

Racial Disparities in Newborn Drug Testing After Implementation of Question-Based Screening for Prenatal Substance Use

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OBJECTIVE: To examine the association of universal question-based screening for prenatal substance use on racial inequities in prenatal and newborn drug testing.

METHODS: We conducted a retrospective cohort study of 32,802 live births of patients receiving prenatal care at an academic medical center in the midwestern United States from 2014 to 2022, before and after implementation of question-based screening in 2018. Primary outcomes included prenatal and newborn drug test orders. Logistic regression models using a generalized estimating equation framework assessed associations with question-based screening and results, birthing parent age, race, ethnicity, marital status, and insurance type. Charts of patients who indicated difficulties stopping substance use were audited for guideline-directed care.

RESULTS: A total of 12,725 of 14,992 pregnant people (85.3%) received question-based screening. Implementation of question-based screening was associated with a decrease in prenatal urine test orders (5.0% [95% CI, 4.6–5.3%] before implementation, 3.1% [95% CI, 2.8–3.4%] after implementation; $P < .001$), with Black birthing parents having the largest reduction in prenatal urine drug testing (10.3% [95% CI, 9.0–11.7%] before implementation, 4.9% [95% CI, 3.9–5.9%] after implementation). However, rates of newborn drug testing did

not change (4.7% [95% CI, 4.4–5.0%] before implementation, 4.5% [95% CI, 4.2–4.8%] after implementation; $P = .46$), and clinicians continued to order significantly more newborn drug tests for newborns of Black birthing parents compared with other race and ethnicity groups.

CONCLUSION: Implementation of question-based screening for substance use in pregnancy was associated with decreased prenatal urine drug testing but no change in overall newborn drug testing or racial inequities in newborn drug testing for Black birthing people. Further policy efforts are warranted to improve substance use treatment and to eliminate racial inequities in punitive policies such as newborn drug testing and subsequent child protective services reporting.

(*Obstet Gynecol* 2024;144:233–40)

DOI: 10.1097/AOG.0000000000005631

During pregnancy, 13.5% of people report alcohol use, 7.2% report tobacco use, 7% report cannabis use, and 6.6% report prescription opioid use, with smaller numbers reporting illicit opioid, methamphetamine, or cocaine use.^{1–5} Illicit substance use in pregnancy can have negative health consequences for the birthing parent–newborn dyad and requires mandated reporting to child protective services in 37 states and Washington, DC.⁶ Black birthing people are more likely to be screened for substance use, to experience barriers in accessing support and treatment programs, to be penalized by reporting to health authorities and child protective services for prenatal substance exposure, and to be investigated by child protective services.^{7–11} Regardless of the outcome, child protective services investigation alone is associated with future adverse outcomes.¹²

Inequities in newborn drug testing are a manifestation of systematic racism that harms Black families.¹³ Partially in response to the history of obstetric racism, the American College of Obstetrics and

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Financial support was provided by the University of Michigan Office of Research.

Each author has confirmed compliance with the journal's requirements for authorship.

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Financial Disclosure

The authors did not report any potential conflicts of interest.

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ISSN: 0029-7844/24



Gynecology and the Society for Maternal-Fetal Medicine recommend that clinicians screen all pregnant people for substance use with a validated questionnaire at the first prenatal visit and provide appropriate brief counseling, provide referral to treatment, and discuss the implications of prenatal substance exposure on child protective services reporting relevant to their state laws and institutional policy.¹⁴

An effective and equitable screening program would improve diagnosis and treatment of substance use disorders in pregnancy and ideally reduce racial bias in punitive policies such as newborn drug testing and subsequent reporting to child protective services.¹⁵ One study of county-level data in California found that despite universal screening and similar rates of alcohol and drug use among Black and White birthing people, health care professionals were four times more likely to report Black newborns to child protective services after delivery compared with White newborns.¹⁶ However, little is known about how system implementation of universal question-based substance use screening affects racial inequities in subsequent newborn drug testing.

The primary aim of this study was to investigate the association of institutional implementation of a universal prenatal question-based substance use screening program in pregnancy on racial and ethnic disparities in rates of prenatal and newborn drug testing. We hypothesized that implementation would result in changes in inequities in drug testing among Black newborns compared with newborns of other races and ethnicities and rates of biological drug testing. A secondary aim was to assess the association of a positive substance use screen result with referral to treatment services.

METHODS

This retrospective cohort study was performed at the University of Michigan, an academic medical center that implemented universal screening for substance use in pregnancy on May 16, 2018. Before this date, institutional policy recommended that clinicians ask about alcohol or illicit substance use and, if positive, administer the CAGE questionnaire and refer patients to a social worker. After implementation, policy recommended that a registered nurse verbally deliver a question-based screen to all patients at the first pregnancy intake visit, typically in the first trimester. Throughout the study period, the institution had no policy regarding biological prenatal urine or newborn drug testing, leaving decisions to the discretion of clinicians. The state of Michigan mandates that clinicians make a report to child protective services

for suspected child abuse or neglect if a newborn has symptoms of or is suspected to have alcohol or a controlled substance in their body.¹⁷ In practice, clinicians typically order a newborn drug test when they suspect or know of substance use; if the test result is positive or the newborn exhibits withdrawal symptoms, they place a child protective services report, and child protective services conducts an evaluation or investigation for child abuse or neglect.¹⁸ Michigan legalized medical cannabis in 2008 and recreational cannabis in 2018, although widespread recreational sales did not start until December 2019. Cannabis remains illegal at the federal level and was considered a controlled substance for child protective services reporting throughout the study period.

The University of Michigan IRB approved this study and waived the requirement for patient consent. This study followed the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) reporting guideline for cohort studies.¹⁹

All pregnancies resulting in a live birth at the study institution were eligible for inclusion. We obtained electronic health record data for 34,512 live births from July 1, 2014, to July 1, 2022. We excluded birth records without prenatal care at the study institution because of a lack of available data on relevant analytical variables.

The primary outcome variables were presence of at least one prenatal urine drug test and a newborn meconium drug test order after delivery. The unit of analysis was a single live birth. For births with multiples, a test order for any newborn in the same delivery was considered an order for the birth. Demographic data included birthing parent age, self-reported race and ethnicity, marital status, insurance type, completion and results of substance use screening questionnaire, and zip code. We use the gender-inclusive term birthing parent because the electronic health record did not capture self-reported gender.²⁰

Categories of patient self-reported race were American Indian or Alaska Native, Asian, Black, Native Hawaiian or Other Pacific Islander, other, and White. Patient self-reported ethnicity was listed as Hispanic or non-Hispanic. When referring to newborn drug testing, we reported newborn race concordant with birthing parent self-reported race. We categorized patients self-reporting more than one race as multiracial. In all analyses, we aggregated data for Asian, American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander with patients who self-selected “other” race given small sample sizes and refer to this as a combined group.



The screening questionnaire included six questions on current and past substance use, substance use history of partner and parents, and whether the patient desired assistance with substance use (Box 1). For data analysis, we considered a *positive screen result* for current substance use as a positive response to questions 1 and 5 (“Have you ever used drugs or alcohol during pregnancy?” or “Now that you are pregnant, are you struggling to stop using drugs or alcohol?”). Each pregnant person then was categorized as not having received the screening questionnaire, having a negative screening result (no to questions 1 and 5), or having a positive screening result (yes to question 1, 5, or both).

Each pregnancy was categorized as before or after implementation of the universal prenatal substance use screen according to the date of first prenatal encounter. Pregnancies in which prenatal care began after June 1, 2018, were categorized as after implementation of the screening protocol. The proportion of pregnancies with at least one prenatal urine drug test was compared before and after implementation of the screening protocol. The proportion of births with an order for a newborn drug test was also compared before and after implementation of the prenatal screening protocol. Comparisons were made with logistic regression models including an indicator for whether prenatal care began before or after the date of implementation. To explore disparities in behaviors across birth parent race, models including race and a time-by-race interaction were also examined. Marginal probabilities of both newborn and prenatal drug testing were estimated and compared between all race and ethnicity groups both before and after implementation, and the pairwise differences were compared between time periods to evaluate any changes in disparities after implementation of universal question-based screening.

Subsequent analysis characterized pregnancies after implementation as no substance use screen, a

negative screen result, or a positive screen result. Characteristics of the birthing parent, prenatal care, prenatal drug testing, and newborn drug test orders for each birth were descriptively assessed, stratified by screen result (no screen, negative, or positive). Exploratory models to estimate the frequency of prenatal urine drug testing and newborn testing orders were run and included race, verbal screening result, and the interaction between the two. Because of the small sample size in some categories, these results were not statistically compared.

All comparisons were made with models run under a generalized estimating equation framework to account for correlations present between multiple deliveries for the same birthing parent during the study period. Models assumed an exchangeable correlation matrix and estimated robust SEs. Individuals with unknown race were removed from all analyses that included race as a covariate but were otherwise included. Statistical analyses were performed with Stata 17.0 and R 4.1.2 (<https://www.R-project.org/>) with a specified two-tailed α level of 0.05. Results for pairwise group comparisons were adjusted for multiple comparisons with a Bonferroni correction.

To characterize how screening results informed subsequent interventions and referrals to treatment, chart review was performed for all 39 patients within the sample who answered “yes” to the question, “Now that you know you are pregnant, are you struggling to stop using drugs or alcohol?” between 2018 and 2020. Chart reviews included documentation of substance use and details in the progress note, orders and results of biological drug testing, documentation of brief intervention or treatment such as social work referrals or community resources, and ongoing substance use monitoring. Lastly, we noted orders and results of biological newborn drug testing.

RESULTS

There were 34,512 live births during the study period, of which 1,710 (5.0%) were excluded from analysis because of a lack of prenatal care within the medical center. Of the remaining 32,802 births from 25,934 unique birthing parents, 31,967 (97.5%) were singleton. Most of the births occurred among birthing parents who were White (23,513 [71.7%]) and non-Hispanic (30,509 [93.0%]) and had private insurance coverage (24,077 [73.4%]) with a mean \pm SD age at delivery of 30.6 ± 5.2 years.

After implementation of the prenatal question-based substance use screening policy, 12,725 of 14,922 pregnant people (85.3%) received the

Box 1. Substance Use Screening Questionnaire

1. Have you ever used drugs or alcohol during pregnancy?
2. Have you ever had a problem with drugs or alcohol in the past?
3. Does your partner have a problem with drugs or alcohol?
4. Do you consider one of your parents to be an addict or alcoholic?
5. Now that you know you are pregnant, are you struggling to stop using drugs or alcohol?
6. Would you like help?



screening (Table 1), with use lowest in the first 2 years (81.6% in 2018 and 79.7% in 2019) and increasing to 86.6% in 2020, 88.2% in 2021, and 88.6% of pregnancies in 2022. Rates of positive screen results were 644 of 12,725 (5.1%) answering affirmatively to, “Have you ever used drugs or alcohol during pregnancy?” or “Now that you are pregnant are you struggling to stop using drugs or alcohol?” Screening implementation was significantly lower for White pregnant people compared with Black pregnant people across the post-implementation period (84.7% vs 87.5%, model based, $P=.015$).

The implementation of universal prenatal question-based screening was associated with a significant reduction in prenatal urine test orders (5.0% [95% CI, 4.64–5.29%] before implementation, 3.1% [95% CI, 2.8–3.4%] after implementation, $P<.001$). A significant interaction between race and time was found (P for interaction=.018), indicating an inconsistent reduction in urine drug testing across different race and ethnicity groups. Multiracial and Hispanic pregnant people did not have a significant change in urine drug testing, whereas pregnant people in the White, Black, and combined race group had a significant reduction after implementation. Compared with all other race and ethnicity groups except the multiracial group, Black pregnant people had higher rates of urine drug tests

before and after implementation (10.3% [95% CI, 9.0–11.7%] before implementation, 4.9% [95% CI, 3.9–5.9%] after implementation) (Fig. 1).

We compared the differences in the rate of prenatal urine drug testing by race and ethnicity before and after implementation of universal question-based screening. There was a significant reduction in the disparity of more frequent urine drug testing among Black birthing parents after implementation. Compared with White birthing parents, the rate of prenatal urine drug testing among Black birthing parents was higher by 5.6% (95% CI, 3.6–7.7%) before implementation and significantly reduced to 1.7% (95% CI, 0.2–3.2%) after implementation ($P<.001$). Similarly, we observed reductions in the disparities between Black and Hispanic birthing parents (6.8% [95% CI, 4.2–9.5%] before implementation, 2.0% [95% CI, –0.2% to 4.2%] after implementation, $P=.04$) and the Black and combined race groups (9.2% [95% CI, 7.2–11.2] before implementation, 4.5% [95% CI, 3.0–6.0%] after implementation, $P<.001$) (Appendix 1, available online at <http://links.lww.com/AOG/D700>).

The implementation of universal prenatal question-based screening was not associated with a significant reduction in newborn drug testing (4.7% [95% CI, 4.4–5.0%] before implementation, 4.5%

Table 1. Pregnancy Characteristics and Drug Test Rates Before and After Implementation of a Universal Prenatal Screening Questionnaire, by Screening Result

Characteristic	Before Implementation (n=17,880)	After Implementation (n=14,922)		
		No Screen [n=2,197 (14.7)]	Negative [n=12,081 (80.9)]	Positive [n=644 (4.3)]
Age at delivery (y)	30.3±5.3	30.7±5.2	31.1±5.1	29.3±5.4
Birthing parent race and ethnicity*				
Black	2,111 (11.8)	221 (10.1)	1,444 (12.0)	142 (22.1)
Combined†	2,038 (11.4)	204 (9.3)	1,357 (11.2)	22 (3.4)
Hispanic	824 (4.6)	124 (5.6)	658 (5.5)	42 (6.5)
Multiracial	215 (1.2)	34 (1.6)	187 (1.6)	13 (2.0)
White	12,504 (69.9)	1,588 (72.3)	8,314 (68.8)	421 (65.4)
Unknown	188 (1.1)	26 (1.2)	121 (1.0)	4 (0.6)
Insurance				
Private	13,756 (76.9)	1,543 (70.2)	8,434 (69.8)	344 (53.4)
Public	3,753 (21.0)	361 (16.4)	1,751 (14.5)	178 (27.6)
Unknown or self-pay	371 (2.1)	293 (13.3)	1,896 (15.7)	122 (18.9)
No. of prenatal encounters	10.3±0.1	8.9±3.6	9.4±2.9	8.4±3.1
Prenatal urine drug test	874 (4.9)	88 (4.0)	255 (2.1)	110 (17.1)
Newborn drug test order	815 (4.6)	109 (5.0)	353 (2.9)	193 (30.0)

Data are mean±SD or n (%).

* A total of 25,934 unique birthing parents: n=3,093 Black (11.9%), n=3,086 combined race (12.0%), n=1,334 Hispanic (5.1%), n=365 multiracial (1.4%), n=17,770 White (68.5%), and n=286 unknown (1.1%).

† Because of small sample sizes, the combined group aggregates patients self-reporting as American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, and other race.



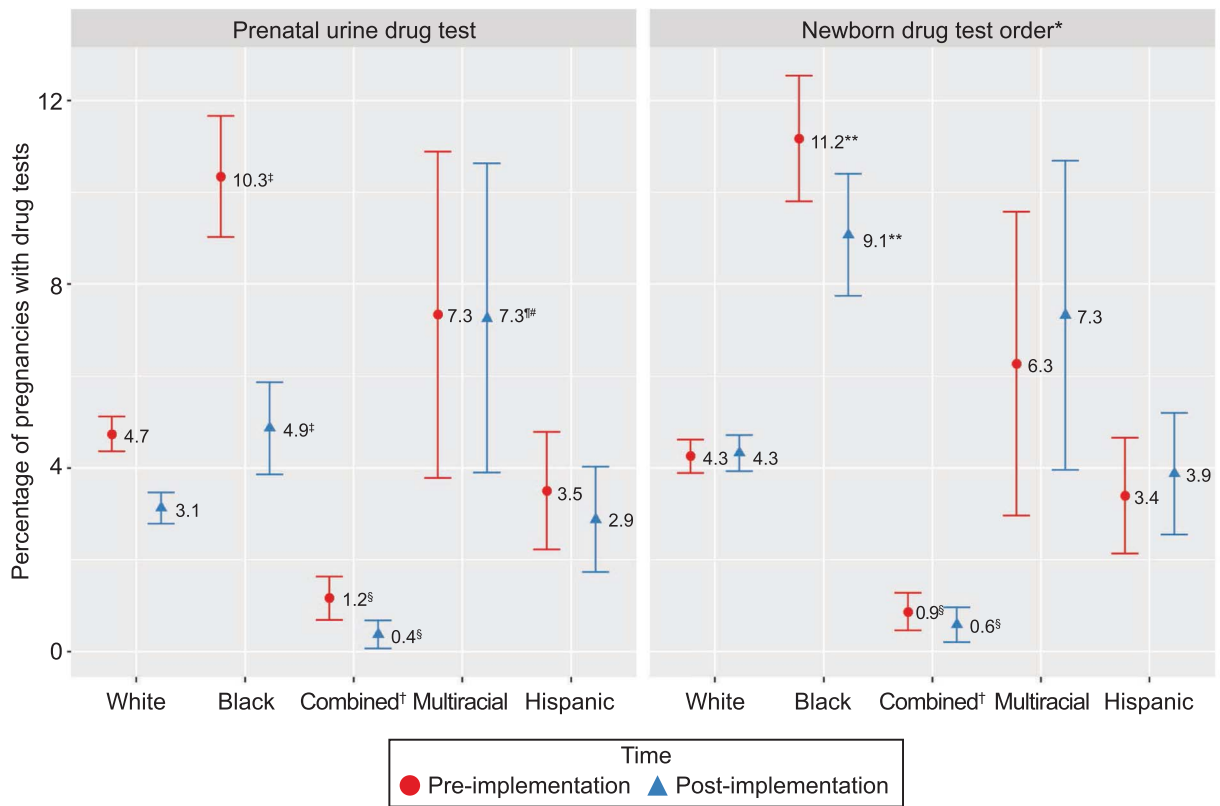


Fig. 1. Prenatal urine drug testing by race and ethnicity before and after implementation of question-based screening for prenatal substance use. *No groups defined by race and ethnicity saw significant changes in newborn drug test orders before implementation vs after implementation. †In all analyses, we aggregated data for American Indian or Alaska Native, Asian, and Native Hawaiian or Other Pacific Islander with patients who self-selected “other” race given small sample sizes and refer to this group as the combined group. ‡Significantly higher than all groups except the multiracial group within the respective time period. §Significantly lower than all other groups within the respective time period. ¶Significantly higher than all other groups except Black. #No significant reduction from before implementation to after implementation (urine drug test only). **Significantly higher than all other groups within the respective time period.
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[95% CI, 4.2–4.8%] after implementation, $P=.46$). Compared with all other race and ethnicity groups, clinicians ordered newborn drug tests significantly more often for newborns of Black birthing parents before and after implementation (11.2% [95% CI, 9.8–12.5%] before implementation, 9.1% [95% CI, 7.8–10.4%] after implementation). Clinicians ordered newborn drug tests significantly less often for newborns of birthing parents in the combined group compared with all other race groups. There was not a significant interaction between time and race ($P=.20$), and there were no significant changes in pairwise group differences in newborn drug testing from before to after implementation, indicating consistent racial differences over time (Fig. 1 and Appendix 1, <http://links.lww.com/AOG/D700>).

Exploratory analysis of the frequency of prenatal and newborn drug testing showed interesting patterns

by screen result and race. All racial groups had the largest percentage of prenatal and newborn drug testing when verbal screen results were positive. Black birthing parents appeared to have higher rates of both prenatal and newborn drug tests, nearly double that of White parents, when no question-based screen result was available and when the question-based screen result was negative (Fig. 2 and Appendix 2, available online at <http://links.lww.com/AOG/D700>).

Of the 39 patients who reported a positive response to the question, “Now that you are pregnant are you struggling to stop using drugs or alcohol?” the majority were White race (25, 64.1%), and about half had private insurance (19, 48.7%). Of the 22 (56.4%) with clinical documentation of active drug or alcohol use, 10 reported isolated cannabis use and 10 reported cannabis use with other substances, four reported alcohol use, four reported opioid use, and two



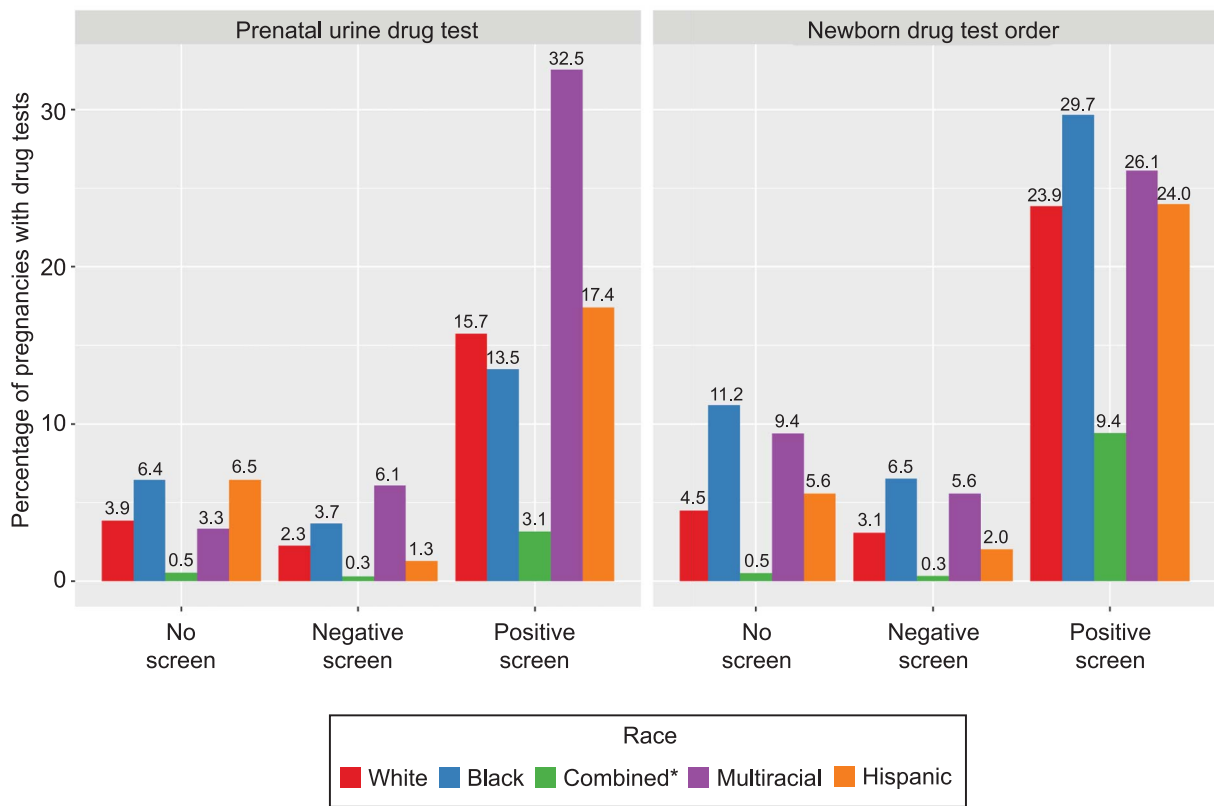


Fig. 2. Prenatal and newborn urine drug testing by race, ethnicity, and results of question-based screening for prenatal substance use. Statistical comparison of testing rates among races was not performed because of limited sample size in some of the cross-tabulation cells of question-based screen result and race. *Positive screen result* was defined as an affirmative response to, “Have you ever used drugs or alcohol during pregnancy?” or “Now that you know you are pregnant, are you struggling to stop using drugs or alcohol?” or both *In all analyses, we aggregated data for American Indian or Alaska Native, Asian, and Native Hawaiian or Other Pacific Islander with patients who self-selected “other” race given small sample sizes and refer to this group as the combined group.

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reported cocaine use. Clinical documentation noted a reason for cannabis use in 16 cases (84.2%), with the most common reasons being treatment for nausea (62.5%), mood disorders (18.8%), chronic pain (18.8%), and insomnia (6.3%). Of the 22 patients (56.4%) with active drug or alcohol use, 14 (63.6%) had documentation of a discussion of health risks of substances use, 15 (68.2%) had the problem list updated with documentation of an International Classification of Diseases, 9th or 10 Revision code regarding substance use, and seven (31.8%) had a urine drug test performed prior to delivery. Sixteen patients (76.2%) had documentation of a referral to social work or a Maternal Infant Health Program. Only 8 of 39 patients (38.1%) had documented a conversation about possible child protective services reporting for substance exposure during pregnancy. Of those who reported cannabis use, 16 (80.0%) received a newborn drug test, of which 12 results (75.0%) were

positive as expected for tetrahydrocannabinol, resulting in a child protective services report. Of those reporting current or former illicit opioid use, two patients were referred for methadone treatment because of ongoing heroin use, one was already being treated with buprenorphine, and one was stable in remission (Appendix 3, available online at <http://links.lww.com/AOG/D700>).

DISCUSSION

In this retrospective cohort study, system-wide implementation of universal question-based substance use screening during pregnancy was associated with a decrease in prenatal urine drug testing but not a decrease in newborn drug testing. Implementation did not result in a reduction in racial disparities in newborn drug testing for Black birthing people.

Our results are consistent with prior studies showing that universal prenatal question-based



screening for substance use and supplemental urine drug testing does not necessarily eliminate racial disparities in referral to child protective services.¹⁶ Our data show uneven implementation of screening, with higher rates among Black birthing people. This is similar to prior studies demonstrating that Black pregnant people are more likely to be asked about substance use.²¹ Our results demonstrate the greatest reduction in urine drug testing for Black pregnant people, raising the possibility that the standardized question-based screener attenuated racial implicit bias in clinicians who ordered more prenatal drug testing for Black patients. This is consistent with a prior study showing that standardizing a hospital policy for drug testing during the birth hospitalization can reduce testing disparities between Black and White birthing people.²² It is disappointing that the increase in question-based screening and reduction in prenatal drug testing did not result in a reduction in racial inequities or overall newborn drug testing. One possible explanation is that clinicians providing newborn care at the study institution interpreted state law to require newborn drug testing to demonstrate or exclude substance exposure and to inform child protective services reporting. Our study adds to the literature showing that improving implicit bias in one aspect of a care pathway does not necessarily affect other parts of the care continuum and that attempts to improve racial equity require attention to all points along the process that may be affected by implicit bias.^{16,23}

One purpose of identifying prenatal substance use is to target treatment efforts. Guidelines recommend brief intervention and a referral to treatment, and prior studies have shown that integrated clinics with support staff and motivational interviewing change behaviors and reduce substance use.^{14,24} In the Kaiser Permanente Early Start program, when birthing parents were screened and started treatment, newborns experienced lower rates of low birth weight, preterm delivery, and need for ventilation.^{25,26} Most patients in our cohort who reported active use of illicit opioids or cocaine received guideline-directed care with referral, medication treatment, and transparent information about child protective services reporting. In contrast, a majority of patients reporting isolated cannabis use did not receive referral to treatment and did not receive a health risk discussion or transparent information about child protective services reporting policies.²³ Considering the substantial increase in cannabis use among pregnant people, the risk of adverse pregnancy outcomes, and the possible effect on neurobehavioral outcomes, these results support the need

to focus on treatment and avoid unnecessary punitive reporting to child protective services.^{27,28}

Limitations of this study include the absence of data to assess drug screening practices of pregnant individuals who delivered without prenatal care at our institution. We cannot fully describe clinician approach to substance use screening and treatment before implementation of universal screening. The American College of Obstetrics and Gynecology and the Society for Maternal-Fetal Medicine recommend use of a validated tool; this institution used slightly differently worded questions, which may limit comparisons with studies using other validated screeners. Although we were able to describe clinician response to a positive screen result and difficulties stopping substance use, the sample size in our chart review was not large enough to draw conclusions about racial inequities in referral and treatment. Finally, Michigan legalized medical cannabis in 2008 and recreational cannabis in 2018. Although widespread recreational sales did not start until late 2019, we were unable to control for any behavioral changes by birthing people or clinicians that could be associated with cannabis legalization.

The findings from this study raise the important possibility that standardized question-based screening for prenatal substance use may decrease prenatal drug testing but not improve racial disparities in newborn drug testing and subsequent child protective services reporting and possible downstream harms to Black families. With the rapid changes in cannabis use among pregnant people, policy changes are urgently needed to prioritize identification and treatment of substance use in pregnancy without perpetuating racial bias in newborn testing that can propagate into the child welfare system.

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PEER REVIEW HISTORY

Received December 26, 2023. Received in revised form March 27, 2024. Accepted April 11, 2024. Peer reviews and author correspondence are available at <http://links.lww.com/AOG/D701>.

