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Medication Initiation, Patient-directed Discharges, and Hospital Readmissions Before and After Implementing Guidelines for Opioid Withdrawal Management

Jillian Zavodnick, MD
Thomas Jefferson University

Nicolette M. Heinsinger
Thomas Jefferson University

Angelo C. Lepore
Thomas Jefferson University

Robert C. Sterling
Thomas Jefferson University

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Title: Medication initiation, patient-directed discharges and hospital readmissions before and after implementing guidelines for opioid withdrawal management

Author names and affiliations: Jillian Zavodnick MD;*^a Nicolette M. Heinsinger PhD;*^b Angelo C. Lepore PhD;^b Robert C Sterling PhD^c

*Co-first authors

^a Sidney Kimmel Medical College at Thomas Jefferson University, Department of Medicine, 1025 Walnut St Ste 805, Philadelphia, PA, 19107, USA

^b Thomas Jefferson University Department of Neuroscience, 900 Walnut St, Room 416, Philadelphia, PA, 19107, USA

^c Thomas Jefferson University Department of Psychiatry, 1021 S 21st St 2nd floor, Philadelphia, PA 19146, USA

Corresponding author contact information:

Jillian Zavodnick, MD
1025 Walnut St Ste 805
Philadelphia, PA 19107
T: 610-724-1716
F: 215-955-3890
jillian.zavodnick@jefferson.edu

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Medication initiation, patient-directed discharges and hospital readmissions before and after implementing guidelines for opioid withdrawal management

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Abstract:

Objectives: Rising rates of hospitalization for patients with opioid use disorder (OUD) result in high rates of patient-directed discharge (PDD, also called “discharge against medical advice”) and 30-day readmissions. Interdisciplinary addiction consult services are an emerging gold standard to improve care for these patients, but these services are resource- and expertise-intensive. A set of withdrawal guidelines was developed to guide generalists in caring for patients with opioid withdrawal at a hospital without an addiction consult service. *Methods:* Retrospective chart review was performed to determine PDD, 30-day readmission, and psychiatry consult rates for hospitalized patients with OUD during periods before (July 1, 2017 – March 31, 2018) and after (January 1, 2019 – July 31, 2019) the withdrawal guidelines were implemented. Information on the provision of opioid agonist therapy (OAT) was also obtained. *Results:* Use of OAT in patients with OUD increased significantly after guideline introduction, from 23.3% to 64.8% ($P < 0.001$). PDD did not change, remaining at 14% before and after. 30-day readmissions increased 12.4% to 15.7% ($p = 0.05065$). Receiving any OAT was associated with increased PDD and readmission, but only within the post-intervention cohort. *Conclusions:* A guideline to facilitate generalist management of opioid withdrawal in hospitalized patients improved the process of care, increasing the use of OAT and decreasing workload on the psychiatry consult services. Though increased inpatient OAT has been previously shown to decrease PDD, in this study PDD and readmission rates did not improve. Guidelines may be insufficient to impact these outcomes.

Introduction

Inpatient hospitalizations for medical conditions related to addiction and opioid use disorder have increased dramatically with the continuation of the opioid epidemic.¹⁻⁵ Patients with opioid use disorder (OUD) frequently leave the hospital before achieving medical stability, a condition described as patient-directed discharge (PDD), though it is commonly referred to as discharge “against medical advice.”⁶⁻⁸ PDD is associated with increased mortality,^{9,10} decreased

treatment completion,¹¹ and increased hospital readmission within 30 days,^{12,13} which is an outcome considered a negative quality marker for hospital care.¹⁴

In addition to its association with other poor outcomes, PDD is important as an indicator of opportunities to improve care. Uncontrolled withdrawal is an important driver of PDD, but it can be effectively treated with opioid agonist therapy (OAT).^{15,16} However, OAT is underutilized in the treatment of OUD, both in the hospital and in the ambulatory setting where they are used long-term and referred to as medications for OUD (MOUD), despite carrying a large mortality benefit that warrants offering them to all patients with OUD.^{17–21} Inpatient initiation of MOUD has been associated with mixed effects on PDD,^{22,23} but has been shown to improve post-hospital addiction treatment engagement as well as rates of readmission.^{24,25} Addiction consult services (ACS) have been described as the emerging gold standard and have been shown to decrease both PDD and readmissions in hospitalized patients with OUD.^{24,26–28}

Interventions to improve the care of hospitalized patients with OUD without an ACS have been less well-described, though interventions to improve internist comfort with buprenorphine have had some success.^{25,29} To address this pressing clinical need, our medical center developed guidelines for managing opioid withdrawal in the hospital without an ACS. The goal of the new guidelines was to facilitate proactive, coordinated, and generalist-driven care of patients with OUD. The guidelines addressed pharmacologic management of withdrawal and referral to outpatient addiction care, which are only a subset of the services available through published ACS models.³⁰ The goal of this study was to determine if these new guidelines supporting the use of OAT with methadone or buprenorphine increased the provision of these medications during hospitalization, and whether this improved patient outcomes such as PDD and 30-day readmission.

Methods

Population

We studied 1821 admissions representing 1326 unique patients with an OUD-related ICD-10 code billed during admission to a large urban academic medical center. Patients were discharged before (July 1, 2017 – March 31, 2018) or after (January 1, 2019 – July 31, 2019) the guideline was published and publicized. The 2019 cohort sample was obtained after allowing six months for the guideline to be publicized, for an electronic health record orderset to be created, and for adoption into practice. Data were obtained from Vizient, a company that collects and provides performance improvement data to healthcare organizations used by our hospital for a variety of performance improvement purposes, as well as through hospital electronic health record billing data.

Pre-intervention state

Prior to publication of the guidelines, the authors observed, as clinicians and in their role on the institution's opioid task force, that opioid withdrawal practices were highly individualized. Some clinicians aimed to manage withdrawal using short-acting opioids, long-acting opioids, psychiatry consultation, or a combination of these. Other clinicians did not prioritize management of opioid withdrawal. Psychiatry consultant teams varied in their approach to the treatment of withdrawal based on which physicians were on duty, which changed daily. The pharmacy was hesitant to approve methadone orders that were not continuation of maintenance methadone or recommended by a psychiatry consultant. Buprenorphine was almost never administered in the hospital outside of the Acute Pain Management Service, an anesthesia specialty service. An "opioid aftercare coordination service" funded by a state opioid Center of

Excellence grant had recently become available to identify outpatient MOUD providers upon discharge, but this service was not well-known among hospital clinicians. Social work consultation was commonplace for patients with OUD, but a high workload meant that consultation was usually delayed for several days into the admission, and services provided were usually limited to the provision of a list of outpatient resources (or, less frequently, placement in an inpatient drug rehabilitation unit).

Description of intervention and implementation

The inpatient opioid withdrawal guidelines (figure 1) were developed by an interdisciplinary task force including pharmacists, physicians, nurses, psychologists, social workers, security personnel, and hospital administrators. The guidelines were based on previously published approaches to the hospital-based management of opioid withdrawal. Considerations addressed include performing initial urine drug testing, Screening, Brief Intervention, and Referral to Treatment, consideration of security search, and using the Clinical Opioid Withdrawal Scale (COWS) to assess withdrawal. Clinicians are directed to choose methadone or buprenorphine in addition to non-agonist adjunctive medications (including clonidine and symptom-focused medications), or non-agonist medications alone if patients decline agonist therapy. Dosing recommendations are given for all medications. Guidance is given for when to consult psychiatry or the acute pain management service (a consultation service run by the Department of Anesthesia).

After administrative approval and publication alongside other local clinical guidelines, in-person educational sessions were delivered to familiarize attending physicians and residents from internal and family medicine with the guidelines. Bedside nurses were trained in performing the COWS assessment and completed an online module on addiction.

Data analysis

Data were analyzed with SPSS and R. Chi square was used to determine statistical significance of all categorical variables; t test was used assess for differences in age. Primary process measure was the rate of OAT use (methadone or buprenorphine), secondary process measure was the rate of psychiatry consultation, and primary outcome measures were PDD and readmission within 30 days.

When determining whether methadone or buprenorphine were administered, we considered patients who received a single dose or more of a medication as having received that medication. Illness severity and risk of mortality were obtained from Vizient, which provides these designations using patient- and diagnosis-specific factors.

Results

Sample

Data for all analyses were derived from 1821 hospital admissions for a medical condition, where at least one billing code suggesting opioid use disorder (codes for OUD, opioid use, “abuse,” dependence, or poisoning) was submitted during the admission (see supplement for full list of codes). Patients were primarily female (56.6%), predominantly white (68.1%), and averaged 39.7 +/- 13.1 years of age at the time of admission. Primary outcome measures in the population indicate that 14.2% (n=259) were a PDD, while 14.0% (n=255) were readmitted within 30 days. Additional descriptive information can be found in table 1.

Use of OAT

From the pre-guideline period of 2017-8 to the post-guideline period of 2019, a significant increase in the proportion of patients prescribed methadone was observed, from 23.3% (n=214/921) pre-guideline to 52.6% (n=473/900) post-guideline, $X^2(1, N = 1821) = 165.3, p < 0.001$. This increase occurred as the number of psychiatric consultations dropped from 34% (n=313/921) in the pre-guideline cohort to 21.8% (n=196/900) in the post-guideline cohort, $X^2(1, N = 1821) = 33.08, p < 0.001$. Overall use of OAT increased after implementing the guidelines, with 64.8% (n=583/900) of admissions involving OAT post-intervention, from 23.3% (n=214/921) before, $X^2(1, N = 1821) = 317.5, p < 0.001$. Buprenorphine was not utilized for withdrawal in the pre-guideline period, but was administered to 13.5% (n=122/900) of post-guideline admissions. These findings are described in figure 2.

Changes in PDD and readmissions

Despite the increased attention on managing symptoms of opioid use disorder, no changes were noted in PDD rates between the pre- and post-guideline cohorts (14%, n=132/921 versus 14%, n=127/900), $X^2(1, N = 1821) = 0.0046, p = ns$. Thirty-day readmission rates did increase from 12.4% (n=114/921) prior to implementation of the guidelines to 15.7% (n=141/900) post implementation, $X^2(1, N = 1821) = 3.8199, p = 0.051$. We observed that the post-implementation cohort was significantly older (average age of 38.92 years before the guidelines and 40.52 after the guidelines, $t(1819) = -2.61, p < 0.01$) and had an elevated admission severity of illness, $X^2(4, N=1821) = 15.63, p < 0.01$, but not risk of mortality, $X^2(4, N=1821) = 5.167, p = ns$ (see figure 3). Thus, while hospital clinicians demonstrated an increasing awareness and sensitivity to treating OUD symptoms, the findings suggest that expanded options introduced in 2019 did not positively impact these patient outcomes.

Association of OAT and outcomes

Across all 1821 admissions, patients who received any methadone or buprenorphine during hospitalization were more likely to leave by PDD, as 12.1% (n=124/1024) of patients in the untreated condition left prematurely as opposed to 16.9% (n=135/797) of patients in the treated condition ($X^2(1, N = 1821) = 8.1757, p < 0.001$). The likelihood of being re-admitted within 30 days was higher for patients who received OAT, with 11.8% (n=121/1024) of those who received no OAT returning within 30 days of discharge, as compared with 16.8% (n=134/797) of those who received methadone or buprenorphine ($X^2(1, N = 1821) = 8.8814, p < 0.003$). Interestingly, we observed that the association between OAT and a higher rate of PDD was only statistically significant in the post-intervention cohort ($X^2(1, N = 901) = 11.36, p < 0.01$), with 17% of patients who received OAT leaving by PDD as compared to 8.8% of patients who did not receive OAT. A similar association between OAT and 30 day readmission rate was also observed ($X^2(1, N = 901) = 8.026, p < 0.001$), with 18.2% of OAT-treated patients returning within 30 days as compared to 11% of non-treated patients returning. This finding is illustrated in figure 4.

Discussion

During the intervention period, OAT use significantly increased; methadone was used twice as often as before the guidelines, and buprenorphine, a medication previously used rarely and only by the pain specialty service, became a common part of generalist practice. OAT use increased despite reduced frequency of psychiatry consultation, suggesting that non-specialty clinicians developed greater confidence treating OUD and became more comfortable addressing the signs and symptoms of opioid withdrawal without specialty assistance. This suggests that

guidance for treating opioid withdrawal in the hospital can support generalists in improving care for patients with OUD.

The intervention did not have the desired impact on hospital-wide outcome measures. There was no change in rate of PDD after the intervention period. PDD is multifactorial, and simply increasing OAT was inadequate to improve this outcome in the population. In fact, in the post-intervention period, receiving OAT during hospitalization was associated with higher rates of PDD. This analysis is limited by the blunt binary determination of “exposed” or “unexposed” to OAT which gives no insight into the quality of withdrawal management or the adequacy of dosing and makes no distinction between a successful buprenorphine initiation and a single small dose of methadone. Indeed, when we looked at the probability that an admission ending in PDD lasted 3 days or longer (as a proxy for successful management of the early withdrawal period and a non-withdrawal driver of PDD), there was no difference observed between the pre- and post-guideline cohorts. The stability of PDD rates overall could also reflect a year’s progression in the severity of addiction among the patients admitted in the second cohort. However, the development of an ACS has been shown to improve these outcomes²⁴ and hospitals wishing to have an impact on outcomes may need to look beyond low-impact interventions like the one described here and commit to the full spectrum of addiction care.

Readmissions within 30 days of discharge increased over the study period. We are left to speculate whether this could potentially be due to aging or intensifying severity of illness in the second cohort. Though readmissions are often considered a negative quality marker,¹⁴ in this population they may in fact be evidence of subjectively improved care leading patients to return more readily to have their serious medical illness addressed. When examining the population as a

whole and the post-intervention cohort alone, provision of OAT was associated with increased rates of readmission after implementation of the guidelines – perhaps patients were more willing to come back to the hospital if they are confident that at least some attempt will be made to address their withdrawal. The very existence of withdrawal treatment plans, even if inadequate to a patient’s needs, may create a more welcoming environment by acknowledging the importance of treating withdrawal. To assess quality of care in patients with OUD, PDD may be a more useful outcome than readmission.

However, the rate of PDD was higher in OAT-treated than non-OAT treated patients in the late cohort. This is at odds with recent data from another hospital showing the opposite, and surprising given the understanding of opioid withdrawal as a driver of premature discharge; however, another recent study demonstrated a higher OAT rate among patients who used drugs and had a PDD.^{11,15,22} A possible explanation for this is that the guidelines were facilitating the targeting of OAT to patients with the most severe addiction or withdrawal, a group that may be predisposed to opt for premature discharge at greater rates. OAT was still underutilized, with nearly half of patients even in the post-guideline cohort receiving no OAT. As described above, study design limits the ability to assess adherence to guidelines. Higher PDD rates in OAT-treated patients may reflect inadequacy of the guidelines themselves (for example, an inappropriately high COWS requirement to receive an as-needed methadone dose), or inadequate clinician adherence to dosing guidelines, or a combination of these – especially in the setting of likely selection bias, with the guidelines potentially applied selectively to patients at highest risk of PDD. Another consideration warranting further study is the role of non-MOUD opioid agonists in treating withdrawal. Were patients who received opioid pain management, such as hydromorphone, better protected from PDD, while patients without the excuse of pain management to drive more

aggressive opioid agonist therapy were left with the less potent options on the withdrawal guidelines? Experts have recently proposed a role for short-acting opioids in the treatment of acute opioid withdrawal, an approach not listed in the guidelines studied here but that will become increasingly important as fentanyl increasingly contaminates the opioid supply.^{31,32} As other adulterants like xylazine become common, the effectiveness of OAT for the resulting withdrawal syndrome will be further challenged.^{33,34} Additionally, drivers such as housing concerns, stigma from staff, and the restrictive hospital environment have been shown to contribute to PDD; none of these challenges are addressed by withdrawal management.^{11,15}

The observational study design limits the attempt to describe the impact of the intervention on outcomes. The provision of OAT may be a marker of disease severity, either addiction or the medical illness leading to the hospitalization. Patients with severe OUD would be expected to manifest more severe and obvious withdrawal, providing a more unambiguous treatment indication. Patients with severe medical illness may prompt more aggressive “PDD prevention” from their medical team, with maximally aggressive measures to facilitate the completion of their medical care. Conversely, patients with less severe illness, less risk of bad long-term outcomes, or closer to the end of their medical needs, may not inspire aggressive withdrawal management on the part of their treating clinicians.

Any causal assessment of the impact of the guidelines is also limited by our inability to assess guideline adherence. Changes over time may be related to a number of other factors including clinicians self-educating on withdrawal management, increasing recognition of the need for better addiction care in the hospital, rising acceptance of MOUD and OAT, decreasing stigma, changes in practices at other local hospitals, and changes in residency education. We were also

unable to assess the impact of non-agonist withdrawal treatment on our outcomes. We did not have access to outcomes related to engagement in ongoing OUD treatment, or longer-term outcomes on readmissions, mortality, or other clinically-relevant outcomes, though a separate chart review evaluation of the post-intervention cohort intended to evaluate the uptake of the then-new aftercare coordination service shows that referrals for MOUD on discharge occurred in 4% of the study population in December of 2018, and 21% by July of 2019.³⁵

Although guidelines for wide use by generalists may appear to be a low-resource intervention compared to ACS²⁷ or investing in sophisticated internist-led processes,^{25,29} there is a major logistical limitation to this approach in the face of rising overdose deaths and a changing drug supply. The time from conception of guidelines to engagement of subject matter experts to eventual committee approval is long, and the process lacks flexibility. A team of experts such as an ACS can adapt quickly using expertise, rather than slow consensus, and guide hospitals to adapt to an ever-changing crisis requiring complex interdisciplinary knowledge. A bureaucratically-designed and updated clinical process is destined to lag behind the ever-changing challenges of the opioid crisis, and should be considered only a stopgap for those institutions unable to invest in dedicated expertise.

Conclusions

A guideline to facilitate generalist management of opioid withdrawal in hospitalized patients improved the process of care, increasing the use of OAT and decreasing psychiatry consult service workload. In this study, PDD and readmission rates did not improve, even though increased inpatient OAT has been previously shown to decrease PDD. Guidelines may be insufficient to impact these outcomes and are sub optimally adaptable to a changing clinical situation.

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Table 1: Characteristics of admissions where an opioid use disorder (OUD)-related diagnosis was present, before and after implementation of guidelines

	Before (N=921)	After (N=900)	Overall (N=1821)
Sex			
Female	539 (58.5%)	492 (54.7%)	1031 (56.6%)
Male	382 (41.5%)	408 (45.3%)	790 (43.4%)
Race			
White	615 (66.8%)	626 (69.6%)	1241 (68.1%)
Black	193 (21.0%)	165 (18.3%)	358 (19.7%)
Other	23 (2.5%)	81 (9.0%)	104 (5.7%)
Not provided/unavailable	90 (9.8%)	28 (3.1%)	118 (6.5%)
Age (years)			
Mean (SD)	38.9 (12.8)	40.5 (13.4)	39.7 (13.1)
Median [Min, Max]	36.0 [18.0, 87.0]	37.0 [13.0, 93.0]	36.0 [13.0, 93.0]
Patient Directed Discharge (PDD)			
Yes	132 (14.3%)	127 (14.1%)	259 (14.2%)
No	789 (85.7%)	773 (85.9%)	1562 (85.8%)
Readmitted within 30 days			
Yes	114 (12.4%)	141 (15.7%)	255 (14.0%)
No	807 (87.6%)	759 (84.3%)	1566 (86.0%)
Length of stay (days)			
Mean (SD)	7.28 (10.6)	6.99 (9.77)	7.13 (10.2)
Median [Min, Max]	4.00 [1.00, 90.0]	4.00 [1.00, 144]	4.00 [1.00, 144]
Severity of Illness			
Minor	96 (10.4%)	65 (7.2%)	161 (8.8%)
Moderate	328 (35.6%)	278 (30.9%)	606 (33.3%)
Major	395 (42.9%)	428 (47.6%)	823 (45.2%)
Extreme	102 (11.1%)	128 (14.2%)	230 (12.6%)
Missing	0 (0%)	1 (0.1%)	1 (0.1%)
Risk of Mortality			
Minor	570 (61.9%)	524 (58.2%)	1094 (60.1%)
Moderate	166 (18.0%)	163 (18.1%)	329 (18.1%)
Major	97 (10.5%)	118 (13.1%)	215 (11.8%)
Extreme	88 (9.6%)	94 (10.4%)	182 (10.0%)
Missing	0 (0%)	1 (0.1%)	1 (0.1%)

Figure 1: Inpatient opioid withdrawal treatment guidelines

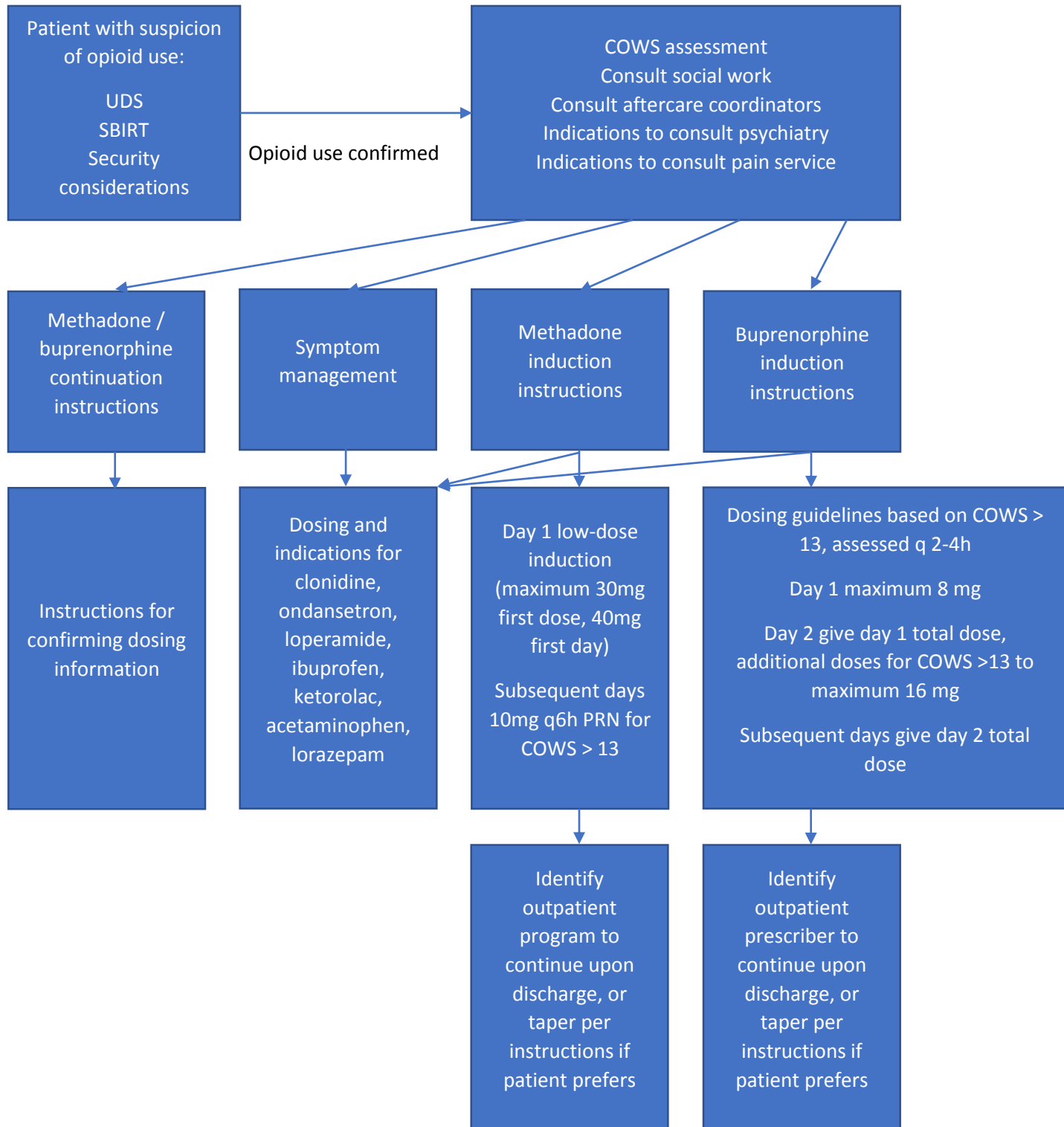


Figure 2: Use of methadone, all opioid agonist therapy (OAT), and psychiatry consultation before and after implementation of guidelines

Color optional in print

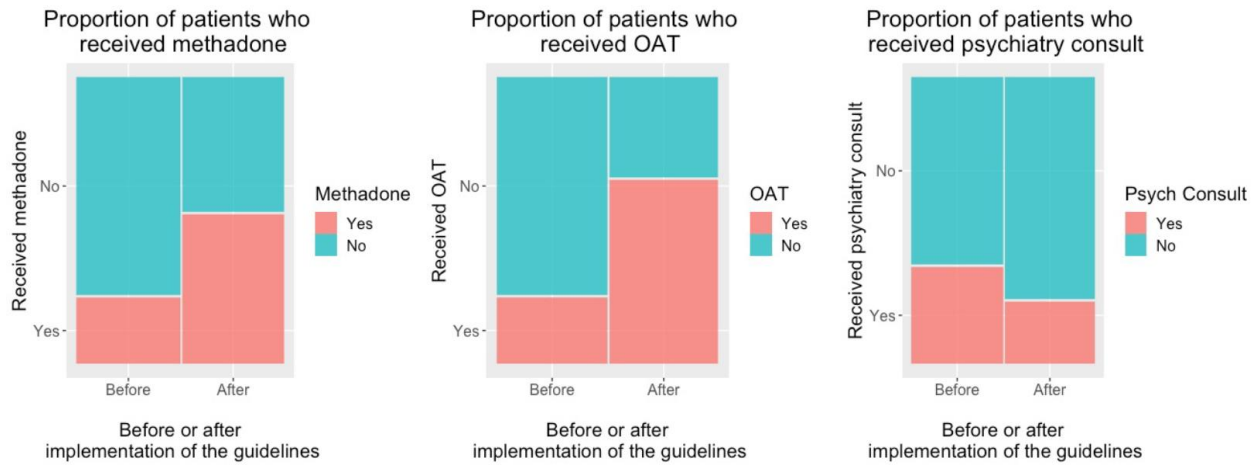


Figure 3: Differences between pre-guideline and post-guideline admission cohorts with regards to age, severity of illness, and risk of mortality

Color optional in print.

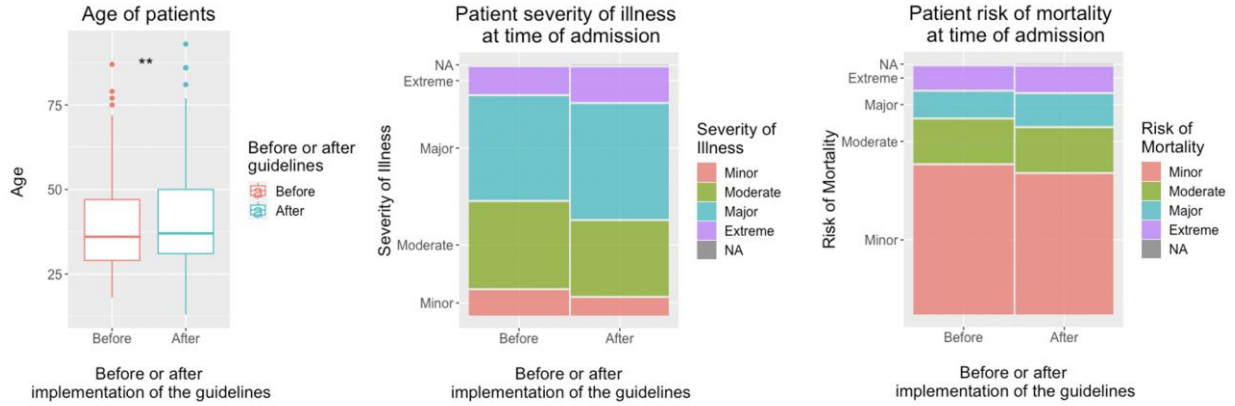


Figure 4: Patient-directed discharge and 30-day readmission by OAT status in overall cohort, before-guideline cohort, and after-guideline cohort

Color optional in print.

