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Social Health Information Exchange Feasibility for the Plan of Safe Care Pilot

Using Technology to Drive Maternal Health Innovation

REPORT HIGHLIGHTS:

- Improving maternal health and closing the gap on disparities will require **cross-system solutions** that address physical, behavioral, and social determinants of health.
- Social Health Information Exchange (S-HIE) can catalyze **whole person care** by leveraging technology to reduce fragmented care systems.
- This study assessed **feasibility of using S-HIE for maternal health innovation**, drawing on the use case of Plans of Safe Care for maternal-infant dyads affected by prenatal substance use.
- By unpacking the ***why***, ***what***, **and** ***how*** **of a S-HIE,** concrete guidance and opportunities for investment in this space are identified.

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Executive Summary

Background

Social Health Information Exchange (S-HIE) is recognized in Colorado as a prime opportunity to improve care coordination and reduce barriers that providers, individuals, community-based services, health care teams, funders, and insurers experience in delivering high-quality care with effective resource use. A S-HIE system leverages technology to connect information across physical, behavioral, and social health providers to better address social determinants of health (SDOH). The Colorado Department of Public Health and Environment partnered with the Colorado Evaluation and Action Lab to explore the role of technology in driving maternal health innovation, with a focus on feasibility of S-HIE. This feasibility study uses Plans of Safe Care (POSC) as a concrete use case to promote actionability and uncover opportunities for innovation that cross-cut maternal health.

Data Sources

Four primary sources were used to assess feasibility of leveraging S-HIE for maternal health innovation:

- Interviews with Subject Matter Experts (SME)
- Review of Reference Documents
- Data Export on SDOH Data from a S-HIE
- Personas for Plans of Safe Care

Why S-HIE?

Maternal health and disparities are largely influenced by SDOH. S-HIE can be used to act on the SDOH that are prevalent within a given community and salient for a family to receive care coordination.

What is a S-HIE?

A S-HIE system promotes coordinated care solutions to achieve whole-person health. A comprehensive S-HIE has five major capabilities:

1. **Screening and assessment activities**: identifying, social, physical, and behavioral health gaps and strengths of the person.
2. **Referral directory**: creating an accessible cross-sector community resource inventory.
3. **Closed loop referrals:** bi-directional flow of information and confirmation of referral receipt.
4. **Case management**: tracking for follow-up, emergent needs, and care receipt.
5. **Health and business analytics:** using analytics to support care coordination and strengthen the social-health infrastructure of a community.

How is a S-HIE realized?

The “What” and “Why” of a S-HIE can be achieved when all core capabilities are present and used to ensure that the underlying root causes of maternal health and disparities are addressed, and coordination of services is not limited to the scope of a provider who recognizes the initial need. Personas of birthing people with substance use during a pregnancy and their providers illustrate how a S-HIE could be leveraged to initiate and implement Plans of Safe Care.

Key opportunities to leverage S-HIE for maternal health innovation and leading opportunities are identified to support CDPHE in continuing momentum forward.

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Acknowledgements

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Data Sources

Data for this study came from key informant interviews, reference documents identified during the discovery process, a dataset prepared by CCMCN for a sample of Federally Qualified Health Centers in Colorado, and personas developed in collaboration with CHI and Illuminate Colorado.

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Note on Gender-Inclusive Language

The Colorado Lab affirms our commitment to the use of gender-inclusive language. We are committed to honoring the unique gender identity of each project participant and validate that pregnancy, birth, and family formation are experienced by individuals across the gender continuum. Throughout this report, we follow the guidance of the Associated Press Stylebook and the Chicago Manual of Style and use the gender-neutral, singular "they" when appropriate and use gender-inclusive terms when referring to experiences of childbirth.

CDPHE Statement on Equity

The Colorado Department of Public Health and Environment acknowledges that generations-long social, economic, and environmental inequities result in adverse health outcomes. They affect communities differently and have a greater influence on health outcomes than either individual choices or one's ability to access health care. Reducing health disparities through policies, practices and organizational systems can help improve opportunities for all Coloradans.

Introduction

- **S-HIE Project Background**
- **Importance of Maternal Health**

Project Background

Social Health Information Exchange (S-HIE) is recognized in Colorado as a prime opportunity to improve care coordination and reduce barriers that providers, individuals, community-based services, health care teams, funders, and insurers experience in delivering high-quality care with effective resource use.[1, 2] Colorado has several local and regional efforts underway to build S-HIE systems, with each effort targeting different needs, goals, and users. In addition, the Colorado Office of eHealth Innovation (OeHI) recently selected to partner with Resultant to develop a scalable, adaptable, and sustainable statewide S-HIE architecture. Resultant is a people-first technology consulting company with a long history of collaborating with state agencies to deliver large, complex data solutions.

> **"A S-HIE System uses technology and other tools to allow data and information sharing among health care and social determinants of health service providers to improve care coordination for individuals. This includes individual and aggregated data." (Colorado Health Institute & OeHI, 2021)**

The Colorado Department of Public Health and Environment (CDPHE) received a $5 million grant through the State Maternal Health Innovation & Data Capacity Program, funded by the Health Resources and Service Administration. This five-year grant aims to explore, develop, and test innovations to promote maternal health and decrease disparities among Colorado childbearing families. This report fulfills the year one grant requirement to explore the role of technology in driving maternal health innovation, with a focus on feasibility of S-HIE.

Importance of Maternal Health

In Colorado between 2016 and 2020 there were 174 pregnancy-associated deaths (54.7/100,000 live births) and 80 pregnancy-related deaths (25.1/100,000 live births).[3] Suicide and unintentional drug overdose were the two leading causes of maternal death; among pregnancy-related deaths, one in two people had either a mental health condition or substance use as a contributing factor to their demise. Further, significant health disparities persist, with American Indian/Alaska Native birthing people being 2.8 times more likely to die during the childbearing year and Black/African American birthing people 1.9 times more likely. Discrimination contributed to over half (58.2%) of maternal deaths.

Eighty-nine percent of pregnancy-related deaths were preventable. This context begs the questions: What will it take to move the needle on these outcomes? What will it take to shift to a space of positive birthing experiences as well as decreases in morbidity and mortality? These questions underscore the need for innovation in maternal health—and illustrate why whole person care is critical to success.

Colorado's maternal mortality data signal that addressing the physical health care needs of birthing people alone will not suffice. There are multiple social determinants of health (SDOH) and structural determinants of equity that must be addressed to achieve systemic change (Appendix A: The Ecology of Perinatal Health).

Approach to Assessing Feasibility

Feasibility of What?

Maternal health innovation is a large space.

Can S-HIE help address pressing problems of practice in maternal health?

This study uses Plans of Safe Care (POSC) as a concrete use case to promote actionability and uncover opportunities for innovation that cross-cut maternal health.

Four primary sources were used to assess feasibility of leveraging S-HIE for maternal health innovation:

- Interviews with Subject Matter Experts (SME)
- Review of Reference Documents
- Data Export on SDOH Data from a S-HIE
- Personas for Plans of Safe Care

Interviews with leading Colorado SMEs in S-HIE and health information technology

We conducted interviews with 15 individuals, representing ten different organizations, including OeHI, the Behavioral Health Administration (BHA), CDPHE, Colorado Health Institute (CHI), Contexture, Unite Us, Pikes Peak United Way, Colorado Community Managed Care Network (CCMCN), Illuminate Colorado, and HD Consult. The goal was to gain insight into the ideal and the practical uses of S-HIE to support coordinated care for 1) closed loop referral systems, and 2) identification and prioritization of pilot sites for maternal health innovation. These interviews were also used to learn about existing efforts that may complement or overlap with S-HIE for maternal health innovation.

Review of reference documents describing S-HIE in Colorado and nationally

We compiled and reviewed grey literature[i] describing S-HIE technical requirements, practical uses, and visioning for Colorado. These materials included published work of the Metro Denver Partnership for Health, Family Connects, OeHI, leading S-HIE vendors, SDOH screenings, and the Office of the National Coordination (ONC) for Health Information Technology. These reference documents were located through literature searches and resource gathering that occurred during the SME interviews.

Data export that aggregates geographical SDOH data from a S-HIE

We requested data from CCMCN to pilot use of SDOH data from a S-HIE to understand how those data could inform pilot programs. This data request was focused on the POSC pilot and maternal-infant dyads affected by substance use during a pregnancy. The data export and consultation with CCMCN elucidated opportunities to leverage data to inform selection of POSC catchment areas and implementation efforts.

Personas for Plans of Safe Care

We partnered with CHI to create personas of birthing people and providers to illustrate how a S-HIE could help coordinate POSC service delivery and address problems of practice. The personas of birthing people reflect the array of time periods where prenatal substance use could be recognized and SDOH needs met.

[i] Grey literature refers to the materials that are produced outside of traditional academic publications (i.e., books or journal articles) such as technical reports, government documents, and white papers.

Key Learnings

Why

The perinatal period is full of opportunities to improve intergenerational health and the needs of families evolve as they move from pregnancy to the birth event and through the first year postpartum.

Maternal health and disparities are largely influenced by SDOH.

S-HIE can be used to act on the SDOH that are prevalent within a given community and salient for a family to receive care coordination.

In this feasibility study, the perinatal period refers to the pregnancy, birth, and one year postpartum. Investing in the perinatal period is an upstream lever to improve the health and well-being of families and communities, providing infants and their caregivers the support they need to thrive. Because needs and goals of families change throughout the perinatal period, comprehensive care approaches that cross different sectors and providers are needed. The need for cross-system care is amplified when considering the large role SDOH play in maternal health outcomes and experiences—and disparities therein. Improving maternal health cannot rely solely on a small set of clinical providers and use of electronic health records. While vital, physical health is only one part of the picture. The SDOH must be addressed at individual and community levels to truly move the needle on outcomes. Yet, providers face significant barriers in knowing what resources are available in the community, how to connect childbearing families to those resources, and how to legally and ethically share information to improve care effectiveness. As a result, childbearing families may not receive the right services, at the right time, or receive an incomplete set of supports that address symptoms, but not root causes. They may also face the additional burden of having to repeat their story to multiple providers in an attempt to receive holistic care, which can be both stressful and (re)traumatizing. This is where a S-HIE comes in to address these problems of practice and the opportunity to leverage technology to innovate solutions in maternal health.

> *"Social determinants of health (SDOH) are the conditions in the environments where people are born, live, learn, work, play, worship and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks."*
>
> **- U.S. Department of Health and Human Services**

What

To achieve whole-person health, coordinated care solutions are essential.

Currently, disconnected services and siloed information dominate the maternal health landscape.

S-HIE aim to solve this problem through technology infrastructure that enhances care coordination across community, health care, and social service providers.

A comprehensive S-HIE has **five major capabilities**: 1) screening and assessment activities, 2) referral directory, 3) closed loop referrals, 4) case management, and 5) health and business analytics. What makes a S-HIE different from a traditional Health Information Exchange (HIE) is the integration of SDOH with traditional measures used in health care. While HIEs focus on clinical aspects of care, S-HIEs consider the

SDOH (Figure 1) of a person and then develop care solutions that promote whole-person health and align information across different providers.

Figure 1. Social Determinants of Health

How

> **The "What" and "Why" of a S-HIE can be achieved when all core capabilities are present and used to ensure that the underlying root causes of maternal health and disparities are addressed, and coordination of services is not limited to the scope of a provider who recognizes the initial need.**

The "How" of a S-HIE is realized when all core capabilities are present and integrated:

6. **Screening and assessment activities**: identifying, social, physical, and behavioral health gaps and strengths of the person.
7. **Referral directory**: creating an accessible cross-sector community resource inventory.
8. **Closed loop referrals:** bi-directional flow of information and confirmation of referral receipt.
9. **Case management**: tracking for follow-up, emergent needs, and care receipt.
10. **Health and business analytics:** using analytics to support care coordination and strengthen the social-health infrastructure of a community.

How this translates into addressing key problems of practice may vary for target populations within the maternal health space. For example, pressing problems of practice for maternal-infant dyads affected by substance use during a pregnancy include the initiation and implementation of a Plan of Safe Care (POSC). This is the "use case" that is presented throughout this report to illustrate how S-HIE may be leveraged for maternal health innovation.

The Plan of Safe Care (POSC) Use Case

What is a Plan of Safe Care?

A POSC is a document intended to ensure the safety and well-being of an infant and caregiver affected by prenatal substance use, including connection to needed resources to stabilize the dyad together when possible.

POSC are recognized as an important means to coordinate care across systems and improve health outcomes for these families. As such, it is a prime use case for exploring the feasibility of leveraging S-HIE for maternal health innovation.

Because this is the use case, we illustrate S-HIE study findings through the lens of POSC and translate implications to the larger sphere of maternal health.

Substance use during pregnancy is a growing issue that demands data-informed, family-centered solutions. POSC are recognized by policy leaders, health care providers, community members, and families as a tool to address the complex origins of perinatal substance use and the need for diverse wraparound services for families (e.g., behavioral health outpatient programs, new parent social support, substance use treatment, obstetric care, concrete supports). The Child Abuse Prevention and Treatment Act (CAPTA) requires states use a POSC for an infant born with and identified as being affected by substance use, withdrawal symptoms, or fetal alcohol spectrum disorders. In Colorado, this requirement is the responsibility of the Colorado Human Services Department (CDHS) Division of Child Welfare. However, states are given flexibility in implementing this requirement, including the option to initiate a POSC prenatally through a designated community organization, since child welfare cannot become involved with a family until after the birth event. Initiating prenatally and engaging families voluntarily is vital to taking an upstream public health approach to this growing issue.

In Federal Fiscal Year (FFY) 2023, the CDHS Division of Child Welfare partnered with the Colorado Evaluation and Action Lab, Illuminate Colorado, and the Kempe Center to create a four-year pilot aimed at aligning and accelerating POSC progress in the state. The goal of the pilot is to develop a data-informed strategic framework for coordinated POSC in a defined catchment area with replicability across Colorado. As such, this pilot provides an opportunity to assess S-HIE feasibility in a concrete and actionable way. Figure 2 illustrates the S-HIE theory of change for POSC.

Testing Feasibility of S-HIE in the POSC Pilot: What is Possible?

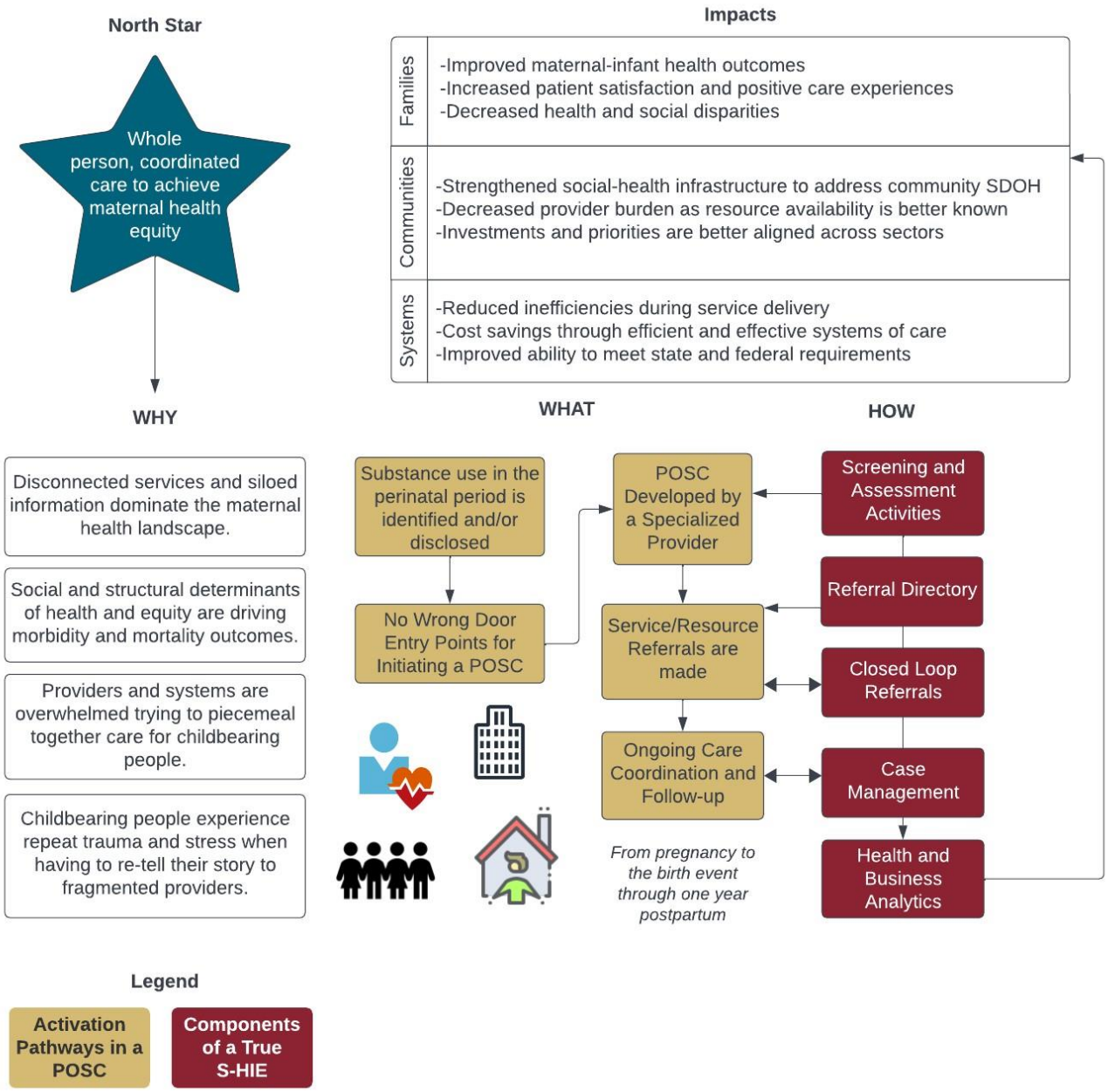
The S-HIE feasibility study aligned with the planning year (year one) of the POSC pilot. This allowed learnings from the feasibility study to inform POSC design and resourcing decisions for subsequent implementation years (years two through four).

As a result, the S-HIE platform, **Unite Us**, was identified as the technology solution for the POSC pilot.

Unite Us has all five capabilities of a true S-HIE, has presence in the proposed catchment area for the pilot, and can support deeper learning around how S-HIE can advance maternal health in Colorado.

In the pages that follow, we dive deeper into the “what” and “how” of a S-HIE, and close by identifying future opportunities and considerations.

Figure 2. S-HIE Theory of Change for POSC



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What

What is a S-HIE?

Problems a S-HIE Aims to Solve

> **To achieve whole-person health, coordinated care solutions are essential.**
>
> **Currently, disconnected services and siloed information dominate the maternal health landscape.**
>
> **S-HIE aim to solve this problem through technology infrastructure that enhances care coordination across community, health care, and social service providers.**

The foundation for S-HIEs was laid through investments in HIEs, notably the 2009 Health Information Technology for Economic and Clinical Health Act and nationwide emphasis on interoperability of electronic health records. What makes a S-HIE different from a traditional HIE is the integration of SDOH with traditional measures used in health care. While HIEs focus on clinical aspects of care, S-HIEs consider the SDOH (Figure 3) of a person and then develop care solutions that promote whole-person health and align information across different providers.

Figure 3. Social Determinants of Health

This results in improved health outcomes, increased patient satisfaction, reduced inefficiencies during service delivery, and cost savings as systems of care are more efficiently and effectively used. Notably, S-HIEs have high potential to improve culturally and linguistically responsive services and decrease health disparities due to their ability to identify leading inequities and develop a social-health infrastructure positioned to address at both individual and community levels.

Capabilities of a Comprehensive S-HIE

A comprehensive S-HIE has **five major capabilities** (Figure 4):

1. **Screening and assessment activities**: identifying, social, physical, and behavioral health gaps and strengths of the person through culturally and linguistically responsive practices.
2. **Referral directory**: creating an accessible cross-sector community resource inventory so that services can be matched to needs and goals.
3. **Closed loop referrals:** bi-directional flow of information and confirmation of referral receipt so that an individual does not have to repeat their story unnecessarily.
4. **Case management**: tracking for follow-up, emergent needs, and care receipt so that care can be more efficiently and effectively delivered with providers and individuals on the same page.
5. **Health and business analytics:** using analytics to support care coordination and strengthen the social-health infrastructure of a community through data-informed investments.

Figure 4. Major Capabilities of a Comprehensive S-HIE

Problems of Practice and How a S-HIE Innovates Solutions

Anchoring in POSC Use Case

To illustrate the value of a comprehensive S-HIE, we outline key problems of practice as they emerge in the POSC pilot and how a S-HIE can help address.

1. Problem of Practice: A POSC is Only Useful if Implemented

A POSC is—at a most basic level—a document that outlines a plan to ensure the safety and well-being of an infant and caregiver affected by prenatal substance use, including connection to needed resources to stabilize the dyad together when possible. Without clear infrastructure and processes in place to activate, the plan risks being a static "document on the shelf" rather than a roadmap for care that is both used and useful.

How a S-HIE Can Help

A S-HIE is the bridge to actionability of a POSC. The resource directory helps to match services and supports available in the community to the needs of the client, as identified in the POSC. Once services are identified, the closed loop referral system enables referrals to go from the POSC developer (e.g., health care provider) to the appropriate services. Services are then able to actively confirm that the referral was received and provide any status updates to "close the loop;" a S-HIE can flag if confirmation has not happened within a certain time period, helping to eliminate clients falling through the cracks.

2. Problem of Practice: Multiple Entry Points Across the Perinatal Continuum are Needed to Improve Accessibility of POSC for Families

Most commonly, a POSC is initiated prior to discharge from a health care provider following the birth. This reflects the origins of POSC in federal legislation surrounding child welfare. In 2016, CAPTA was amended by Congress with a requirement that states use a POSC for an infant born with and identified as being affected by substance use, withdrawal symptoms, or fetal alcohol spectrum disorders. Because child welfare cannot become involved with a family until after the baby is born, POSC were inherently tied to the birth event. This limits the positive benefits a POSC can bring in two notable ways: first, it misses opportunities to wrap support around families during pregnancy through the POSC; and second, it has restricted POSC initiation to a limited number of specialized providers.

How a S-HIE Can Help

A S-HIE can be leveraged so that multiple entry points for initiating a POSC can occur, across diverse providers. In practice, this looks like taking a "no wrong door" approach to POSC for families. This approach recognizes the intense stigma surrounding substance use, especially when pregnant and caregiving, and the fear of child welfare involvement experienced by pregnant persons that acts as a serious barrier to health care and service utilization. If a POSC can be initiated across multiple entry points, then trusted partners that meet families where they are can be leveraged. For example, the trusted partner may be a faith leader, or a Women, Infants, and Children counselor. While these individuals may not be equipped to complete the POSC, a S-HIE can ensure any entry point is able to initiate a POSC by treating the POSC initiation as a referral and activating the closed loop referral system. In this way, initiating a POSC is also not reliant on any one milestone in the perinatal period to occur; any provider can initiate a POSC as soon as perinatal substance use is recognized.

3. Problem of Practice: POSC as a Compliance Versus a Support Tool

POSC are commonly viewed by families and providers alike as a punitive tool stemming from child welfare compliance needs, rather than a tool for support and family strengthening. This has minimized the potential benefit of POSC, as POSC are treated as a checklist, rather than a care plan collaboratively developed with, by, and for families. Origins in child welfare have also meant mandatory engagement of families in the POSC, rather than voluntary engagement where active participation is more likely. As a result, uptake of resources named in the plan can be low and stigma heightened.

How a S-HIE Can Help

A S-HIE helps to expand the "who" and "when" of POSC initiation and development. In addition to POSC initiation across multiple entry points (see above), a S-HIE also allows a family to self-refer at any time in the perinatal period. A self-referral pathway can increase voluntary engagement in the POSC, which in turn can help ensure named supports are tailored to the true need of the family and, as a result, health impacts are better achieved. The self-referral gets activated in a S-HIE as a referral for a POSC, and the closed loop referral system begins. Self-referrals, alongside multiple entry points across diverse providers, are essential to shifting the mental model to POSC as a supportive tool where proactive care can occur without a family having to wait on systems involvement to be noticed.

4. Problem of Practice: Needs Evolve from Pregnancy Through the First Year Postpartum

A POSC must not only be activated after development, but it must also be updated as needs evolve. This is an especially acute reality in perinatal substance use, where substance use can be present at any point in the perinatal period, where maternal and infant care needs change rapidly, and where SDOH are likely to shift overtime as some resources are secured through the POSC and new needs emerge. Additionally, a client having to tell their story over and over to new providers can be traumatic and disempowering.

How a S-HIE Can Help

A S-HIE enables a POSC to be updated real-time across multiple providers through the case management capability. Treating the POSC as a "living document" means all providers supporting a family are using the same roadmap for care and that roadmap remains relevant to drive health outcomes and keep families safely together. Having the POSC integrated into a S-HIE and accessible to providers (with client-controlled consent) also removes the need for clients to re-share their story repeatedly just to initiate care; as such, S-HIE can act as a harm reduction approach to care coordination.

5. Problem of Practice: Not Addressing the Root Causes that Drive Health Outcomes and Disparities

A POSC should address not only the acute needs of a maternal-infant dyad, such as substance use treatment and infant care, but should also work to uncover other social factors in the family's life that can influence substance use patterns, service utilization, and long-term family stabilization (e.g., housing)—that is, the SDOH. Without fully addressing the SDOH, a POSC may act as a temporary stop-gap measure, but sustained well-being is unlikely due to unaddressed root causes. Moreover, disparities by race and ethnicity, gender, geography, socioeconomic status, and more are likely to persist, creating an intergenerational impact on families and communities.

How a S-HIE Can Help

A S-HIE includes built-in screening and assessment activities to identify social, physical, and behavioral health gaps and strengths of the person. A S-HIE can integrate with one or more SDOH screening tools, such as the Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE) Assessment, the American Academy of Family Physicians Social Needs Screening Tool, or the Health-Related Social Needs Screening Tool from the Centers for Medicare and Medicaid Services. Using a SDOH screening can inform a more complete POSC that addresses root causes of health outcomes and disparities. A S-HIE referral directory can then be used to connect the client to services and supports positioned to meet these needs. Beyond the individual-level, the health and business analytics that are inherent to a S-HIE enable community-level modeling of inequities and the 'why' behind them (example: analytics that can overlay child care deserts with child deaths from maltreatment). This can lead to a data-informed approach for strengthening the social-health infrastructure in a community, right-sizing investments to needs, and prioritizing innovations positioned to close the gap on disparities.

6. Problem of Practice: Federal Requirements that are Ever Evolving

CAPTA outlines requirements of child welfare related to POSC. Chief among these is a requirement for health care providers to notify Child Protective Services of all infants born and identified as affected by substance abuse, withdrawal symptoms resulting from prenatal drug exposure, or a Fetal Alcohol Spectrum Disorder. Currently in Colorado, the only way to do this is through a referral to child welfare. However, CAPTA allows notification to be different from a report of child abuse or neglect. In addition,

CAPTA is pending reauthorization and proposed provisions will directly impact child welfare requirements and state opportunities related to POSC, including the potential for POSC to move outside of child welfare.

How a S-HIE Can Help

A S-HIE can help Colorado better meet the spirit and provision of current and future CAPTA legislation. The health and business analytics inherent to a S-HIE can be used to meet the notification requirements to child welfare, while keeping notification separate from reports of abuse and neglect. The coordinated care infrastructure a S-HIE provides also means that regardless of what state agency is tasked with POSC ownership—and how requirements for resource referral and tracking may change—Colorado is positioned to effectively meet these, as the system is not tied to any one entity or in-house data system.

7. Problem of Practice: Burden on the Workforce/Providers

Caring for a family affected by prenatal substance use is challenging, as care coordination can be time-intensive and emotionally taxing. This challenge becomes even more pronounced when providers lack easy access to relevant resource information for the client's home community, when information sharing with other providers is cumbersome at best to impossible at worst, and when there is low engagement by clients. These issues can lead to additional burnout within an already critical workforce shortage and secondary trauma to providers.

How a S-HIE Can Help

The referral directory is a huge asset to providers working to support care coordination, especially given a S-HIE removes the burden on individual providers or organizations to keep the directory up to date. A S-HIE is inherently built on creating a secure environment for interoperability between systems. The closed loop referral capability facilitates smoother care coordination, reducing time spent on paperwork. The case management capability means providers are equipped with more comprehensive information about their client, enabling better care to the client and reducing the emotional toll as providers take comfort in knowing the client is well taken care of by a team. A S-HIE has the built-in consent workflows necessary to facilitate release of information is obtained and help clients remain in control of who sees their information. The health and business analytics also enable providers to meaningfully engage in continuous quality improvement as they strengthen care approaches for this population.

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How

How a S-HIE is realized

Integrating Capabilities to Make a True S-HIE

Realizing a S-HIE through integration of all five capabilities:

- **SDOH Screenings**
- **Referral Directory**
- **Closed Loop Referrals**
- **Case Management**
- **Health and Business Analytics**

All Capabilities Need to Be Present to "Count as a S-HIE"

While there are multiple tools to support providers in identifying individual and family needs and goals, several sites to understand community resources and make referrals, and a growing number of platforms to facilitate case management, having each one alone is hindering true care coordination that is person-centered, culturally and linguistically responsive, and holistic in physical, behavioral, and social health. What makes a S-HIE unique is the presence and integration of all five capabilities *together* with use *across systems and providers.*

Applying Personas to Illustrate How a S-HIE Achieves Better Care Coordination

Personas of birthing people with substance use during a pregnancy and their providers illustrate how a S-HIE could be leveraged to initiate and implement Plans of Safe Care. The personas of birthing people reflect the array of time periods where prenatal substance use could be recognized and a variety of SDOH needs. These personas illustrate how each capability works together to achieve better care coordination and address identified problems of practice.

Personas of Birthing People and Providers

Personas were developed for six birthing individuals with perinatal substance use and 13 providers (across health care, social service, and community organizations) that serve them.

A summary of these personas and their entry point in the perinatal continuum is provided, alongside the full persona profiles.

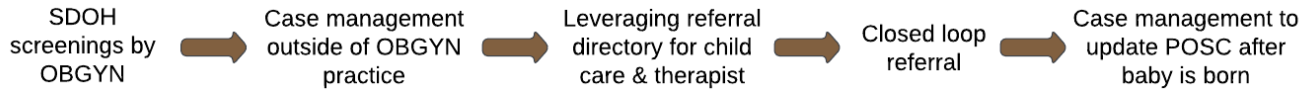
Learn more by reading Appendix B: Plans of Safe Care Personas

Illustrative Personas

The personas of *'Amanda Jenkins,'* '*Nikki Taylor*,' and *'Laura'* are illustrative examples of a prenatal, birthing hospital, and postnatal entry point into initiating POSC for families. These individuals are likely to benefit from case management that is not tied solely to the organization or provider that recognized the need for a POSC. In this section, we show how the capabilities of a S-HIE can be leveraged to address common problems of practice (as described in the "What" section of this report).

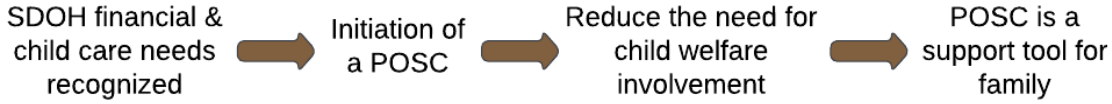
Persona 1: Amanda – Prenatal Initiation

Amanda shared information with her OBGYN about daily alcohol use during pregnancy and child care challenges that are barriers to receiving adequate prenatal care and likely postpartum and newborn care. Initiation of a POSC for Amanda prior to the birth event could help her prepare for the care of a newborn who may exhibit effects of alcohol use during pregnancy, child care so that full participation in postnatal and newborn visits are practical, and Amanda's re-engagement with a therapist. Leveraging S-HIE for case management can help ensure that the referrals meet Amanda's needs and that she is able to engage with services beyond traditional prenatal care. It is not known at the time of initiation of a POSC if or what the observed effects of alcohol use will be present in the baby, and needs of the family will evolve once the baby is born.



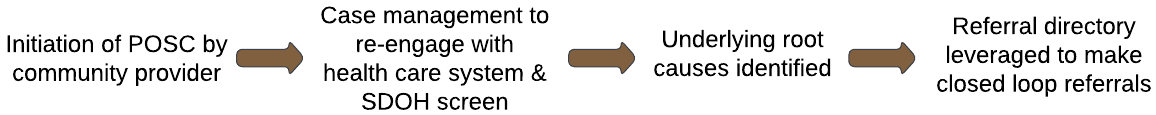
Persona 2: Nikki – Birth Event Initiation

Nikki delivered a full-term baby who exhibited symptoms of withdrawal. Opioid exposure during the pregnancy was recognized by the hospital team. Initiating a POSC while the baby is in the neonatal intensive care unit could help Nikki and her baby remain safely together after discharge by addressing known safety or supervision concerns (e.g., financial assistance for crib/bassinet for safe sleep, childcare). A POSC could be initiated in the hospital; however, after discharge the follow-up case management needs need to be taken on by another entity. S-HIE can be leveraged to track implementation of the POSC and hopefully reduce the need for child welfare involvement while meeting the goal of POSC as a support tool.



Persona 3: Laura – Postnatal Initiation

Laura has a history of methamphetamine use, but there was no evidence of use during the pregnancy. Laura was referred to *SafeCare,* a voluntary program for families with children under five that focuses on home safety, child health, and parenting skills. A *SafeCare* worker recognized changes in her behavior that suggested substance use and Laura reports missing her follow-up visits with her OBGYN and baby's well-child visits. Initiating a POSC postnatally by a community provider could help with safe breastfeeding and other supports Laura and her family need. It is likely beyond the scope of a *SafeCare* worker to support implementation of the POSC, case management is separate from the health care system that Laura is not fully engaged with, and the *SafeCare* program is needed.



Leveraging Data from S-HIE

CCMCN is a Colorado non-profit organization founded in 1994 to support Colorado's Federally Qualified Health Centers (FQHCs) and their community partners. Since 1995, CCMCN has been funded as the Health Center Controlled Network for Colorado by the Health Resources and Services Administration. CCMCN currently serves as a state and federally funded health information organization serving the safety-net organizations in Colorado. CCMCN's services are designed to systematically enhance clinical and operational quality initiatives, reduce health disparities, and improve population health.

In this feasibility study, we engaged CCMCN in an exploration and consultation on how leveraging data from a S-HIE can inform maternal health innovation. CCMCN provided de-identified aggregate data on 1) individuals of childbearing age, defined as 15-44 years old (n=108,567); 2) individuals of childbearing age with current substance use or history of substance use (n=8,885); 3) pregnant individuals (n=17,724); and 4) pregnant individuals with current substance use or a history of substance use (n=1,981). De-identified, aggregate data from 12 FCQH were included in the dataset, representing 60% of all Colorado FQHCs. The following learnings were gleaned from the data extract and analysis.[ii]

How Aggregate Data from a S-HIE Can Be Used

- Aggregate data on SDOH for the target population(s) of interest may be used to determine if the current referral directory and community-based supports are likely sufficient to support implementation of a pilot, like POSC.
    - Is the target population housed or concerned about losing their housing at similar, higher, or lower rates than the general population? What percent of the target population feels safe in their home?
    - What supports/services are common needs among the target populations (e.g., child care, food assistance, clothing, transportation, etc.)?
- Generating geographical data that is useful for informing pilot catchment areas is feasible at the ZIP 3 level for the population of individuals of childbearing age. In rural areas, narrowing down to pregnant with substance use or newborns affected by substance use may not be feasible as the incident rates are relatively low.
- Patterns in types of substance use among the target population(s) of interest may be used to inform referral directory needs. CCMCN used ranking of most prevalent substances, which allowed for reporting of aggregate data even when the sample sizes were relatively small (i.e., an alternative to reporting counts of a particular substance).
- Prevalence data for the target population can inform staffing needs for case managers (e.g., estimating the personnel resources). However, prevalence data may be limited by the ability or inability of a specific S-HIE to connect maternal and infant records; as such, creative linking strategies or other data sources may be needed. This means it might not be possible to get a deduplicated count of maternal-infant dyads affected by substance use during a pregnancy from a S-HIE alone.

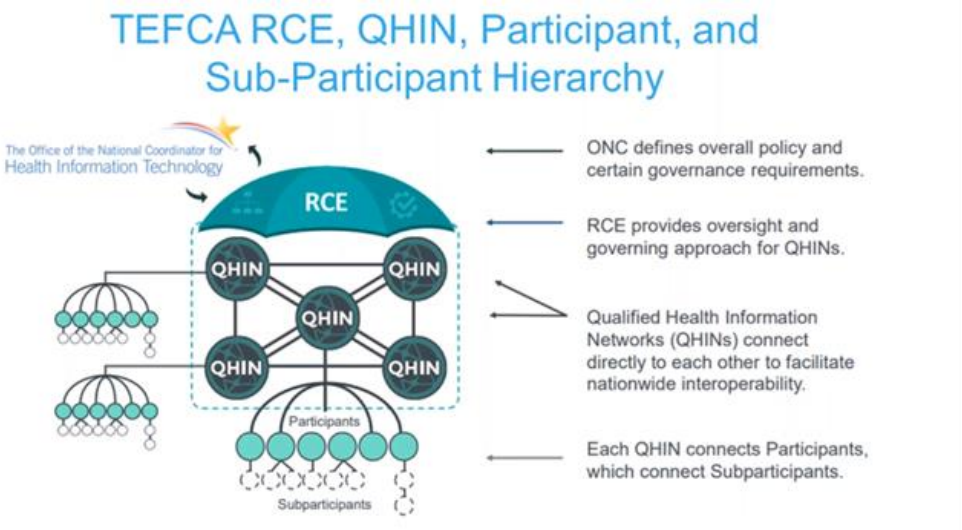
[ii] The full report is not publicly available to ensure compliance with clearance and release protocols by CCMCN and their partners. A copy can be provided to CDPHE for internal use only upon request.

Future Directions for Exploring Use of Data from a S-HIE

With the understanding that data are required to assist in population health, there is a desire to continue exploring other data aggregators in the State of Colorado. A leading data aggregator in Colorado is Contexture and with a potential merger with Quality Health Network (QHN) being discussed, this will expand its data aggregation opportunities in the future.

Additionally, with an overarching goal to aggregate electronic health record data, ONC published the Trusted Exchange Framework and Common Agreement (TEFCA) to establish a universal floor for interoperability across the country.[4] The Common Agreement will establish the infrastructure model and governing approach for users in different networks to securely share basic clinical information with each other—all under commonly agreed to expectations and rules, and regardless of which network they happen to be in. The Trusted Exchange Framework describes a common set of non-binding, foundational principles for trust policies and practices that can help facilitate exchange among Qualified Health Information Networks (QHINs) (Figure 5).

Figure 5. The Trusted Exchange Framework and Common Agreement



These other data repositories should be explored in future feasibility studies to provide the information required to support ongoing expansion and success of S-HIE in maternal health.

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Opportunities Moving Forward

- In Maternal Health Innovation
- In the Plan of Safe Care Pilot

Opportunities to Use S-HIE in Maternal Health

Key Opportunities to Leverage S-HIE for Maternal Health Innovation include:

- **Addressing problems of practice around care coordination**
- **Identifying cross-system priorities in maternal health**
- **Informing catchment areas when innovations are being planned**
- **Using SDOH patterns to inform implementation and capacity-building**
- **Assessing progress and impact of innovations**
- **Using policy levers to move forward coordinated care solutions**

Addressing Problems of Practice around Care Coordination

This feasibility study identified several ways S-HIEs can address problems of practice around care coordination, as documented through the use case of POSC. The identified problems of practice and corresponding S-HIE solutions are not unique to POSC; many are shared by other use cases within maternal health where care coordination is an essential driver of success. The transferability of problems and solutions identified in this study can be applied to other use innovations in maternal health to accelerate progress.

Identifying Cross-System Priorities in Maternal Health

The robust health and business analytics a S-HIE produces can be used to inform cross-system priorities in maternal health. For example, where are there shared gaps across communities in Colorado that are drivers of poor health outcomes? Where are there exemplar outcomes and what strategies are behind these outcomes that could be replicated to other regions of the state? What populations are experiencing SDOH where targeted resourcing is needed to close the gap? By leveraging S-HIE analytics, state and local partners can better identify priorities in maternal health that cross systems and geographic bounds, including shared outcome measures and common investments. For pilot programs targeting certain maternal health populations or issues, specific diagnoses codes can be leveraged. For example, the POSC pilot will benefit from rank order of the most frequently used substance types used during pregnancy by birthing people.

Informing Catchment Areas When Innovations are Being Planned

Innovations in maternal health are critical to improving health outcomes and closing the gap on disparities. Often, innovations are piloted in areas where there are existing champions or low-hanging fruit connections, which can lead to the same area being chosen repeatedly and over-saturation results. This is problematic in terms of equitable distribution of resourcing and may reduce impact of planned innovations. S-HIE health and business analytics can be used to better understand community need and readiness, and then innovations matched to those factors. In this way, a data-informed approach to catchment area selection can occur, improving resource allocation and increasing reach of planned innovation. Additional examples of the types of information that can be generated are provided in the "HOW" section of this report.

Using SDOH Patterns to Inform Implementation and Capacity-Building

Implementation effectiveness can be improved by using SDOH patterns identified through a S-HIE to understand maternal health needs and community assets. The approach used in this feasibility study compared SDOH across four populations: individuals of childbearing age, individuals of childbearing age with substance use, pregnant people, and pregnant people with substance use. This approach was fruitful because the broadest population—individuals of childbearing age—can yield a much larger sample size and thus more data on SDOH, particularly in rural communities. Furthermore, it allowed us to isolate differences between this broad population and the target population.

For example, prioritizing referral partners for a given intervention or program should match community partners working to address SDOH. If housing is the leading SDOH for individuals of childbearing age, then housing partners in the community should be prioritized during implementation. If data suggests that "fear of losing housing" is particularly salient for the target population for a program, then building out partnership and referral networks to ensure immediate access to temporary housing solutions might be a priority before implementing a program.

Assessing Progress and Impact of Innovations

Innovations are, by definition, novel and without a precedent to guide implementation effectiveness. S-HIE health and business analytics can be used in both formative and summative ways to build evidence on what works, for whom, and under what conditions. In the POSC pilot, the S-HIE platform, *Unite Us,* will be leveraged for evidence-building and strategic learning. Specifically, Colorado's Steps to Building Evidence guide evidence-building activities with a focus on Steps 1 through 3. During the pilot, learning indicators focused on implementation will be extracted from *Unite Us,* such as reach of the pilot, distribution of providers/community organizations engaged, referral uptake, and major SDOH presenting in the catchment area. These analytics will be paired with qualitative data and stories to drive continuous quality improvement and strengthen the pilot design. After two years of implementation, analytics from *Unite Us* will be linked with other data sources to understand health outcomes and service navigation patterns for both families and systems. Collectively, the analytics provided by a S-HIE enable real-time assessment of progress during a pilot as well as inform long-term scalability, sustainability, and replicability of the innovation.

Using Policy Levers to Move Forward Coordinated Care Solutions

HIEs are much further along than S-HIEs. It will require long-term, substantive investments to bring the social component to a fully functioning level in Colorado. Policy levers can be used to guide investments in S-HIE so that Colorado can create a more systemic approach to coordinated care solutions. One approach is to leverage existing policies where care coordination is required and opportunity (with resourcing) to innovate is present. In the case of the POSC pilot, CAPTA legislation provides a prime opportunity to test the value of a S-HIE in meeting evolving federal requirements and improving support for state agencies tasked with fulfilling. Such policy levers create natural use cases to innovate different aspects of a S-HIE, from improving consent processes to engaging community-based providers more effectively to using analytics to determine community-level SDOH and priority investments. These use cases can help to test and advance the larger S-HIE architecture being developed by OeHI through vendor, Resultant.

Considerations in Using S-HIE for Innovation

Leading Considerations in Using S-HIE for Maternal Health Innovation include:

- **A "One S-HIE Fits All" model is not viable in Colorado**
- **Anchor S-HIE value and technical requirements in concrete use cases**
- **Costs for leveraging S-HIE during innovations can and should vary**
- **Sustainability plans when using S-HIE during innovations is essential**
- **The ONC Toolkit can be used when planning innovations**
- **The newly selected OeHI vendor will be critical to aligning state efforts**

Moving forward, several key considerations emerged from this feasibility study that should be centered as CDPHE and other partners move forward in leveraging S-HIE for maternal health innovation.

- **A "One S-HIE Fits All" model is not viable for Colorado.** While it is tempting to think about a singular S-HIE solution or vendor that everyone will use, this is neither practical nor necessary. The underlying assumption to S-HIE value is that, like a health information exchange, it is vendor agnostic. It neither matters where the provider/service organization nor the individual/family come from, as a S-HIE rests on the power of interoperability to exchange information. Vendor choice is critical to ensuring feasibility and sustainability of expanding S-HIEs to different use cases and geographic communities in Colorado.
- **Anchor S-HIE value and technical requirements in concrete use cases.** As illustrated in this feasibility study, the value of a S-HIE is directly tied to problems of practice. While many problems of practice in maternal health are shared, there are also unique needs and goals depending on the innovation envisioned or solution tested. Identifying ideal versus 'must-have' requirements and right-sizing S-HIE investments can only occur if the conversation moves beyond "in theory a S-HIE can do x" to "in this specific use case, here is the value of a S-HIE and the investment it will take to maximize benefits." This study provides a model process for how to assess feasibility in other use cases within maternal health.
- **Costs for leveraging S-HIE during innovations can and should vary.** SMEs in this study were quick to recommend that while largescale investments are needed to build out Colorado's full S-HIE architecture, there is no need to wait on the whole to leverage S-HIE value today. Rather, deeper pilots in smaller capabilities of a S-HIE is one approach to advancing progress and maximizing benefits for maternal health more proximately. For example, pilots into the consent process within a S-HIE, especially for topics with additional layers of stigma and data regulations (such as substance use) are in and of themselves valuable and can inform the state's larger S-HIE architecture. Deeper pilots in smaller capabilities are also appealing because they can be more cost feasible.
- **Sustainability plans when using S-HIE during innovations is essential.** Innovations of any kind run the risk of infusing communities and systems with resources and then pulling those resources when the pilot is complete, leaving gaps in the newly built infrastructure. This risk is heightened when a S-HIE becomes part of the picture, as cross-sector providers—and the families they serve—become reliant on the social-health infrastructure built by a S-HIE. There are two aspects of sustainability that should be proactively considered: 1) funding sustainability – after the pilot (often grant funded) ends, what options does the community have to maintain the S-HIE system

put in place? and 2) technology sustainability – with new and different S-HIE platforms (e.g., new vendors, mergers) and policies (e.g., data governance) coming out all the time, what plan is in place to ensure the S-HIE system built during the innovation can keep up with a changing landscape?

- **The ONC Toolkit can be used when planning innovations.** ONC has published a *Social Determinants of Health Information Exchange Toolkit*[5] intended to support communities in leveraging SDOH information exchanges and interoperability to advance health equity. A wealth of resources and tools are included in this kit; of note for planning maternal health innovations is the "Community Readiness and Stewardship" guide (to promote community engagement, feasibility, and sustainability of any S-HIE solutions brought forward during a pilot) and the "Policy" guide (to help jumpstart alignment with larger S-HIE architecture led by OeHI and supported by county and state partners).
- **The newly selected OeHI vendor will be critical to aligning state efforts.** OeHI has established a strong foundation for exploring and advancing S-HIE in Colorado. OeHI's S-HIE approach consists of both a statewide unifying architecture and regional hubs, the latter to allow customization for regional priorities and context. The former was the focus of the recent Invitation to Negotiate (ITN) from OeHI that led to Resultant being selected as the vendor to develop a scalable, adaptable, and sustainable statewide S-HIE architecture. Many vendors, partners, and innovations working in the S-HIE space were hesitant to move forward boldly until the OeHI vendor was selected. This is because while innovation into S-HIE capabilities and regional customization is critical, alignment and connections can best be made through a statewide architecture. For example, having a data dictionary to create common understanding and promote alignment across vendors is an important ingredient in achieving feasibility and sustainability.

From Feasibility to Action: A S-HIE System for the POSC Pilot

This study explored the feasibility of leveraging S-HIE for maternal health innovation, grounded in the use case of the POSC pilot to keep the work concrete and actionable. Results of this study illustrate that conceptually, S-HIE show high potential for a) addressing problems of practice around care coordination, b) improving maternal health and decreasing disparities by addressing SDOH through whole-person care; c) maximizing efficiency and effectiveness in systems of care, and d) informing maternal health innovation priorities and investments. Now, the key question is "what would it take to move this possibility to the next step, from conceptual to practical?"

The S-HIE feasibility study aligned with the planning year (year one) of the POSC pilot. This allowed learnings from the feasibility study to inform POSC design and resourcing decisions for subsequent implementation years (years two through four). As a result, the S-HIE platform, *Unite Us*, was identified as the technology solution for the POSC pilot. *Unite Us* has all five capabilities of a true S-HIE, has presence in the proposed catchment area for the pilot, and can support deeper learning around how S-HIE can advance maternal health in Colorado communities.

What Will it Take to Move S-HIE Forward in the POSC Pilot?

OeHI has produced an SDOH Vendor Guide (last updated in May 2023) that provides a list of SDOH services and tools in Colorado. While the list is not comprehensive, it provides a starting place when communities are thinking through what S-HIE platform or related resources could support their use of technology for whole-person, coordinated care that addresses the SDOH. The services/tools listed in the Vendor Guide illustrate that S-HIE systems are possible today. What it will take to move this forward in maternal health includes:

- clear and defined use cases;
- resourcing for the technology solution (i.e., licenses) *and* to build a learning and improvement infrastructure (i.e., human resourcing to drive at action);
- sustainability planning for communities where a S-HIE is lifted; and
- alignment planning to ensure individual S-HIE systems can integrate with larger health technology plans as Colorado moves to an economy of scale in addressing SDOH.

The POSC pilot is a clear and defined use case that has initial resourcing to lift *Unite Us* as the technology platform for POSC service delivery and tracking in the catchment area. Evidence-building baked into the POSC pilot will produce rich information to inform both replicability of the pilot across Colorado, as well as S-HIE efforts in maternal health broadly writ. The following (new) investments would help to maximize impact of S-HIE in the POSC pilot:

- **Resourcing of a second S-HIE feasibility study**, to hold continuity in learnings from the discovery process (this study) to the activation process (use of *Unite Us* in the POSC pilot).
- **Resourcing to develop a sustainability and alignment plan,** to promote identification of how S-HIEs can best be leveraged *across* use cases in maternal health, to drive at collective solutions with greater efficiency.
- **Inclusion of maternal health S-HIE SMEs at key tables where the S-HIE architecture for Colorado is being built,** to identify resources, partners, and shared priorities in the landscape and reduce duplication of efforts.

One of the lessons learned in this feasibility study was that waiting for a giant investment in S-HIE or waiting for a perfectly aligned state structure will only prove to slow progress. By definition, innovation is an iterative process—and S-HIE for maternal health innovation is no exception. To continue the momentum built by this feasibility study and avoid any missed opportunities in the POSC pilot, *Unite Us* will be used. Once a provider or organization is in-network with *Unite Us*, the use of the platform is not restricted to just one use case. This means the pilot can explore how adopting existing S-HIEs for multiple use cases can strengthen the social-health infrastructure of a community more efficiently.

Additional resources would help meet the goals of a) a second S-HIE feasibility study, b) developing a sustainability and alignment plan, and c) inclusion of maternal health S-HIE SMEs at key tables where the S-HIE architecture for Colorado is being built. Given the existing landscape, promising opportunities for securing these investments include:

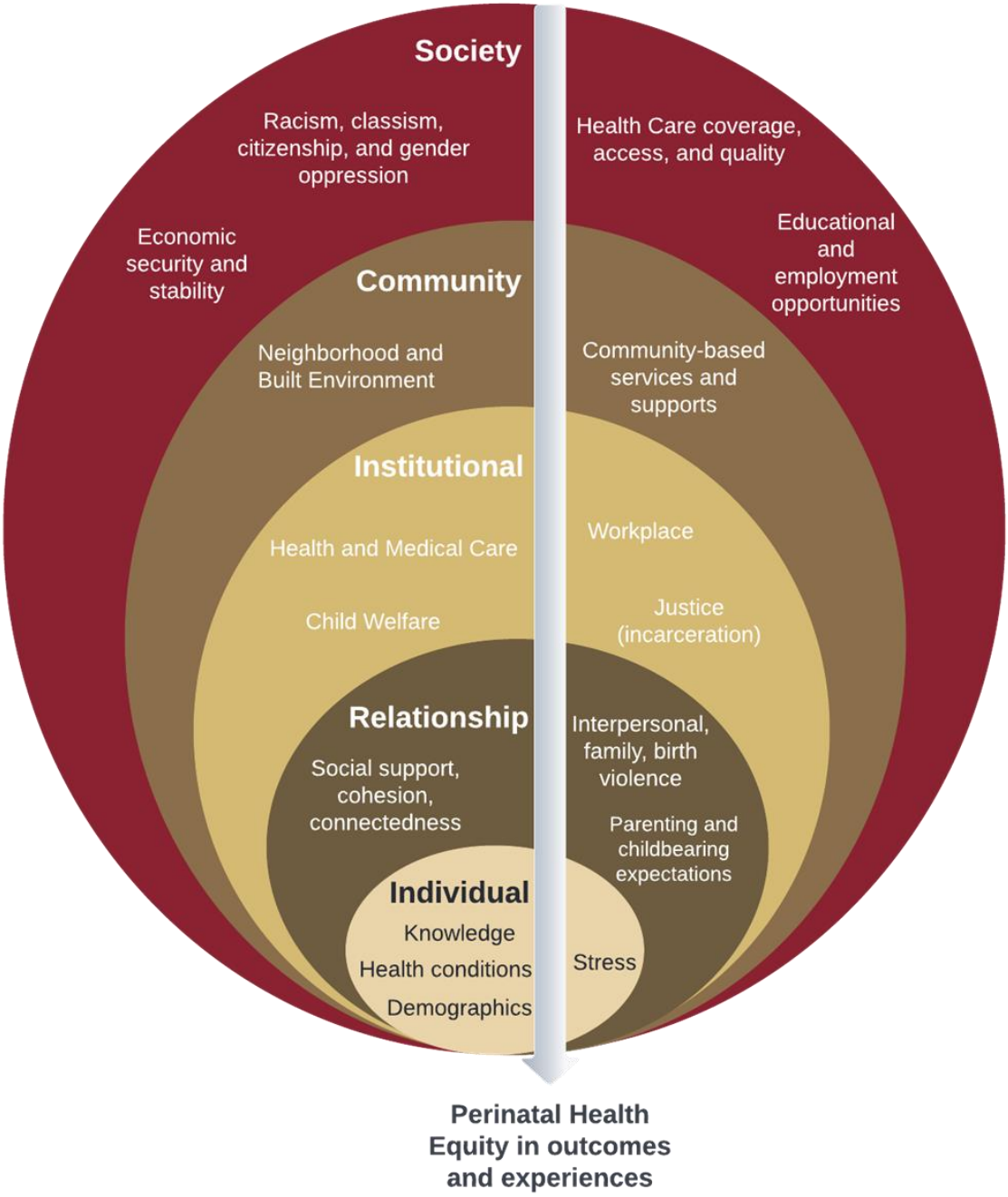
- Leverage funds from the Maternal Health Innovation grant administered by CDPHE to resource continuity of S-HIE innovation in the POSC use case.
- Position SMEs interviewed in this study as key partners to CDPHE to move the work forward.

- Use resources and support developed by the new OeHI-selected vendors, Resultant, to advance progress more efficiently.
- Ensure communities and partners thinking about S-HIE use cases in maternal health have ready access to key resources, such as the ONC Toolkit and the leading SDOH assessments.

Conclusion

This feasibility study illustrates the value of leveraging S-HIE for maternal health innovation and unpacks key considerations to advance progress. While the road ahead is long and significant investment in S-HIE statewide architecture is needed, there is opportunity to use S-HIE systems today to inform different aspects of maternal health innovation, from catchment area selection to improving the social care infrastructure of a community to informing priority investments. These “bite size” opportunities to leverage S-HIE are a promising pathway forward as Colorado works to balance the future of coordinated care with possibilities of today. Partners in this feasibility study are well positioned to catalyze learnings from this project and lead identified opportunities.

Appendix A: The Ecology of Perinatal Health



Note: This visual was developed from a comprehensive evidence review of factors that drive perinatal health at each level of the social-ecology model, completed as part of the *Use of Research Evidence in Perinatal Policies* project led by the Colorado Lab in collaboration with CDPHE.

Appendix B: Plans of Safe Care Personas

Summary of Personas and Their Entry Point in the Perinatal Continuum

ID	Persona Name	Title/Role	Demographics	Prenatal, Birth/ Perinatal, Postpartum	Substance Abused	Prenatal	Other Considerations/ Characteristics
1	Amanda Jenkins	Mother/Family	35, straight, white, cisgender, woman	Prenatal	Alcohol	N/A	
2	Nikki Taylor*	Mother/Family	27, straight, Black, cisgender, woman	Birth	Opioids	N/A	Unstable housing
3	Laura Macias	Mother/Family	22, straight, Hispanic, cisgender woman	Postpartum	Methamphetamine	N/A	Undocumented
4	Brittany Lombardi*	Mother/Family	17, bi-sexual, white, cisgender, woman	Prenatal	Alcohol	N/A	CPS involvement
5	Kachina Moon	Mother/Family	29, straight, Indiginous, cisgender woman	Prenatal	Heroin	N/A	Partner also using
6	Regina Rubio	Mother/Family	32, straight, Hispanic, cisgender woman	Birth/Perinatal	Cannabis+Cocaine	N/A	Birthing center
7	Angelica Santos*	Hospital L&D Nurse	32, straight, Filipina, cisgender, woman	Birth	N/A	Specialized	
8	Latasha Meyers*	Hospital Discharge Social Worker	45, straight, Black, cisgender woman	Birth/Postpartum	N/A	Specialized	
9	Eva Watkins	Certified Peer Support Person	47, straight, white, cisgender woman	Prenatal/Birth/Post	N/A	Non-Specialized	
10	Lian Feng	WIC Specialist	33, straight, cisgender Asian woman	Prenatal/Postpartum	N/A	Non-Specialized	

ID	Persona Name	Title/Role	Demographics	Prenatal, Birth/ Perinatal, Postpartum	Substance Abused	Prenatal	Other Considerations/ Characteristics
11	Nituna Kingbird	Family Indian Resource Center Director	40, straight, cisgender Native woman	Prenatal/Postpartum	N/A	Non-Specialized	
12	Becky Travers	Midwife	55, straight, cisgender White woman	prenatal/Birth/Post	N/A	Specialized	
13	Carla Sanchez	Resource Navigator/ CPS Intake Worker	40, queer, Hispanic, woman	Birth/Postpartum	N/A	Specialized	
14	Orena Shaw	Facilities Recovery Group (religious)	45 years old, straight, cisgender Black/African American woman	Prenatal/Birth/Postpartum	N/A	Non-Specialized	
15	Dean Williams	Local Family Resource Center Coordinator	35 years old, straight, cisgender white man	Prenatal/Postpartum	N/A	Non-Specialized	
16	Samuel Haley*	Behavioral Health Specialist (CMHC)	33, gay, white, transgender, man	Prenatal/Postpartum	N/A	Specialized	SUD-focused
17	Silvia Panagiotis*	OB/GYN Physician	55, straight, white, cisgender, woman	Prenatal/Birth/Postpartum	N/A	Specialized	
18	Peter Phan*	Pediatrician Physician	45, straight, Asian, cisgender, man	Postpartum	N/A	Non-Specialized	
19	Amy Liu*	Universal Home Visiting Nurse	33, straight, Asian cisgender, woman	Postpartum	N/A	Specialized	

Note: Personas above that are also included in the Family Connects business requirements are flagged with an asterisk (*) after their name

Plans of Safe Care Personas
S-HIE Feasibility Study

Note: The personas below were adapted from the S-HIE Family Connects Business Requirements, which were developed based on the personas and user stories included in the Gravity Project Use Case Package. Personas that also appear in the S-HIE Family Connects Business Requirements are indicated with an asterisk (*) after their name or title.

Childbearing Person/Family Personas

Persona: Amanda Jenkins	
About Amanda	• 35 years old, identifies as white, straight, cisgender woman • Amanda is currently 23 weeks pregnant with her third child • Amanda has two other children in her home ages 2 and 4
Social Supports and Resources	• Married to her partner for seven years • Amanda is a stay at home mom and her husband works out of the home and travels for work on occasion • The family has independent/market health insurance plan
Clinical Health Concern	• During a routine appointment with her OBGYN (Dr. Silvia Panagiotis), Amanda reported she had heard it is safe to occasionally use alcohol while pregnant in the later trimesters as major development is“complete” • Amanda is considered a high risk pregnancy due to the preterm birth of her second child and requires additional monitoring • After further discussion with Dr. Panagiotis, Amanda reports almost daily alcohol use/multiple drinks in the evenings to help her sleep and to deal with stress from being a stay at home mom and pregnant • Health concern is exposure to alcohol prenatally and impact to fetus • Amanda reports over use of alcohol in her past and she sought support from a mental health professional to reduce her drinking
Social Risk Factors	• Amanda has a history of alcohol misuse (self reported) • Amanda’s partner also uses alcohol in the evenings • Amanda does not have consistent childcare or babysitters and her partner travels occasionally for work and she has little support

Persona: Amanda Jenkins	
Typical Routine & Interactions	• Amanda is home with the children for most of the day alone • Amanda has a couple drinks a night and starts while preparing dinner • 100% of Amanda's time is spent during the day caring for the needs of her two children, leaving her no time to accomplish anything else and it can be challenging to attend all of her prenatal appointments • Physically and emotionally tired by the end of each day
Challenges & Goals	• Amanda's alcohol use is daily • Amanda is considered high risk during this pregnancy and struggles to attend all appointments due to lack of childcare and supports • Having trouble getting health insurance & a pediatrician for newborn
What Amanda Wants	• Help identifying child care supports in order to attend all medical appointments and for support when her partner is out of town • Education on alcohol use during pregnancy • Would like to re-engage with a therapist

Persona: Nikki Taylor *	
About Nikki	• 27 years old, identifies as a Black, straight, cisgender woman • Nikki is currently in the hospital and has just given birth to a full term baby girl (Jada) • Delivery was Nikki's first and was uncomplicated and routine • Nikki received prenatal care • Nikki works full time and can only take a few weeks leave, she reports work is not flexible • Nikki would like to breastfeed Jada
Social Supports and Resources	• Nikki lives alone in an apartment and is recently divorced from her husband of 5 years; Nikki and her husband remain on good terms and hope to figure out how to co-parent • Nikki's parents are elderly, disabled and cannot provide any childcare • Nikki and Jada are both covered by Health First Colorado (Medicaid)

Persona: Nikki Taylor *	
Clinical Health Concern	• At birth hospitalization Jada displayed symptoms of withdrawal • Jada is currently being observed in the NICU • The observations have been discussed with Nikki • Nikki reports opioid use during her pregnancy • Nikki reports this use to be prescribed in the past, but she no longer has an active prescription • Nikki declines a toxicology test as she reported use • Nikki is taking opioids daily and it is unclear the amount she is taking of non prescribed opiates and if she is impaired by her use • Nikki reports no history of substance use treatment • Nikki would like to breastfeed
Social Risk Factors	• Nikki has not identified child care • Nikki has to go back to work soon after birth due to a need for consistent income • Nikki's ex-husband is planning to move three hours from Nikki due to a job promotion and can provide occasional support both with care for Jada and financially, she does not feel prepared to be a single mother and worries with the distance how much her ex-husband can support her. Nikki's family cannot provide childcare and Nikki needs to return to work as soon as possible • It is currently unclear how long Jada will need to be observed or treated in the NICU, the extent of Nikki's use is unknown • Nikki's ability to meet Jada's immediate needs when she goes home while using non prescribed opioids in unknown
Typical Routine & Interactions	• Nikki is isolated and has no other adult contact right now and cannot identify immediate support people • Nikki is lacking basic supplies for safe sleep for Jada and other supplies • Nikki plans to co-sleep • Nikki does not have reliable transportation and uses mainly public transportation
Challenges & Goals	• Nikki needs childcare for Jada during the day when she goes to work. There is no financial ability to pay for a crib/bassinet for safe sleep • Financial support is needed for other supplies to meet Jada's needs
What Nikki Wants	• Wants to obtain child care right away • A flexible job so she can care for her baby when childcare is not available • Child support from ex husband • Supplies for Jada • Wants to breastfeed

Persona: Laura Macias	
About Laura	• 22 years old, identifies as a Hispanic, straight, cisgender woman • Baby boy (Manuel) born 12 weeks ago in a local hospital • The delivery was Laura's first and was uncomplicated and routine; Laura did not attend prenatal care until near the end of the pregnancy • Laura and Manuel recently applied for Medicaid • Laura immigrated to Colorado 4 years ago with her mother and siblings to escape from a physically abusive father in Mexico • Laura lives with her mother and is currently not working • Laura speaks Spanish and very limited English
Social Supports and Resources	• Laura's is no longer in a relationship with the Manuel's father, however, he wants to co-parent with the support of his family • Manuel's father is 20 yrs old • Laura and Manuel qualify for Medicaid • Laura was referred to *SafeCare* in home services as this is her first child and she was offered a referral at birth hospitalization and was interested in the support
Clinical Health Concern	• None for child • Laura reports a history of methamphetamine use and reports she stopped using methamphetamines shortly after finding out she was pregnant • Laura denied current use and use during pregnancy
Social Risk Factors	• Laura's family has very little money and struggles financially. The extra cost of the infant has been challenging. • Laura's mom works long hours in order to financially support Laura, the baby, and Laura's siblings • Laura is a stay at home mom and plans to remain living with her mother • Laura has a history of trauma due to physical abuse, a history of methamphetamine use and no history of substance use treatment • The *SafeCare* in-home worker has noticed a dramatic change in Laura's appearance, mood and behavior. The worker has inquired about Postpartum Depression (PPD) and Laura reported she did not attend her postpartum checkups with a doctor. The worker is concerned about possible current substance use due to Laura's dramatic change in appearance and behavior and reported history of methamphetamine less than a year ago • Laura's mother has also noted a big change and she is concerned but is not aware of any methamphetamine use • Laura is denying current use; however, is willing to be referred for "help"

Persona: Laura Macias	
Typical Routine & Interactions	• Laura is home all day with Manuel and sometimes Laura's siblings are around • Laura's mother works long hours • Laura is responsible for the majority of Manuel's care • Laura's grandma helps when she can, she lives close by • Manuel's father comes over to visit, but not consistently caring for Manuel • Laura's only support for Manuel is *SafeCare* • The *SafeCare* worker has helped with immediate needs for Manuel (diapers, wipes, baby gate, crib) but money is a concern • *SafeCare* worker is currently concerned seeing a big shift in Laura's behavior and interactions with Manuel
Challenges & Goals	• Not enough money in the household to afford expenses • Laura has few supports during the day/week • It is unclear if Manuel is attending routine well-child checks • Concerns Laura may be using substances due to change in appearance and behavior • Concerns of PPD
What Laura Wants	• Laura wants to continue to be a stay at home mom; Laura reported she is open to talking to someone to get "help" • Laura needs more support with caring for Manuel when family is not available • More support for Manuel's father and his family

Persona: Brittany Lombardi *	
About Brittany	• 17 years old, identifies as a white, bi-sexual, cisgender woman • Brittany is currently 12 weeks pregnant • This is not Brittany's first child, however, Brittany's rights were terminated for her other child through the child welfare system • Brittany got pregnant accidentally and both parents decided to keep the baby • Brittany is currently living wherever she can and stays with friends • Brittany is not in a relationship with the baby's father and Brittany has an on and off relationship with her girlfriend • Brittany is currently on probation and currently struggling with substance use and using multiple substances • Probation is looking into resources to provide support and encouraging Brittany to get help soon for her substance use as this could impact her criminal case

Persona: Brittany Lombardi *	
Social Supports and Resources	• Brittany's on and off girlfriend does not use substances and the baby's father uses substances "recreationally" • Brittany has Health First Colorado (Medicaid) • Brittany has an older sister, but her sister is busy raising her own children
Clinical Health Concern	• Brittany has been screened for depression and anxiety, however, not attending any treatment services • Brittany reports she is struggling to stop using substances and is currently 12 weeks pregnant • Brittany is not currently receiving prenatal care
Social Risk Factors	• Brittany is not currently employed and "couch" surfing • Brittany has an on and off relationship with her girlfriend, however, her substance use is problematic in the relationship • Brittany is not in a relationship with the father of the baby, but sees him as a support • The father uses substances recreationally
Typical Routine & Interactions	• Brittany has little consistency in her life • Brittany is struggling to meet her own basic needs for housing, income, medical needs • Brittany does attend all probation appointments and court hearings • Brittany has a history of child welfare involvement with her other children and is very fearful of the "system"
Challenges & Goals	• Brittany may be struggling with depression and anxiety; Brittany's is using substances on a daily basis • Brittany feels overwhelmed often • Brittany does not have consistent income or housing • Brittany has been in substance use treatment in the past; however, feels too overwhelmed to seek help • Brittany's use may impact her criminal case
What Brittany Wants	• To have consistent housing, food and income • To not feel depressed, anxious and overwhelmed • To be in a relationship with her girlfriend • To be in compliance with probation and the courts • To not have child welfare involvement

Persona: Kachina Moon	
About Kachina	• 29 years old, identifies as an Indigenous, straight, cisgender woman • Kachina is currently 38 weeks pregnant and has been attending all prenatal care • Kachina is married to the father of her current pregnancy and of her other child and they reside together. Kachina has another child who is 2 years old • Kachina has a history of substance use (heroin) and has been in recovery for five years • Kachina recently relapsed around 30 weeks pregnant due to the passing of her mother who she was very close to and who was her biggest support • Kachina has a history of substance use treatment and recently reached out to a former peer recovery support person due to her relapse • Kachina's husband uses alcohol and cannabis occasionally and recreationally
Social Supports and Resources	• Kachina reached out to a past support person • Kachina is regularly attending prenatal care • Kachina works part time • Kachina and her family have employer-based insurance through her husband's employment
Clinical Health Concern	• Kachina is currently pregnant and has relapsed and is currently using heroin
Social Risk Factors	• Kachina is at risk of losing her employment due to missing work in the mornings • Kachina is the primary caregiver for her other child due to working part time and her husband working full time • Kachina's mother was providing childcare and she recently passed away unexpectedly
Typical Routine & Interactions	• Kachina is working part time, but starting to miss work due to her substance use and lack of childcare • Kachina's husband works full time and is home on the weekends
Challenges & Goals	• Kachina could possibly lose her job due to missing work in the mornings due to substance use • Kachina has not reported her use yet to her OBGYN (Dr. Silvia Panagiotis) and she is due in two weeks
What Kachina Wants	• Kachina reached out to a past peer support person and is considering re-engaging in treatment; Kachina is concerned about reporting her use to her OBGYN (Dr. Panagiotis), but understands she needs support

Persona: Regina Rubio	
About Regina	● 32 years old, identifies as a Hispanic, straight, cisgender woman ● Regina is currently at the birthing hospital in labor at 33 weeks ● Regina does not have a relationship with the baby's father (ex-boyfriend) and he is not interested in a relationship with the baby ● Regina attended most prenatal appointments ● Regina has two other children in her home and she shares custody with her ex-boyfriend
Social Supports and Resources	● Regina works part time from home ● Regina and her ex-boyfriend share child care responsibilities during the week ● Regina has felt run down working, caring for her children, being pregnant and dealing with nausea, anxiety and fatigue daily
Clinical Health Concern	● Regina went into labor early and appeared to be spontaneous ● While exploring medical history with a labor and delivery nurse it was noted that Regina has a history of cannabis and cocaine use that was disclosed during screening with her OBGYN (Dr. Panagiotis) ● After further discussion, Regina disclosed occasional cannabis use during pregnancy due to nausea and use has increased recently in order to work and care for her children while feeling extreme nausea ● Regina denies cocaine use ● Baby is preterm and will need NICU care
Social Risk Factors	● Regina has the support of her ex-boyfriend and they co-parent ● Regina has family who reside nearby. Regina reports friendships but feels isolated working from home, struggling with nausea and anxiety
Typical Routine & Interactions	● Regina was working up until going into labor and will take some time off ● Worried about what this will look like if baby needs to stay several weeks or more in the NICU
Challenges & Goals	● Worried about NICU stay and being present for baby and her other children
What Regina wants	● More support while baby is in the NICU ● Support around managing anxiety

Provider/Community Personas

Persona: Angelica Santos, Hospital Nurse *	
About Angelica	• 32 years old, identifies as Filipina, straight, cisgender woman • Works as an inpatient labor & delivery nurse at a local hospital
Social Supports and Resources	• Married with two school-aged children • Her sister takes her kids to school each day and takes care of the kids if Angelica and her husband are working
Typical Routine & Interactions	• Her work shifts typically begins at 8:00am and goes until 6:00pm • She picks up her kids in the evening or from her sister's house
Challenges & Goals	• Works long hours, to help deliver babies
What Angelica Wants	• To see that her patients receive support and care after they leave the hospital • Spend more time with her children

Persona: Latasha Meyers, Hospital Discharge Social Worker *	
About Latasha	• 45 years old, identifies as a Black, straight, cisgender woman • Works as a social worker at a local hospital
Social Supports and Resources	• Sandra has family who live nearby
Typical Routine & Interactions	• Works 9:00am to 5:00pm five days a week
Challenges & Goals	• She is the only discharge social worker and struggles with meeting capacity needs
What Latasha Wants	• Feeling burned out due to capacity issues and would like to see additional positions created to support discharge planning • Learn more about community resources to connect her patients to where the information is easily accessible

Persona: Eva Watkins, Certified Peer Support Person	
About Eva	• 47 years old, identifies as a white, straight, cisgender woman • Works for MAT clinic
Social Supports and Resources	• One daughter in high school
Typical Routine & Interactions	• Works 9:00am to 5:00pm Monday through Friday
Challenges & Goals	• None
What Eva Wants	• Make an impact in her community • Support families as a Lived Experience Expert • Professional Development for growth • Connect with resources in order to better support people using substances

Persona: Lian Feng, WIC Specialist	
About Lian	• 33 years old, identifies as an Asian, straight, cisgender woman • Works as a WIC Specialist
Social Supports and Resources	• Lian is married and recently had a baby
Typical Routine & Interactions	• Lian returned to work at the WIC office and is working full time
Challenges & Goals	• Better understand how to support families impacted by substance use and how to connect to other resources that WIC does not provide
What Lian Wants	• Professional Development • Learn about resources and how to refer

Persona: Nituna Kingbird, Family Indian Resource Center Director	
About Nituna	• 40 years old, identifies as an Indigenous, straight, cisgender woman • Nituna is the director of the Family Indian Resource Center that has locations in both urban and rural communities
Social Supports and Resources	• Married and has one child
Typical Routine & Interactions	• Nituna oversees the operations of both Resource Centers • Nituna assists with programing and is currently looking to start an evidence based parenting program for Native Families

Persona: Nituna Kingbird, Family Indian Resource Center Director	
Challenges & Goals	• Connecting with other systems to support families and offer supportive services; would like to offer consulting services
What Nituna Wants	• Make an impact for parents and babies • Connect with other organizations to better collaborate

Persona: Becky Travers, Midwife	
About Becky	• 55 years old, identifies as a white, straight, cisgender woman • Works as Midwife with her own practice • Delivers babies in a birthing facility • Speaks English and Spanish fluently
Social Supports and Resources	• On several boards of agencies focused on maternal mental health and prevention of maternal mortality
Typical Routine & Interactions	• Working full time, however, part of her time is dedicated to other initiatives
Challenges & Goals	• Capacity and time to spend with patients
What Becky Wants	• Support moms during pregnancy • Advocate for breastfeeding and make an impact on minorities • Understand OBGYN role in preventing maternal mortality

Persona: Carla Sanchez, Resource Navigator/CPS Intake Worker	
About Carla	• 40 years old, identifies as a Hispanic, queer, woman • Carla has been in recovery for 10 years
Social Supports and Resources	• Carla has a strong connection to the recovery community
Typical Routine & Interactions	• Groups are held three times a week in various locations in the evenings
Challenges & Goals	• None
What Carla Wants	• Help to identify parents that might benefit from her organization • Needs childcare for families during the one hour meetings in order for parents to attend meetings in person

Persona: Orena Shaw, Facilitates Recovery Groups at local religious organizations	
About Orena	• 45 years old, identifies as a Black, straight, cisgender woman • Pauline has been in recovery for 10 years
Social Supports and Resources	• Orena has a strong connection to the recovery community
Typical Routine & Interactions	• Groups are held three times a week in various locations in the evenings
Challenges & Goals	• None
What Orena Wants	• Help to identify parents that might benefit from her organization • Needs childcare for families during the one hour meetings in order for parents to attend meetings in person

Persona: Dean Williams, Local Family Resource Center - Program Coordinator	
About Dean	• 35 years old, identifies as a white, straight, cisgender man • Works for a non-profit organization
Social Supports and Resources	• 10 years of experience working for the county resource center
Typical Routine & Interactions	• Responsible for overseeing the emergency food assistance program and helping families apply to food/SNAP benefits • Oversees the operations of a small emergency shelter for families; assist in coordinating other emergency services and assisting in developing more long term solutions with families
Challenges & Goals	• Spends too much time navigating multiple systems to receive, respond and track families seeking their help • Lots of manual work required to keep up with all the referrals and next steps • Very few resources for the unhoused
What Dean Wants	• Work with fewer or a single system that provides referrals to his organization • A system that allows him to support systems navigation in an efficient way • Connect with more housing authorities to partner in working to support unhouse people

Persona: Samuel Haley, Community Resource – Behavioral Health Specialist *	
About Samuel	• 33 years old, identifies as a gay, transgender white man • Works as an family psychologist for a Community Mental Health Center (CMHC)
Social Supports and Resources	• Works on a small team within the agency where every clinician has a specialty • Samuel specializes in working with families impacted by substance use • Samuel has extensive MI and Trauma Informed care training
Typical Routine & Interactions	• Samuel works full time and various days/hours
Challenges & Goals	• Challenging to refer clients to more intensive services • Long waitlists and takes a great deal of time to send referrals and follow up with referrals • Struggle to provide immediate support and warm handoffs when clients who have historically been ambivalent about a higher level of care/support and are ready to access these services
What Samuel Wants	• More support in referring to high level of care services

Persona: Silvia Panagiotis, OB/GYN Physician *	
About Silvia	• 55 years old, identifies as a white, straight, cisgender woman
Social Supports and Resources	• Has a Doula program within her organization as well as other contracted midwives
Typical Routine & Interactions	• Work hours are built around need and flexible • Have built in evening a weekend hours if a client is in need
Challenges & Goals	• Seeking better collaboration with local birthing center when the need to transfer services arises
What Silvia Wants	• Better connection to the local birthing center • More postpartum resources available for her families after delivery

Persona: Peter Phan, Pediatrician *	
About Peter	● 45 years old, identifies as an Asian, straight, cisgender man ● Works as a Pediatric physician
Social Supports and Resources	● None
Typical Routine & Interactions	● Works a Monday-Friday schedule 9am-5pm with some emergency hours on the weekends
Challenges & Goals	● Recently attended a forum focused on newborns exposed to substances and FASDs ● Would like to bring additional training opportunities to his practice ● Would need to obtain CEU's
What Peter Wants	● Increased knowledge on how to support caregivers of newborns exposed to substances during pregnancy

Persona: Amy Liu, Universal Home Visiting Nurse *	
About Amy	● 33 years old, identifies as an Asian, straight, cisgender woman ● Provides in home support to birthing people postpartum
Social Supports and Resources	● Married with one child - 5 years old
Typical Routine & Interactions	● Flexible schedule to meet needs of families
Challenges & Goals	● Ensuring families receive ongoing services if a need is identified - can be hard to navigate referrals and provide a hand off to services
What Amy Wants	● To help birthing people and their families get connected to ongoing supports as needed

Plans of Safe Care Personas
S-HIE Feasibility Study

Crosswalk of Childbearing Individual Persona #, Entry Point, and Provider Personas Engaged

Childbearing Individual Persona #	POSC Entry Point	POSC Initiation	Professional Persona Associated #
Example: Amanda #11	Prenatal	Specialized: OBGYN Specialized: L&D Nurse	OBGYN #12 Labor and Delivery Nurse #6
Amanda Jenkins #1	Prenatal	Non-specialized: Resource Navigator	Resource Navigator #13, Local Family resource Center Coordinator #15; Behavioral Health Specialist #16
Nikki Taylor #2	Prenatal	Specialized: OB/GYN	OB/GYN #17; Hospital L&D # 7; Resource Navigator #13;
Laura Macias #3	Postnatal	Non-Specialized: Universal Home Visiting Nurse	WIC Specialist #11; Universal Home Visiting Nurse # 19
Brittany Lombardi #4	Prenatal	Specialized: CPS Intake worker	CPS Intake worker # 13; Behavioral Specialist #17; Local Family Resource Center # 15
Kachina Moon #5	Prenatal	Specialized: OB/GYN	OB/GYN # 17; Certified Peer Support # 9; Family Indian RCD #11
Regina Rubio #6	Birth	Specialized: OB/GYN	OB/GYN # 16; Hospital L&D Nurse #7; Hospital Discharge SW #7; WIC Specialist #11; Behavioral Health Specialist #16

Endnotes

[1] Colorado Office of eHealth Innovation. (2023). *Colorado Social Health Information Exchange (SHIE): Working together towards whole-person health* [Diagram). https://oehi.colorado.gov/sites/oehi/files/documents/OeHI-SHIE-ecosystem.pdf

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[3] Colorado Department of Public Health and Environment. (2023). *Maternal mortality in Colorado: 2016-2020*. https://drive.google.com/file/d/1L8YyFzO7MUKJuG17p2qa1O8mwTz_PR4T/view

[4] Office of the National Coordinator for Health Information Technology. (2022). *Trusted Exchange Framework and Common Agreement (TEFCA)*. https://www.healthit.gov/topic/interoperability/policy/trusted-exchange-framework-and-common-agreement-tefca

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