clinics (rather than examining if receiving MOUD impacted outcomes for a given patient) [20–22]. This type of analysis provides valuable insight for clinical and healthcare system leaders concerned with improving population-level outcomes through implementation and quality improvement interventions. Whether an MOUD implementation intervention impacts population-level utilization outcomes likely depends on multiple factors, including how much it increases MOUD receipt, among which patients (i.e., among patients who would have been likely to have hospitalization and ED utilization without MOUD), and to what extent patients initiated on MOUD are retained in treatment.

The few studies that have examined this question have found mixed results [20–22]. One observational study of buprenorphine for OUD implemented in primary care found that patients with OUD in intervention facilities had fewer hospitalizations than those in non-intervention facilities but found no difference in ED utilization [20]. Another observational study of addiction pharmacotherapy and recovery coaching integrated into primary care found that patients with OUD in intervention facilities had fewer inpatient days and ED visits than those in non-intervention facilities, but found no difference in mean number of hospitalizations [21]. A cluster-randomized implementation-effectiveness trial of nurse care management for OUD in primary care found no differences in days of acute care utilization (hospitalizations, ED, and/or urgent care) between patients in intervention and non-intervention facilities [22].

The Veterans Health Administration (VHA) is the largest provider of OUD treatment in the U.S [23]. The Stepped Care for Opioid Use Disorder Train the Trainer (SCOUTT) initiative is a national VHA effort to implement MOUD provision in primary care, mental health, and pain care settings [24]. A prior evaluation found evidence that the SCOUTT initiative increased MOUD receipt among patients with OUD in intervention vs. comparison clinics [25]. However, it is unknown whether the SCOUTT initiative affected downstream utilization outcomes, and to our knowledge no evaluations of VHA MOUD national initiatives have assessed impact on these outcomes. This evaluation aimed to assess the impact of the SCOUTT initiative on hospitalizations and ED utilization among patients with OUD.

## Methods

### Setting and evaluation design

SCOUTT is a national VHA initiative that was initially implemented in 35 intervention clinics (primary care, mental health, and pain) at 18 VHA facilities across the U.S., one from each regional network. SCOUTT was initiated on September 1, 2018, during an in-person conference attended by teams from the 18 VHA facilities. The conference, subsequent trainings, and ongoing external practice facilitation were aimed to help the teams

implement evidence-based models of MOUD care within the three types of clinics in their facilities. SCOUTT implementation is described in more detail in prior publications [24, 25].

The present evaluation used a controlled interrupted time series design; comparing an intervention group to a control group allowed us to examine whether changes in outcomes from pre- to post-implementation were likely due to the intervention as opposed to another contemporaneous factor [26]. We examined whether SCOUTT implementation impacted trends in hospitalization and ED utilization for patients seen in intervention clinics relative to patients seen in comparison clinics. Implementation began 9/1/2018; the pre-implementation period was defined as the year prior to implementation (9/1/2017-8/31/2018) and the post-implementation period was defined as the year following implementation (9/1/2018-8/31/2019). Thirty-five matched comparison clinics in other VHA facilities were selected based on their similarity to intervention clinics with respect to clinic-level metrics using nearest-neighbor matching, including volume of patients with OUD, pre-implementation MOUD prescribing trends, and facility complexity (see supplemental materials in Hawkins et al., 2021 for a detailed description of comparison clinic selection) [25]. Per VHA policy (VHA Program Guide 1200.21) this evaluation was designated as a quality improvement project and received a non-research determination from the VHA Office of Mental Health and Suicide Prevention, and therefore did not require institutional review board oversight.

### Data source and sample

Electronic health record data including patient demographic information, diagnoses, healthcare utilization, and medications were extracted from the VHA Corporate Data Warehouse. The sample included patients who were ≥18 years old, had ≥1 visit in an intervention or comparison clinic in the post-implementation period, and had an OUD diagnosis documented during either the pre- or post-implementation periods assessed via International Classification of Diseases 10th Revision codes. Because SCOUTT reached mostly primary care patients, and patients who have OUD identified in primary care may be less likely to have repeated visits with confirmatory diagnostic codes than in other clinic settings, we used a broad definition of OUD requiring ≥1 diagnostic code to ensure that all patients potentially eligible to receive MOUD were included (aligned with prior studies of MOUD in primary care) [27, 28].

### Measures

#### *Outcomes*

Primary outcomes included the monthly proportion of patients with hospitalization (proportion with ≥1 VHA inpatient hospitalization during each month) and the monthly proportion of patients with ED utilization (proportion with ≥1 VHA ED visit during each month). We secondarily examined different types of hospitalization (psychiatric or medical/surgical) using patient treatment file (PTF) codes to classify hospitalization type, as well as counts of inpatient hospitalizations and ED visits during each month.

#### *Covariates*

Baseline patient characteristics were measured during the pre-implementation period; these included age, race, ethnicity, sex, VHA service-connected disability rating ≥ 50%, housing instability, marital status, anxiety, posttraumatic stress disorder, depression, serious mental illness (bipolar, psychoses, and/or schizophrenia), non-opioid/non-tobacco drug use disorder, alcohol use disorder, and Charlson comorbidity score [29]. Clinic type (primary care, mental health, pain) was adjusted for to account for practice differences across these settings. To account for whether patients had an opportunity to be impacted by the intervention and for receipt of other SUD services, two binary, time-varying (monthly) covariates were also included: (1) having ≥1 visit in the intervention or comparison clinic, and (2) having ≥1 visit to a VHA SUD specialty clinic.

### Analyses

We described patient characteristics across intervention and comparison clinics and described outcomes during the year prior to and year following implementation across intervention and comparison clinics. For the controlled interrupted time series analyses, we used segmented regression models to estimate changes in monthly outcomes from the pre- to the post-implementation period (immediate level change and trend change) in intervention and comparison facilities. Models included terms for month since the beginning of pre-implementation period (months 1-24) to estimate the pre-implementation trend, month since implementation (months 13-24) to estimate change in trend after implementation, and a pre/post-implementation indicator (0 = pre [months 1–12], 1 = post [months 13–24]) to estimate immediate change after implementation, adjusted for all covariates described above [26, 30]. Models comparing the difference in pre-post changes between intervention and comparison clinics additionally included interaction terms between facility type and month since the beginning of pre-implementation, month since implementation, and pre-/post-implementation indicator. We used generalized estimating equations models to account for correlation among multiple observations for the same patient, with a fixed effect for facility to additionally account for facility-level correlation. Models examining

binary outcomes used a logit link, and models for analyses examining secondary count outcomes used a negative binomial link. Models were fit with robust standard errors and an autoregressive (AR1) correlation structure. We graphed the marginal adjusted prevalence of outcomes among patients in intervention and comparison clinics over each month.

To determine if results were different for patients with longer engagement in SCOUTT clinics, we conducted a sensitivity analysis that repeated interrupted time series analyses for primary outcomes among a subsample of patients with ≥1 visit during the pre-implementation period and ≥1 visit during the post-implementation period. Because a prior analysis found that the SCOUTT initiative may not have increased MOUD provision among patients with co-occurring non-opioid SUDs [31], we also conducted a post-hoc secondary analysis that repeated the main analyses among patients with OUD and ≥1 other SUD and among patients with OUD only to determine if results differed between these groups. Analyses were conducted with Stata version 18 software [32].

## Results

### Sample characteristics and outcome prevalence

Patient characteristics in intervention ($N$=7,488) and comparison ($N$=7,558) clinics are presented in Table 1. In

**Table 1** Characteristics of VA patients with OUD seen in SCOUTT intervention or comparison clinics

| | Comparison clinics ($N$=7,558) | | Intervention clinics ($N$=7,488) | | Standardized mean difference |
|---|---|---|---|---|---|
| | *N* | % | *N* | % | |
| Age in years (mean, SD) | 53.4 | 14.0 | 53.3 | 14.2 | -0.4 |
| Sex | | | | | |
| Male | 6943 | 91.9 | 6858 | 91.6 | -1.0 |
| Female | 615 | 8.1 | 630 | 8.4 | 1.0 |
| Race and ethnicity | | | | | |
| Black | 1463 | 19.4 | 1476 | 19.7 | 0.9 |
| Hispanic | 405 | 5.4 | 417 | 5.6 | 0.9 |
| White | 5196 | 68.8 | 5162 | 68.9 | 0.4 |
| Other/multiple race[a] | 244 | 3.2 | 239 | 3.2 | -0.2 |
| Unknown | 250 | 3.3 | 194 | 2.6 | -4.2 |
| Marital status | | | | | |
| Married | 2282 | 30.2 | 2432 | 32.5 | 4.9 |
| Not married[b] | 5256 | 69.5 | 5025 | 67.1 | -5.2 |
| Unknown | 20 | 0.3 | 31 | 0.4 | 2.6 |
| Service disability ≥ 50% | 3976 | 52.6 | 4103 | 54.8 | 4.4 |
| Unstable housing | 2043 | 27.0 | 1800 | 24.0 | -6.9 |
| Alcohol use disorder | 2895 | 38.3 | 2586 | 34.5 | -7.8 |
| Cannabis use disorder | 1516 | 20.1 | 1398 | 18.7 | -3.5 |
| Stimulant use disorder | 2140 | 28.3 | 1996 | 26.7 | -3.7 |
| Any nonopioid drug use disorder | 3113 | 41.2 | 2951 | 39.4 | -3.6 |
| Depression | 3358 | 44.4 | 3354 | 44.8 | 0.7 |
| Anxiety | 2704 | 35.8 | 2426 | 32.4 | -7.1 |
| Posttraumatic stress disorder | 2975 | 39.4 | 3267 | 43.6 | 8.7 |
| Serious mental illness[c] | 1425 | 18.9 | 1309 | 17.5 | -3.6 |
| Charlson comorbidity index | | | | | |
| 0 | 3548 | 46.9 | 3789 | 50.6 | 7.3 |
| 1 | 1731 | 22.9 | 1550 | 20.7 | -5.3 |
| ≥2 | 2279 | 30.2 | 2149 | 28.7 | -3.2 |
| Clinic type | | | | | |
| Primary care | 3613 | 47.8 | 4172 | 55.7 | 15.9 |
| Mental health | 2638 | 34.9 | 2293 | 30.6 | -9.1 |
| Pain | 1307 | 17.3 | 1023 | 13.7 | -10.1 |
| Received MOUD in SCOUTT clinics; pre-implementation year | 318 | 4.2 | 472 | 6.3 | 9.4 |
| Received MOUD in SCOUTT clinics; post-implementation year | 461 | 6.1 | 1,016 | 13.6 | 25.5 |

OUD = opioid use disorder; MOUD = medication for opioid use disorder; SCOUTT = Stepped Care for Opioid Use Disorder Train the Trainer Initiative; SD = standard deviation; VA = Veterans Health Administration

[a] Includes American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, and multiple races

[b] Includes never married, divorced, or widowed

[c] Includes bipolar, psychoses, and schizophrenia disorders

**Table 2** Descriptive summaries of outcomes during year prior to and year following implementation

| | Comparison clinics (*N* = 7,558) | | Intervention clinics (*N* = 7,488) | |
|---|---|---|---|---|
| | % | 95% CI | % | 95% CI |
| **Year prior to implementation (9/1/2017-8/31/2018)** | | | | |
| ≥ 1 hospitalization | 27.5 | 26.5–28.5 | 28.2 | 27.1–29.2 |
| Count of hospitalizations (**mean**) | 0.63 | 0.59–0.66 | 0.62 | 0.58–0.65 |
| ≥ 1 psychiatric hospitalization | 14.3 | 13.5–15.1 | 15.3 | 14.5–16.1 |
| ≥ 1 medical/surgical hospitalization | 18.3 | 17.5–19.2 | 17.9 | 17.0-18.8 |
| ≥ 1 ED visit | 48.8 | 47.7–50.0 | 49.9 | 48.7–51.0 |
| Count of ED visits (**mean**) | 1.73 | 1.65–1.81 | 1.71 | 1.63–1.78 |
| **Year following implementation (9/1/2018-8/31/2019)** | | | | |
| ≥ 1 hospitalization | 35.1 | 34.0-36.1 | 32.8 | 31.8–33.9 |
| Count of hospitalizations (**mean**) | 0.84 | 0.81–0.88 | 0.74 | 0.71–0.78 |
| ≥ 1 psychiatric hospitalization | 18.3 | 17.5–19.2 | 18.8 | 17.9–19.7 |
| ≥ 1 medical/surgical hospitalization | 23.6 | 22.6–24.5 | 20.5 | 19.5–21.4 |
| ≥ 1 ED visit | 53.5 | 52.4–54.6 | 54.3 | 53.2–55.4 |
| Count of ED visits (**mean**) | 1.89 | 1.81–1.97 | 1.82 | 1.74–1.90 |

CI = confidence interval; ED = emergency department; OUD = opioid use disorder; SCOUTT = Stepped Care for Opioid Use Disorder Train the Trainer Initiative; VA = Veterans Health Administration

both intervention and comparison clinics, mean age was about 53 years, and the majority of patients were male, White, and not married. Over half had a VHA service-connected disability rating ≥ 50%, and about one-quarter had housing instability. Non-opioid SUD diagnoses, anxiety, serious mental illness and Charlson comorbidities were slightly less common in intervention than comparison clinics, while posttraumatic stress disorder was slightly more common. In intervention facilities, 56% of patients were seen at primary care clinics, 31% at mental health clinics, and 14% at pain clinics, while in comparison facilities 48% of patients were seen at primary care clinics, 35% at mental health clinics, and 17% at pain clinics. As reported in the prior evaluation, 6% of patients in intervention clinics and 4% of patients in comparison clinics received MOUD during the pre-implementation year, and 14% of patients in intervention clinics and 6% of patients in comparison clinics received MOUD during the post-implementation year [25].

Descriptive summaries of outcomes during the year prior to and the year following implementation are presented in Table 2. During the year prior to implementation, over one-quarter of patients had ≥ 1 hospitalization (28.2% in intervention clinics and 27.5% in comparison clinics), and nearly half of patients had ≥ 1 ED visit (49.9% in intervention clinics and 48.8% in comparison clinics). During the year following implementation, about one-third of patients had ≥ 1 hospitalization (32.8% in intervention clinics and 35.1% in comparison clinics), and over half of patients had ≥ 1 ED visit (54.3% in intervention clinics and 53.5% in comparison clinics).

## Interrupted time series results

### *Hospitalizations*

The adjusted monthly proportion of patients with ≥ 1 hospitalization across intervention and comparison clinics is presented in Fig. 1. In intervention clinics, this proportion increased over time during the pre-implementation period (from 3.7% in month 1 to 5.4% in month 12; adjusted odds ratio [aOR] for pre-implementation trend: 1.03, 95% confidence interval [CI]: 1.01–1.04, $p < 0.001$), and decreased over time during the post-implementation period (from 5.3% in month 13 to 5.1% in month 24; the monthly trend changed significantly

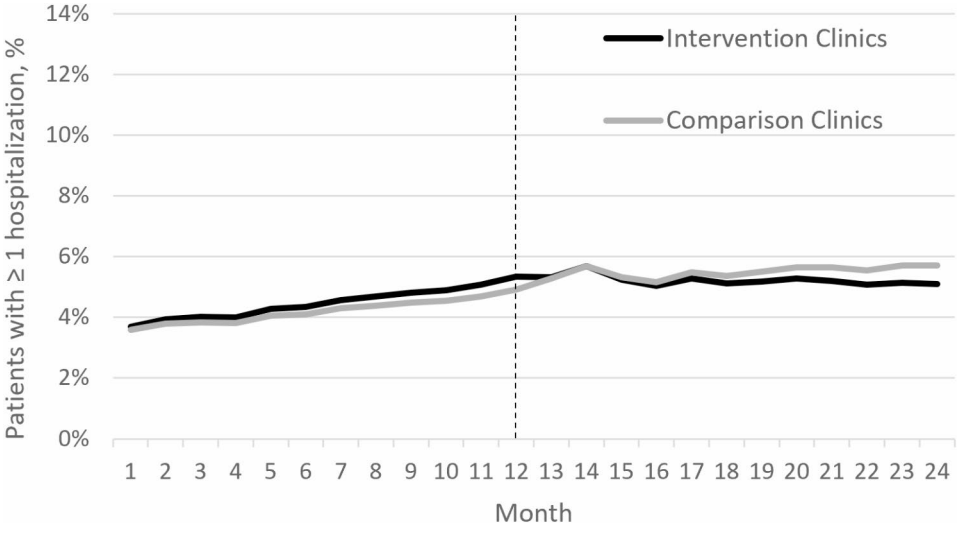


**Fig. 1** Adjusted monthly proportion of patients with ≥ 1 hospitalization in intervention and comparison clinics; the vertical line represents the start of implementation

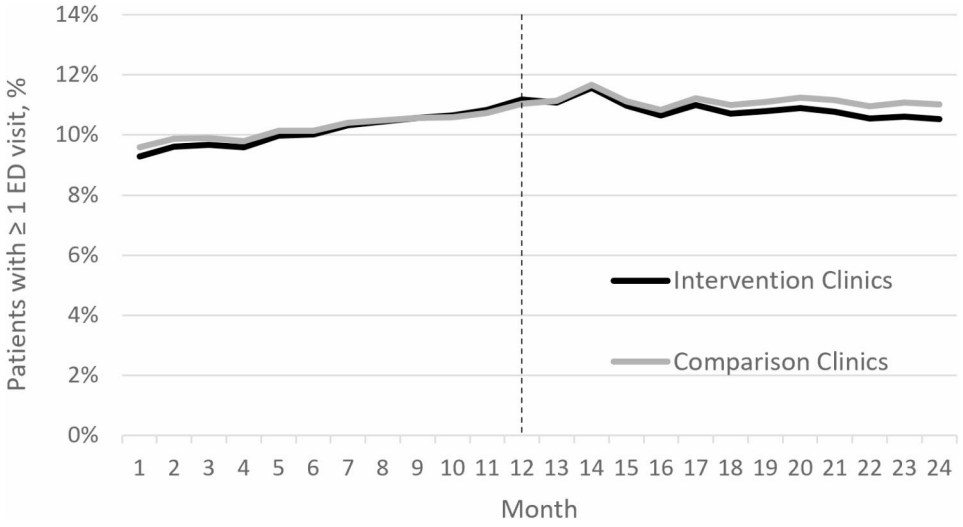


**Fig. 2** Adjusted monthly proportion of patients with ≥ 1 emergency department visit in intervention and comparison clinics; the vertical line represents the start of implementation

from pre- to post-implementation (aOR 0.98, 95% CI: 0.96–0.99, $p < 0.001$). In comparison clinics, this proportion increased over time during the pre-implementation period (from 3.6% in month 1 to 4.9% in month 12; aOR for pre-implementation trend 1.02, 95% CI: 1.01–1.03, $p < 0.001$), and remained relatively stable during the post-implementation period (5.3% in month 13 to 5.7% in month 24; the monthly trend did not significantly change from pre- to post-implementation (aOR 0.99, 95% CI: 0.98-1.00, $p = 0.148$).

In models comparing intervention and comparison clinics, the change in the monthly proportion with hospitalization immediately after implementation (from the last month of the pre-period to the first month of the post-period) did not significantly differ between intervention and comparison clinics (aOR 0.93, 95% CI: 0.82–1.05, $p = 0.235$), and the change in the monthly trend from pre- to post-implementation did not significantly differ between intervention and comparison clinics (aOR 0.98, 95% CI: 0.96-1.00, $p = 0.068$). Results from analyses separately examining psychiatric and medical/surgical hospitalizations, and monthly counts of hospitalizations, are presented in Appendix A; controlled interrupted time series findings for all secondary hospitalization outcomes were similar to the main analyses.

Results from sensitivity analyses repeating the main analyses among patients with ≥ 1 clinic visit during the pre-implementation period and ≥ 1 visit during the post-implementation period are presented in Appendix B; controlled interrupted time series findings for hospitalization were similar to the main analyses. Results from post-hoc secondary analyses repeating the main analyses among patients with OUD and ≥ 1 other SUD and among patients with OUD only are presented in Appendix C; controlled interrupted time series findings for hospitalization were similar to the main analyses except that among patients with OUD and ≥ 1 other SUD, the decrease in the monthly trend from pre- to post-implementation was larger in intervention vs. comparison clinics (aOR: 0.97, 95% CI: 0.95–0.99, $p = 0.028$).

#### *ED utilization*

The adjusted monthly proportion of patients with ≥ 1 ED visit across intervention and comparison clinics is presented in Fig. 2. In intervention clinics, this proportion increased over time during the pre-implementation period (from 9.3% in month 1 to 11.2% in month 12; aOR for pre-implementation trend: 1.01, 95% CI: 1.01–1.02, $p < 0.001$), and decreased over time during the post-implementation period (from 11.1% in month 13 to 10.5% in month 24; the monthly trend changed significantly from pre- to post-implementation (aOR 0.98, 95% CI: 0.97–0.99, $p = 0.001$). In comparison clinics, this proportion increased over time during the pre-implementation period (from 9.6% in month 1 to 11.0% in month 12; aOR for pre-implementation trend 1.01, 95% CI: 1.00-1.01, $p = 0.024$), and remained relatively stable during the post-implementation period (from 11.2% in month 13 to 11.0% in month 24; the monthly trend did not significantly change from pre- to post-implementation (aOR 0.99, 95% CI: 0.98-1.00, $p = 0.104$).

In models comparing intervention to comparison clinics, the change in the monthly proportion with ED utilization immediately after implementation (from the last month of the pre-period to the first month of the post-period) did not significantly differ between intervention and comparison clinics (aOR 0.98, 95% CI: 0.90–1.07, $p = 0.643$), and the change in the monthly trend from

pre- to post-implementation did not significantly differ between intervention and comparison clinics (aOR 0.99, 95% CI: 0.98-1.00, $p = 0.172$). Results from analyses examining monthly counts of ED visits are presented in Appendix A; controlled interrupted time series findings for this secondary outcome were similar to the main analyses.

Results from sensitivity analyses repeating the main analyses among patients with ≥1 clinic visit during the pre-implementation period and ≥1 visit during the post-implementation period are presented in Appendix B; controlled interrupted time series findings for ED visits were mostly similar to the main analyses, except that the decrease in the monthly trend from pre- to post-implementation was larger in intervention vs. comparison clinics (aOR: 0.98, 95% CI: 0.97–0.99, $p = 0.037$). Results from post-hoc secondary analyses repeating the main analyses among patients with OUD and ≥1 other SUD and among patients with OUD only are presented in Appendix C; controlled interrupted time series findings for ED visits were similar to the main analyses.

## Discussion

The present evaluation did not find evidence that the SCOUTT initiative substantially impacted hospitalizations or ED utilization among patients with OUD. In sensitivity analyses, the change in monthly trend from pre- to post-implementation for ED visits was larger in intervention vs. comparison clinics among the subsample of patients who had ≥1 visit during the pre-implementation period and ≥1 visit during the post-implementation period, suggesting that there may have been some positive impact on this outcome for patients with longer engagement in SCOUTT clinics. These findings align with a recent implementation-effectiveness trial of primary care-based nurse care management for MOUD, which did not find differences in acute care utilization between intervention and non-intervention facilities [22].

In general, monthly trends in both hospitalizations and ED visits changed from increasing to decreasing over time in intervention clinics, and from increasing over time to relatively stable over time in comparison clinics. It is possible that any positive impact SCOUTT may have had on these outcomes was joined by the impact of other factors that were also affecting comparison clinics around the same time as the intervention, such as broader efforts to address OUD and overdose (e.g., efforts to change opioid prescribing, increase MOUD, and increase overdose education/naloxone distribution) [23, 33, 34]. While the present evaluation cannot determine the reasons for these changes, it may be that a combination of multiple VHA initiatives and/or other factors (e.g., an overall increasing awareness of opioid risks) positively affected hospitalization and ED utilization among VHA patients with OUD. It also may be possible that more follow-up time is needed for differences in these outcomes to emerge. Importantly, all data from this evaluation precede the COVID-19 pandemic which may have altered later trends in these outcomes.

Post-hoc secondary analyses suggested that hospitalization trends may have improved in intervention relative to comparison clinics among patients with OUD and ≥1 other SUD. This finding was somewhat surprising, given that a prior analysis found that SCOUTT may not have increased MOUD receipt among this group [31]. It is unclear why SCOUTT may have positively impacted hospitalizations among this group, and further evaluation is needed to understand potential mechanisms. For example, if SCOUTT increased clinician knowledge and awareness of SUDs more generally, it may have helped engage patients with multiple SUDs in care and/or prevent hospitalizations related to non-opioid SUDs (e.g., alcohol-related hospitalizations). However, this cannot be determined from the present evaluation.

There may be ways in which SCOUTT and other MOUD implementation efforts can increase their overall impact on downstream outcomes. An increased focus on linking patients at high risk for hospitalization and ED care to MOUD care could increase the impact of the initiative on these outcomes. This might include providing more support for providers to prescribe MOUD to complex patients (e.g., clearer guidelines, increased collaboration with SUD specialists) [35], improved handoff processes from primary care, mental health, and pain settings to SUD specialty care settings, and/or expanding the initiative to inpatient and ED settings. Additionally, a prior evaluation found that although SCOUTT increased MOUD receipt in intervention clinics relative to comparison clinics, retention on MOUD was lower in intervention clinics than comparison clinics [25]. As retention is important for preventing adverse outcomes, a greater focus on supporting retention may be needed in MOUD implementation efforts. Further implementation work, including qualitative investigation, is needed to better understand factors that may be limiting impact on downstream outcomes and how to address them (e.g., barriers to and facilitators of reaching complex patients and supporting retention). Finally, increasing focus on harm reduction strategies in MOUD implementation interventions, especially strategies that may reduce the risk of adverse outcomes, may also increase their impact on hospitalization and ED care outcomes. These include increasing distribution of harm reduction supplies such as naloxone (an opioid overdose reversal medication), sterile syringes, and fentanyl testing supplies, and providing overdose prevention education [36].

There are limitations to this evaluation. Although we adjusted for patient-level covariates and the

pre-implementation trend in outcomes and included a control series, there may have been unmeasured confounding (e.g., patient baseline clinical severity or provider factors at intervention vs. comparison clinics) or residual bias from external factors occurring at the same time as the intervention [26]. Intervention clinics may have varied in experience with MOUD prior to the intervention (though matched comparison clinics were selected based on pre-implementation trends in MOUD prescribing), and may have implemented SCOUTT later than the launch date due to variation in the length of time needed to complete local training and other implementation activities. Additionally, future evaluations might examine whether findings differed for different types of clinics in stratified analyses. Though comparison clinics were matched to intervention clinics on multiple characteristics, intervention clinics may have had other differences from comparison clinics that could be related to care outcomes among their patients (e.g., willingness to participate in a quality improvement initiative might be related to overall quality of care). We used a broad definition of OUD to ensure that all patients potentially eligible to receive MOUD were included, however some prior studies have used more conservative definitions [2], and it is possible that our sample included some patients who were misdiagnosed. Our data could not definitively determine whether patients were actively receiving treatment during the entire month, or whether hospitalizations and ED visits were OUD-related -- while OUD may contribute to these outcomes in multiple ways (e.g., overdoses, infections, increased risk of cardiovascular and psychiatric events) [37–40], some hospitalizations/ED visits may not have been directly related to patients' OUD. Additionally, these data do not capture ED visits or hospitalizations that occurred outside of the VHA system. Finally, the generalizability of these findings may be limited in non-VHA settings.

## Conclusions

This evaluation examined the impact of a national initiative to increase MOUD provision in VHA primary care, mental health and pain clinics on hospitalization and ED utilization. We did not find evidence that the initiative substantially impacted hospitalization or ED utilization relative to comparison clinics, though there may have been positive impacts for patients with longer engagement in SCOUTT clinics and patients with OUD and ≥1 other SUD. Overall trends suggested that there was improvement in these outcomes over the period when SCOUTT was implemented in both intervention and comparison clinics, which may have resulted from a combination of multiple VHA initiatives and/or other factors. MOUD implementation initiatives might seek to increase their impact on hospitalization and ED utilization by increasing focus on reaching higher risk patients and incorporating harm reduction strategies.

### Abbreviations

| | |
|---|---|
| aOR | Adjusted odds ratio |
| CI | Confidence interval |
| ED | Emergency department |
| MOUD | Medication for opioid use disorder |
| OUD | Opioid use disorder |
| SCOUTT | Stepped Care for Opioid Use Disorder Train the Trainer |
| SUD | Substance use disorder |
| VHA | Veterans Health Administration |

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12888-025-06722-6.

Supplementary Material 1

### Acknowledgements

Not applicable.

### Author contributions

MCF, CAM, and EJH designed the evaluation and planned the analyses. CAM extracted the data and conducted statistical analyses. MCF led preparation of the manuscript. All authors assisted with interpretation of findings, contributed important intellectual content and revisions to the manuscript, and read and approved the final manuscript.

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### Data availability

Data are not publicly available due to institutional rules regarding data sharing.

## Declarations

### Ethics approval and consent to participate

Per VHA policy (VHA Program Guide 1200.21) this evaluation was designated as a quality improvement project and received a non-research determination from the VHA Office of Mental Health and Suicide Prevention, and therefore did not require institutional review board oversight. The evaluation used secondary electronic health record data and therefore did not consent participants.

### Consent for publication

Not applicable.

### Competing interests

AJS receives royalties from UpToDate, Inc. No other disclosures are reported by the authors.

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## Publisher's note