Neonatal Abstinence Syndrome and Children's Integrated Services

SCOPE Vermont Session 4, March 28, 2022

Sara Forward, LICSW

Children's Integrated Services Personnel Development Coordinator

Center on Disability and Community Inclusion, UVM

SCOPE Vermont Training Series

Supporting Children of the OPioid Epidemic

Connect with Project SCOPE Vermont

go.uvm.edu/scopevt

www.med.uvm.edu/vchip/icon

This project is supported, in part, by:

Objectives

- Describe the role of early childhood professionals in monitoring child's development
- Discuss developmental milestones and red flags in social-emotional development for children experiencing NAS or similar exposures
- Identify resources and referral sources as well as potential barriers from identification to referral for children with NAS or similar exposures
- Discuss longer-term developmental outcomes for children with NAS (based on what is currently known in the literature) and identify one strategy to support these children in their development

Developmental Areas Covered:

- Brain Development
- Vision
- Motor
- Speech/Language
- Cognition
- Behavior

Brain Development

Some reported differences in brain development include:

- Reduced structural connectivity within the brain observed by MRI at 4-6 weeks
- Differences in how the amygdala connects to different regions of the brain observed by fMRI at <48 weeks
- Altered brain matter that appears to persist throughout childhood
- Reduced grey matter volume of newborns

Brain Development

Summary of articles which used advanced multimodal imaging

Author	Age of Patients	Type of neuroimaging	Neuroimaging abnormality	Neuroanatomic vulnerability
Wollman et al, 2017[49]	Children	Volumetric imaging	Reduced gray matter volume	Frontal–cerebellar Frontal–insular
Walhovd et al, 2010[50]	Children	Diffusion tensor imaging	Reduced fractional anisotropy (white matter integrity) (ILF) and (SLF)	Frontal–temporal Prefrontal
Wolhovd et al, 2007[51]	Children	Volumetric imaging	Reduced gray matter volume—amygdala, basal ganglia, cerebellum, anterior cingulate, lateral orbital frontal	Frontal–cerebellar Frontal–insular
Upadhyay et al, 2010[52]	Adult	Structural imaging diffusion tensor imaging functional connectivity	Reduced volume of amygdala Decreased fractional anisotropy of the white matter tracts that project to the amygdala	Para-limbic and limbic
Bora et al, 2010[53]	Adults	Diffusion tensor imaging	Reduced fractional anisotropy (white matter integrity) in the ILF and corpus callosum and thalamic radiations	Frontal–temporal Prefrontal
Monnelly et al, 2017[54]	Neonates	Diffusion tensor imaging	Reduced fractional anisotropy (white matter integrity) in the ILF and internal and external capsules	Frontal–temporal Prefrontal
Walhovd et al, 2012[55]	Infants	Diffusion tensor imaging	Reduced fractional anisotropy (white matter integrity) in the ILF and SLF	Frontal–temporal Prefrontal
Yuan et al, 2014[56]	Infants	Volumetric imaging	Reduced gray matter volume	Basal ganglia

Vision Development

Children with NAS have been observed to have increased risk of :

- Nystagmus [15, 88, 140]
- Strabismus [15, 88, 175]
- Decreased visual acuity [15, 88]
- Refractive errors [88]
- Cerebral Visual Impairment [88] (aka cortical visual impairment)
- Delayed visual maturation [140]
- Failed visual exams [130]

Vision Development – Why this matters

Visual impairment can have a significant impact on a child's development due to the importance of interacting and exploring your environment to learn.

Developmental areas that can be impacted include: social skills, motor skills, language acquisition, learning, and independence in daily living skills[1]

Motor Development

Research on motor outcomes for children born with NAS/prenatal opioid exposure have varied, with some infants not showing motor delays, whereas others experience atypical motor patterns and the experience of atypical neurologic exams.

Next, we discuss studies on motor development in:

- Infancy
- Toddler – School Aged
- Young adult

Motor Development: Infancy

Some commonly reported atypical motor outcomes include:

- Atypical motor patterns during first year of life – including writhing and fidgety movements [181]
- Increased occurrence of torticollis [213]
- Higher incidence of atypical neurologic examinations [177]

For infants in the withdrawal process, hypertonia can lead to exaggerated back arching as the body moves into extension. Swaddling and non-nutritive sucking can help decrease these pronounced and atypical body positions. [6]

Motor Development: Toddler/School-age

A systematic review found children (6 and younger) with prenatal opioid exposure performed lower on motor development.[81]

Study observing 25 children with buprenorphine exposure in-utero with follow up at 5-6 years old. Group performance on *McCarthy Motor Scale* significantly lower than McCarthy standard sample.

Study comparing opiate exposed infants (n=67) and healthy control infants (n=133), at 3 years of age the exposed infants showed significantly lower scores on the *McCarthy Motor Scale*

Motor Development: Long-Term

One study compared 45 children born with opioid and polysubstance exposure, to 48 children without prenatal exposure [27]

Long-term follow up (ages ranged 17-21) showed that both groups had fine motor functioning within normal ranges, however the prenatally exposed group performed poorer than control group.

Speech & Language Development

Emerging research suggests that a portion of children with NAS/prenatal opioid exposure experience delays in speech & language development [1, 38, 214, 255, 273]

An article published in ASHA's Leader Magazine expresses the importance of expanding the current knowledge on NAS and it's relationship to infant feeding skills, communication, and literacy for children and adults who were born prenatally exposed to opioids. [273]

Speech & Language Development: Tennessee Study

2018 study from the Tennessee Department of Health, linking Tennessee Medicaid, birth certificate and special education data for 1,185 children with NAS, and 5,441 children without NAS the following Speech-Language outcomes were observed [38]

- A significantly higher proportion of children with a history of NAS were diagnosed with a speech or language impairment (10.3% vs. 8.3%, p=.001)
- Children with a history of NAS were significantly more likely to receive speech therapy than children without a history of NAS (14% vs. 10.8%, p=.0002)

What this suggests: Children born with NAS can experience learning challenges in childhood. More studies needed to better understand long-term effects.

Speech & Language Development:
Experiences of Speech Language Pathologists

A graduate thesis from 2017, surveyed speech language pathologists (SLP) about communication difficulties of children with known or suspected NAS.[272]

Most common comorbid communication difficulties identified for children with known or suspected NAS by SLPs' included:

- Language Disorders: Sub Skills - Receptive Language & Expressive Language
- Literacy Disorders: Sub Skills - Phonological Awareness & Reading Comprehension
- Speech Sound Disorders

Speech & Language Development Longitudinal Study

2020 longitudinal study observed language delays (at 1, 5, and 10 years) comparing children with NAS (658) and a "high risk" control group (730) [214]

Follow Up	NAS Group	High-Risk Group
1 year	65%	74%
5 years	81%	82%
10 years	24%	12%

What this suggests: Children with NAS had a different pattern of language delay over time, which calls for increased need for developmental surveillance throughout early and middle childhood.

Important to note that high-risk sample had high rates of exposure to other substances (e.g., tobacco, alcohol, cocaine, marijuana).

Cognitive Development

There is emerging research suggesting that NAS and prenatal opioid exposures can impact cognitive development throughout childhood.

Next few slides share findings from several relevant studies.

Cognitive Development:
Infants/Toddlers

A systematic review & meta-analysis observing cognitive and motor outcomes of children with prenatal opioid exposure looking at children 6-24 months[81]

- Data from 13 studies, 584 children with prenatal exposure, and 1496 controls
- Analysis revealed a significant difference in neurocognitive development, with children with prenatal exposure performing lower (d= -0.52; P<.001)

Follow up study of 149 children – maternal marijuana use (n=38); maternal cocaine (n=35); maternal methadone maintenance (n=24); and controls (n=49) [177]

- Administration of the Bayley at 18-24 months methadone group had significantly lower cognitive scores compared to other groups (p< .05)

Cognitive Development:
Preschool / Early Elementary (1)

A systematic review & meta-analysis observing cognitive and motor outcomes of children with prenatal opioid exposure looking at children 3-6 years old[81]

- Data pulled from 13 studies, 719 children with prenatal exposure, and 1346 controls
- Analysis revealed a significant difference in neurocognitive development, with children with prenatal exposure performing lower ($d = -0.38$; $P < .02$)

Cognitive Development:
Preschool / Early Elementary (2)

Opiate exposed infants (n=67) assessed at 18 months and 3 years of age, compared to health control infants (n=133) [97]

- Greatest difference in cognitive abilities between groups at 18 months, showing significantly lower cognitive scores on the Bayley-III ($p < .001$)and Vineland Maturity Scale ($p < .05$)
- Significant cognitive differences persisted at 3-year assessment using the Stanford Binet Intelligence Test ($p < .01$) and Reynell Language Scale ($p < .05$)

Cognitive Development:
School Age / Young Adult (1)

A systematic review & meta-analysis observing cognitive and motor outcomes of children with prenatal opioid exposure looking at children 7 to 18 years old[81]

- Data from 3 studies, 152 children with prenatal exposure, and 140 controls
- Analysis revealed a significant difference in neurocognitive development, with children with prenatal exposure performing lower (d= -0.44; P= .23)

Cognitive Development:
School Age / Young Adult (2)

A Longitudinal Study on cognitive development comparing children with prenatal opioid exposure (n=72) and health controls (n=58) – follow up at ages 1, 2, 3, 4-5, and 8.5 [47]

- Exposed boys scored significantly lower on all assessments ($p<.001$)
- Exposed girls scored lower than the control group at all assessments, but did not have significant difference until final assessment ($p< .001$)
- This study showed that boys with prenatal exposure had significant and stable lower performance, whereas girls experienced increasing cognitive difficulties over time.

Behavior

Existing research suggests that NAS and prenatal opioid exposures can impact behavior throughout childhood.

Commonly reported behavioral difficulties in this population include inattention, difficulties with self-regulation, and impulsivity.

Next few slides discuss studies on behavior development at various points of childhood.

Behavior: Infancy

Some studies on early behavioral differences suggest infants with NAS/prenatal opioid exposure may experience difficulties with behavior during infancy [58, 72]

- Showing a negative affect
- Decreased self-regulation
- Increased sensory seeking behaviors

Behavior: Toddler / Preschool

Chart review (n=87) from a NICU follow up clinic of children with NAS. At 2-years, 26% of families reported tantrums, hyperactivity, sensory issues, and difficulty falling/staying asleep [1]

Systematic review of 5 articles. [96] Children with prenatal exposure had poorer trends (not statistically significant) in growth, perceptual, emotional, intellectual, and behavioral capabilities.

Children born to mothers on buprenorphine maintenance (n=25) completed neurobehavioral testing and experienced elevated levels of hyperactivity, impulsivity, attention problems [14]

Behavior: School Age (1)

Mental health status of school-aged children with a history of prenatal exposure to alcohol and other substances using the Strengths and Difficulties Questionnaire.

105 children with prenatal exposure (48 = FASD; 57=other exposures) [28]
Substance exposed group showed significant differences in all 5 SDQ subscales (emotional problems, hyperactivity problems, conduct problems, peer problems, prosocial behavior).

Behavior: School Age (2)

Study examined cognitive and socioemotional functioning of children born to mothers receiving substance abuse treatment while pregnant [147]

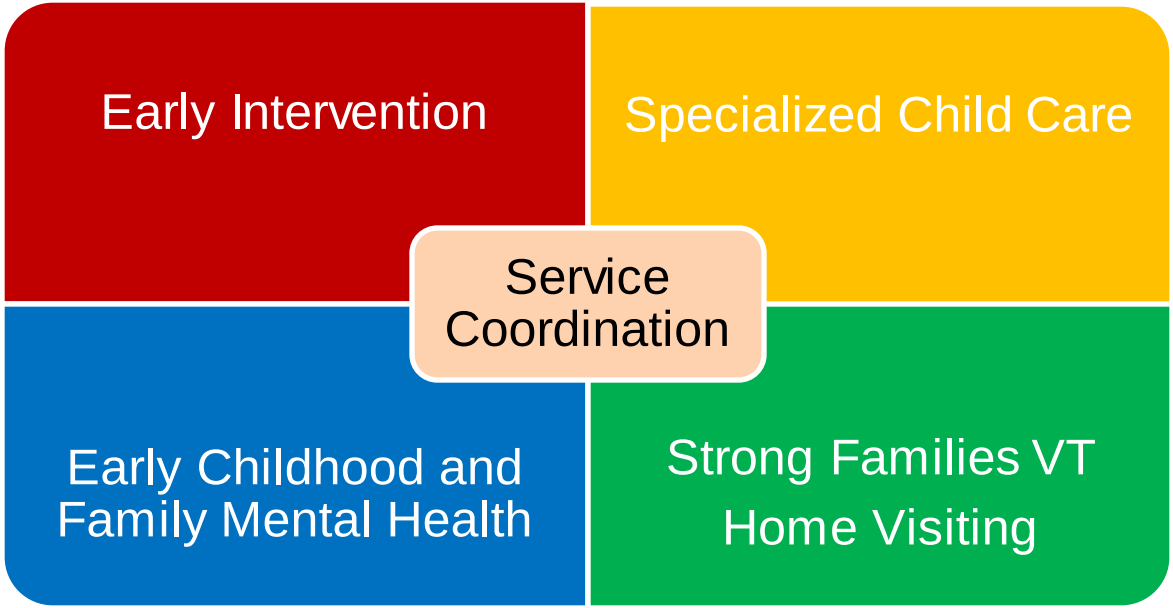
- Three testing groups all aged 4.5 years: children born to mothers with substance abuse problems (n=22); children born to mothers with mental health problems (n=18); youth born to low-risk groups (n=26).
- Children born to mothers with substance abuse and mental health concerns were more likely to have socioemotional difficulties.

Behavior: School Age (3)

Longitudinal cross-informant study comparing 72 children with prenatal exposure to heroin and multiple drugs, with 58 children with known prenatal risk factors. [26]

- At 4.5 years preschool teachers reported regulatory problems, whereas caregivers did not report problems until 8.5 years old.
- Children at 8.5 years had more significantly more regulatory problems reported by caregivers and teachers compared to comparison group.
- Caregivers reported that regulatory problems seemed to increase as children entered more complex social situations.

Children's Integrated Services:



CIS Population Served

Primary Population:

Prenatal to 6 years

~5400 Referrals Annually

~1500 Served Monthly

82% Served are Medicaid Recipients

~50% Receive Early Intervention Services

early intervention (EI)

Population

Children with or at risk of developmental delays or disabilities

Services

Wide-ranging, including developmental education and occupational, physical, and speech therapies

Authority

EI is an entitlement under the federal IDEA Part C for all eligible children 0-3

State must ensure children receive necessary services, regardless of insurance status

Funding

VT receives an annual Part C grant $2.3 million

State acts as payor of last resort, reimbursing what is not covered by other insurance (copays, etc.)

Paid through monthly case rate and fee-for-service

Specialized Child Care

SCC Coordinators assist families in accessing and maintaining childcare placements with the qualifications required to meet their specialized needs

Care Coordination

Grants to transportation providers allow eligible families to safely and reliably access specialized child care

Transportation

SAGs provide childcare programs with funding for supports needed to safely maintain placements, such as assistive devices or individual aides

Special Accommodation Grants

Home Visiting

strong families VERMONT start at home

Sustained Home Visiting

- Registered Nurses or Family Support workers deliver long-term, structured, evidence-based home visiting programs. The programs improve maternal and child health and family economic self-sufficiency, promote optimal child development, prevent child abuse and neglect, and coordinates referrals to community resources.

Responsive Home Visiting

- Maternal and Child Health nurses and/or Family Support workers provide regular home visits in response to time-limited needs. These visits support and strengthen families' health, wellbeing, parenting skills, social connections and ability to address stressors.

Early childhood & family mental health (ECFMH)

Treatment Services

- Address an event or detect social, emotional, and/or behavioral mental health developmental problems,
- Provide preventative and early intervention supportive services to mitigate these problems
- Expand young children's access to mental health services

Consultation and Education Services

- Improve the overall capacity of caregivers to support the healthy social, emotional and behavioral development of young children.
- May include support for child care staff and other service providers to enhance understanding and skill in addressing factors within their programs to support children's healthy social, emotional and behavioral health and development

CIS integrates the early childhood system across sectors

CIS collaborates with multiple partners for initiatives including:

- Specialized childcare with CDD and FSD
- Strong Families VT and Help Me Grow with VDH
- IDEA Part C with AOE co-leads
- ECFMH with DMH
- Collaborative early childhood workforce efforts with multiple stakeholders

Integrated multi-disciplinary Teaming at every level

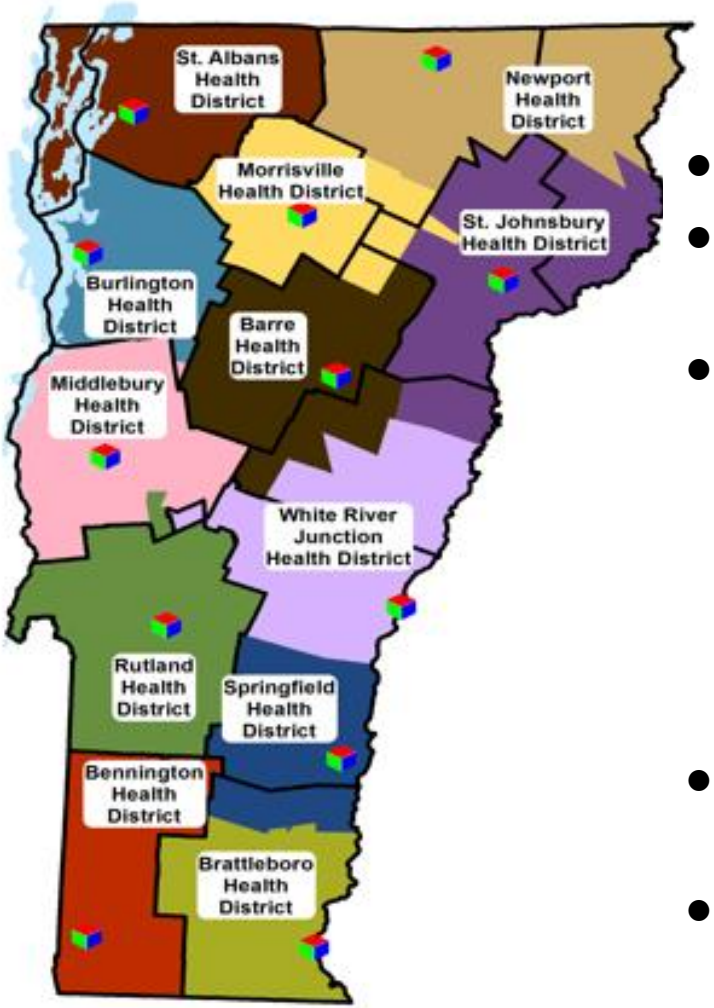
CIS State Team: Staff in Waterbury provide program oversight and support

Fiscal Agent Contractor: A single agency in each region holds the CIS bundled contract

Regional CIS Admin Team: A coalition of providers and partners governs the regional CIS system and ensures service delivery

Local CIS Coordinators: An individual in each region coordinates partners, reporting, etc.

Regional Intake & Referral Meetings: Weekly meetings triage referrals and collaborate to serve children and families



How is CIS Structured?

- Central CIS State Administrative Team
- A statewide network of community agencies and providers
- Multi-disciplinary Teaming:
  - Fiscal Agent
  - Administrative/Systems Team
  - CIS Coordinator
  - Referral and Intake Team
  - CIS Consultation Team
- Families and providers work together based on a shared OnePlan
- St. Albans and Middlebury serve under Integrated Family Services contracts, which are held and managed by the Department of Mental Health.

Main Components of a Family's Connection (part 1)

Day 1

- Referral Received by CIS Coordinator

By Day 5

- Initial contact with family to determine next steps

By Day 45

- Intake, screening
- Assessments and Evaluations
- Initial OnePlan meeting
- Eligibility for services determined
- **OnePlan developed with goals and outcomes**

Main Components of a Family's Connection (part 2)

Day 1 of the OnePlan

- Family signed consent to receive services
- All parties have signed OnePlan
- Services must begin within 30 days

Ongoing OnePlan Monitoring

- Plan is reviewed and updated as needed, at least every six months

Six Month Review

- At a minimum, a review must happen six months from the date of the original, signed OnePlan

Annual Review

- OnePlan reviewed and updated one year from the original, signed OnePlan

What is the OnePlan?

The One Plan is Vermont's Individualized Family Service Plan (IFSP), which is the heart of early intervention. "The One Plan is a vehicle for developing a comprehensive and individualized child and/or family plan with the goal of supporting the family's competence and competency."

- An overview of primary stages of CIS program: Referral and Intake; Screening, Assessment & Eligibility Determination; Individualized Goals and Outcomes; Service Delivery; and Transition/Exit.
- Guides for conversations with clients, including their strengths, resources, concerns, and priorities.
- A service grid for services delivered.
- A family consent.