Applying American Society of Addiction Medicine Performance Measures in Commercial Health Insurance and Services Data

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Objectives: ASAM's Standards of Care for the Addiction Specialist established appropriate care for the treatment of substance use disorders. ASAM identified three high priority performance measures for specification and testing for feasibility in various systems using administrative claims: use of pharmacotherapy for alcohol use disorder (AUD); use of pharmacotherapy for opioid use disorder (OUD); and continuity of care after withdrawal management services. This study adds to the initial testing of these measures in the Veteran's Health Administration (VHA) by testing the feasibility of specifications in commercial insurance data (Cigna).

Methods: Using 2014 and 2015 administrative data, the proportion of individuals with an AUD or OUD diagnosis each year who filled prescriptions or were dispensed appropriate FDA-approved pharmacotherapy. For withdrawal management follow up, the proportion with an outpatient encounter within seven days was calculated. The sensitivity of specifications was also tested.

Results: Rates of pharmacotherapy for AUD ranged from 6.2% to 7.6% (depending on year and specification details), and rates for OUD pharmacotherapy were 25.0% to 29.7%. Seven-day follow up rate after withdrawal management in an outpatient setting was 20.5%, and an additional 39.7% in an inpatient or residential setting.

Conclusions: Application of ASAM specifications is feasible in commercial administrative data. Because of varying system needs and payment practices across health systems, measures may require adjustment for different settings. Moving forward, important focus will be on the continued refinement of these measures with the new ICD-10 coding systems, new formulations of current medications, and new payment approaches such as bundled payment.

Key Words: addiction, performance measures, quality of care

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Substance use disorder (SUD) affects an estimated 21 million Americans, or 8% of the nation's population over the age of 12, with around 10% (2.3 million Americans) seeking treatment from the specialty treatment sector each year (Substance Abuse and Mental Health Services Administration (SAMHSA Center for Behavioral Health Statistics and Quality. 2016). Additional patients also receive SUD treatment within nonspecialty healthcare settings, an area of growing importance as integration of substance use treatment into primary care and other specialty settings is a way to address unmet need for screening, treatment, and follow-up of initial diagnoses (Saitz et al., 2016; Gerrity, 2017). In particular, access to high-quality treatment is a national priority as opioid-related deaths have spiraled with drug overdoses—driven by substantial increases in prescription opioid and illicit heroin and fentanyl overdoses—now the leading cause of injury death in the United States (Murphy et al., 2013; The White House, 2017). Alcohol use disorder affects 6.2% of the adult population, or 15.1 million adults, contributing to 88,000 deaths annually and costing the United States an estimated $249 billion per year (Sacks et al., 2015; SAMHSA, 2015; CDC, 2018).

As attention in health care has increasingly turned to methods of measuring value and performance of healthcare services, the development and use of performance measures for SUD treatment provides critical metrics for providers, payers, and patients (Amato et al., 2011; Thomas et al., 2011; Pincus et al., 2016). To gain endorsement and widespread use, measures are needed that are clinically important, scientifically acceptable, administratively feasible and practically usable (National Quality Forum, 2017). One key aspect of feasibility is that measures can be specified and calculated using data from the range of settings where they are intended to be used. While the general definition of a measure remains the same, even for measures based on insurance claims or managed care encounter data, the specifications may need to be customized to unique aspects of data collection or coding.

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For example, many state Medicaid programs have state-specific codes for treatment episodes, and some organizational entities may wish to adapt data collection to incorporate such measures into reporting and payment.

The American Society of Addiction Medicine (ASAM)'s Standards of Care for the Addiction Specialist established appropriate care for the treatment of alcohol use disorder (AUD) and opioid use disorder (OUD) [American Society of Addiction Medicine (ASAM), 2017a) and recommended 9 performance measures for implementation in addiction treatment: 6 process measures; 1 utilization-outcome measure; and 2 contextual measures (ASAM, 2017b). Three of the process measures implemented in the current study using administrative data have been selected by ASAM for initial testing, due to their high importance and a greater likelihood of being implemented: use of pharmacotherapy for AUD; use of pharmacotherapy for OUD; and continuity of care after withdrawal management services. Pharmacotherapy was selected by ASAM for testing because use of pharmacotherapy for SUD is considered to be underused (Klein, 2016), and insufficient office-based opioid treatment capacity persists for OUD, particularly in rural areas (Sigmon, 2014; Knudsen, 2015; Sigmon, 2015). Follow-up after withdrawal management was selected because studies have shown that continuity of care is associated with better outcomes (Carrier et al., 2011; Dunigan et al., 2014; Schmidt et al., 2017), but large numbers of people each year receiving withdrawal management services do not receive follow-up treatment (Center for Substance Abuse Treatment (CSAT) 2006; Carrier et al., 2011; Specka et al., 2011). While a range of services might be considered adequate follow-up, ASAM measure developers determined that evidence of inpatient services after withdrawal management might in fact reflect a recurrence or transfer rather than follow-up. Therefore, the ASAM measure counts outpatient follow-up rather than inpatient transfers, though the current study explores a version that includes both for future consideration. It should be noted that benchmarks have not been widely established for these measures.

These 3 high-priority measures have now been tested in the Veterans' Health Administration (VHA) (Harris et al., 2016), and an earlier version of the pharmacotherapy measure, developed by the Washington Circle group, has been tested in the Veteran's Administration, and commercial and Medicaid administrative claims, using MarketScan data (Thomas et al., 2013). Also, Schmidt et al tested the validity of the ASAM 7-day withdrawal management follow-up measure in Veterans' Administration data, and found it to be predictive of outcomes, with meeting the measure significantly decreasing the odds of 2-year mortality (Schmidt et al., 2017). The Centers for Medicare and Medicaid Services is also supporting the testing for Medicaid beneficiaries of 2 measures for endorsement by the National quality Forum (NQF) (National Quality Forum, 2017): use of pharmacotherapy for OUD; and continuity of care after withdrawal management services (Mathematica Policy Research, 2017).

As performance measures for SUD are initially designed, testing their use across a range of systems assessing feasibility with available data, and beginning the development of benchmarks for practice is critically important. This study builds upon the previous work focused on VHA enrollees and Medicaid beneficiaries in testing ASAM high-priority measures. We add commercially insured enrollees to the list by using the ASAM-developed specifications for the 3 high-priority performance measures in administrative claims from Cigna, a major national health services company and insurer serving nearly 14 million individuals in the United States (The term ''Cigna'' as used here refers to operating subsidiaries of Cigna Corporation including Cigna Health and Life Insurance Company and Cigna Behavioral Health, Inc.)

The 3 performance measures being applied in Cigna administrative data are as follows:

- Per cent of individuals with a diagnosis of AUD who are receiving treatment pharmacotherapy within the same year;
- Per cent of individuals with a diagnosis of OUD who are receiving treatment pharmacotherapy within the same year; and
- Per cent of individuals who have received withdrawal management services (for AUD or OUD) who have outpatient follow-up within 7 days of discharge.

METHODS

This study applied the ASAM quality measures specified for addiction treatment (Harris et al., 2016) to assess their feasibility and applicability in a commercial health services and insurance system (Cigna). All claims for covered individuals were provided for the years 2014 and 2015 for analysis. The study included members of all ages, with the exception of those with Medicare coverage, as the Medicare portion of coverage was not available. Each year was calculated separately, with covered members and services counted separately for each year.

Data

All claims were scanned for the designated AUD, OUD, and withdrawal management services, using The International Classification of Diseases, Ninth Revision (ICD-9) codes, using primary and secondary diagnoses to identify the appropriate users of services (see Appendix). Adjustments were made and noted where different diagnosis, procedure, or revenue codes were necessary due to slight differences between the VHA data and available variables in the commercial claims data (eg, use of revenue codes in certain cases to identify detoxification episodes). Data and case identification for calculation of ASAM Quality Measures using 2014 and 2015 commercial insurance data were drawn from 2014 and 2015 general medical claims, merged with specialty behavioral health claims for the same members, who were covered by such a program. The carrier's general medical claims data totaled approximately 300 million records each year for approximately 8 to 8.5 million members who used services during the year. These claims were combined with retail pharmacy data for all users of health services, or who purchased medications. This study was approved by the Brandeis University Committee for Protection of Human Subjects.

Analysis

Pharmacotherapy for Alcohol or Opioid Treatment

Calculation of annual rates of pharmacotherapy began with construction of denominator sets of Cigna customers

who received treatment for AUD or OUD during the year. To be considered a substance use disorder treatment service, a claim for a member had to have an appropriate diagnosis (AUD or OUD, see Appendix). For members in the constructed denominators, the matching year's ASAM prescription drug claims were reviewed to identify the numerators for the pharmacotherapy rate calculations. To belong to a numerator, a member who had SUD treatment had either to have filled at least 1 prescription for an appropriate treatment medication or have a medical claim, indicating they had received an injection for an appropriate drug (ie, long-acting naltrexone) or bundled service to administer methadone or long-acting naltrexone). Individuals who may have received methadone through an outpatient treatment program (OTP) or other state program not billed to, or reimbursed by, Cigna will not show as receiving methadone. Specific medication preparations that are not used for AUD or OUD, such as buprenorphine patch or injection approved for other uses, were not included in the numerators. Calculated pharmacotherapy rates were the counts of numerators, divided by the corresponding count of their matching denominator, at the person level.

As a first step, overall rates of pharmacotherapy were calculated for each year's cohort of AUD and OUD clients. For AUD clients, 2 versions of an overall rate were calculated. The first numerator was restricted to US Food and Drug Administration (FDA)-approved treatment drugs, and the second numerator was expanded to include topiramate, to broaden the numerator criteria to additional medications whose use in AUD is supported by high-quality studies (Blodgett et al., 2014; Jonas et al., 2014), and to facilitate comparison of results with that of Harris et al. After calculations of overall pharmacotherapy rates for AUD and OUD, rates of use for individual medications for each diagnosis were also calculated. Additional testing was performed to assess members with claims for OUD and AUD-specific medications who did not have appropriate coded diagnoses. Consistent with ASAM specifications and intent, these members have not been included in the denominator.

Follow-up After Withdrawal Management Services

For this measure, we have applied the ASAM criteria for follow-up (outpatient services only), and then constructed and tested a broader measure, including outpatient and inpatient services, for future consideration. Calculation of a rate of follow-up after withdrawal management again relied on the construction of denominator and numerator sets, and the calculation of rates. For this performance measure, the denominator consisted of all identified withdrawal management episodes that ended during 2014, with the corresponding numerator consisting of all those in the denominator who received another outpatient treatment service after discharge, with an associated SUD diagnosis (not restricted to the specific diagnosis associated with the detoxification services). Withdrawal management episodes were identified by daily procedure code (see Appendix), and were bundled so that no episode had a gap in treatment greater than 3 days (ie, treatments within 3 days are grouped together in the same episode).

To identify withdrawal management episodes, revenue codes for withdrawal management related room and board (0116, 0126, 0136, 0146, 0156), and service codes (H0008-H0014) were used to create a denominator for the current measure. While the same withdrawal management service codes as the VHA study were used, the denominator in this study departed from the VHA by using the above revenue codes rather than ICD-9 procedure codes (ie, 94.62, 94.63, 94.64) for identification of withdrawal management.

To be an appropriate follow-up treatment to a withdrawal management episode, the service or prescription must have taken place between 1 and 7 days after discharge (as represented in the claims data), have an SUD diagnosis (not restricted to the original reason for withdrawal management), and not represent a new withdrawal management episode. Additional claims or prescriptions on the last day of the episode did not count as follow-up. Various types of follow-up were examined (ie, AUD or OUD pharmacotherapy in the absence of follow-up visits). Additional analyses were conducted to assess differences in follow-up based on the initial reason for withdrawal management (ie, AUD or OUD, both, or nonspecified). In addition, while ASAM specifications for withdrawal management follow-up included outpatient services only, and were reported as such in the VHA study, examined follow-up in inpatient or residential settings were also examined. In this case, inpatient or residential follow-up post withdrawal management was distinguished from return to withdrawal management by using the revenue codes 124, 128, 190, or 1002 (rehabilitation services), or CPT codes 99,221 to 99,239, with a diagnosis of SUD, and not the original withdrawal management codes.

RESULTS

Among each year's claims (general medical and specialty behavioral health), approximately 1.0 million AUD-related claims per year covering 38,000 to 41,000 alcohol treatment members, and another 1.0 million OUD-related claims per year covering 22,000 to 26,000 opioid treatment members were identified. In all, 5731 detoxification episodes of any type were recognized in 2014.

Measure 1: Pharmacotherapy for AUD

Unique individuals identified as having AUD by ICD-9 diagnosis codes numbered 38,018 in 2014 and 40,682 in 2015 (Table 1). Of these diagnosed individuals, 2339 (6.2%) were on an US FDA-approved AUD treatment medication in 2014, increasing to 2709 (6.7%) in 2015. When the numerator was expanded to include additional AUD pharmacotherapy with evidence of effectiveness (US FDA-approved medications plus topiramate, as set forth in the ASAM data), the proportions treated with pharmacotherapy increased to 2711 (7.1%) in 2014 and 3088 (7.6%) in 2015.

Just over 20% of AUD pharmacotherapy users were on more than 1 type of AUD medication at some point during the year. The most widely used AUD pharmacotherapy was oral naltrexone, accounting for nearly half of all those treated with a medication (41.6% in 2014 and 47.7% in 2015). Disulfiram accounted for another 22% to 23% of treated patients, and injectable naltrexone approximately 20%, followed by

TABLE 1. Rate of Pharmacotherapy Use for Alcohol Use Disorder (AUD) (All Non-Medicare Users of Health Services)

Measure	2014 (n = 8.06 Unique Users of Health Services)	2015 (n = 8.38 Unique Users of Health Services)
Number (% of sample) with AUD disorder	38,018 (0.5%)	40,682 (0.5%)
N (%) of AUD diagnosed, having any US FDA-approved pharmacotherapy during year*	2339 (6.2%)	2709 (6.7%)
N (%) of AUD diagnosed, having any AUD pharmacotherapy during year†	2711 (7.1%)	3088 (7.6%)
Individual medications, n (%) of all AUD pharmacotherapy users, including topiramate)‡		
Naltrexone oral	1129 (41.6%)	1474 (47.7%)
Naltrexone long-acting injectable	535 (19.7%)	635 (20.6%)
Acamprosate	517 (19.1%)	510 (16.5%)
Disulfiram	639 (23.6%)	678 (22.0%)
Topiramate	493 (18.2%)	538 (17.4%)

*Excludes topiramate.
†Includes topiramate.
‡Percentages add to greater than 100% due to multiple pharmacotherapies used during the year by some individuals.

acamprosate and topiramate, each under 20%. Excluding topiramate (which is used off-label for AUD as noted), about half of individuals who received an AUD medication during each year did not have a documented diagnosis of AUD during the study year. The most common associated diagnosis or procedure code for individuals on an AUD medication without an AUD diagnosis was routine physical examination.

Measure 2: Pharmacotherapy for OUD

Individuals identified with OUD numbered 21,986 (0.27% of members) in 2014 and 25,507 (0.30% of members) in 2015 (Table 2). Of these individuals, 5908 (26.9% of those with OUD) received pharmacotherapy in 2014 and 6371 (25.0%) in 2015. When oral methadone medication or service code is included (version 2 of OUD pharmacotherapy from the study by Harris et al), the proportion receiving pharmacotherapy increased to 6537 (or 29.7% of those with OUD) in 2014, and 7070 (or 27.7% of those with OUD) in 2015. Between 76% and 80% of pharmacotherapy users (including methadone) were on buprenorphine during at least 1 of the study years, with another 9% to 10% on long-acting injectable naltrexone. Up to 8% of OUD pharmacotherapy users were on more than 1 different medication during the year. Oral methadone medication or methadone as a service occurred in about 10% of claims for patients with an OUD diagnosis and a pharmacotherapy.

As with AUD, nearly half of individuals who received OUD medications did not have an OUD-specific diagnosis. However, a large proportion of these individuals did have an SUD diagnosis, though not specific to opioids. For example, in 2014, of 4813 individuals on buprenorphine with no OUD-specific diagnosis (and not included in the measure denominator), the most common diagnoses were: drug dependence—unspecified (ICD-9 code 304.90); drug dependence in remission (ICD-9 code 304.03); other mixed or unspecified drug abuse (ICD-9 code 305.90); long-term current use of other medications (ICD-9 code v58.69) or chronic pain (eg, 338.4 for chronic pain syndrome, 723.1 for cervicalgia, 724.2 for lumbago). In these cases, buprenorphine may have been provided as part of a pain regimen, and therefore appropriately excluded from our SUD denominator.

Measure 3: Follow-up After Withdrawal Management (Detoxification) Services

In all, 5731 withdrawal management episodes were identified in the data, representing approximately 10% of SUD-diagnosed individuals (Table 3). Nearly all withdrawal management episodes identified were inpatient episodes. Of

TABLE 2. Rate of Pharmacotherapy Use for Opioid Use Disorder (OUD) (All Non-Medicare Users of Health Services)

Measure	2014 (n = 8.06 Unique Users of Health Services)	2015 (n = 8.38 Unique Users of Health Services)
Number (% of sample) with OUD disorder	21,986 (0.27%)	25,507 (0.30%)
N (%) of OUD diagnosed, having any US FDA-approved pharmacotherapy during year, excluding methadone	5908 (26.9%)	6371 (25.0%)
N (%) of OUD diagnosed, having any OUD pharmacotherapy during year, including methadone or methadone service	6537 (29.7%)	7070 (27.7%)
Individual medications, n (% of all pharmacotherapy users)*		
Buprenoprhine-naloxone or buprenorphine	5211 (79.7%)	5398 (76.4%)
Methadone (oral) medication*	259 (4.0%)	253 (3.6%)
Methadone as a service	424 (6.5%)	519 (7.3%)
Naltrexone long acting injectable	604 (9.2%)	743 (10.5%)
Naltrexone oral	461 (7.1%)	717 (10.1%)

*Methadone for OUD treatment is required to be provided in an outpatient setting only. Pharmacy claims in the data may be associated with other diagnoses within the population with an SUD diagnosis.

TABLE 3. Follow-up After Withdrawal Management Within 7 Days (2014)

Withdrawal Management Episode Type	Number of Episodes	Number (%) Outpatient Follow-up Within 7 d	Number (%) Inpatient (Residential) Encounters Within 7 d	Total Number (%) Outpatient and Inpatient Follow-up Within 7 d
AUD-associated	2431	494 (20.3%)	1226 (50.4%)	1720 (70.7%)
OUD-associated	1959	393 (20.1%)	822 (42.0%)	1215 (62.0%)
Both AUD and OUD on claim	326	74 (22.7%)	127 (39.0%)	201 (61.7%)
Diagnosis nonspecified	1015	223 (22.0%)	102 (10.0%)	325 (32.0%)
Total	5731	1184 (20.7%)	2277 (39.7%)	3461 (60.4%)

the 5731 episodes, 2431 (42.4%) were identified on the claim as related to AUD only, 1959 (34.1%) were identified as OUD only, 326 (5.7%) were identified as both AUD and OUD, and the remaining 1015 (17.1%) were unspecified as either AUD or OUD on the claim.

Overall, over half (60.4%) of individuals receiving withdrawal management had another SUD treatment encounter within 7 days, either in an outpatient or inpatient setting. Based on the ASAM specification restricted to outpatient follow-up, 1184 (20.7%) of the 5731 episodes had evidence of an outpatient follow-up visit with an SUD-related claim or appropriate pharmacotherapy medication claim within 7 days, starting 1 day after the last day of the episode (the ASAM-specified numerator). Follow-up rates in outpatient settings were similar across diagnoses: for AUD-only patients, 494 of the 2431 episodes (20.3%) were followed up in an outpatient setting within 7 days, whereas 393 of those with OUD-related detox (20.1%) were seen as outpatients within 7 days. (Because we do not know the content of the withdrawal management episode, some individuals may have received injectable naltrexone and not required to follow-up until later.) The outpatient follow-up rate for withdrawal management with both OUD and AUD diagnoses was 22.7%, and for diagnosis not specified, 22.0%. Very few (less than 1%) of the episodes were followed up with a prescription claim only in lieu of a visit or an admission. A large proportion of individuals' postwithdrawal management had evidence of inpatient or residential rehabilitation services, which would also represent appropriate residential follow-up: the proportion of detox services followed up with an inpatient SUD-related service within 7 days was 39.7%.

DISCUSSION

The current study found that it is feasible to apply ASAM-recommended performance measure specifications for AUD and OUD pharmacotherapy and follow-up after withdrawal management in a private national insurer administrative claim database. The data were easily extractible through claims, using the established specifications, and could be automated, though pharmacy claims, in particular, must be updated as national drug coding (NDC) is updated each year. As these and similar measures are developed with the goal of endorsement by the National Quality Forum as a prelude to their widespread use, focusing on the similarities and differences when applying the measure specifications in a range of health systems and settings is of the utmost importance.

Results for AUD and OUD pharmacotherapy are similar to that found in the Veterans' Administration, and earlier applications of the Washington Circle pharmacotherapy performance measure. In this study AUD pharmacotherapy was used for between 7.1% (2014) and 7.6% (2015) of the episodes in which AUD was diagnosed; these rates are slightly higher than that of the VHA (5.9% of AUD patients) (Harris et al., 2016). Using an earlier but similar version of this measure developed by the Washington Circle, authors found that 16% of AUD patients in MarketScan private plans had a pharmacotherapy in 2006 to 2007 (Thomas et al., 2013), higher than the current study in spite of the earlier dates. Regarding OUD, current study rates were slightly lower than that of the VHA (28%–30% by year in the current study, versus 32.2% for VHA); however, the denominator in the present study was slightly expanded from that of the VHA, by including ICD-9 codes 304.70–72 (use of opioid type drug in combination with other drugs).

At the same time, results were different between the VHA study and the current analysis in commercial data for follow-up after withdrawal management, when limiting the originally ASAM-defined follow-up specifications to outpatient data. While Harris et al. found an overall 7-day follow-up rate for withdrawal management of 34.7%, we found a lower rate at 20.7% in Cigna. Some of the difference between Cigna and VHA rates in outpatient service follow-up after withdrawal management between the VHA and Cigna may be related to the different methods used to identify withdrawal management episodes, as described earlier. Also, important differences between populations were noted, which did not result in large differences regarding pharmacotherapy: the current study was generally limited to individuals under age 65 (non-Medicare) in a working population or their dependents, compared with those seeking services through the VHA.

Among Cigna members, a large proportion of follow-up is likely occurring in residential settings, thus not evident in outpatient services. While this study attempted to distinguish inpatient follow-up post withdrawal management (positive outcome) from a recurrence to withdrawal management (adverse outcome) by using rehabilitation-specific codes and nonwithdrawal management codes to identify follow-up, possibly some of the inpatient follow-up could be readmission or recurrence rather than planned follow-up. The chance of misinterpreting recurrence as follow-up in inpatient claims led ASAM to restrict the measure to outpatient services. Nevertheless, other studies have noted common use of inpatient services in measuring follow-up post withdrawal

management: in reporting on the site of follow-up for those clients who had follow-up after withdrawal management in public sector data for 5 states, the outpatient and residential treatment split fairly evenly in Connecticut, Massachusetts, and Oklahoma. In New York and Washington, higher percentages of clients had continuity of care in residential treatment (Dunigan et al., 2014). The addition of inpatient services may be important for future consideration, particularly in programs that rely heavily on such settings, and if the nature of those services can be reliably documented (not recurrence or transfer).

While the central concept of each measure remains the same, adapting the specifications may be necessary to some extent across health systems and types of providers, and over time. For instance, in using commercial insurer data, it is critical to ensure that any data related to behavioral health carve out programs be included in calculating metrics. An estimated 170 million Americans are subject to receiving services within a behavioral health and wellness insurer [The Association for Behavioral Health and Wellness (ABHW), 2018]. Also, the way in which systems incorporate payments for methadone and methadone services may vary, and presents a challenge. As an example, because methadone for OUD is provided through OTPs and is not expected in administrative claims, it does appear sometimes, but not consistently across systems as a medication claim, service code, or as part of a bundled service. Long-term opioid programs, which often provide follow-up after some detoxification programs, and are an important component of ongoing care, are not always observed in claims.

Another measurement challenge for pharmacotherapy emerges because some of the widely used SUD medications have both SUD and non-SUD indications, metrics must be restricted to individuals who are being treated for SUD. Related to this, in each study—that of Harris et al in the VHA, Thomas et al of Washington Circle pharmacotherapy measure, and the current study—the authors identify a significant portion of users of SUD treatment medications, without an the SUD diagnosis that is relevant for that medication noted at any time during the study year. This issue has been noted elsewhere as a challenge as well (Thomas et al., 2006). However, the current study did find a number of imprecise SUD diagnoses as noted for some pharmacotherapy users, which strongly suggests that the quality of accurately coding diagnoses with appropriate detail may be inconsistent, which could be related to the stigma of OUD diagnosis. In our opinion, this does not mitigate the usefulness of the measures, because it indicates an important gap in documentation of diagnoses, and a goal of applying measures should drive improvements in accuracy of documentation.

Of critical importance in interpreting measures is to be cognizant of the challenges that arise in applying metrics and comparing different systems. First, differences in the prevalence of denominator diagnoses between systems may be present, due to methods of defining and calculating covered populations (Harris et al., 2015). Also, the problem of pharmacotherapy not being captured in claims or encounter data is common across systems, but the reasons may be different. Among commercially insured individuals, some treatment for OUDs may be sought and paid for without ever submitting insurance claims, again, in part, because of fear of stigmatization including employers knowing about members' drug use. Medications may also be embedded in other services like counseling codes. Among Medicaid beneficiaries, some states do not cover the full spectrum of medications (Grogan et al., 2016), so that the measure of OUD pharmacotherapy may be lower in those states either because Medicaid beneficiaries with OUDs are less likely to be treated with pharmacotherapy or because their pharmacotherapy is covered under a different payment sources such as the block grant from the SAMHSA.

To further place our findings in context, a number of reasons may be present beyond the technical aspects for variation in actual service use and measure performance. Services such as methadone programs may not be reimbursed for some populations or situations in the commercial sector, and would not appear in claims as treatment because no service was provided. Alternatively, services may be fully reimbursed, but providers are not offering them to patients for a host of reasons, or patients may be resistant to treatment or follow up. Interpreting and improving performance on measures of evidence-based practice often requires identifying addressing each potential gap.

CONCLUSIONS

In the current burgeoning opioid epidemic, and ongoing prevalence of alcohol use disorders, performance measures can play a crucial role in monitoring if individuals who reach the treatment system receive care that is based on a strong foundation of effectiveness and is widely endorsed by addiction professionals. By testing the feasibility and results of 3 performance measures focused on follow-up after detoxification and pharmacotherapy for individuals with AUDs or OUDs, this study adds to the evidence that these measures are feasible to implement in another setting, private health insurance plans, and that the results are generally comparable with the benchmarks from other treatment settings. The fact that, in many cases, medications were documented in the absence of a SUD diagnosis in the measure year, might drive systems improve documentation and to better understand why such medications are not associated with a covered provider visit.

Because of varying system needs, performance measures should be adjusted to meet the circumstances of different treatment settings, which limits the usefulness of comparing across settings. Moving forward, an important to focus will be on the continued refinement of these measures with the new ICD-10 coding systems, new formulations of the current medications, entirely new medications, and new approaches to payment such as bundled payment. However, the measurement concept will prevail despite these marginal changes, as will well-conceptualized performance measures like the three measures tested here.

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Appendix: Codes for identifying AUD, OUD, and withdrawal management services

Appendix: Main specifications

Numerator or denominator	Code	Description
Alcohol use disorder (AUD) (ICD9 diagnosis, primary or secondary)	303	Acute alcoholic intoxication in alcoholism, unspecified
	303.01	Acute alcoholic intoxication in alcoholism, continuous
	303.02	Acute alcoholic intoxication in alcoholism, episodic
	303.9	Other and unspecified alcohol dependence, unspecified
	303.91	Other and unspecified alcohol dependence, continuous
	303.92	Other and unspecified alcohol dependence, episodic
	305	Alcohol abuse, unspecified
	305.01	Alcohol abuse, continuous
	305.02	Alcohol abuse, episodic
	291	Alcohol withdrawal delirium
	291.1	Alcohol induced persisting amnestic disorder
	291.2	Alcohol induced persisting dementia
	291.3	Alcohol induced psychotic disorder with hallucinations
	291.5	Alcohol induced psychotic disorder with delusions
	291.81	Alcohol withdrawal
	291.82	Alcohol induced sleep disorders
	291.89	Other alcohol induced mental disorders
	291.9	Unspecified alcohol induced mental disorders
	357.5	Alcoholic polyneuropathy
	425.5	Alcoholic cardiomyopathy
	535.30	Alcoholic gastritis, without mention of hemorrhage
	535.31	Alcoholic gastritis, with hemorrhage
	571.1	Acute alcoholic hepatitis
	571.2	Alcoholic cirrhosis of liver
	571.3	Alcoholic liver damage
Medications for AUD		Naltrexone, oral and injectable; Disulfiram; Acamprosate; Additional: Topiramate
Opioid use disorder (OUD) (ICD9 diagnosis)	304.00	Opioid type dependence, unspecified
	304.01	Opioid type dependence, continuous
	304.02	Opioid type dependence, episodic
	304.70	Combination of opioid type drug with other drug, unspecified
	304.71	Combination of opioid type drug with other drug, continuous
	304.72	Combination of opioid type drug with other drug, episodic
	305.50	Opioid abuse, unspecified
	305.51	Opioid abuse, continuous
	305.52	Opioid abuse, episodic
Medications for OUD		Naltrexone, oral and injectable (J2315); buprenorphine/naloxone; buprenorphine excluding patches and IV medications; subutex; buprenorphine service or implant (0570, 0571, 0572, 0573, 0574, 0575); methadone oral medication, or methadone (OTP) service (H0020 and S0109)
Withdrawal management procedures (service codes)	H0008	Alcohol and/or drug services: sub-acute detoxification (hospital inpatient)
	H0009	Alcohol and/or drug services: acute detoxification (hospital inpatient)
	H0010	Alcohol and/or drug services: sub-acute detoxification (residential program inpatient)
	H0011	Alcohol and/or drug services: acute detoxification (residential program inpatient)
	H0012	Alcohol and/or drug services: sub-acute detoxification (residential addiction outpatient)
	H0013	Alcohol and/or drug services: sub-acute detoxification (residential addiction outpatient)
	H0014	Alcohol and/or drug services; ambulatory detoxification / with 0994 or 0995
		Revenue codes for detox room and board: 0116, 0126, 0136, 0146, 0156
Inpatient follow up post withdrawal management	Revenue	Revenue codes for rehabilitation room and board: 0124, 0128, 0190, 1002
	CPT4	CPT4 codes: 99221–99239 with SUD ICD9 diagnosis
Outpatient follow up post withdrawal management	ICD9	All visits or services associated with SUD diagnosis codes that are not identified as inpatient