

NICHHD

NEONATAL RESEARCH NETWORK



Impact of Maternal COVID-19 on Outcomes of Extremely Preterm Infants in the Neonatal Intensive Care Unit

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Disclosures

Speaker: Emily A. Messick, DO

- I have no financial relationship to disclose or conflict of interest to resolve.
- This presentation will not involve discussion of unapproved or off-label, experimental or investigational use of a drug.

COVID-19 During Pregnancy

- COVID-19 during pregnancy is associated with preterm birth and stillbirth
- In term neonates, clinical manifestations of COVID-19 vary widely:
 - Asymptomatic infection
 - Fever, cough, hypoxemia, respiratory distress or pneumonia
 - GI symptoms (feeding difficulties, diarrhea, emesis)
 - Rare: Disseminated intravascular coagulation, neurological manifestations, multisystem inflammatory syndrome, death
- Less is known about vertical transmission and NICU outcomes in extremely preterm infants exposed to maternal SARS-CoV-2 infection during gestation

Objectives

- 1) To determine the prevalence of SARS-CoV-2 detection among mothers who delivered preterm infants <29 weeks' gestation
- 2) To determine the rate of vertical transmission
- 3) To describe possible association(s) of maternal COVID-19 infection during pregnancy with adverse NICU outcomes

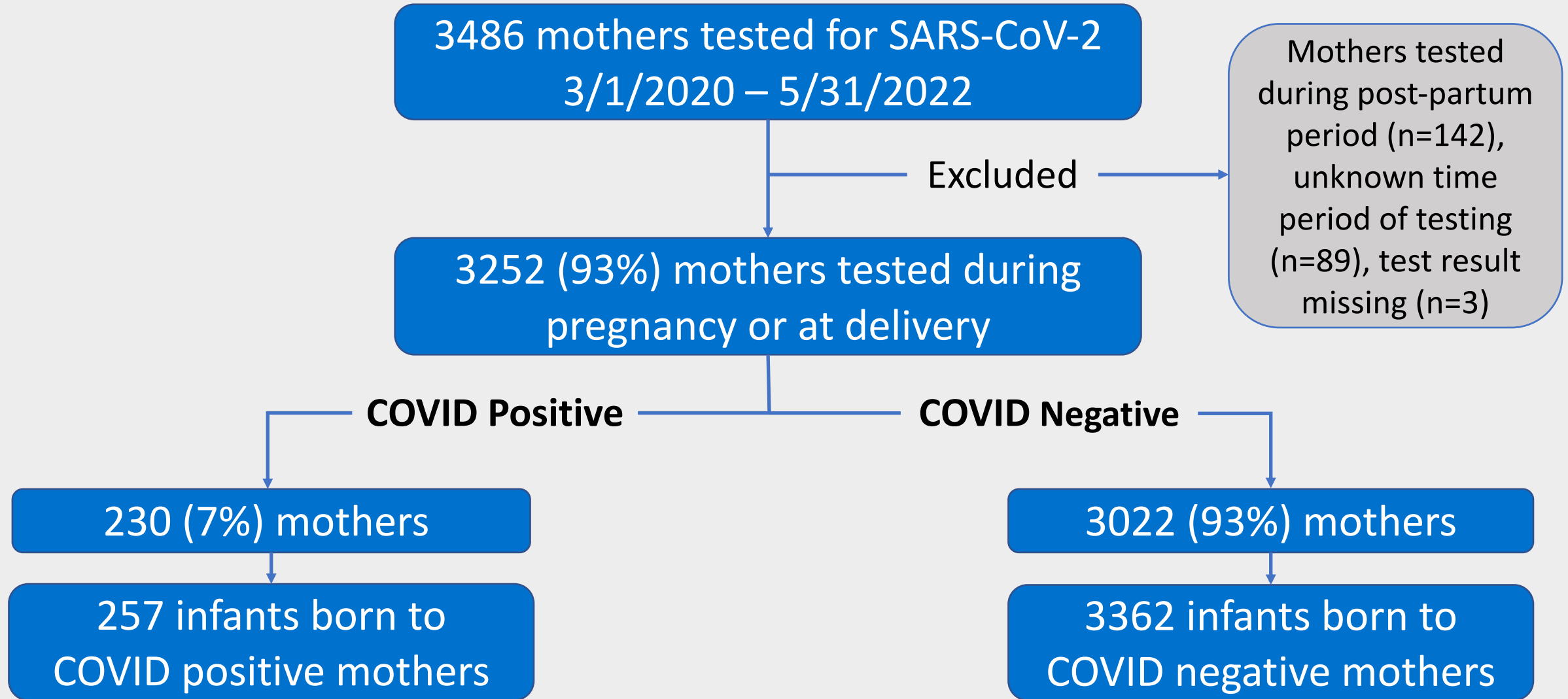
Methods

- Prospective observational study: 3/1/2020 - 5/31/2022
- 15 centers of the NICHD Neonatal Research Network
- Inborn infants: birth weight 401-1000 grams and/or <29 weeks' gestation
- Born to mothers tested for SARS-CoV-2 during pregnancy
- Maternal and infant testing for SARS-CoV-2 was performed per center's infection prevention policy

Methods


- Pertinent maternal and infant demographic, clinical, laboratory, and NICU outcome data were recorded
- Infant outcomes were compared between infants born to mothers with and without SARS-CoV-2 infection during pregnancy
- Data analyzed using nonparametric Kruskal-Wallis test for continuous outcomes and Chi-square/Fisher's Exact test for categorical outcomes

Results



Results: Reason for Maternal COVID Testing

- 3252 mothers tested for SARS-CoV-2 at a mean (\pm SD) of 25 (\pm 37) days before delivery
- 47% tested at delivery

	Maternal SARS-CoV-2 Infection	
	Yes	No
No. of mothers	230 (7%)	3022
Reason for testing:*		
Screening	62%	95%
Symptomatic	34%	3%
Exposure	4%	1%
Other	<1%	<1%

*22 (<1%), not known

Results: Reason for Infant COVID Testing




	Maternal SARS-CoV-2 Infection	
	Yes (n=230)	No (n=3022)
No. of infants	257 (7%)	3362 (93%)
No. of infants tested	141 (55%)	979 (29%)
Reason for testing:		
Mother suspect/has COVID	62%	8%
Exposure (other than mom)	4%	13%
Clinical signs/symptoms	13%	29%
Screening	20%	50%
Other	1%	1%

Results: Maternal Characteristics



	Maternal SARS-CoV-2 Infection		p-value
	Yes (n=230)	No (n=3022)	
Age (years; median, IQR)	30 (25, 34)	29 (25, 34)	0.94
Race:			0.27
Black	39%	39%	
White	45%	49%	
American Indian/Alaska Native	1%	1%	
Asian	2%	4%	
Native Hawaiian/Pacific Islander	1%	1%	
Ethnicity:			<0.01
Hispanic	23%	18%	
Not Hispanic	73%	80%	

Results: Maternal Characteristics


	Maternal SARS-CoV-2 Infection		p-value
	Yes (n=230)	No (n=3022)	
Multiple gestation	11%	15%	0.11
Diabetes before pregnancy	7%	5%	0.35
Diabetes during pregnancy	6%	6%	0.99
Pre-eclampsia	43%	38%	0.16
Magnesium sulfate	86%	84%	0.34
Antenatal steroids	89%	89%	0.96

Results: Maternal Characteristics



	Maternal SARS-CoV-2 Infection		p-value
	Yes (n=230)	No (n=3022)	
Preterm premature ROM	35%	46%	<0.01
Prolonged ROM (≥ 18 hours)	19%	28%	<0.01
Histologic chorioamnionitis	34%	45%	<0.01
Clinical chorioamnionitis	12%	16%	0.15
C-Section	70%	68%	0.48

Results: Neonatal Infection and Vertical Transmission

	Maternal SARS-CoV-2 Infection	
	Yes (n=230)	No (n=3022)
No. of infants	257	3362
No. of infants tested	141 (55%)	979 (29%)
Infant SARS-CoV-2:		
Positive:	2 (1.4%)	5 (0.5%)
≤ 72 hours	2	1
>72 hours	0	4
Negative	99%	99%

Vertical Transmission Rate: 1.4%

Results: Infant Characteristics



	Maternal SARS-CoV-2 Infection		p-value
	Yes (n=230)	No (n=3022)	
No. of infants	257	3362	
Gestational age (wk; median, IQR)	27 (24, 28)	26 (24, 28)	0.10
Birth weight (g; median)	830	810	0.30
APGAR, 1 min (median)	4	4	0.53
APGAR, 5 min (median)	7	7	0.24
Head circumference (cm; median)	24	23.5	0.09
Small for gestational age	20%	18%	0.47

Results: Infant Outcomes



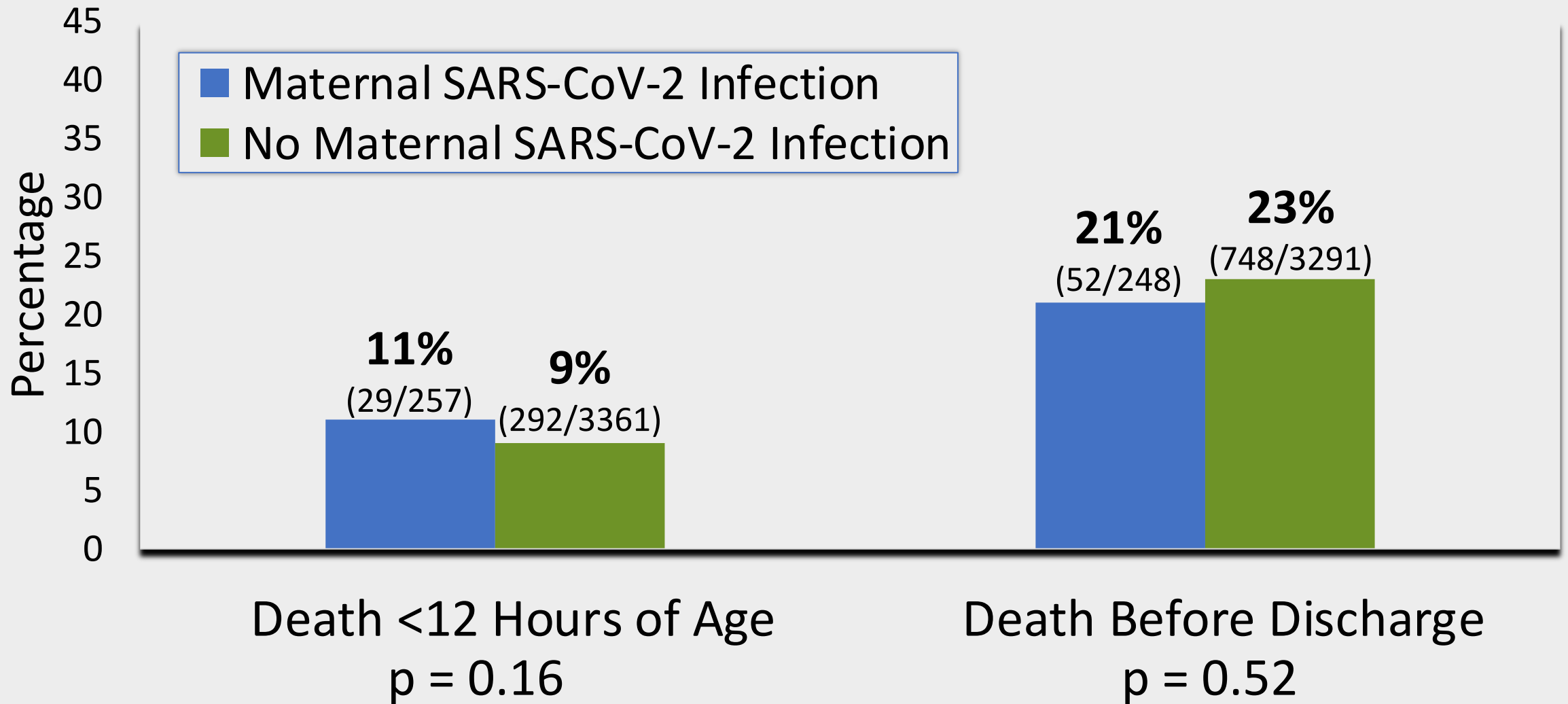
	Maternal SARS-CoV-2 Infection		p-value
	Yes (n=230)	No (n=3022)	
No. of infants	257	3362	
IVH (Gr III/IV)	14%	14%	0.82
Seizures	2%	1%	0.56
Early-onset sepsis	4%	2%	0.34
Antibiotics \geq 5 days	18%	23%	0.17
Late-onset sepsis	15%	18%	0.28

Results: Infant Outcomes



	Maternal SARS-CoV-2 Infection		p-value
	Yes (n=230)	No (n=3022)	
No. of infants	257	3362	
NEC	15%	11%	0.06
BPD	52%	53%	0.76
Any ROP	57%	61%	0.30
Severe ROP (\geq Stage 3)	16%	13%	0.24
NICU duration (d; median, IQR)	80 (56, 118)	87 (54, 120)	0.46

Results: Infant Mortality



Conclusions

- Among a large cohort of extremely preterm infants, the prevalence of maternal SARS-CoV-2 infection during pregnancy was 7%.
- The vertical transmission rate of SARS-CoV-2 was low at 1.4%.
- There was no identified association between maternal COVID-19 infection during pregnancy and adverse in-hospital infant outcomes.

Neonatal Research Network Centers: 2016-2023

- Brown University
- Case Western Reserve University
- Cincinnati Children's Medical Center
- Duke University
- Emory University
- Nationwide Children's Hospital,
The Ohio State University
- RTI International
- Stanford University
- University of Alabama at
Birmingham
- University of Iowa
- University of New Mexico
- University of Pennsylvania
- University of Rochester
- University of Texas Southwestern
- University of Texas Health Science
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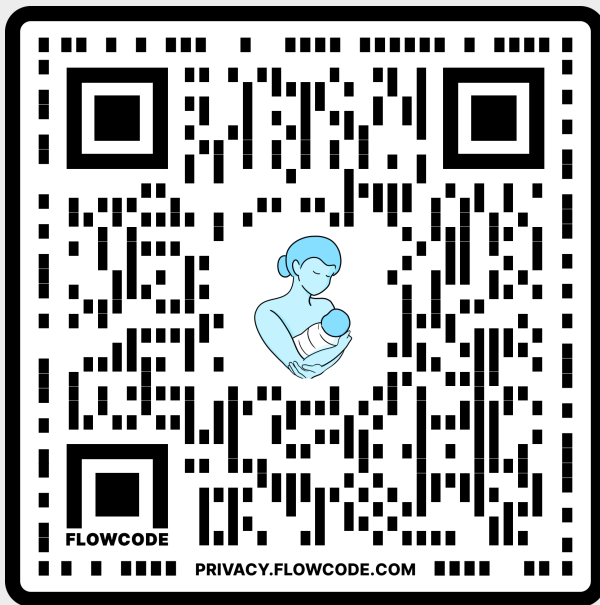
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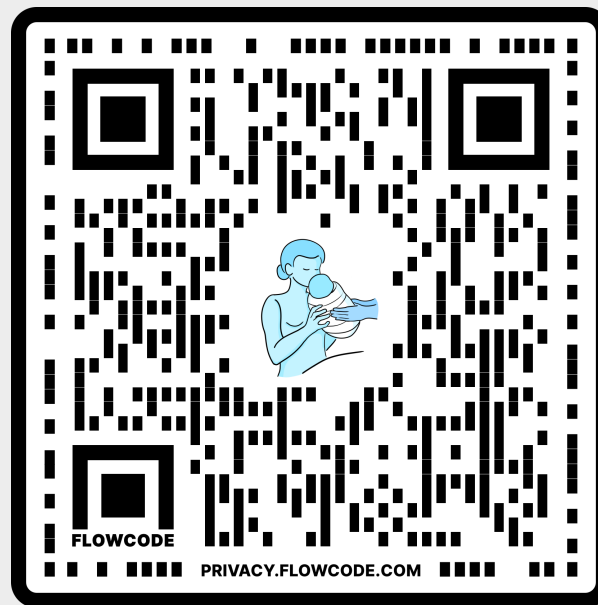
Graphics: Will Ray, PhD (NCH)

Questions?

References



Abstract



NRN Abstracts

