

Yale New Haven Children's Hospital Experience Developing and Instituting an Objective Protocol for Newborn Toxicology Testing: Collaboration for Health Equity

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Objectives

- Reconsider the clinical utility of newborn toxicology testing
- Describe data on the clinical utility of extended-time frame testing (meconium and umbilical cord) vs short term testing (urine)
- Present guideline for newborn toxicology testing in the setting of prenatal substance exposure
- Present data demonstrating practice patterns before and after guideline implementation



Biden-Harris Administration Plan

The Administration's vision is that all pregnant women with SUD will be identified early in pregnancy and prioritized to receive evidence-based treatment, services, and other recovery and social supports. Health care delivery will be well coordinated to optimize outcomes for families and prevent foster care placement where possible. Clear coordination of health care and early childhood systems, including public health, early learning, courts, child welfare systems, and family economic supports will optimize the outcomes for infants and pregnant women with SUD.

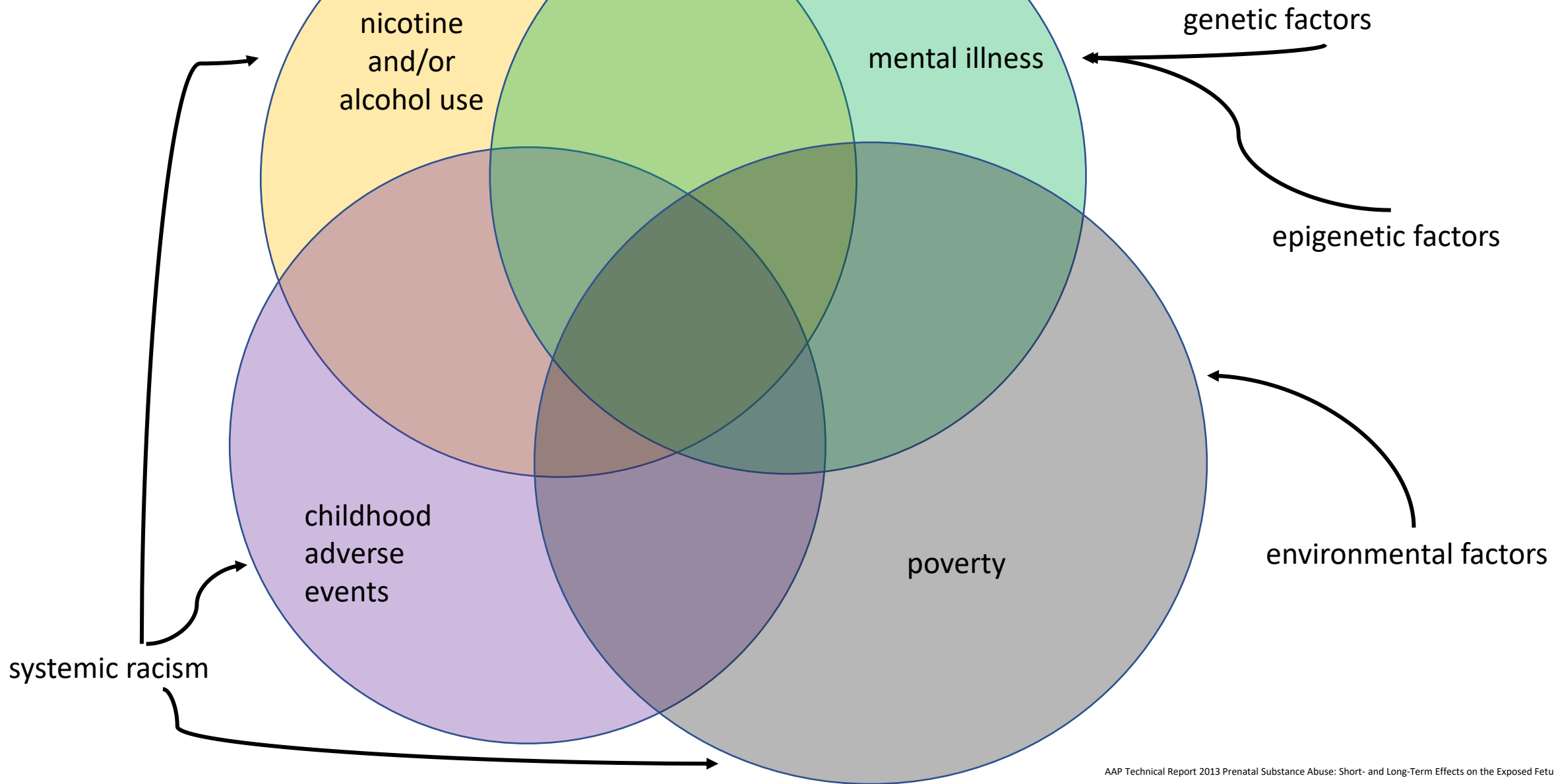
5. Improving coordination of public health, criminal justice systems, treatment and early childhood systems can optimize outcomes and reduce disparities.

3. Everyone has the right to effective treatment, and denying such care on the basis of sex or disability is a violation of civil rights.²³
4. Pregnant women using substances or having SUD, should be encouraged to access support and care systems, and barriers to access should be addressed, mitigated, and eliminated where possible.
5. Improving coordination of public health, criminal justice systems, treatment and early childhood systems can optimize outcomes and reduce disparities.

Substance Use Disorder in Pregnancy:
Improving Outcomes for Families
(The White House
Executive Office of the President
Office of National Drug Control Policy)
Published 10/2022



What are we most concerned about?



- The physiologic impact of maternal substance use on the fetus is highly variable.



- Neuropsychiatric effects due to pre-natal exposure are highly mitigated by positive parenting interventions post-natally.

Infant and Child Development. The role of mother's prenatal substance use disorder and early parenting on child social cognition at school age
[Volume30, Issue3](#) May/June 2021



- If we did toxicology testing with the intent of finding those things that were most concerning for the health of the pregnant patient, the viability of the pregnancy, and the health of the infant that may be born of the pregnancy, we would be testing for nicotine and alcohol metabolites.
- Of all known exposures, poverty is more detrimental than any substance when experienced by a fetus.

Aber et al. THE EFFECTS OF POVERTY ON CHILD HEALTH AND DEVELOPMENT. *Annu. Rev. Public Health.* 1997. 18:463–83

American Journal of Obstetrics & Gynecology DEC 2015 761-778

Addiction, March 2020, Volume: 115, Issue: 11: 2148-2163

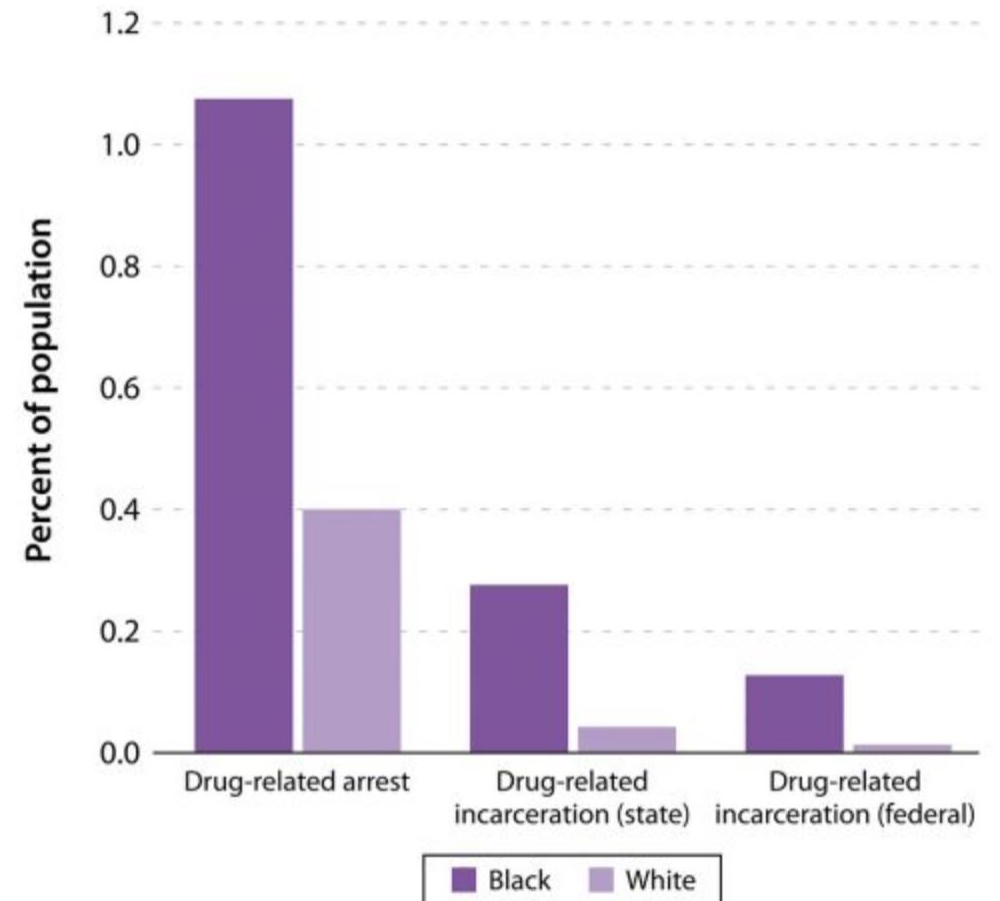
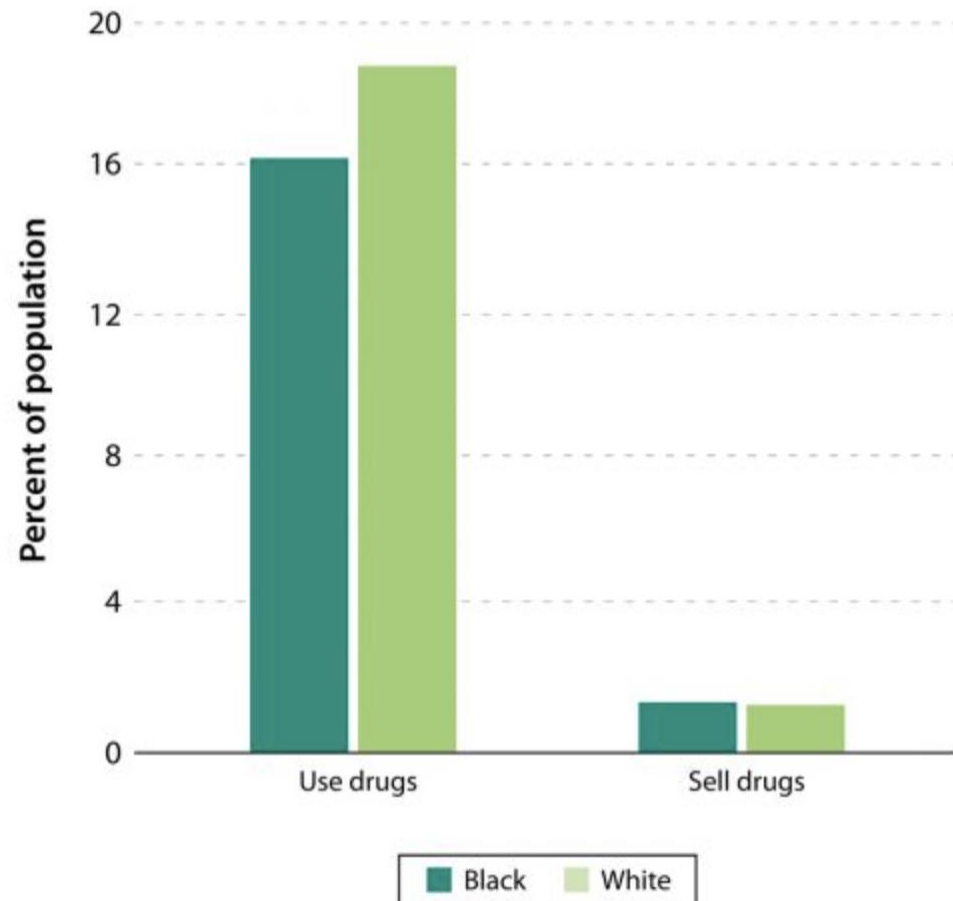
Centers for Disease Control and Prevention [last updated 2017 Sep 29]

Psychol Addict Behav 2019 Sept 9

February 27, 2020 Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion



Legalization & inequality



Our ultimate goals are...

- To identify substance use during pregnancy to counsel patients and enroll in treatment if indicated
 - Smoking cessation
 - Alcohol use cessation
 - Opioid use cessation including MOUD
 - Cannabis use cessation and/or risk mitigation
 - Cessation of other substances: cocaine, PCP etc
- To support parents in their responsibility of parenting
 - Treat associated mental health issues
 - Enroll in social assistance programs
- To provide the best start in life for newborns
 - Best evidence supports promoting families remaining together



What are the reasons to test?

- Will it benefit the patient?
- Will it change disposition?
- Will it change anticipatory guidance?
- Will it change follow up or specialist consultation?
- Will it change the need for SW or DCF consultation?
- Will it affect DCF substantiation of claim of harm?
- Is it required by law?



Is infant testing required to fulfill CAPTA requirements?

- There is no requirement for infant toxicology testing in the CAPTA legislation.
- No state requires universal toxicology testing of all newborns.
 - 2 states require testing if “drug-related complications” noted after delivery (Minnesota & North Dakota)
 - 4 states require testing if prenatal substance exposure is suspected or identified (Minnesota, North Dakota, Iowa, Kentucky)



What are the reasons not to test?

- Are there harms of a child protective services referral?
- Will it interrupt the patient-provider relationship at a critical time by inappropriately valuing “objective” information over information provided by the family?
- Will it demonstrate bias against people who use substances?
- Will it demonstrate racism and result in inequitable consequences for people of color?



Would universal testing provide equitable care to pregnant patients and families?

- While the testing would be distributed evenly, the downstream consequences (including who gets referred to DCF and whose families are separated, for how long, and at what cost) differ greatly

NYU Review of Law & Social Change 2019 The Harm of Child Removal Shanta Trivedi



What kind of test?



Specimen Collection Considerations

	Urine	Umbilical Cord	Meconium
Collection	Difficult	Easy	Moderate
Typical Turnaround Time	<4 hrs	1–2 days	12 hrs–2 days
Window of Detection	Short	Intermediate	Long
Drug Concentrations	Moderate	Low	High
Extent of Characterization	Moderate	Low	High



Review of all umbilical cord tests sent at L&M in the last 3 years

- Unexpected positive results (ie there was no known substance use but a clinical concern arose and a test resulted positive)
 - 0%
- Unexpected negative results (ie there was known substance use but the test resulted negative)
 - ~20%



Review of all umbilical cord tests sent at L&M in the last 3 years

- Test results changed clinical care or treatment plan
 - 0%
- Test results changed Family Care Plan or disposition plan (ie home with family)
 - 0%



If toxicology testing is deemed relevant to the clinical care of the newborn

- Urine toxicology testing is standard of care for withdrawal in adult population and is deemed appropriate for detection of substance resulting in withdrawal

UpToDate: Opioid withdrawal in adults: Clinical manifestations, course, assessment, and diagnosis

- Urine toxicology is the only kind of testing that provides actionable information



Previous practice pattern for newborn toxicology

- Provider discretion, NOT UNIVERSAL TESTING
- Primarily urine toxicology
- Not testing in all cases of known prenatal substance exposure
- Not testing in all cases of known MOUD during pregnancy
- Mutual deference
 - Usually ordered when requested by SW or DCF (or expectation of this)
 - Per discussions with DCF, they thought they were ordered for medical purposes

Presler, C. (2021). Mutual Deference Between Hospitals and Courts: How Mandated Reporting from Medical Providers Harms Families. *Columbia Journal of Race and Law*, 11(3), 733–766.
<https://doi.org/10.52214/cjrl.v11i3.8750>

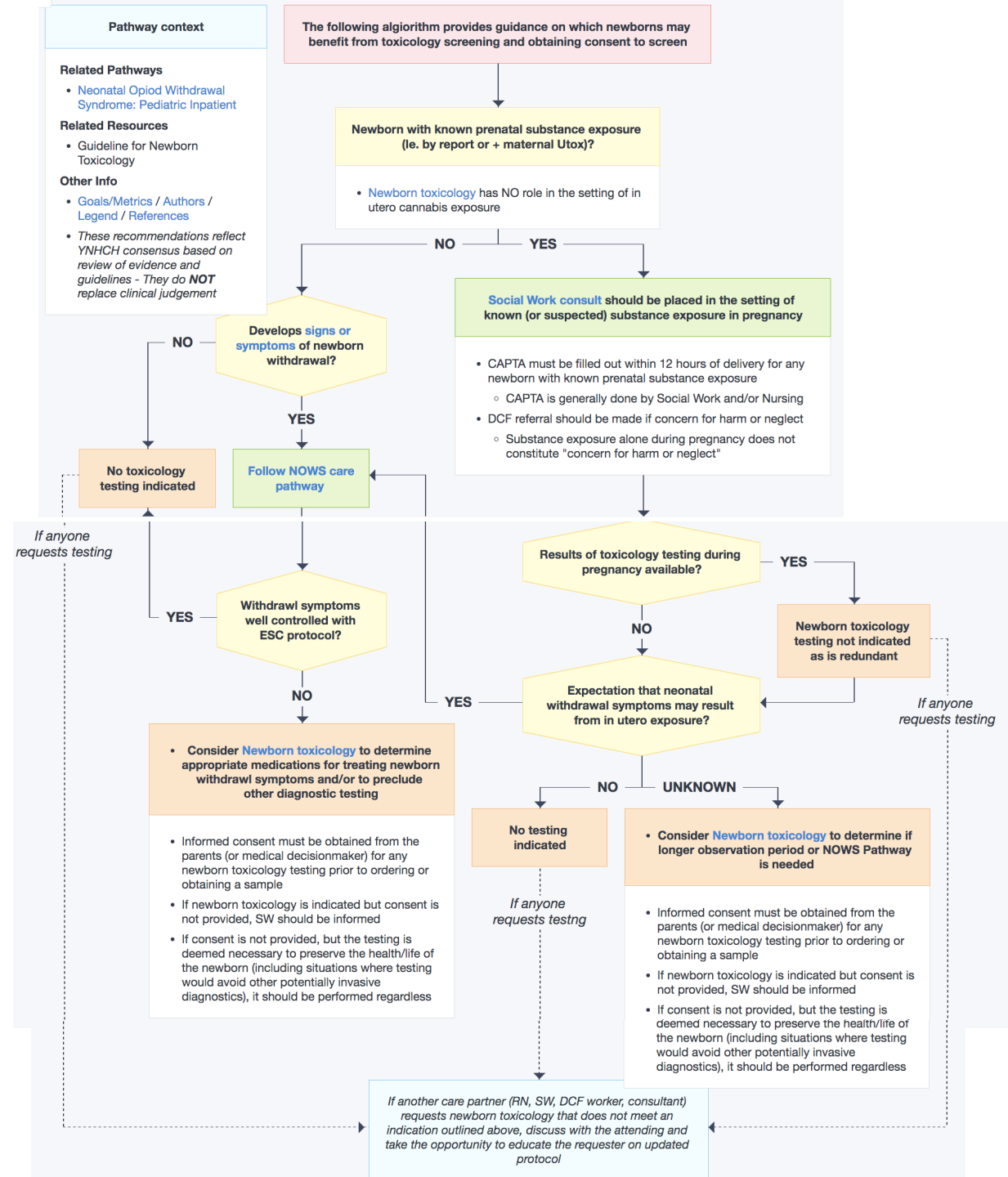


Collaboration

- Pediatric Hospital Medicine Section
 - Section Chief
 - Medical Director of Newborn Nursery
- Child Abuse Section
- SW
- Pediatric and OB trainees
- NICU
- OB
- DCF
- Addiction Medicine
- Psychiatry



The newborn toxicology pathway



Pathway context

Related Pathways

- Neonatal Opioid Withdrawal Syndrome: Pediatric Inpatient

Related Resources

- Guideline for Newborn Toxicology

Other Info

- [Goals/Metrics](#) / [Authors](#) / [Legend](#) / [References](#)
- *These recommendations reflect YNHCH consensus based on review of evidence and guidelines - They do **NOT** replace clinical judgement*

The following algorithm provides guidance on which newborns may benefit from toxicology screening and obtaining consent to screen

Newborn with known prenatal substance exposure (ie. by report or + maternal Utox)?

- [Newborn toxicology](#) has NO role in the setting of in utero cannabis exposure

NO

YES

Develops **signs or symptoms** of newborn withdrawal?

NO

YES

No toxicology testing indicated

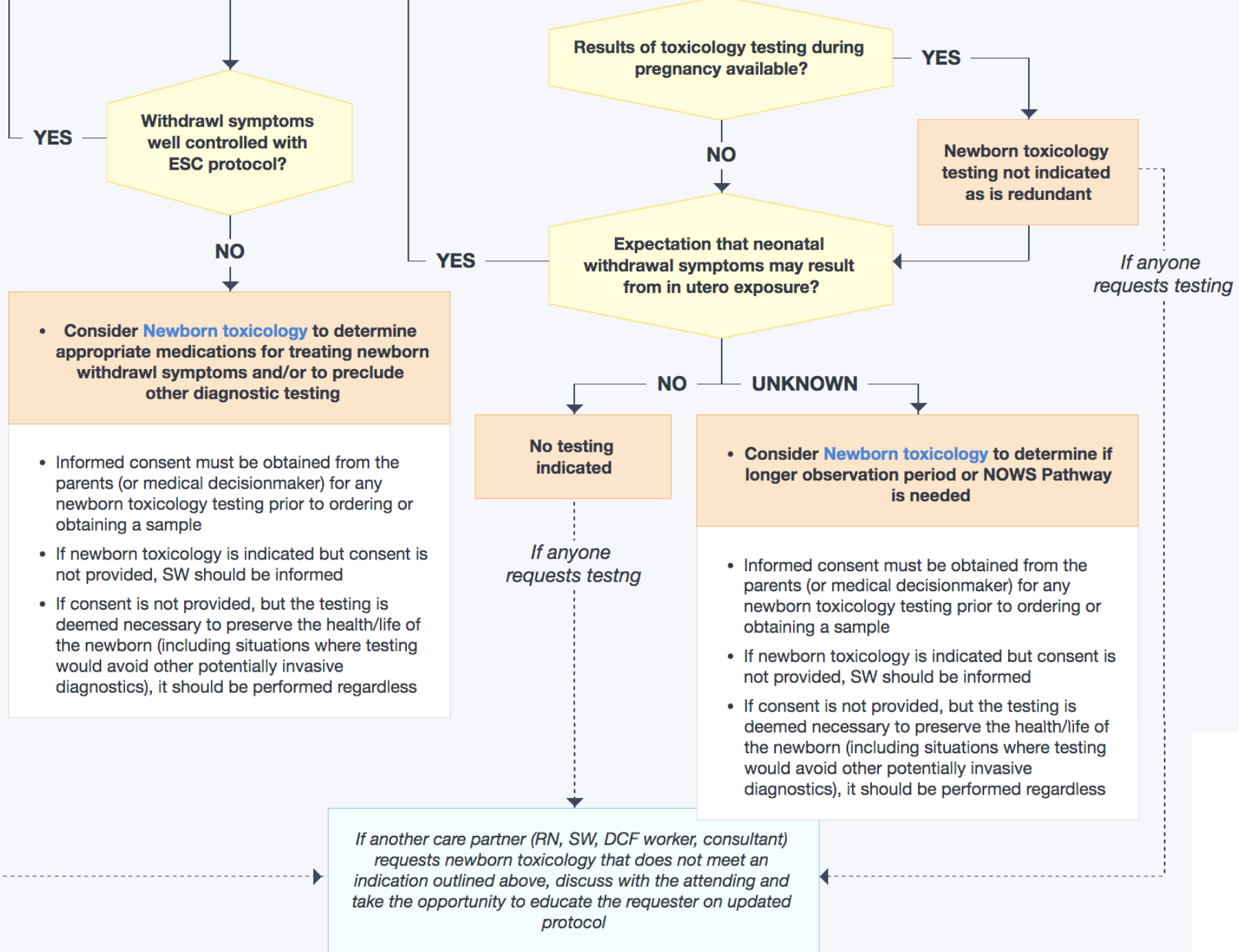
Follow **NOWS** care pathway

Social Work consult should be placed in the setting of known (or suspected) substance exposure in pregnancy

- CAPTA must be filled out within 12 hours of delivery for any newborn with known prenatal substance exposure
 - CAPTA is generally done by Social Work and/or Nursing
- DCF referral should be made if concern for harm or neglect
 - Substance exposure alone during pregnancy does not constitute "concern for harm or neglect"

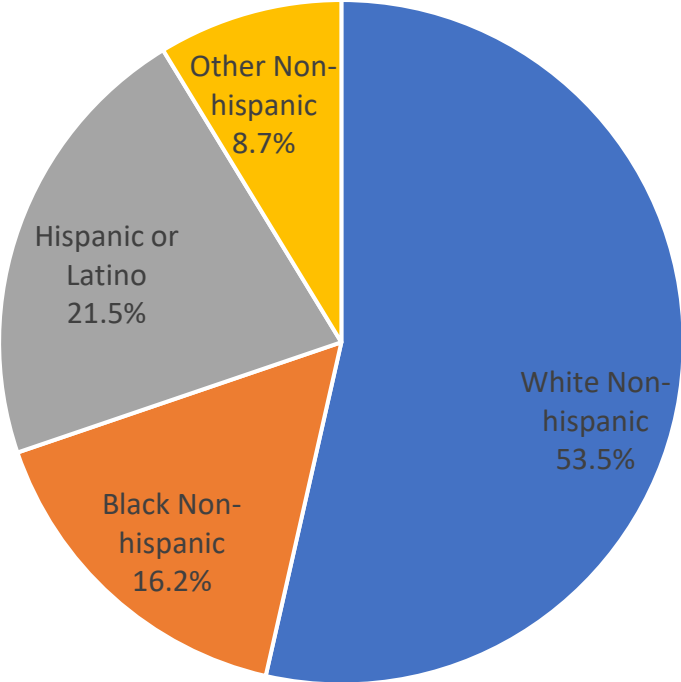


If anyone requests testing

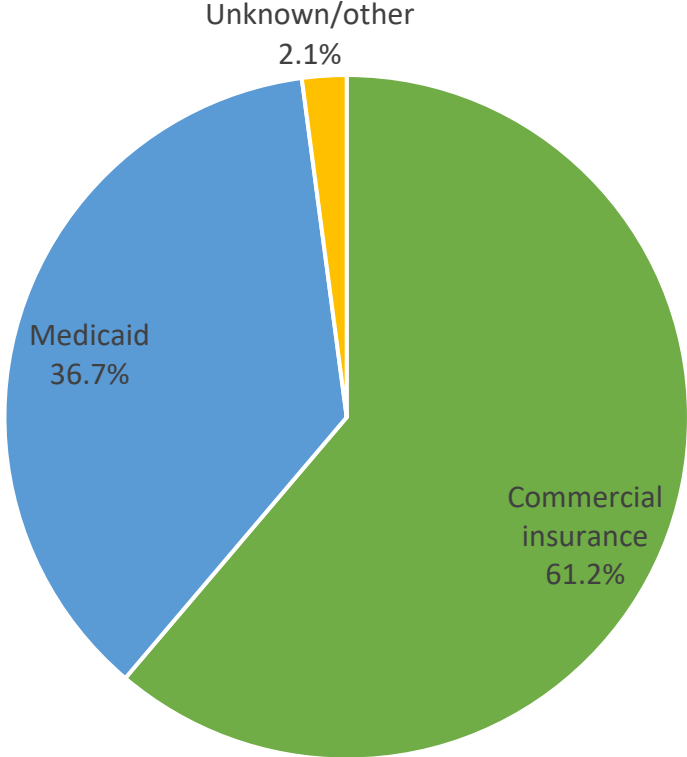


The before times (1/1/2019-12/31/2020)

Newborns by Race

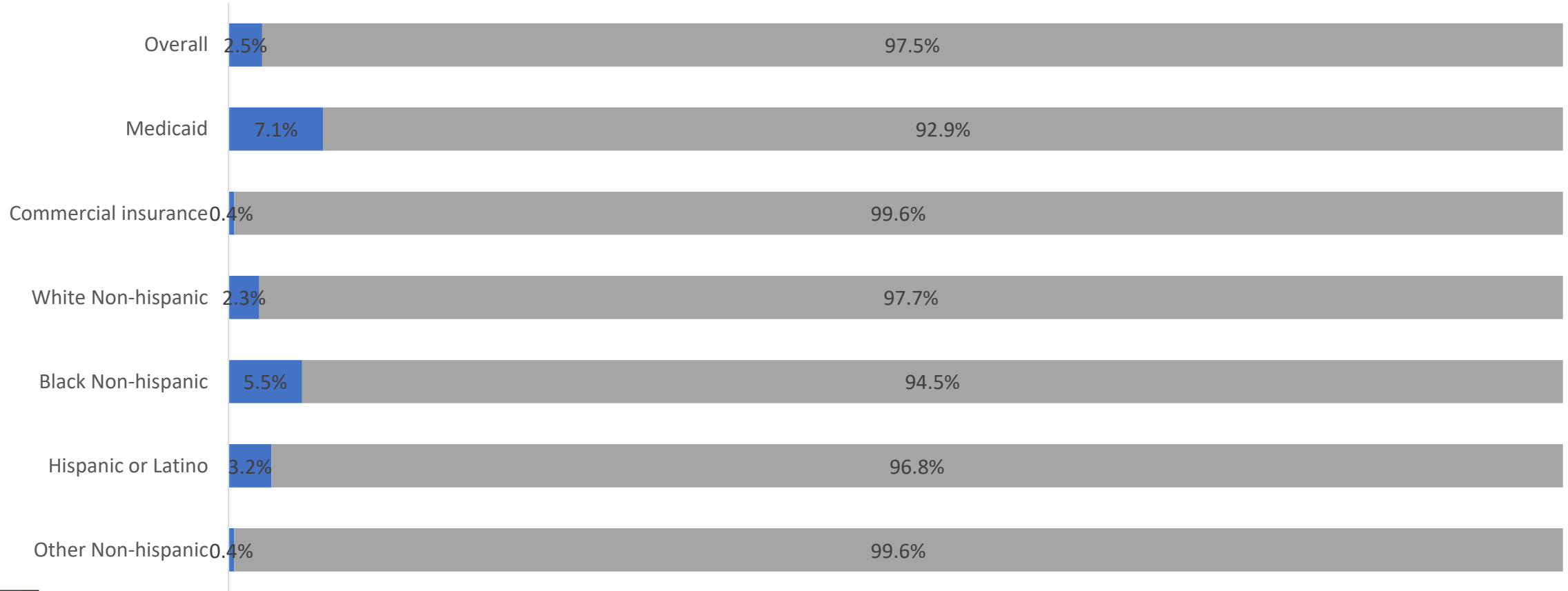


Newborns by insurance provider



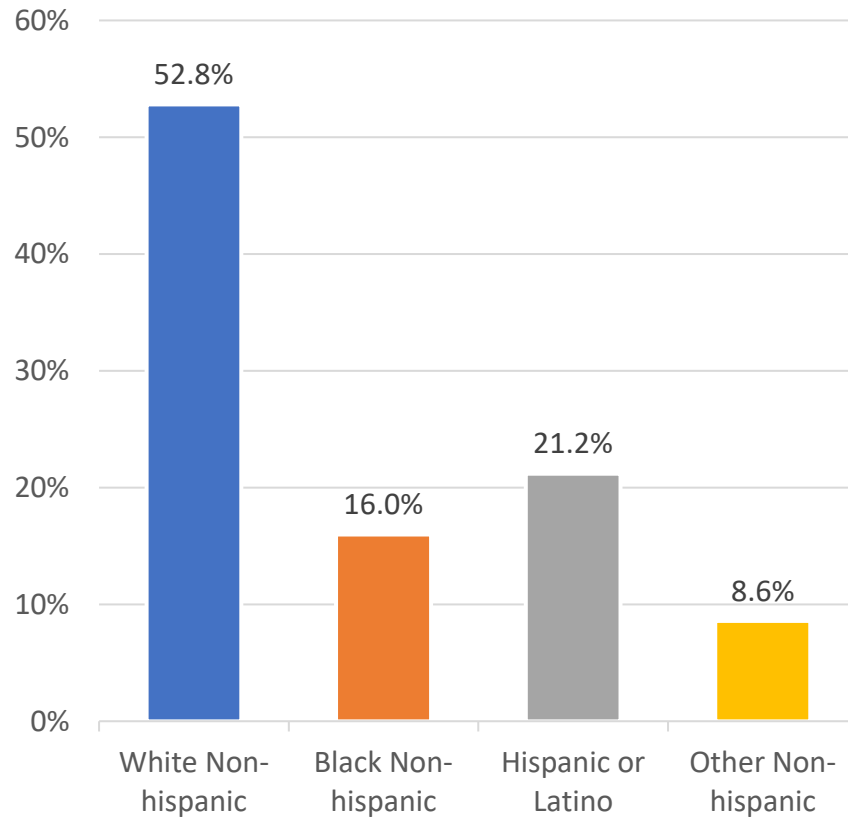
Toxicology Tests Obtained

■ Tox collected ■ Tox not collected

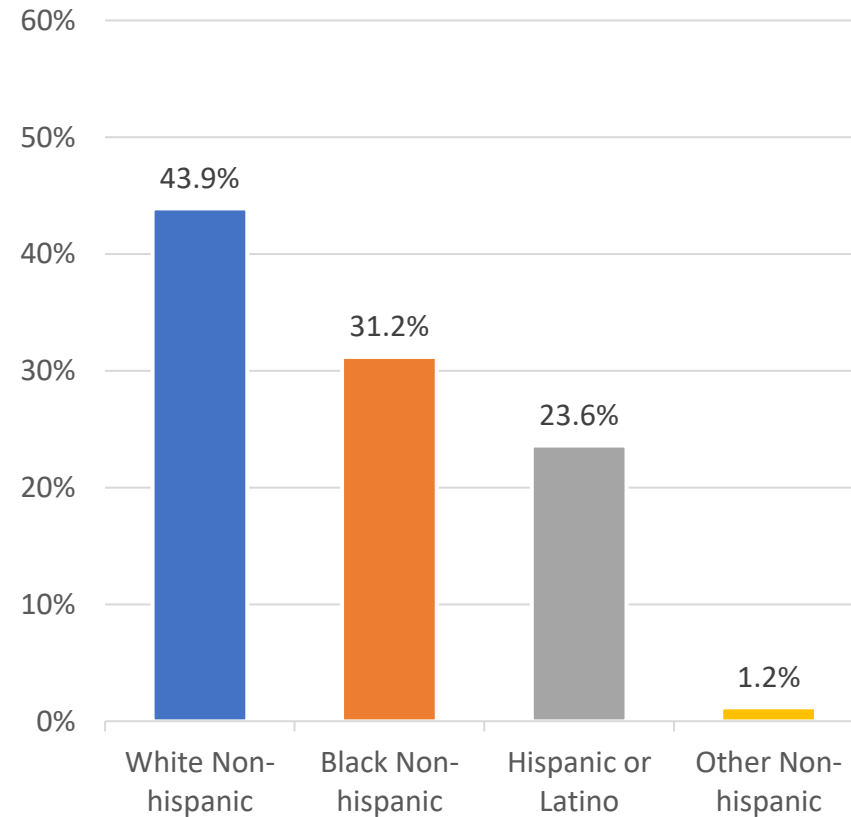


Differences in test collection by race

Newborns by Race

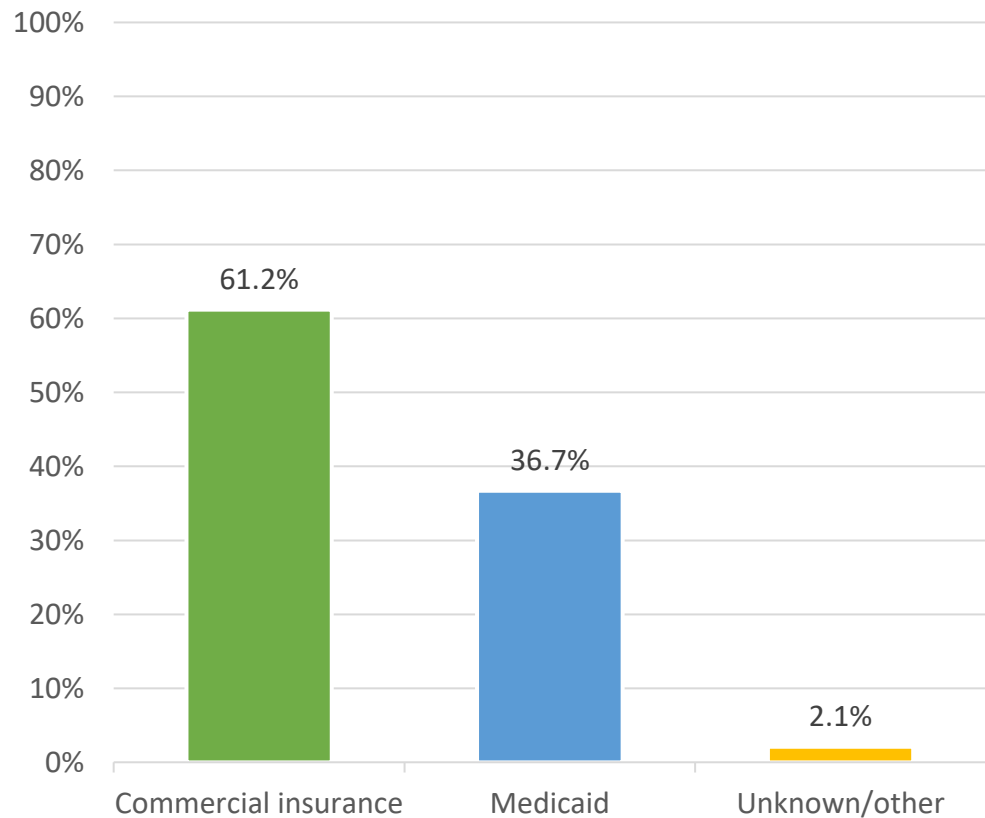


Toxicology Tests Collected by Race

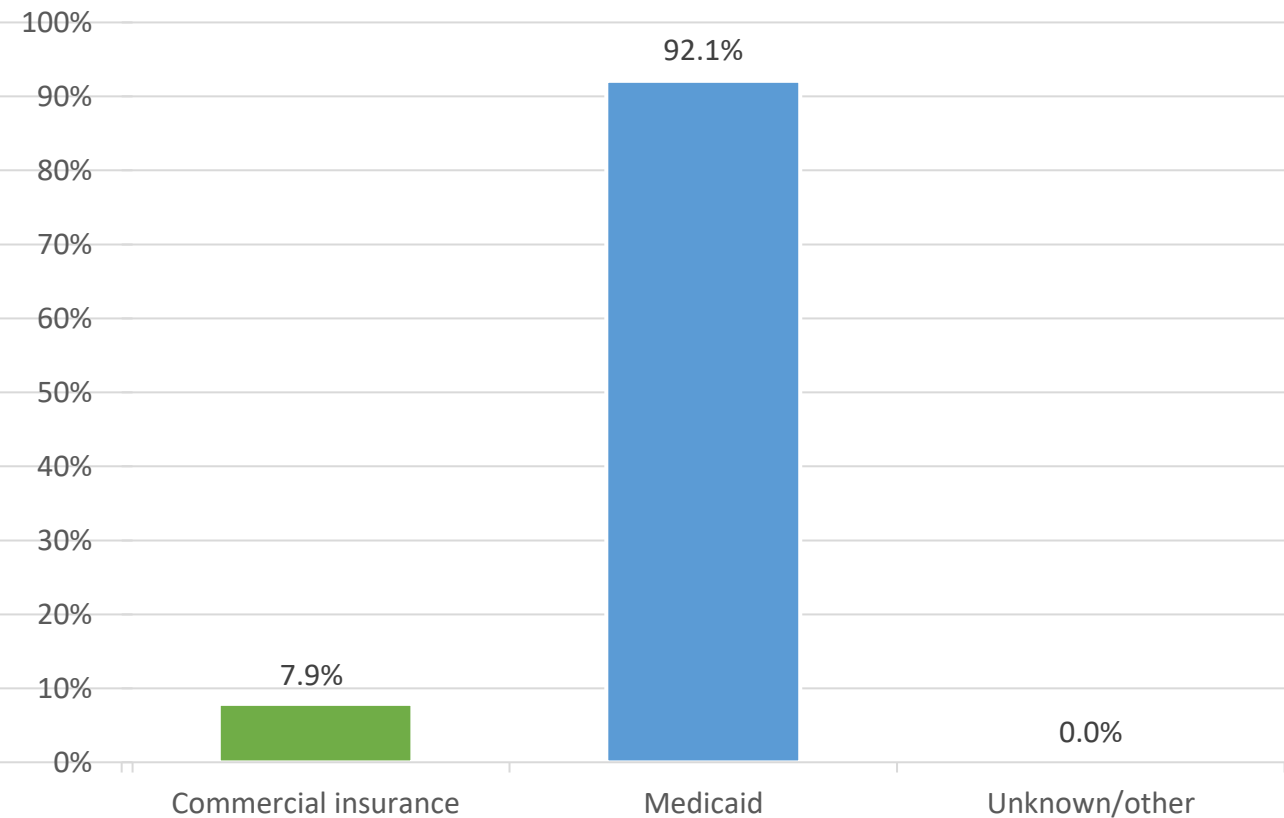


Differences in test collection by insurance

Newborns by insurance provider

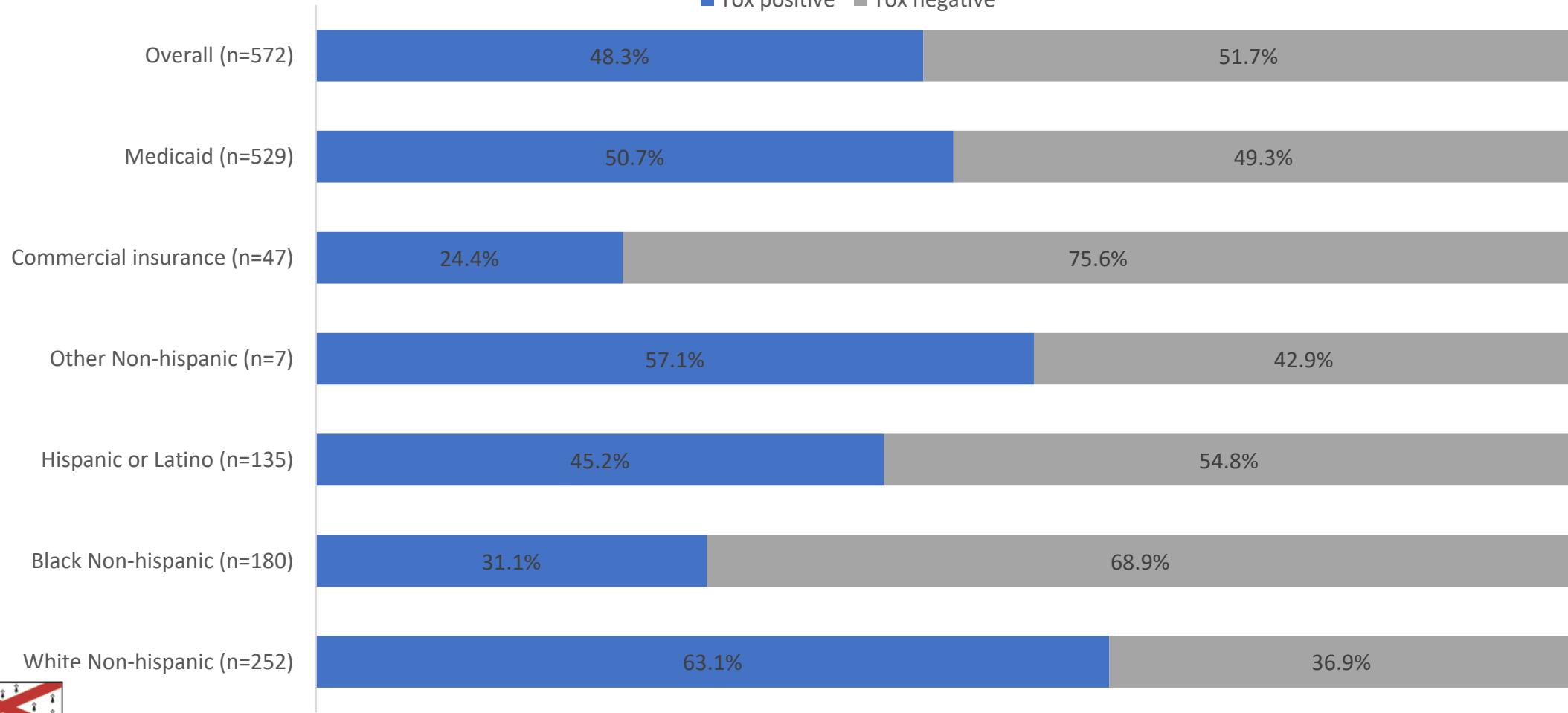


Toxicology tests obtained by insurance provider

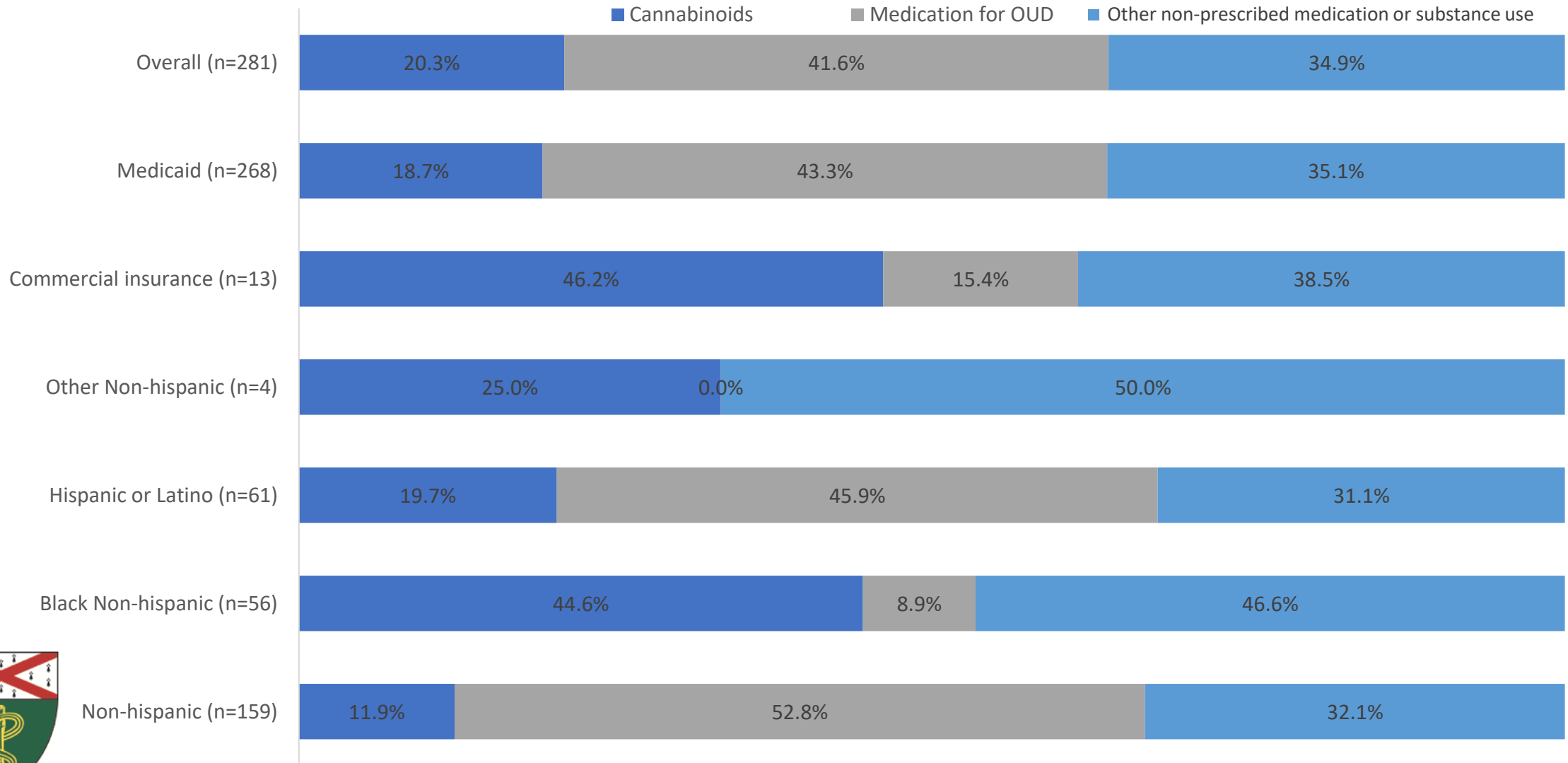


Rates of test positivity

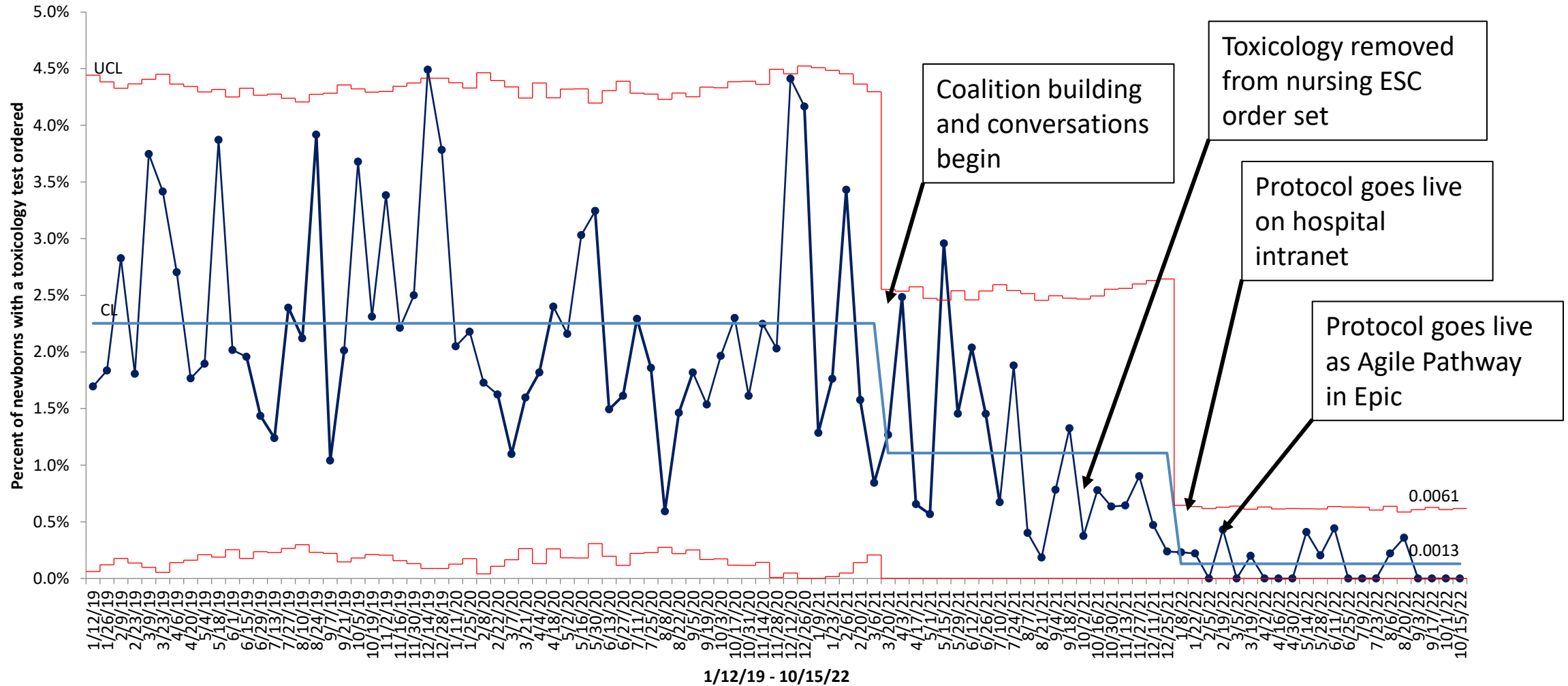
■ Tox positive ■ Tox negative



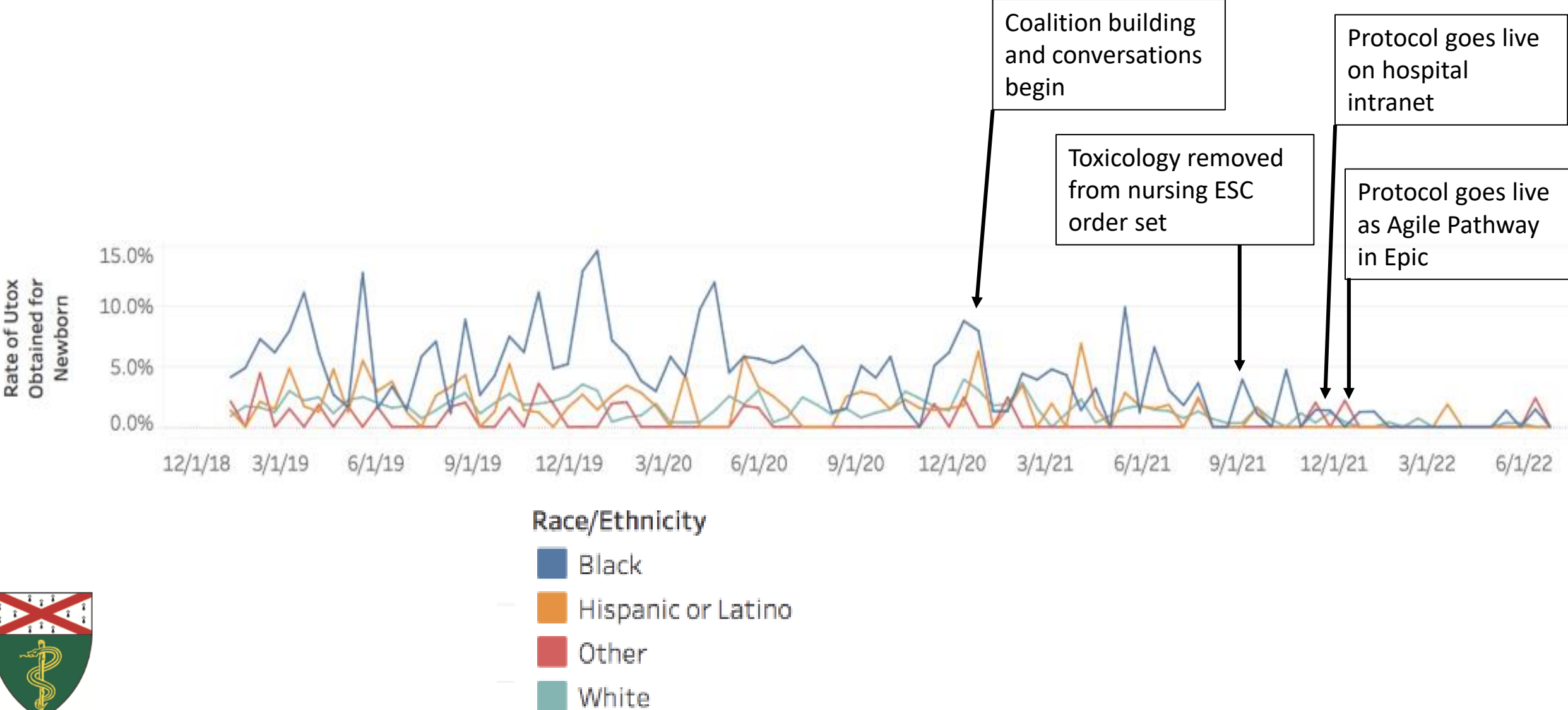
Rates of test positivity



Control chart



Control chart by race



After (1/1/2022-6/3/2022)

	WNH	BNH	HL	ONH
Tox obtained	3	3	1	0
Total newborns	1441	484	716	238
Percentage (pre)	0.2% (2.3%)	0.6% (5.5%)	0.1% (3.2%)	0.0% (0.4%)

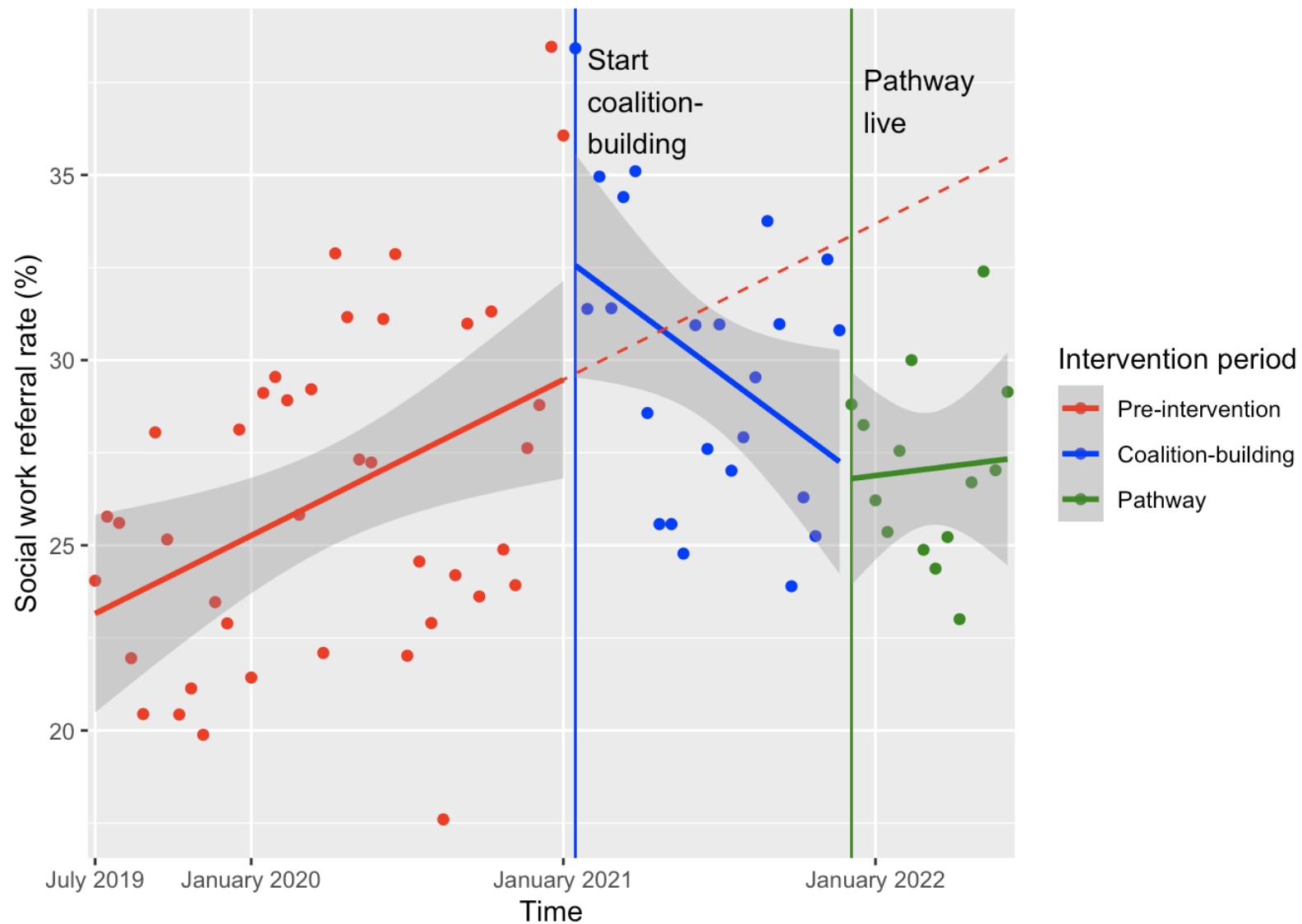


After (1/1/2022-6/3/2022)

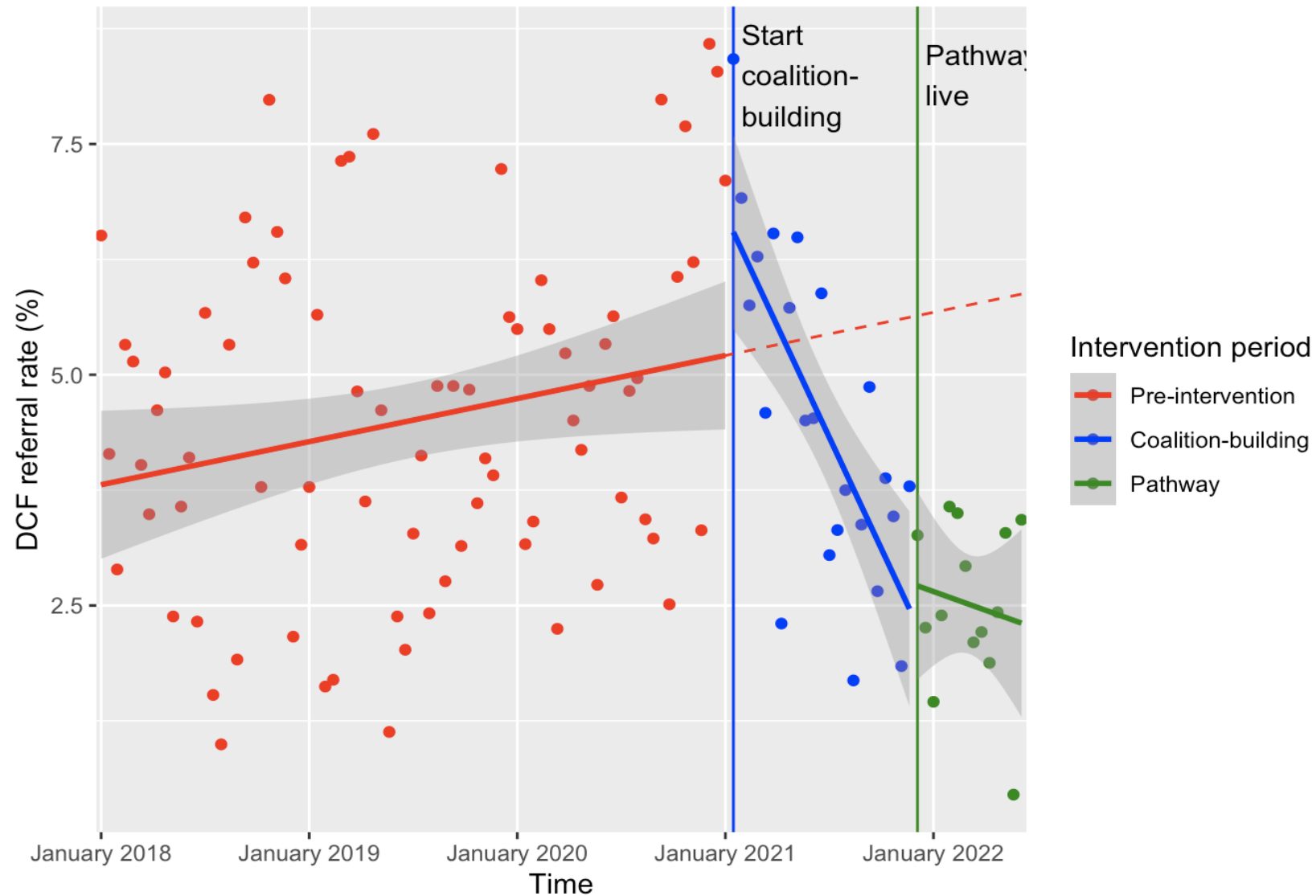
	Commercial insurance	Medicaid
Tox obtained	2	6
Total newborns	1716	1125
Percentage	0.1% (0.4%)	0.5% (7.1%)



SW referrals (in all newborns)



DCF referrals (in all newborns)



Balancing measures

- Will newborns return to the hospital with untreated/uncontrolled withdrawal symptoms?
 - None before (collection of data established during Eat, Sleep, Console QI project)
 - None after
- Will children present with neglect in the setting of ongoing parental substance use?
 - No cases identified via Child Abuse ongoing data collection or High Risk Newborn Working Group
- The underlying aspect of these questions is: “in situations where the newborn toxicology test would have been the only piece of information that led to a suspicion for and subsequent evaluation of prenatal substance use”
 - Rare
 - A failure of multiple systems that we are concurrently working to strengthen



	BRIDGEPORT		GREENWICH		LAWRENCE & MEMORIAL		YALE NEW HAVEN		NETWORK		STATE	
	% of hospital total		% of hospital total		% of hospital total		% of hospital total		% of network total		% of state total	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST
	N=228	N=18 [^]	N=9 [^]	N=3 [^]	N=310	N=93	N=609	N=124	N=1156	N=238	N=5657	N=1677
NUMBER OF CAPTA NOTIFICATIONS TO DCF												
2019 - <i>Partial Year beginning March 14</i>	83	-	1	-	81	-	207	-	372	-	1610	-
2020	85	-	0	-	133	-	251	-	469	-	2044	-
2021	60	-	8	-	96	-	151	-	315	-	2003	-
2022 – <i>Partial Year ending November 30</i>	-	18	-	3	-	93	-	124	-	238	-	1677

	BRIDGEPORT % of hospital total		GREENWICH % of hospital total		LAWRENCE & MEMORIAL % of hospital total		YALE NEW HAVEN % of hospital total		NETWORK % of network total		STATE % of state total	
CAPTA OUTCOMES	PRE N=228	POST N=18^	PRE N=9^	POST N=3^	PRE N=310	POST N=93	PRE N=609	POST N=124	PRE N=1156	POST N=238	PRE N=5657	POST N=1677
Family Care Plan												
<i>No Family Care Plan</i>	9.2	38.9	11.1	0	10.6	23.7**	45.5	13.7***	28.7	19.3**	32.4	27.5***
<i>Yes, Developed by Reporter</i>	65.4	22.2	77.8	66.7	27.4	26.9***	16.1	27.4***	29.3	27.3**	41.2	42.8***
<i>Yes, Verified by Reporter</i>	25.4	38.9	11.1	33.3	61.9	49.5**	38.4	58.9***	42.0	53.4**	26.4	29.8***
CPS Referral Triggered	39.5	44.4	55.6	33.3	32.3	37.6***	72.4	34.7***	55.0	36.6***	47.4	41.0***

	BRIDGEPORT % of hospital total		GREENWICH % of hospital total		LAWRENCE & MEMORIAL % of hospital total		YALE NEW HAVEN % of hospital total		NETWORK % of network total		STATE % of state total	
BIRTHING PERSON & FAMILY DATA	PRE N=228	POST N=18^	PRE N=9^	POST N=3^	PRE N=310	POST N=93	PRE N=609	POST N=124	PRE N=1156	POST N=238	PRE N=5657	POST N=1677
Mean Age	26.58	29.11	31.44	36.33	28.35	29.41	28.58	29.62	28.15	29.58	27.99	28.55
Hispanic	29.4	33.3	22.2	33.3	13.2	16.1	12.6	9.7	16.2	14.7	20.6	22.9
Race^^	n=189	n=15	n=6	n=1	n=272	n=79	n=453	n=95	n=920	n=190	n=4336	n=1244
<i>Black/African American Only</i>	52.9	46.7	33.3	0	18.8	20.3	43.7	57.9	38.2	41.1	29.5	27.1
<i>White Only</i>	46.6	53.3	66.7	100	79.0	21.0	53.6	41.1	59.3	54.7	68.6	70.8
<i>Multi/Other</i>	0.5	0	0	0	3.7	8.9	2.6	1.1	2.5	4.2	1.9	2.1
Mean Number of CPS Risks (scale 0-3)	0.62	0.67	0.56	0.33	0.45	0.39	1.28	0.58	0.93	0.51	0.57	0.42
<i>Child Tested Positive for Maternal Misuse#</i>	17.5	0	22.2	0	7.4	1.1***	5.7	0.8***	8.7	0.8***	12.2	10.7
<i>Current Maternal Substance Misuse</i>	31.6	33.3	33.3	0	23.5	25.8	64.9	29.0***	47.0	27.7***	26.4	17.6***
<i>Family Present, Suspect Abuse/Neglect</i>	13.2	33.3	0	33.3	14.5	11.8	57.8	28.2***	36.9	22.3***	18.3	13.2***

	BRIDGEPORT % of hospital total		GREENWICH % of hospital total		LAWRENCE & MEMORIAL % of hospital total		YALE NEW HAVEN % of hospital total		NETWORK % of network total		STATE % of state total	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST
	N=228	N=18^	N=9^	N=3^	N=310	N=93	N=609	N=124	N=1156	N=238	N=5657	N=1677
Child Tested for Substances	61.8	0	44.4	33.3	44.8	5.4***	27.6	2.4***	39.1	3.8***	72.8	69.3**
<i>Meconium</i>	0	0	0	0	1.3	0	0	0	0.3	0	43.4	49.1***
<i>Urine</i>	60.5	0	44.4	33.3	15.2	1.1***	26.6	2.4***	30.4	2.1***	60.6	58.3
<i>Umbilical Cord</i>	0	0	0	33.3	39.7	4.3***	0.2	0	10.7	2.1***	6.4	2.7***

NEWBORN DATA CONTINUED	BRIDGEPORT % of hospital total		GREENWICH % of hospital total		LAWRENCE & MEMORIAL % of hospital total		YALE NEW HAVEN % of hospital total		NETWORK % of network total		STATE % of state total	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST
	N=228	N=18^	N=9^	N=3^	N=310	N=93	N=609	N=124	N=1156	N=238	N=5657	N=1677
Substance Exposures Reported												
<i>Alcohol</i>	3.1	0	0	33.3	5.8	6.5	6.7	7.3	5.7	6.7	3.0	3.0
<i>Buprenorphine</i>	0.4	0	22.2	0	8.7	6.5	3.0	5.6	4.2	5.5	5.2	4.9
<i>Cocaine</i>	6.1	38.9	11.1	0	10.6	15.1	13.6	16.5	11.3	16.8*	8.1	8.7
<i>Marijuana</i>	85.5	72.2	66.7	100	73.5	73.1	71.3	68.5	74.7	71.0	79.1	82.2**
<i>Methadone</i>	10.5	16.7	11.1	0	17.1	11.8	14.4	22.6*	14.4	17.6	8.8	8.6
<i>Non-Rx Opiate</i>	2.6	11.1	0	0	6.1	7.5	9.9	12.9	7.4	10.5	6.0	7.9**
<i>Other Illegal/Non-Rx Substance</i>	5.3	5.6	11.1	0	4.8	11.8*	5.4	7.3	5.3	8.8*	4.3	4.2
<i>PCP</i>	1.8	11.1	0	0	0.6	0	4.4	1.6^	2.9	1.7	1.2	0.8
<i>Rx Benzodiazepine</i>	1.8	0	33.3	0	2.3	2.2	4.3	8.1	3.5	5.0	2.7	2.0
<i>Rx Opiate</i>	3.1	0	0	0	2.3	0	3.1	10.5	2.9	5.5*	3.0	2.3
<i>OTC Exposure</i>	0	0	0	0	1.3	0	1.1	1.6^	1.0	0.8	0.3	0.2

To summarize...

- Newborn toxicology testing in the setting of prenatal substance exposure is usually not necessary to provide optimal clinical care
- When it is clinically indicated, urine toxicology testing provides actionable clinical information
- Informed consent should be obtained before ordering newborn toxicology testing in the vast majority of circumstances
- Implementing an objective protocol for toxicology test ordering resulted in significantly decreased rates of testing across all groups and differences between groups became minimal
- In enacting a practice guideline with these key messages, we did not see safety events occur as a result

