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Patient characteristics associated with treatment initiation and engagement among individuals diagnosed with alcohol and other drug use disorders in emergency department and primary care settings

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ABSTRACT

Background: Treatment initiation and engagement rates for alcohol and other drug (AOD) use disorders differ depending on where the AOD use disorder was identified. Emergency department (ED) and primary care (PC) are 2 common settings where patients are identified; however, it is unknown whether characteristics of patients who initiate and engage in treatment differ between these settings. **Methods:** Patients identified with an AOD disorder in ED or PC settings were drawn from a larger study that examined Healthcare Effectiveness Data and Information Set (HEDIS) AOD treatment initiation and engagement measures across 7 health systems using electronic health record data ($n = 54,321$). Multivariable generalized linear models, with a logit link, clustered on health system, were used to model patient factors associated with initiation and engagement in treatment, between and within each setting. **Results:** Patients identified in the ED had higher odds of initiating treatment than those identified in PC (adjusted odds ratio [aOR] = 1.89, 95% confidence interval [CI] = 1.73–2.07), with no difference in engagement between the settings. Among those identified in the ED, compared with patients aged 18–29, older patients had higher odds of treatment initiation (age 30–49: aOR = 1.25, 95% CI = 1.12–1.40; age 50–64: aOR = 1.42, 95% CI = 1.26–1.60; age 65+: aOR = 1.27, 95% CI = 1.08–1.49). However, among those identified in PC, compared with patients aged 18–29, older patients were less likely to initiate (age 30–49: aOR = 0.81, 95% CI = 0.71–0.94; age 50–64: aOR = 0.68, 95% CI = 0.58–0.78; age 65+: aOR = 0.47, 95% CI = 0.40–0.56). Women identified in ED had lower odds of initiating treatment (aOR = 0.80, 95% CI = 0.72–0.88), whereas sex was not associated with treatment initiation in PC. In both settings, patients aged 65+ had lower odds of engaging compared with patients aged 18–29 (ED: aOR = 0.61, 95% CI = 0.38–0.98; PC: aOR = 0.42, 95% CI = 0.26–0.68). **Conclusion:** Initiation and engagement in treatment differed by sex and age depending on identification setting. This information could inform tailoring of future AOD interventions.

KEYWORDS

Alcohol and other drug disorders; emergency department; health services research; performance measures; primary care; substance-related disorders; treatment initiation

Introduction

Alcohol and other drug (AOD) use disorders are highly prevalent in the United States, but patients often go untreated despite many available effective treatments.^{1–3} Since patients with AOD use disorders have high rates of other medical conditions and injuries,⁴ general health care settings, including primary care and emergency departments (EDs), provide opportunities to identify individuals with AOD use disorders and encourage entry into treatment.

Performance measures such as the Healthcare Effectiveness Data and Information Set (HEDIS) initiation and engagement measures⁵ are intended to measure participation in AOD treatment immediately following a new AOD diagnosis. Treatment engagement has been associated with improved alcohol outcomes,⁶ better employment outcomes and lower criminal justice involvement among people with past criminal history,⁷ and reduced mortality among adults receiving care in the Veterans Health Administration (VA).^{8,9} However, several factors affect treatment initiation

and engagement, including patient and clinical characteristics (e.g., sex,^{10,11} race,¹² and type of AOD use disorder¹³) and facility and health system characteristics (e.g., availability of medications for addiction treatment within the facility where the AOD diagnosis was made and having behavioral medicine specialists or clinical health educators in primary care¹³). Within health systems, the setting where the AOD diagnosis is identified may also be associated with initiation and engagement in treatment. Patients from integrated health systems diagnosed in AOD specialty treatment settings had higher odds of initiating and engaging in treatment than patients diagnosed in other settings.¹³ Similarly, VA patients receiving services in AOD specialty clinics advanced from identification to initiation and engagement more often than patients treated in psychiatric or other medical specialties.¹⁴ This is likely because once patients have visited a specialty clinic and had an AOD use disorder identified there, they may be more likely to return; the act of moving from another department to specialty treatment demands more motivation from the individual and more action by the referring department.

We recently assessed the proportion of individuals who met HEDIS AOD treatment initiation and engagement criteria across 7 large health systems (see related paper by Weisner et al.¹⁵). Performance on both measures revealed significant room for improvement across all sites. The odds of initiating or engaging in treatment differed by patient characteristics, including age, race, and sex, and by setting of identification. ED and primary care were the most common settings for identification of an AOD use disorder; however, both settings had low rates of treatment initiation and engagement. Although the ED and primary care settings both provide unique opportunities to help patients initiate and engage in treatment, correlates of treatment initiation and engagement may differ at the 2 care settings.

This paper examines the characteristics of individuals diagnosed with AOD use disorders in ED and primary care settings to answer the following questions: (1) Do patients identified in the ED differ demographically from those identified in primary care? (2) Which patients are more or less likely to initiate or engage in treatment if they were initially diagnosed in the ED or in primary care? This is an ideal study to evaluate the correlates of initiation and engagement in the 2 care settings for several reasons: (1) our large sample size; (2) the diversity of the health systems membership; (3) patients with AOD use disorders tend to be high utilizers of the ED¹⁶; and (4) primary care is a setting where many individuals will be identified because of the recent emphasis on screening.¹⁷ Knowing who is more likely to initiate treatment among those identified in the ED and primary care could inform tailoring of AOD interventions in each setting. It could also inform the development or modification of quality metrics to consider adjustment for systems that serve different patient population groups.

Methods

Study participants and data sources

The current study utilizes a subsample of patients from a large multisite study that examined HEDIS AOD treatment

initiation and engagement measures across 7 health systems using electronic health record (EHR) data between October 1, 2014, and August 15, 2015.^{18,19} Following the National Committee for Quality Assurance (NCQA) Measure Technical Specifications, adult patients (age ≥ 18) with a qualifying AOD use disorder diagnosis who did not have an AOD diagnosis in the 60 days prior were eligible for study inclusion. The current study included patients whose index diagnosis was made in an ED or primary care (e.g., internal medicine, family practice, primary care, obstetrics and gynecology [OB/GYN], urgent care) setting. This research was reviewed and approved by the Kaiser Permanente Northern California Institutional Review Board. This study met requirements for a waiver of informed consent.

Measures

Patient-level characteristics

The index diagnosis date, diagnosis (classified as alcohol use disorder, cannabis use disorder, opioid use disorder, or other drug use disorder [including amphetamine, cocaine, hallucinogen, sedative, unspecified]), and setting (ED or primary care) of diagnosis were identified. Demographic data (age, sex, and race/ethnicity) were extracted from the EHR; insurance type (commercial/private, Medicare, state subsidized [including Medicaid], unknown) was available for 6 of the 7 participating health systems and thus is reported in descriptive tables but was excluded from statistical models. To examine the cumulative burden of medical comorbidity, Charlson-Deyo comorbidity index score was calculated for all patients based on ICD-9 (International Classification of Diseases Ninth Revision) diagnosis codes made in the year prior to the index date.²⁰ The Charlson-Deyo is a weighted score of 17 conditions predicting 1-year mortality risk. Each condition is assigned a score of 1, 2, 3, or 6, depending on the associated risk of dying. Scores are summed to create a total score where a higher score indicates higher mortality risk.

Outcomes

Consistent with HEDIS definitions,^{18,19} patients were required to have a subsequent AOD service (not including an ED visit or detoxification) within 14 days of the index episode to be considered “initiated.” Patients who had 2 or more AOD-related services within 30 days after initiating treatment were considered “engaged” in treatment.

Analysis

Chi-square tests and analysis of variance (ANOVA) models were used to examine differences in categorical and continuous measures, respectively, by index setting (ED versus primary care). As patients were nested within health systems, generalized linear models (GLMs), with a logit link, clustered on health system, were used to model patient factors associated with initiation of treatment and engagement. Treatment initiation was examined among all patients

Table 1. Patient characteristics associated with an alcohol or drug use disorder diagnosis index encounter in October 1, 2014, to August 15, 2015, across 7 health systems by index encounter setting ($n = 54,321$).

Characteristic	Setting				P value
	Emergency department ($n = 22,553$)		Primary care ($n = 31,768$)		
	<i>n</i>	%	<i>n</i>	%	
Sex, %					<.001
Women	9,493	42.1	11,503	36.2	
Men	13,060	57.9	20,265	63.8	
Age, %					<.001
18–29	8,019	35.6	4,996	15.7	
30–49	6,665	29.6	9,410	29.6	
50–64	5,207	23.1	10,256	32.3	
65+	2,662	11.8	7,106	22.4	
Race/ethnicity, %					<.001
American Indian/Alaska Native	270	1.2	468	1.5	
Asian	1,078	4.8	979	3.1	
Native Hawaiian/other Pacific Islander	183	0.8	172	0.5	
Black/African American	2,596	11.5	2,761	8.7	
Hispanic	4,590	20.4	6,788	21.4	
White	12,404	55.0	19,161	60.3	
Other/unknown	1,432	6.4	1,439	4.5	
Insurance type, %					<.001
Commercial/private pay	15,497	68.7	18,609	58.8	
Medicare	3,945	17.5	7,807	24.6	
State subsidized	2,952	13.1	2,796	8.8	
Unknown	159	0.7	2,556	8.1	
Type of index diagnosis, %					<.001
Alcohol	12,582	55.8	17,491	55.1	
Marijuana	3,805	16.9	4,002	12.6	
Opioids	1,308	5.8	5,154	16.2	
Other drug	4,858	21.5	5,121	16.1	
Charlson-Deyo comorbidity index score	Mean	SD	Mean	SD	.2834
	0.73	1.52	0.75	1.45	

Note. SD = standard deviation.

identified, whereas treatment engagement was examined only among those who initiated treatment. Initial models compared initiation and engagement rates directly between settings. The sample was then stratified by setting to examine associations between patient characteristics and treatment initiation and engagement within each setting. All models included age, sex, race/ethnicity, Charlson-Deyo comorbidity score, and index diagnosis type. Statistical significance was measured at $P < .05$.

Results

Patient characteristics

Among all patients included in the parent study with a qualifying AOD diagnosis during the study period ($N = 86,565$), 26.1% (22,553) were identified in ED and 36.7% (31,768) were identified in primary care; all of these patients were included in the present analyses ($n = 54,321$). Fewer women (42.1% ED versus 36.2% primary care; $P < .001$), younger patients aged 18–29 (35.6% ED versus 15.7% primary care; $P < .001$), and black/African Americans (11.5% ED versus 8.7% primary care; $P < .001$) were identified with an AOD diagnosis in the ED compared with primary care. More patients identified in the ED also had commercial or private pay insurance (68.7% ED versus 58.8% primary care; $P < .001$). Level of medical comorbidity (per the Charlson-Deyo comorbidity score) did not differ between the 2 groups. Among all diagnoses made, opioid use disorder

diagnoses occurred more frequently in the ED (5.8%) than in primary care (16.2%), whereas cannabis use disorder (16.9% ED versus 12.6% primary care) and other drug use disorder diagnoses (21.1% ED versus 16.1% primary care; $P < .001$) occurred more often in the ED; identification rates for alcohol use disorder were similar across settings (55.8% ED versus 55.1% primary care; see Table 1).

Treatment initiation

Patients identified in the ED had higher odds of initiating treatment than those identified in primary care (adjusted odds ratio [aOR] = 1.89, 95% confidence interval [CI] = 1.73–2.07; Table 2). Among those identified in the ED ($n = 22,553$), 12.2% ($n = 2,749/22,553$) initiated treatment. Compared with patients aged 18–29, older patients had higher odds of treatment initiation (age 30–49: aOR = 1.25, 95% CI = 1.12–1.40; age 50–64: aOR = 1.42, 95% CI = 1.26–1.60; age 65+: aOR = 1.27, 95% CI = 1.08–1.49). Patients with an index opioid use disorder diagnosis (aOR = 1.31, 95% CI = 1.10–1.56) or other drug use disorder diagnosis (aOR = 1.20, 95% CI = 1.08–1.33) had higher odds of treatment initiation compared with those with an alcohol use disorder. Women (aOR = 0.80, 95% CI = 0.72–0.88), and patients with a cannabis use disorder index diagnosis compared with alcohol use disorder (aOR = 0.69, 95% CI = 0.60–0.80), had lower odds of treatment initiation when identified in the ED. Asians

Table 2. Patient characteristics associated with treatment initiation and engagement* among all patients identified with an alcohol or other drug use disorder in an emergency department or primary care setting.

Characteristic	Treatment initiation (n = 54,321)			Treatment engagement (n = 5,061)		
	aOR	95% CI	P value	aOR	95% CI	P value
Setting						
Emergency department	1.89	1.73–2.07	<.001	0.81	0.65–1.01	.050
Primary care (ref)	—	—	—	—	—	—
Sex						
Women	0.87	0.80–0.94	.004	1.09	0.89–1.32	.340
Men (ref)	—	—	—	—	—	—
Age						
18–29 (ref)	—	—	—	—	—	—
30–49	1.13	1.03–1.23	.011	1.13	0.90–1.42	.260
50–64	1.08	0.98–1.18	.113	0.86	0.67–1.09	.203
65+	0.82	0.73–0.92	.002	0.52	0.37–0.72	.001
Race/ethnicity						
American Indian/Alaska Native	0.95	0.73–1.23	.664	1.31	0.70–2.45	.381
Asian	0.73	0.62–0.87	<.001	0.72	0.45–1.15	.163
Native Hawaiian/other Pacific Islander	0.73	0.50–1.09	.118	0.45	0.13–1.61	.212
Black/African American	0.76	0.68–0.85	<.001	0.57	0.40–0.80	.003
Hispanic	0.75	0.69–0.89	<.001	0.83	0.66–1.03	.091
Other/unknown	0.77	0.67–0.89	<.001	0.89	0.64–1.25	.505
White (ref)	—	—	—	—	—	—
Charlson-Deyo comorbidity index score	1.04	1.01–1.06	<.001	0.89	0.83–0.95	<.001
Type of index diagnosis						
Alcohol (ref)	—	—	—	—	—	—
Marijuana	0.54	0.49–0.61	<.001	0.46	0.32–0.68	<.001
Opioids	1.19	1.08–1.32	<.001	1.46	1.16–1.84	.003
Other drug	1.09	1.00–1.18	.045	0.71	0.57–0.89	.005

Note. aOR = adjusted odds ratio; CI = confidence interval.

*Engagement was estimated among all patients who initiated AOD treatment.

(aOR = 0.74, 95% CI = 0.59–0.91), black/African Americans (aOR = 0.70, 95% CI = 0.60–0.81), Hispanics (aOR = 0.69, 95% CI = 0.61–0.78), and other/unknown race/ethnicities had lower odds of initiation than whites. The Charlson-Deyo score was not significantly associated with initiation among patients identified in ED.

Among patients identified in primary care ($n = 31,768$), 7.3% ($n = 2,312/31,768$) initiated treatment. Compared with patients aged 18–29, older patients were less likely to initiate treatment (age 30–49: aOR = 0.81, 95% CI = 0.71–0.94; age 50–64: aOR = 0.68, 95% CI = 0.58–0.78; age 65+: aOR = 0.47, 95% CI = 0.40–0.56); there were no differences by sex. Patients with greater medical comorbidity (higher Charlson-Deyo score: aOR = 1.04, 95% CI = 1.01–1.08), or an opioid use disorder compared with those with an alcohol use disorder (aOR = 1.14, 95% CI = 1.00–1.29), were more likely to initiate treatment. Hispanics compared with whites (aOR = 0.84, 95% CI = 0.74–0.95), and patients with a cannabis use disorder compared with alcohol use disorder index diagnosis (aOR = 0.34, 95% CI = 0.33–0.43), were less likely to initiate treatment (Table 3).

Treatment engagement

Treatment engagement did not differ between index diagnosis settings (aOR = 0.81, 95% CI = 0.65–1.00; Table 2). Among patients identified in the ED who initiated treatment ($n = 2,749$), 15.2% ($n = 419/2,749$) also engaged in treatment. Patients with opioid use disorder were more likely to engage than those with alcohol use disorder (aOR = 1.76, 95% CI = 1.20–2.57). Patients aged 65+ compared with patients aged 18–29 (aOR = 0.61, 95% CI = 0.38–0.98), black/African

Americans compared with whites (aOR = 0.53, 95% CI = 0.32–0.87), and patients with more medical comorbidity (aOR = 0.87, 95% CI = 0.79–0.95) had lower odds of engagement. Patients with a cannabis use disorder (aOR = 0.39, 95% CI = 0.24–0.65) or other drug use index diagnosis (aOR = 0.65, 95% CI = 0.48–0.88) also had lower odds of engaging in treatment compared with patients with an alcohol use disorder.

Among patients identified in primary care who initiated treatment ($n = 2,312$), 19.4% ($n = 448/2,312$) engaged. Patients with an opioid use disorder had higher odds of engagement compared with those with an alcohol use disorder (aOR = 1.36, 95% CI = 1.01–1.83). Patients aged 65+ (aOR = 0.42, 95% CI = 0.26–0.68) compared with patients aged 18–29, black/African Americans (aOR = 0.60, 95% CI = 0.36–0.99) compared with white patients, and those with higher medical comorbidity (aOR = 0.91, 95% CI = 0.82–1.00) had lower odds of engagement (Table 4).

Discussion

We examined characteristics of individuals diagnosed with AOD use disorders in the ED and primary care settings to identify demographic differences related to AOD treatment initiation and engagement. Among patients identified in the ED, older patients were more likely to initiate. The opposite was true among patients identified in primary care, with younger patients being more likely to initiate. Race/ethnicity was more strongly associated with initiation in the ED setting, whereas medical comorbidities were more strongly associated in the primary care setting. Factors associated with engagement were similar in both settings.

Table 3. Patient characteristics associated with treatment initiation by alcohol or drug abuse/dependence diagnosis index encounter setting.

Characteristic	Treatment initiation emergency department index encounters (n = 22,553)			Treatment initiation primary care index encounters (n = 31,768)		
	aOR	95% CI	P value	aOR	95% CI	P value
Sex						
Women	0.80	0.72 – 0.88	<.001	0.97	0.86 – 1.09	.516
Men (ref)	—	—	—	—	—	—
Age						
18–29 (ref)	—	—	—	—	—	—
30–49	1.25	1.12 – 1.40	<.001	0.81	0.71 – 0.94	.007
50–64	1.42	1.26 – 1.60	<.001	0.68	0.58 – 0.78	<.001
65+	1.27	1.08 – 1.49	.006	0.47	0.40 – 0.56	<.001
Race/ethnicity						
American Indian/Alaska Native	0.92	0.63 – 1.35	.674	0.94	0.65 – 1.36	.722
Asian	0.74	0.59 – 0.91	.007	0.79	0.60 – 1.04	.088
Native Hawaiian/other Pacific Islander	0.66	0.39 – 1.10	.109	0.86	0.48 – 1.55	.599
Black/African American	0.70	0.60 – 0.81	<.001	0.85	0.71 – 1.02	.075
Hispanic	0.69	0.61 – 0.78	<.001	0.84	0.74 – 0.95	.007
Other/unknown	0.63	0.52 – 0.77	<.001	1.03	0.84 – 1.26	.769
White (ref)	—	—	—	—	—	—
Charlson-Deyo comorbidity index score	1.02	1.00 – 1.05	.110	1.04	1.01 – 1.08	.012
Type of index diagnosis						
Alcohol (ref)	—	—	—	—	—	—
Marijuana	0.69	0.60 – 0.80	<.001	0.34	0.33 – 0.43	<.001
Opioids	1.31	1.10 – 1.56	.004	1.14	1.00 – 1.29	.046
Other drug	1.20	1.08 – 1.33	.002	0.90	0.79 – 1.03	.126

Note. aOR = adjusted odds ratio; CI = confidence interval.

Regardless of setting, there was a higher prevalence of AOD use disorders among men. A higher proportion of women with AOD use disorders were identified in the ED. However, when women were identified in the ED, they were less likely to initiate treatment than men, although this was not true in the primary care setting. Importantly, once patients initiated treatment, rates of engagement in treatment do not appear to differ by sex in either setting.

The ED was also an important setting for identifying AOD use disorders among young adults. The absolute number of young adults identified in the ED was 60% higher than the number identified in primary care, and the proportion identified in the ED, compared with primary care, was twice the rate. Young adults identified in the ED had lower odds of initiating treatment than older adults, but higher odds when identified in primary care. These differences in initiation may be due to the reasons that young and older individuals access ED versus primary care, which is outside the scope of this study, but which warrants further research. Importantly, after initiating treatment, young adults identified in either setting were as likely as their older counterparts to engage in treatment.

The reverse pattern was found for older adults (≥ 50 years). More older adults were identified in primary care than in the ED. However, older adults identified in primary care were less likely to initiate or engage in subsequent treatment. It may be that primary care clinicians are more likely to screen older adults than younger adults in their practices; however, it is also likely that older patients have more frequent primary care visits, providing more opportunities for providers to screen for AOD use disorders and discuss their concerns. Clinicians may also be less likely to follow up on positive AOD screens with older patients, or older patients

may be less likely to follow up on primary care provider recommendations for AOD treatment due to competing health needs. When an AOD use disorder is identified in the ED, older patients were more likely to initiate. An ED visit that results in an AOD use disorder diagnosis may be more compelling for eliciting follow through for these patients, whereas a primary care visit may be more focused on a specific health condition that the patient does not feel is related to an AOD problem. In both settings, older patients were less likely to engage than younger patients. Future research should focus on reasons for lack of engagement among this oldest group, and how engagement interventions can be tailored to maintain this group of patients in ongoing care.

More individuals were identified with opioid use disorder in primary care than in the ED. Individuals with a cannabis use disorder were identified in both settings in about equal numbers, but there were fewer patients with opioid use disorder and cannabis use disorder in both settings than patients with alcohol use disorder. Individuals identified with cannabis use disorder had lower odds of initiating and engaging in treatment than individuals with alcohol use disorder, regardless of setting. This could be because many patients with cannabis use disorders, and possibly their providers as well, do not consider their use to be problematic. Conversely, individuals identified with opioid use disorder, in either setting, had higher odds of initiating and engaging in treatment than individuals with alcohol use disorders. Increased attention to the opioid use disorder crisis, resulting in lost access to opioids, may be increasing its identification and patient willingness to initiate treatment.

There are several limitations to this EHR-based, multisite health system study. Insurance type was only available for 6 of the 7 participating health systems and thus was not

Table 4. Patient characteristics associated with treatment engagement* by alcohol or drug abuse/dependence diagnosis index encounter setting.

Characteristic	Treatment engagement emergency department index encounters (n = 2,749)				Treatment engagement primary care index encounters (n = 2,312)			
	aOR	95% CI		P value	aOR	95% CI		P value
Sex								
Women	1.10	0.84	1.44	.428	1.09	0.82	1.43	.494
Men (ref)	—	—	—	—	—	—	—	—
Age								
18–29 (ref)	—	—	—	—	—	—	—	—
30–49	1.30	0.96	1.76	.081	0.94	0.67	1.32	.726
50–64	0.87	0.62	1.22	.388	0.80	0.56	1.14	.194
65+	0.61	0.38	0.98	.043	0.42	0.26	0.68	.001
Race/ethnicity								
American Indian/Alaska Native	1.78	0.75	4.19	.180	1.00	0.40	2.47	.994
Asian	0.63	0.33	1.21	.158	0.84	0.41	1.71	.622
Native Hawaiian/other Pacific Islander	0.67	0.14	3.24	.603	0.27	0.03	2.34	.225
Black/African American	0.53	0.32	0.87	.013	0.60	0.36	0.99	.046
Hispanic	0.82	0.60	1.12	.207	0.80	0.59	1.10	.164
Other/unknown	1.00	0.63	1.60	.998	0.91	0.57	1.45	.677
White (ref)	—	—	—	—	—	—	—	—
Charlson-Deyo comorbidity index score	0.87	0.79	0.95	.003	0.91	0.82	1.00	.049
Type of index diagnosis								
Alcohol (ref)	—	—	—	—	—	—	—	—
Marijuana	0.39	0.24	0.65	.001	0.57	0.32	1.03	.060
Opioids	1.76	1.20	2.57	.006	1.36	1.01	1.83	.045
Other drug	0.65	0.48	0.88	.009	0.79	0.56	1.11	.161

Note. aOR = adjusted odds ratio; CI = confidence interval.

*Engagement was estimated among all patients who initiated AOD treatment within each setting.

included in the models, making it unclear if socioeconomic status, for which insurance type can act as a proxy, is related to initiation and engagement. There was some variation in the coding of the department variable across sites, and at one site enrollment was based on utilization; however, this conservative definition is unlikely to impact the results. Identification of initiation or engagement was based on ICD-9 diagnosis codes of AOD use disorders; therefore, patients identified with a concern but not given a diagnosis would have been missed. Identification in these 2 settings could be low given that these providers are not clinicians with specialized AOD use disorder knowledge relative to identification in specialty clinics. We were unable to examine reasons for ED visits in this study, and there may be differences in the severity or types of events that lead to ED visits (and related AOD use disorder diagnoses) for men and women, as well as for different age groups. Future research should examine differences in reasons for ED visits, and reasons for avoiding or initiating AOD treatment following an ED visit, in order to develop tailored interventions. With the increase in implementation of screening, brief intervention, and referral to treatment (SBIRT) in health systems, primary care will also likely be an even more important setting for such interventions.

Conclusion

Patients have diverse motivations for, and barriers to, entering AOD treatment, and perhaps even divergent responses to different circumstances depending on whether their AOD disorder was identified in the ED or primary care. Patient characteristics associated with AOD treatment initiation

differed between primary care and ED settings, whereas those associated with treatment engagement did not. Based on these study findings, although there is still a need for broad screening in both settings, it may be beneficial for clinicians in the ED setting to focus extra attention on younger patients and nonwhite race/ethnicities, whereas clinicians in primary care settings may need to spend extra time with older patients and those with a medical comorbidity, to encourage treatment initiation among these groups. Rates of initiation and engagement are still low in both settings, however, and more emphasis should be placed on connecting all patients to treatment as needed. As the ED and primary care settings are often the first line of care for patients struggling with an AOD use disorder, addressing patients' needs in these settings as they are identified may help them access and engage in treatment.

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Author contributions

A.H.K.-S. conducted the analysis and drafted the manuscript. S.P.S., C.W., and B.J.Y. participated in drafting the manuscript. All other coauthors have provided scientific critiques and comments and reviewed and approved the final manuscript. All authors attest they meet the ICMJE criteria for authorship and agree to be accountable for all aspects of the work.

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