



Maternal and Infant Mental Health (MIMH) Innovation Day – Working Paper

Emerging opportunities for policymakers, funders,
systems leadership and providers

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Acknowledgements	2
Executive Summary	3
Chapter 1. Why the Innovation Day	5
Chapter 2. Organizing Framework for the Innovation Day	7
Chapter 3. Participants	8
Chapter 4. Key Insights by Phase	10
Chapter 5. Key Themes	22
Chapter 6. Recommendations for Action	24
Appendix A: Participant Biosketches	30

About the Authors

Marco Smit founded Next Innovation Health Partners (NIHP), a consulting firm focused on white space innovation in health care.

NIHP has been tracking, analyzing and facilitating the data digitization and related innovation in health care for foundations and Fortune 500 companies since 2007. NIHP operates on the intersection of health care, technology and financial incentives.

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About the Packard Foundation

For more than 50 years, the David and Lucile Packard Foundation has worked with partners around the world to improve the lives of children, families, and communities—and to restore and protect our planet. The Foundation works on the issues our founders cared about most: improving the lives of children, enabling the creative pursuit of science, advancing reproductive health, and conserving and restoring the earth's natural systems.

Maternal Postpartum Depression (PPD) is the historic used name for what may be better called Maternal and Infant Mental Health (MIMH). The term Maternal and Infant Mental Health suggests that the signs and symptoms of depression do not necessarily start only after delivery (postpartum) or that attention should be focused purely on the baby or the mother. Instead, MIMH represents a two-generation approach to understand and support social and behavioral health that acknowledges the interconnection between parents and infant together. This approach underscores the need to provide early screening and support for parents during the perinatal and postpartum phases and to identify and track outcomes of both parents and infant together in the early years of life.

MIMH is a large and costly health care and early education problem with far-reaching ramifications for families, and particular children over their life course if left untreated. On average 15 percent of women who give birth are estimated to suffer from PPD, but within high-risk populations the incidence has found to be between 25 percent to 50 percent¹. Among women who have already experienced PPD following a previous pregnancy, some prevalence estimates increase to 41 percent².

On average 15% of women who give birth are estimated to suffer from PPD

As implementation of the Affordable Care Act (ACA) moves into its third year, there are now more opportunities to support maternal and infant mental health in different health systems in which technology, reimbursement, and regulatory developments could fully align in smart and innovative ways to help MIMH patients. However, on the road to impact, change can be impeded by interdependencies, lack of coordination, and the complexity of measuring intermediate and long-term impacts.

Five important themes emerged with respect to the challenges:

Need to redefine the problem

- This is not a problem that only starts postpartum; this is a **perinatal** problem and it would be beneficial to think about opportunities for early and better screening, diagnosis and treatment as early as the pregnancy phase (as the precursor to postnatal).
- Similarly, expanding screening to anxiety could help identify, monitor and inform MIMH patients earlier, as anxiety and maternal postpartum depression are related.

Applying a two-generation model to the problem

- Within the two-generation model, mothers and maternal health are vital to the wellbeing of the child. This approach underscores the need to provide early screening and support for parents during the perinatal and postpartum phases and to identify and track outcomes of both parents and infant together in the early years of life.

Need for more awareness, education and information

- Patients lack awareness and education about the illness, and concern about possible repercussions (including stigma) limits the likelihood they will reach out for appropriate help. Furthermore, the demands of infant care can make it difficult for new mothers to attend regular doctor's appointments and to find time to devote to their own mental health. In addition, lower income patients can have a hard time finding providers with experience and who accept Medicaid. Locating a local provider is vital information that more than a million patients seek annually, according to Katherine Stone from Postpartum Progress, one of the patient advocacy organizations that participated in the MIMH Innovation Day.

- Providers: pediatricians are not trained or used to diagnosing mothers during well-child visits and during the pregnancy phase information is often not shared among the different providers who interact with the patient (nurses, obstetricians and gynecologists [OBYGN], child mental health providers, others), thereby missing patient engagement opportunities and creating further confusion for the patient.

Understanding the reimbursement lever

- Many proven opportunities for interventions were identified that providers did not execute because these interventions are not reimbursed. It is an area in which the Centers for Medicare and Medicaid Services (CMS) can have a particularly influential role, given that a higher-than-average percentage of MIMH patients are on Medicaid.

Paying close attention to outcomes measurement

- Outcome measurement is a key area for improvement, in part because the data infrastructure needed for MIMH is complex (e.g. covering providers in different organizations, longitudinal data tracking, potentially including non-health care providers) and partly because the population is heterogeneous and hard to engage (more than 50 percent don't show up for their postnatal visit and many change their prepaid phone access monthly, impeding continued engagement). Also, in many situations it is known what outcome measure would be desired, but is not being tracked or monitored. It is important to identify why this is the case (often related to provider training or reimbursement) and for specific initiatives to be developed that address the data issues and help with provider training and engagement.

Additional key themes are discussed in [Chapter 4](#).

Turning to opportunities for improvement, Innovation Day participants identified five key improvement areas:

- 1) Reimbursement (and innovation funding)**
- 2) Awareness and Education**
- 3) Outcome Measurement**
- 4) Resource (Use) Innovation**
- 5) Provider Training and Engagement**

To address these improvement areas, leaders would develop specific initiatives focusing on the following three objectives:



The initiatives focused on analysis have the broadest scope and longest time horizon. [Chapter 6](#) summarizes a number of initiatives in each of the three objective areas.

Innovation Day Context

MIMH is a large problem that carries a heavy burden, both human and financial. Yet often the costs and benefits are not easily captured and measured within a single system. Instead the wider benefits in destigmatizing and addressing MIMH accrue to parents and children over time, and often in multiple systems that don't capture or share data in order to make larger inferences about such benefits.

- **15% of all pregnant women experience some form of postpartum depression**
- **This rate climbs to as high as 61% for new mothers of lower socioeconomic status**

Surveys in Los Angeles County suggest that the rate for PPD for Latino women is 2.5 times more likely, and for African-American women two times more likely as compared to Caucasian mothers to report a severe depressed condition in the months after pregnancy.

MIMH State Policy Innovation: New York Adopts S. 7234B / A. 9610B

August 4, 2014 Albany, NY

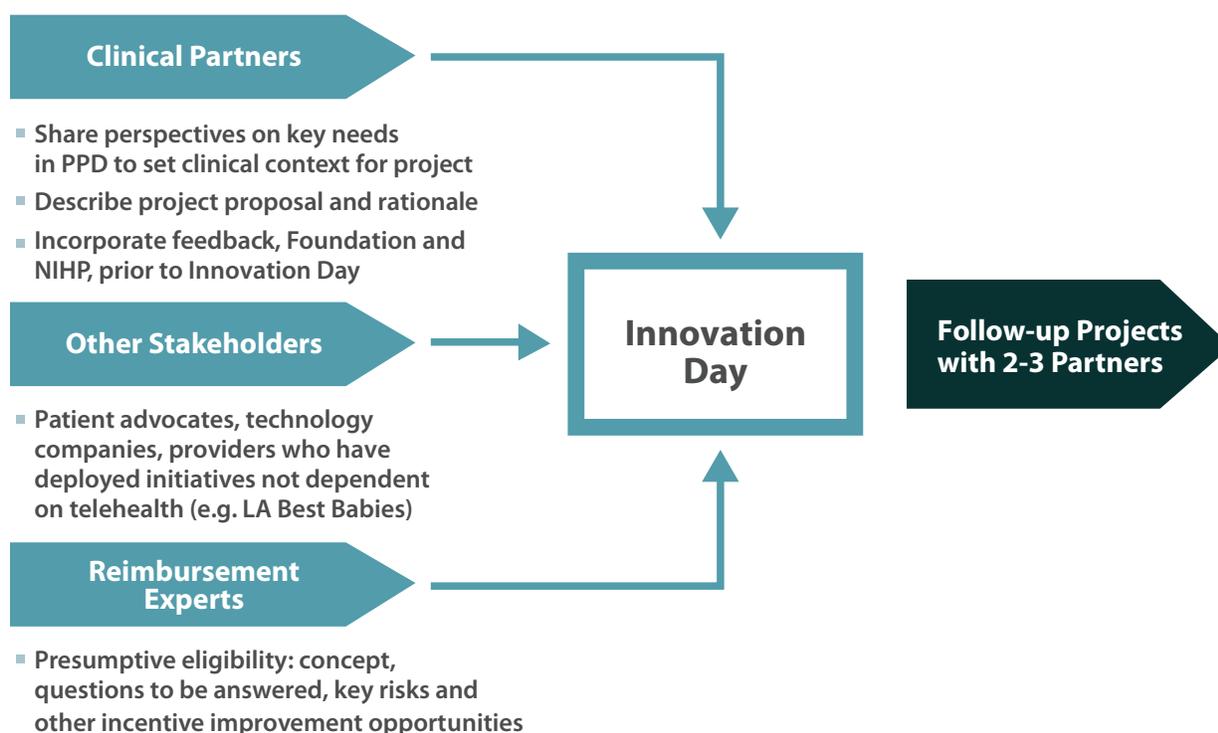
Governor Andrew M. Cuomo today signed a bill designed to provide support for women facing maternal depression during pregnancy and following childbirth. The new law will provide educational services, as well as promote screening and treatment for maternal depression disorders. Early screening and identification of postpartum depression has an eighty to ninety percent success rate and offers long-term health care costs savings. Dr. Ellen Landsberger, MD, MS, American Congress of Obstetricians and Gynecologists (ACOG) Fellow and Associate Professor of Clinical Obstetrics and Gynecology and Women's Health at the Jack D. Weiler Hospital of Albert Einstein College of Medicine, said, *"Screening for, diagnosing, and treating depression have the potential to benefit a woman and her family. Pregnancy and the postpartum period represent an ideal time during which consistent contact with health care professionals will allow women at risk to be identified and treated. Women with current depression or a history of major depression warrant particularly close monitoring and evaluation."*

According to research for the New York State screening Bill S. 7234B / A. 9610B, mothers in the most advanced stage of PPD commit suicide at a rate of 5 percent and infanticide in 4 percent of the cases. Maternal depression is also associated with suboptimal infant care including frank neglect or abuse in severe cases.³ These early difficulties can lead to longer-term impairments in intellectual and emotional development and academic readiness.⁴

Fortunately, this is a unique time of change and opportunity to improve maternal and child outcomes together in which technology, regulatory developments (e.g. New York), reimbursement, and other factors are all aligning in favor of doing more – in impactful ways – to help patients with perinatal and postpartum depression.

The Packard Foundation and other interested stakeholders are interested in supporting initiatives in MIMH that improve screening, diagnosis, early intervention and treatment of MIMH towards the broad goal of ensuring U.S. children are healthy and ready to learn.

Figure 1. MIMH Innovation Day – Packard Foundation



Source: Next Innovation Health Partners

With an eye on this goal and taking action focused on impact, the Packard Foundation hosted a MIMH Innovation Day in spring 2015, organized and facilitated by Next Innovation Health Partners. This MIMH Innovation Day engaged different stakeholders to combine the different perspectives that are necessary to generate breakthrough initiatives.

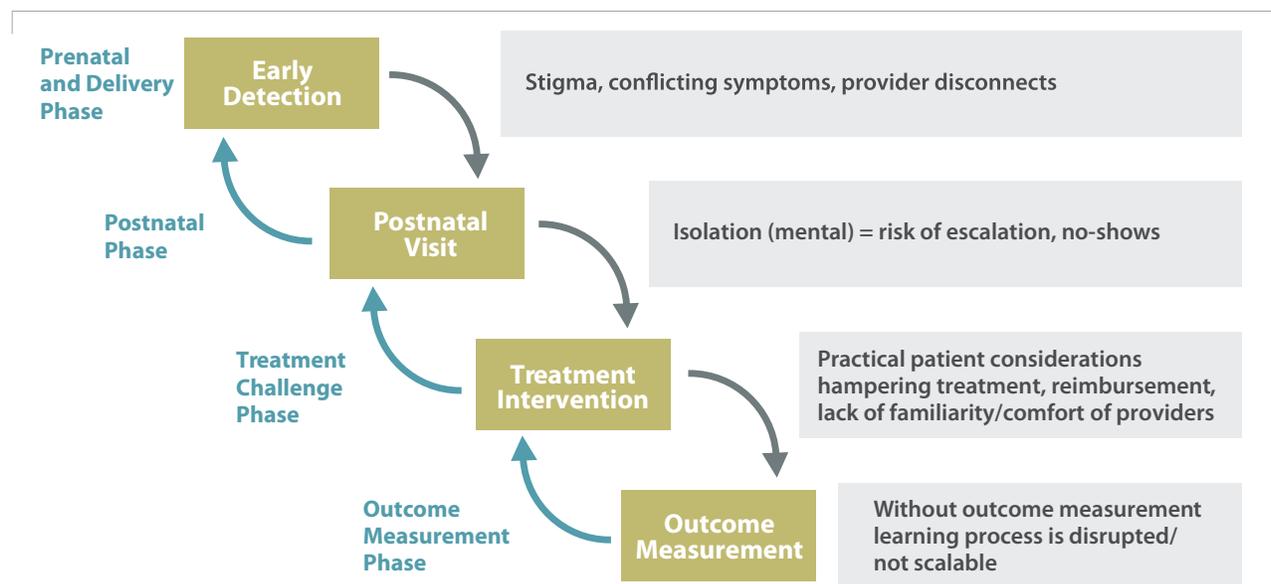
The overriding objective is to identify opportunities that create innovation in MIMH “at scale” as many MIMH or PPD improvement efforts are often undertaken at a local or state level. To make a lasting, significant change for the hundreds of thousands MIMH patients every year, however, innovation efforts need to “roll up” and have national impact. Initiatives that are designed with that in mind can be tested and refined on a small scale, before increasing in scope and impact. The Packard Foundation’s objective is specifically to focus on opportunities with the potential for national impact and state/regional scale.

This working paper synthesizes key themes, insights and highlights initiatives that can help address/solve key problems. The objective of this working paper is to continue engagement with stakeholders and to help channel the community’s energy to address hurdles best overcome through collective action, iterative learning and sharing.

Organizing Framework

MIMH is a complex continuum and screening, diagnosing, and treating it – or making changes in how this is done – is complicated by the fact that multiple providers are involved who each have their own mandates. Yet each individual provider’s decision and action impacts other providers and the patient along the continuum (e.g. a psychiatrist may prescribe medication for the mother’s MIMH during pregnancy, but the pharmacist filling the prescription may tell the patient not to take medication while pregnant, confusing the patient) which may actually discourage the patient from complying with prevention and treatment. To provide a common platform for discussion about MIMH problems and potential solutions Next Innovation Health Partners developed the organizing framework included below.

Figure 2. Impact Waterfall: Highest Impact Levers



Source: Next Innovation Health Partners

The framework breaks down the complex interactions among patients and the various providers in discrete steps. Besides compartmentalizing the connected interactions, the benefits of using this framework are that:

- The top three levels of the waterfall sync up with the place of treatment and diagnosis – each place has a consistent set of incentives and similarities of behavior. In many cases each level represents one organization.
- The transitions between each waterfall level are key points where MIMH care of patients tends to break down.
- Any innovation that wants to have a sustained, scalable impact in MIMH needs to address at least one or more of the levels or the breakdown in the transitions between the levels.

Using this framework allowed the group to address the many related challenges in a structured manner.

“One in four people will experience a mental health problem in their lives, but the majority of them will not receive treatment.”

– Jen Hyatt, Founder and CEO, Big White Wall

Expert Participants

Participants were selected to represent all the key stakeholders involved in achieving change in the screening, diagnosis, and treatment of MIMH patients, including Stanford, Mount Sinai and Dignity Health.



Dignity Health is a 21-state network of nearly 9,000 physicians, 55,000 employees, and more than 380 care centers, including hospitals, urgent and occupational care, imaging centers, home health, and primary care clinics. The Dignity Health system delivers over 60,000 babies per year, with about 30 percent enrolled in MediCal.



Stanford: Stanford University's Department of Obstetrics and Gynecology in the Johnson Center for Pregnancy and Newborn Services at the Lucile Packard Children's Hospital collectively delivers over 4,156 babies per year. The OBGYN Clinic had 14,173 visits in 2014. The clinic is an important resource for care for women in the San Francisco Bay Area. Approximately 45 percent are enrolled in MediCal and 37 percent of women who receive obstetrical care deliver are Hispanic or Latino. The Women's Wellness Clinic in the Department of Psychiatry is a clinic specializing in the evaluation treatment of perinatal mood and anxiety disorders, including medication and evidence based psychotherapies.



Mount Sinai recently expanded to include seven hospitals delivering more than 18,000 babies per year. The patient population is highly diverse: 88 percent are enrolled in Medicaid or a Medicaid HMO, 58 percent self-identify as Hispanic/Latino, 32 percent self-identify as African-American, 3.5 percent self-identify as Caucasian, 6.5 percent self-identify as Native American, Indian, Filipino, Asian, Pacific Islander, or unknown. In addition, 72 percent report being single at their first preterm appointment and 41 percent reported having less than a high school education.

Technology companies at the leading edge of innovation in the socio-behavioral space. It is of note that usually NIHP's health care innovation landscape scan leads to the discovery of 200-500 potentially aligned companies. However, in this case a much smaller number of companies were discovered in the scan at less than 50. It is interesting to note that venture funding in mental health (all mental health combined) is a fraction of venture funding as compared to other, similarly costly disease areas.

That being said, the companies discovered during the landscape scan were typically economically viable (e.g. Empower Interactive, Ginger.io, Wildflower Health) generating revenue from commercialized products. Some had just received recent funding and Wildflower Health closed on a \$5 million Series B round since the Innovation Day. So even though – or perhaps precisely because – the area of mental health appears to be one that is not receiving mainstream attention in private sector funding as companies in this space need to know how to sustain themselves instead of pursuing a model of growth-while-incurred-heavy-losses, as can be observed in other high-tech startup segments.

The patient perspective was brought into the conversation as well as other external stakeholders, including:

- **Patient advocates**
- **Health systems with hospitals in urban, suburban, and rural settings**
- **Various providers: OBGYNs, psychologists, physicians and nurses**
- **Clinical researchers**
- **Technology companies**
- **Funders/thought partners**
- **CMS: patient outreach and quality**

An overview – including brief bios – of all participants can be found in [Appendix A](#).

The diversity of participants was intended to enrich the discussion and accelerate the feedback cycle among stakeholders with respect to problem definitions and opportunities for improvement. Hopefully the recommendations in this paper on next steps are more robust and actionable. Given the multi-stakeholder nature of many solutions to the challenges in helping MIMH patients, collaboration is a key success factor for lasting change in MIMH.

Other stakeholders who we wanted to be present, but for different reasons were not in attendance, were a pediatrician and a child mental health expert. Pediatricians do see patients who are at risk of PPD, but since their training is focused on the infant instead of the mother, pediatricians are often uncomfortable screening the mother about her mental health.

Summary of Key Insights by Phase

In this section key insights per phase outlined in the organizing framework are highlighted. In the next section we will roll these insights up to overall themes that emerged during the discussions.

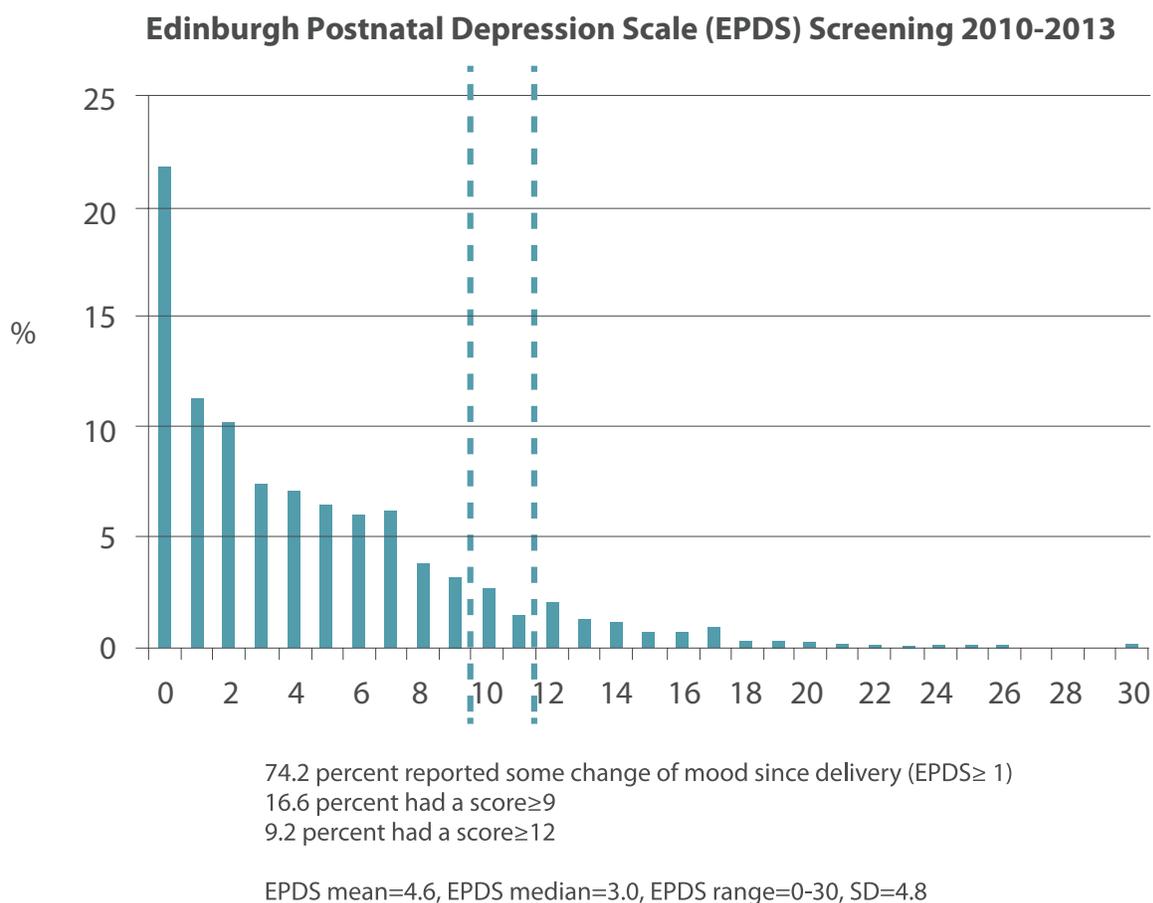
Participants were in agreement that we should be thinking about this as a perinatal problem that closely correlates with postpartum depression, because the problems – and early intervention options – often start in the prenatal/delivery phase, and not only postpartum. This may increase support for interventions in this phase to prevent onset of postpartum depression and/or detection of onset of maternal depression during pregnancy.

Table 1. **Pregnancy and Delivery Phase**

Phase 1	Problem:	Potential Solutions, Questions:
Pregnancy and Delivery	No early screening because there is a shortage of providers to refer to	Use telehealth for resource efficiency? Introduce digitized/simplified screening tools?
		Make training more scalable w/technology.
	Conflicting provider instructions that confuse patients	Create care coordination mechanisms. Stimulate use of such tools by providers.
		Data-sharing to avoid provider interference.
	Lack of reimbursement prevents providers from referring patients	Change CMS reimbursement rules and/or clarify existing policy and regulations? Give directory of qualified PPD psychs to patients?
	Perception that many psychologists don't take insurance	CMS reimbursement changes: there are clinic-based therapists who do accept insurance. A provider directory should clearly state payment options accepted by each therapist listed.
	Ideal treatment protocols should include the patient's MIMH risk-score	Conduct pilot study to show differences in approach, costs and outcomes for two cohorts that differ in risk score. Model must be transferable not limited to large academic medical centers.

In addition, surveys have documented that postpartum depression often starts in the perinatal phase. For example, a 2012 Los Angeles Mommy and Baby (LAMB) Survey of the Los Angeles Public Health Maternal Adolescent Health Program indicated that: 11 percent of new mothers reported symptoms of depression before pregnancy, 30 percent of reported symptoms during pregnancy and 47 percent (N=62,000 women) reported depressive symptoms after pregnancy. Dr. Silverman from Mount Sinai in New York presented results from their near-universal screening program (screening 99.5 percent of all discharged patients), indicating similar proportions (25.8 percent) of patients with MIMH during pregnancy:

Figure 3. MIMH Screening Data, Mount Sinai Health System 2010-2013



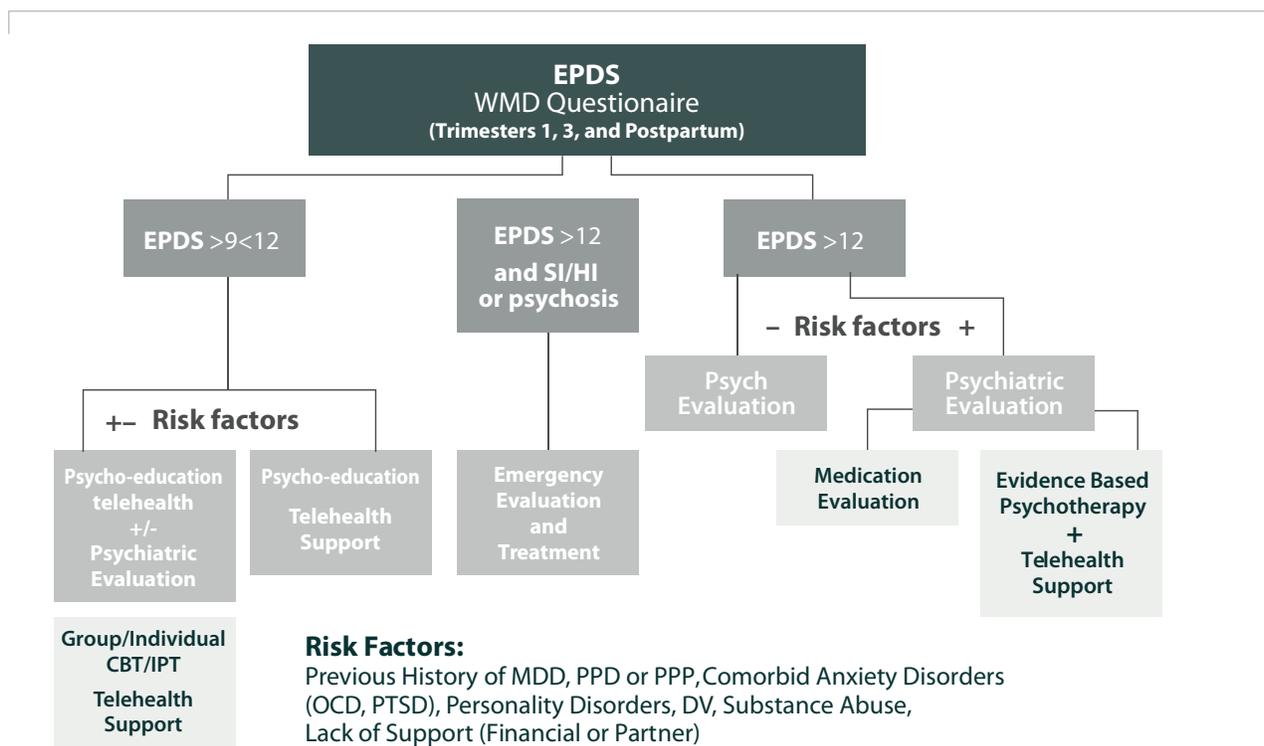
The term Maternal and Infant Mental Health explicitly addresses the health of both mother and infant and recognizes that the different mental health challenges (e.g. anxiety, depression of the mother, ADHD of the child later on) are interdependent illnesses.

MIMH represents a two-generation approach to understanding and supporting social and behavioral health that explicitly acknowledges the interconnection between parent and infant together. This approach underscores the need to provide early screening and support for parents during the perinatal and postpartum phases and to identify and track health and behavioral health outcomes of both parents and infants in the early years of life.

The Edinburgh Postnatal Depression Scale (EPDS) is a questionnaire originally developed to assist in identifying possible symptoms of depression in the postnatal period and is also useful in identifying symptoms of anxiety.

The EPDS is not a diagnostic tool; rather it is a screening tool that aims to identify women who may benefit from follow-up care, such as mental health assessment. This may lead to a diagnosis based on accepted diagnostic criteria (Diagnostic and Statistical Manual of Mental Disorders-IV-TR or International Statistical Classification of Diseases and Related Health Problems-10). Screening patients generates risk scores of patients. Stanford faculty suggested that treatment algorithms should be tied to a patient’s EPDS risk score, as outlined in Figure 4 below. Such patient stratification is already done in other disease areas like oncology and chronic cardiac care. Patients with very different risk scores require very different levels and intensity of care. Tailoring the treatment algorithm optimizes efficient use of health care resources and avoids over- or under-treating the patient relative to her risk of disease progression.

Figure 4. Edinburgh Postnatal Depression Scale (EPDS)

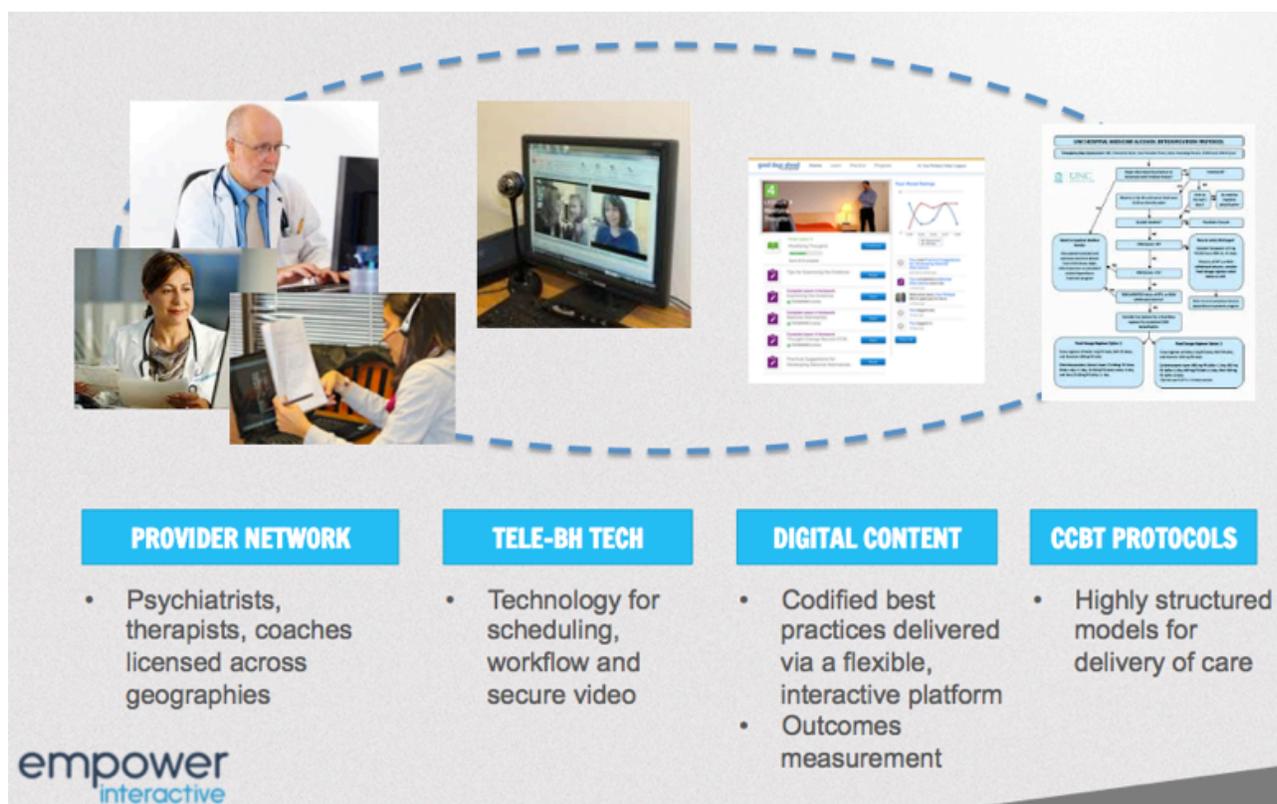


One challenge that this approach may also help address is that patients can be confused by too many providers giving conflicting instructions during pregnancy. For example, a treating psychiatrist may instruct the mother to take anti-anxiety medication or antidepressants for MIMH, but another health care provider may tell the same mother that such medication during pregnancy may affect the fetus and should therefore be discontinued until the pregnancy is over, or until the mother stops breastfeeding.

A major challenge for this phase is the question of which provider is the central ‘controller’ of the patient in case of provider instructions conflict, or otherwise put: which provider has the obligation to coordinate the patient’s care in this phase? Our suggestion is that the answer to question should be based on the risk score of the patient: the care of a high-risk patient is probably best coordinated by a psychologist, whereas the care for a low-risk patient may be best coordinated by the OBGYN.

A major stumbling block throughout all phases, but particularly impactful in this phase, is the shortage of mental health care providers to refer diagnosed patients to. Mount Sinai and Dignity Health, for example, do not currently screen for perinatal or postpartum depression to avoid diagnosing a patient who is at high risk but cannot receive treatment due to an insufficient number of providers or the patient to be referred to. To overcome this dilemma, new ways to make use of available resources are needed. Simply adding resources without productivity/efficiency gains is not a viable approach.

Figure 5. Empower Interactive’s Patient-Provider Engagement Model



Using technology to improve the access to and utilization of existing mental health care providers is a promising avenue to address this provider shortage in the short and long term. Empower Interactive is one of the participating companies illustrating their approach to blending technology with existing providers (see above Figure 5).

Empower Interactive’s model digitizes some of the Cognitive Behavioral Treatment (CBT) actions of mental health care providers in order to enable patients to go through treatment when they are not visiting the health care provider. This is one – but not the only - way to increase the number of patients that can be treated by mental health providers. Empower Interactive can be considered an extender of psychologists’ capabilities by helping patients do some of the tasks that were usually conducted in-office or at home.

As was pointed out several times during the Innovation Day, training providers who interact with patients at risk for PPD to better identify, diagnose and refer patients to treating physicians would be beneficial as well. Mothers interact with many providers, including pediatricians, primary care practitioners, social workers, and others during the first year after pregnancy. Training such providers can be time consuming and needs to include incentives for the providers to complete such training. For the field it would be beneficial if technology can be used to lower the cost and time needed for training. Technology can also make standardization of content and certification of providers who have completed the training, which in turn may help with the creation of a database/directory of trained providers.

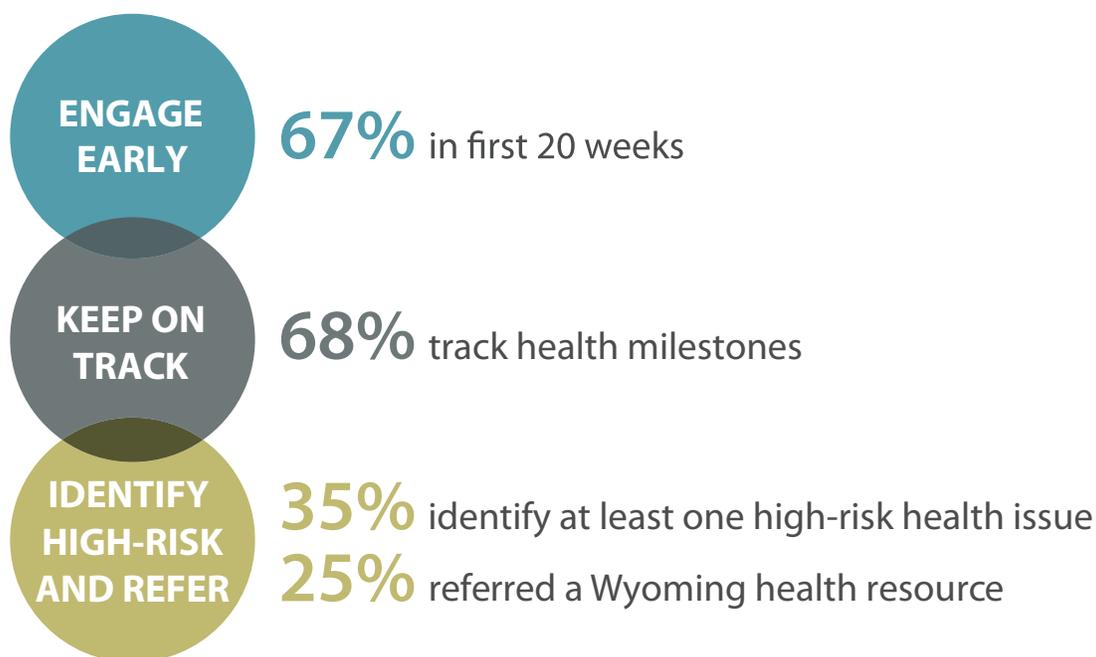
Table 2. Postnatal Phase

Phase 2	Problem:	Potential Solutions, Questions:
Postnatal Visit	More than 50% of Medicaid-patients do not show up for their postnatal visit whereas 89% of commercially insured patients show up for this visit	Increase the value of this visit (explore how). Create awareness of need for this prior to delivery.
		Leverage existing home visitation models to reach hard to reach patients for postnatal treatment. Which models are best suited for this? Nurses open to this 'modification' and/or can psychologists join via telehealth?
		Use data from this visit for subsequent care.
	Often no hand-off/data-sharing among providers	Use/develop app for data-sharing (this is not necessarily best addressed through electronic medical records or EMRs, as inpatient EMRs and outpatient EMRs can be very different and not compatible).
		Insert stop in workflow if screening data is not entered or not shared with patient's primary care provider.
	Many low-income patients switch their prepaid phones every month, hindering ongoing engagement	Provide them with a smartphone to use as long as they engage with provider, e.g. report certain data every week.

Once patients deliver their babies, it can become very challenging to sustain engagement with patients who are at high risk, or diagnosed with PPD. Some barriers are that more than 50 percent of Medicaid patients don't show up for the postnatal visit (compared to 89 percent for commercially insured patients) and many use prepaid phones, which they replace every 30 days (which leaves the provider no way to call the patient).

Creating engagement prior to or at discharge from the hospital may be able to help mitigate this dropoff in engagement. Wildflower Health offers an example of early and continued engagement for pregnant women, although it must be noted that only 20 percent of patients have indicated that they experience PPD/mental health issues.

Figure 6. Wildflower Health Study Data from Wyoming Health, February 2014



Wildflower Health's study in Wyoming was conducted using smartphones. Given the high costs of treating more advanced MIMH patients, payers and/or health care systems should consider paying to provide patients with similar phones to avoid preventable costs of disease progression.

One avenue to increase care without a commensurate increase in resources is to build awareness among providers and to make new use of existing resources and processes. Dr. Lynn Yonekura from Dignity Health suggested leveraging existing programs for in-home visits of patients to address the engagement hurdles. There are multiple in-home visit models available and a potential next step would be to conduct one or more pilot projects to develop a scalable model and evaluate their potential impact on MIMH care.

Table 3. Treatment Challenges

Phase 3	Problem:	Potential Solutions, Questions:
Treatment	Pediatricians uncomfortable screening/dealing with mothers (instead of infants)	Enable pediatrician to embed psychologist via telehealth and/or train providers.
		Ability to refer the mother to a telehealth-enabled provider after the pediatric visit.
	Patients unaware of help available to them	Create central resource of information that can be tapped by advocacy organizations, as well as providers (maximize ease of access/use). Create directories of qualified providers. Give visibility to these resources.
	Patients doubt themselves, don't proactively seek out help	Awareness campaign to destigmatize the anxiety, depression that new moms may feel.

Improving awareness and education – among patients as well as providers – are most important in this phase. Technology can play a role in making information more accessible at low cost and potentially customized. Awareness and education take time and a hybrid approach is probably most effective. Whereas providers have been actively engaging the patient during the pregnancy and delivery phase, in the postpartum phase the patient often becomes harder to find and engage. In addition to not showing up for postnatal visits, patients also tend to seek advice from their peers (online or in-person, will differ by socioeconomic status, ethnic community, personal preference) instead of health care providers.

Peer-provided information and support can be invaluable and should not be underestimated for low- and moderate-risk patients. Postpartum Progress had been mentioned before as a resource for patients. According to surveys that they conducted among visitors to their forums and websites:

- **79% of audience report Postpartum Progress helped them recognize they were suffering from a maternal mental illness**
- **75% report Postpartum Progress increased their willingness to seek professional help for their maternal mental illness**

As Katherine Stone of Postpartum Progress shared, these women find the voices of their peers trustworthy, sometimes even more accessible or relatable and less biased than that of institutions and organizations, whether it is corporations or voices of authority like policymakers and physicians' groups. For progress to be made **at scale**, it is important for both providers and patients to better connect. As Katherine Stone says:

[There is a] "fairly large gap between what the [professional] health community is saying about the recognition and treatment of perinatal mood and anxiety disorders (we're trained, we're screening, we're referring) and what the mothers are saying (no one is screening me, I was given incorrect information and/or stigmatized when I asked for help, no one knew where to send me, I reached out for help but didn't get a response/couldn't get an appointment, etc.)"

On that note, it is still the case that there is a stigma attached to mental health issues. In addition, some mothers are also concerned that bringing up MIMH problems can jeopardize their custody over their child/children.

Many patients hide their symptoms, or deny having MIMH due to these concerns. It is a barrier to the patient seeking help. Peer support resources can be an important midway point between the patient suffering in silence or seeing a provider.

With respect to the stigma, we have seen how other diseases like breast cancer and autism were once stigmatized. Innovation and treatment in both disease areas has advanced since the stigma around these diseases has given way to strong and long-lasting public awareness campaigns, changing the perception of patients, healthy individuals, and to a lesser extent providers.



“When this photo was taken, I was suffering from the worst depression and anxiety I’d ever known, over 8 months postpartum. You can’t tell by looking, but I felt like I was drowning. I was never happy, worried about everything all the time, and wanted nothing more than to just disappear and never return.”

– Jenna Rosener

Table 4. Outcome Measurement Challenges

Phase 4	Problem:	Potential Solutions, Questions:
Outcome Data	U.S. lacks the comprehensive, longitudinal data infrastructure that for example Sweden has	The question is what the Minimum Viable Data needed (MVD) is to do effective outcomes research in MIMH.
		Can patients be enticed/given incentives to submit data that fills this data gap? What about care givers, even if they are not health care professionals?
	What to measure may be clear (Patient Health Questionnaire-9 [PHQ-9] and Edinburgh 3), but the gap between what could be measured (beyond this) and what would be ideal to measure is enormous, making the challenge tougher	Measure both mother and infant ideally, but for how long and what level of granularity?
	Patient base is very heterogeneous	How to recruit enough patients for each subsegment, track them long enough and still create statistically strong control groups?
	Little funding for this sector. More data/evidence of effectiveness could increase	What data is needed to change reimbursement from Medicaid?
	Inflow of funding, whether venture capital funding or other (e.g. grants)	What outcome measurement improvement data is needed for employers/private payers? Could they be quicker to convince than CMS (see e.g. Wildflower)?

With respect to outcome measurement Mount Sinai and Ginger.io shared examples of their work in this area. Longer term the need for outcome research and evidence accumulation is of critical importance, including for evidence supporting interventions for which the benefits don't accrue for a long time. Data is key to interest from governmental funding agencies and paves the way for reimbursement of activities that providers currently do not engage in, because reimbursement for these activities is lacking.

This cycle of data-triggers-innovation-and-funding can be observed in digital health in general (in which the rise of EMR funding has triggered a surge in the private sector funding for digital health innovation in 2010), in life sciences (where all the investments in data-generation companies in the early 2000s has led to a surge of funding IPOs) and also in telehealth (which is only just starting to see a surge in funding and an increase in adoption in clinical practice along with it).

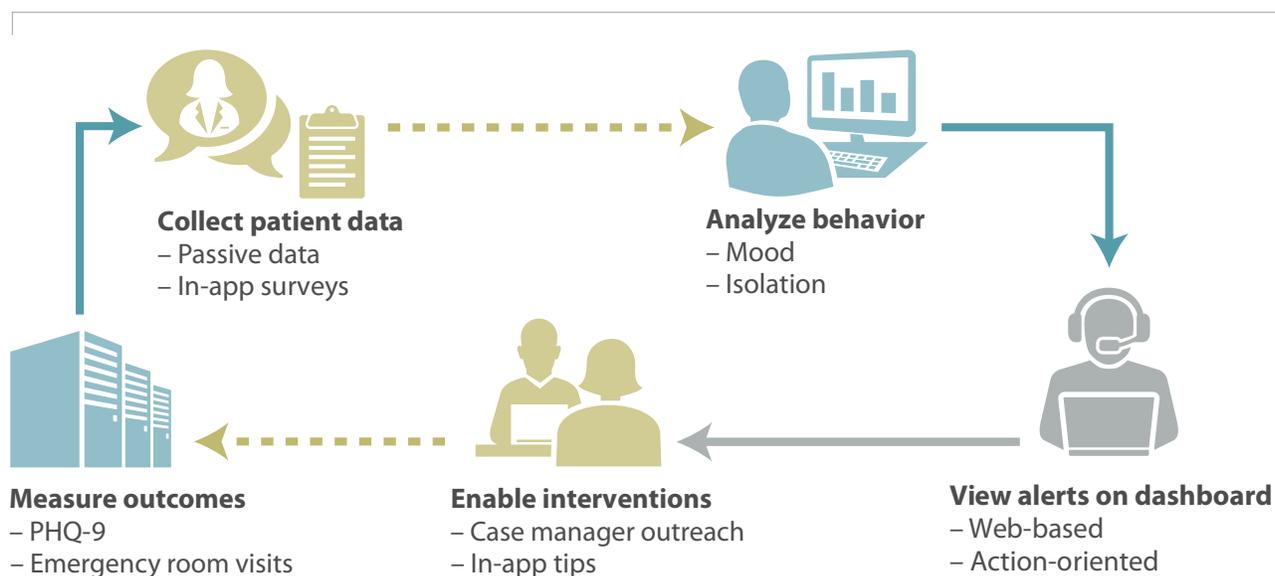
Outcome measurement is a critical area in need of innovation and implementation. Without strong outcome measurement data it is hard to envision innovation in MIMH initiatives supported at a level to help them scale.

Ginger.io presented an overview of MIMH study that they completed with Novant, a large regional health system in 2013. The study focused on MIMH, aiming to identify and reach perinatal patients experiencing depressive symptoms in a timely and effective way. For the study 426 patients were approached, 282 expressed interest and 257 of them downloaded the Ginger.io app. The company uses a closed loop learning and data gathering system. With this Novant and Ginger.io captured self-reported data (Patient Health Questionnaire-2, EPDS, weekly treatment), passive data (movement, communication), and clinical chart data to measure engagement and satisfaction, clinical outcomes, efficiency and utilization.

The results of the study:

- 97% of alerts identified patients with legitimate concerns
- Over 90% of alerts handled within 24 hours, potentially preventing hospitalization
- 82% of those contacted addressed concerns at little to no extra cost (on phone or during routine visits)
- Identified stressors and improved adherence, based on chart reviews
- More frequent screenings (6.4 vs 1.5 average) resulted in better targeting of the depression population

Figure 7. Ginger.io - Continuous cycle of engagement, feedback and measurement



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NIHP introduced the Staircase of Evidence framework that it suggests for use when complex, interdependent innovations are evaluated for effectiveness.

Interdependencies (technology, data, people) are a core characteristic of the problem areas in MIMH screening, diagnosis, and treatment. Each step of this staircase addresses one or more key stakeholders. Therefore, the more steps an innovation can address, the more stakeholders are aligned: from patient to CFO and the health care providers in between (physicians, nurses, social workers, etc.).

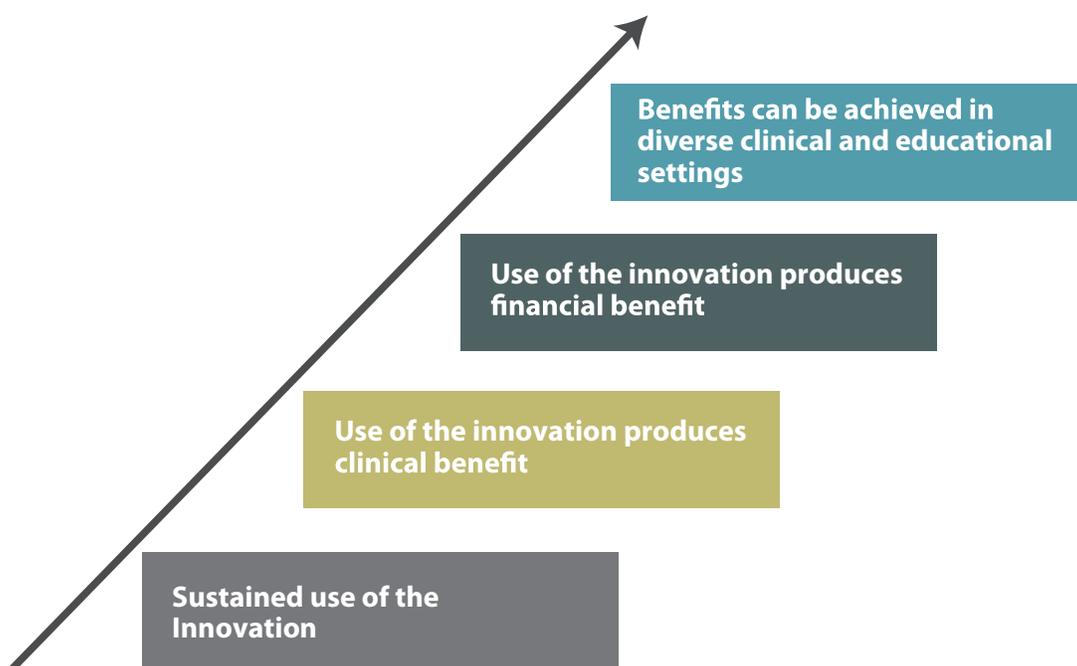
The 'sustained use of the innovation' step is important for MIMH in particular, as:

- 1) Many patients lack resources and may be using old/disposable technology (e.g. prepaid phones), making this step hard to execute successfully.**
- 2) Any attempt to do strong outcome research analysis requires longitudinal data, preferably for at least one year and at least for five weeks as defined by the Diagnostic and Statistical Manual of Mental Disorders.**

An alternative to generating new data with the Staircase of Evidence Framework is to analyze existing data, if available. On that note, Dr. Michael Silverman from Mount Sinai described his use of outcome measurement data from Sweden. Sweden has a unique data infrastructure that collects data on mothers and children for years, including school grades for the children, prescription data, medical visits, and much more.

The comprehensiveness, granularity, and duration of data collection in Sweden is unmatched in the U.S. due to the cohesion of the single payer health care system that Sweden has, as opposed to the highly fragmented, combination of private and government payors in the U.S. Health systems that come closest to the Swedish data infrastructure may be integrated delivery networks like Kaiser Permanente or Geisinger.

Figure 8. Staircase of Evidence Framework



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It is important to determine:

- Which evidence gap questions need to be addressed now and over the long term?
- What different types of data can be used to grow the evidence base?
- What existing data can be (re)analyzed to answer outcome questions? Who owns this data, especially for data that needs to be analyzed across providers?
- What new data is needed to enable first-time analysis of outcomes?
- What outcomes data can increase reimbursement by CMS for care services?
- What data would fuel funding for innovation to address care gaps or resource shortages?
- A framework to help guide a concerted effort from the professional and patient communities to address the most pressing MIMH challenges.
- Awareness among practitioners, researchers, and patients needs to be raised about the importance of outcome data to fuel further innovation.

Key Themes

It is important to look across all phases to understand what core themes to consider. In this chapter we first cover key themes individually, before summarizing key conclusions.

Individual themes:

- 1) **Two-generation intervention model** recognized by participants as being key to addressing this problem. Within the two-generation model, mothers are vital and considered even more directly influencing the health and wellbeing of the child than other members of the family.
- 2) Most opportunities for improvement were identified in the **pregnancy and delivery phase** as in this phase there is:
 - Most natural control over the patient, patient is engaged
 - Need for ongoing provider training and provider feedback loop
 - Many postnatal high-risk MIMH patients are hard to engage/track
 - More opportunities for interventions that are expected to be beneficial rather than primarily postpartum
- 3) **Reimbursement** impacts many phases and is a key facilitator or barrier of making beneficial interventions take place on a large scale. In MIMH there are many action steps that providers know to be effective for diagnosis (or treatment) of patients, but providers don't execute them due to lack of reimbursement.
 - CMS can play a larger role in impacting the MIMH field, since a higher-than-average share of MIMH moms depend on public coverage for their care
 - Private insurers have a key role to play in securing reimbursement for MIMH services
 - The full impact of reimbursement on providers' tendency to screen and referral patterns should be investigated in more detail to optimize reimbursement changes
- 4) **Resource shortages** hinders providers from taking action that could clearly be beneficial. Health systems need to find a way to overcome these shortages through a blend of coordinated providers and technology that could clearly be beneficial: need to find a way to overcome these shortages through blend of technology and health care practitioners. Embedded care models could be an interesting new approach for multiple phases. Need to explore in more detail how this could be implemented, potential benefits, and requirements for use at scale.
- 5) **Data capture and integration with Electronic Medical Records (EMR)** are important challenges to outcome measurement. For example, Dr. Williams mentioned that at Stanford the EPDS screening data cannot be integrated into the EMR, and at Mount Sinai screening rates increased from 60 percent to 99.5 percent when it was made a mandatory part of the workflow in the EMR. Dr. Lyell (Stanford) pointed out that the diagnosis of MIMH is not a "check mark to select" in the EMR that Stanford is using during pregnancy. Information technology data architecture impacts clinical workflow and screening and diagnosis of MIMH patients.

- 6) Introducing treatment paths based on **risk-stratified patient types**, instead of the 'average' patient, has had transformative impact in other diseases (e.g. oncology). In MIMH as well, risk score could influence what follow-up actions are taken, who is engaged in the care of the patient, etc.
- 7) **Funding** to address this problem is insufficient. CMS potentially has major impact on this yet is less prone to funding innovation in MIMH than commercial payers/employers.
- 8) **Technology companies** that participated in the Innovation Day are solution-oriented, but are not working with any of the clinical stakeholders present in the meeting yet. What are the opportunities to connect health systems with technologies to address MIMH? Perhaps pilot programs could be developed specifically to support such collaborations where they fill a void in MIMH care.

In summary:

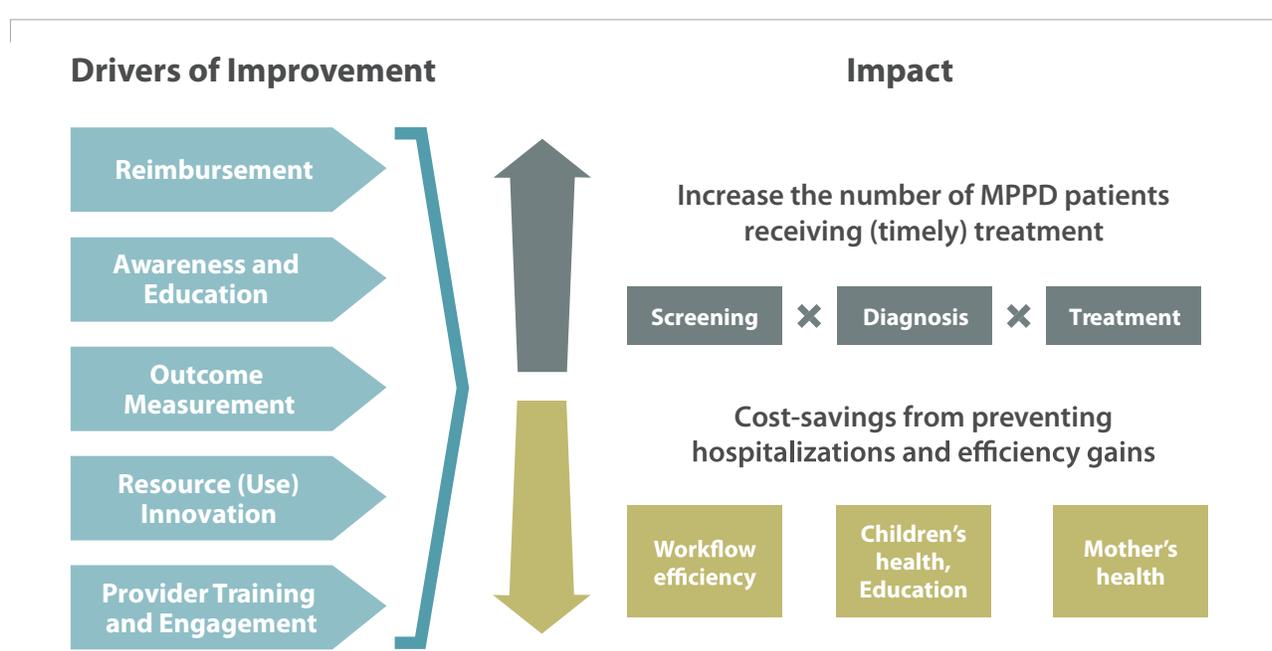
The core improvement areas cluster within five categories:

- Reimbursement (and innovation funding)
- Awareness and Education
- Outcome Measurement
- Resource (Use) Innovation
- Provider Training and Engagement

Addressing those five areas of need should yield two different types of benefits:

- More patients receive the care they need and children are healthy and ready to learn
- The resources, costs (financial, human) of providing the needed care are reduced

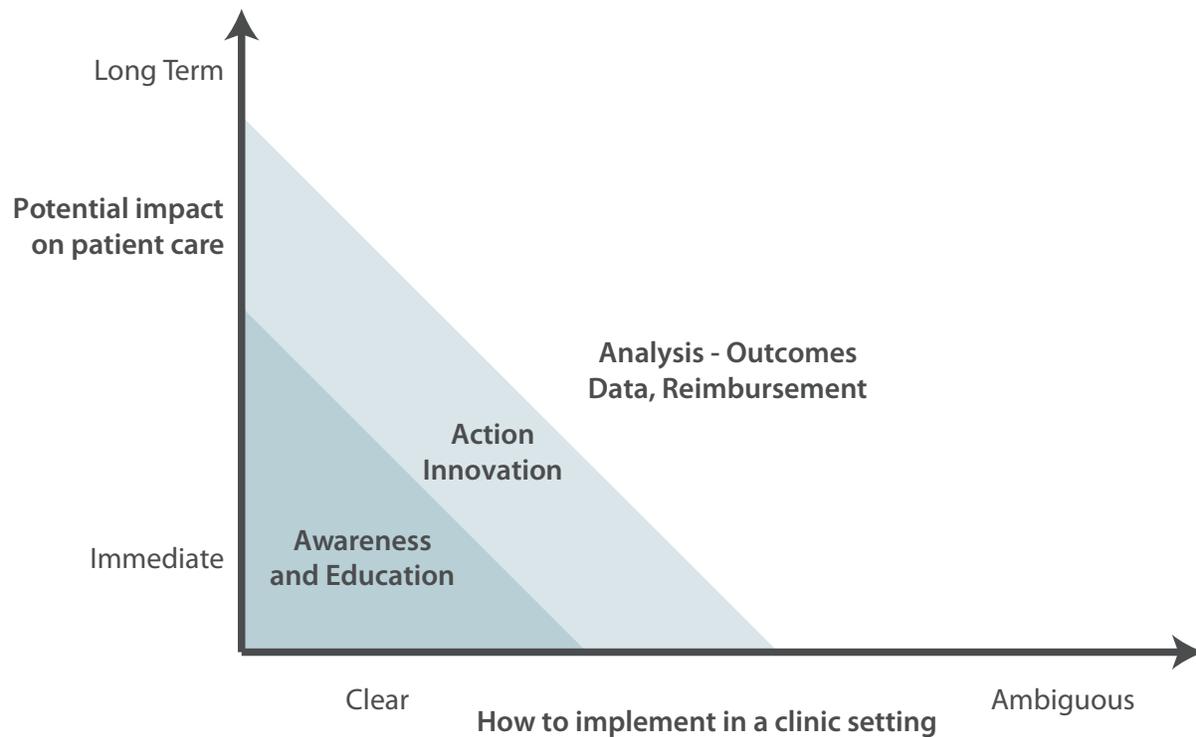
Figure 9. Key Opportunities for Improvement in MIMH



Recommendations for Action

Many phase-specific solutions or opportunities for improvement have been identified. These opportunities can be clustered into three categories based on their speed/ease of implementation and size of their potential impact:

Figure 10. Three Clusters of Improvement Initiatives



Source: Next Innovation Health Partners

Awareness and Education:

Innovation day participants frequently cited the import of raising the awareness of providers and patients of screening, proper diagnosis and early intervention.

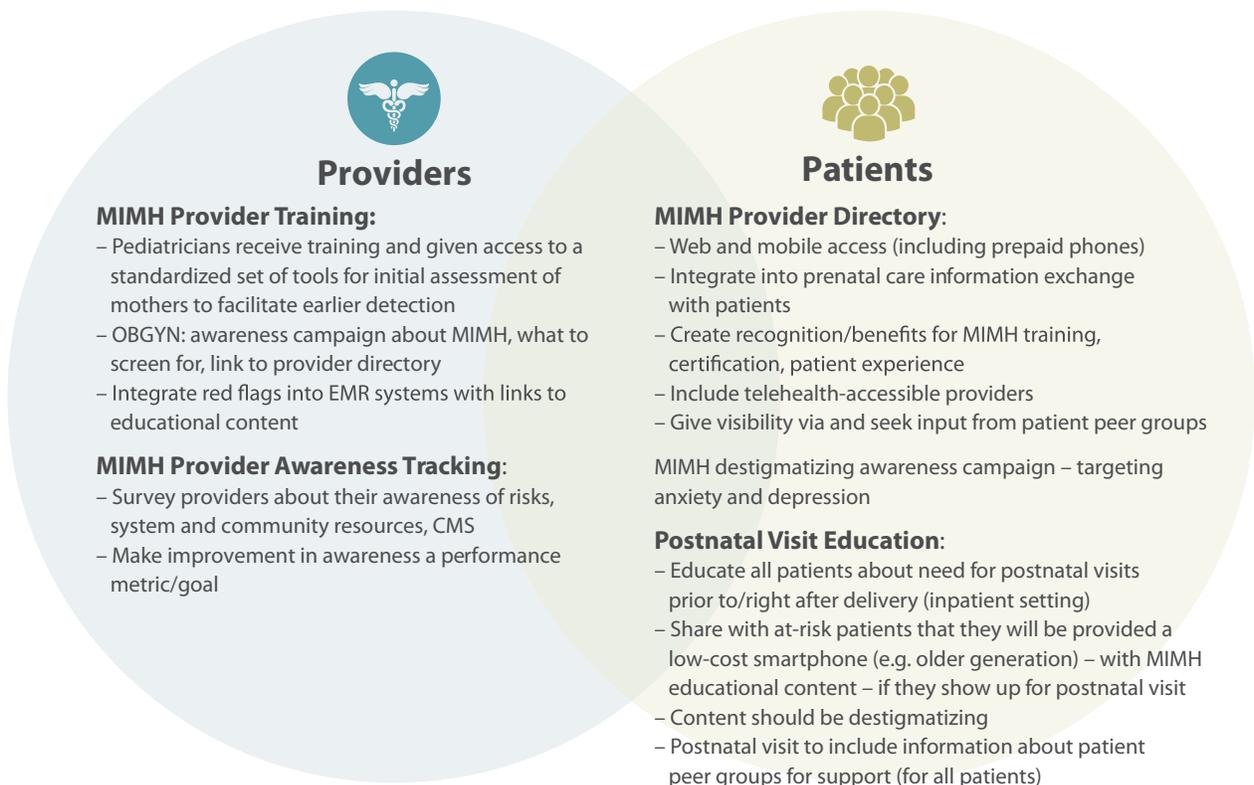
For providers, an ongoing combination of training, awareness raising and use of technology in workflows would increase providers' knowledge and comfort in diagnosing and referring PPD patients.

For pediatricians it is critical to offer standardized, validated tools that they can easily access (e.g. internal web resource or mobile tools). The fact that the tools are standardized and supported by scientific evidence will increase pediatricians confidence in the tools and resulting outcomes.

On the patient side, there are two main hurdles to treatment, over and beyond what providers can do:

- 1) Overcoming the stigma and anxiety related to realizing that one may have a mental health issue**
- 2) Knowing which provider within their health system and/or in their community to turn to for help**

Figure 11. Awareness and Education Improvement Initiatives



Source: Next Innovation Health Partners

Postpartum Progress is an organization that helps patients with these challenges and has attracted more than one million visitors to their website per year. One of the primary requests they receive is for a list of ‘vetted providers.’ **The need for a central, validated and updated provider directory that directly facilitates connecting patients with the appropriate providers.** It is important that such a directory would be validated by an independent entity or an entity that represents various key stakeholders and is not biased any way. The provider directory would also need to be updated on open and closed practices on a regular and frequent basis.

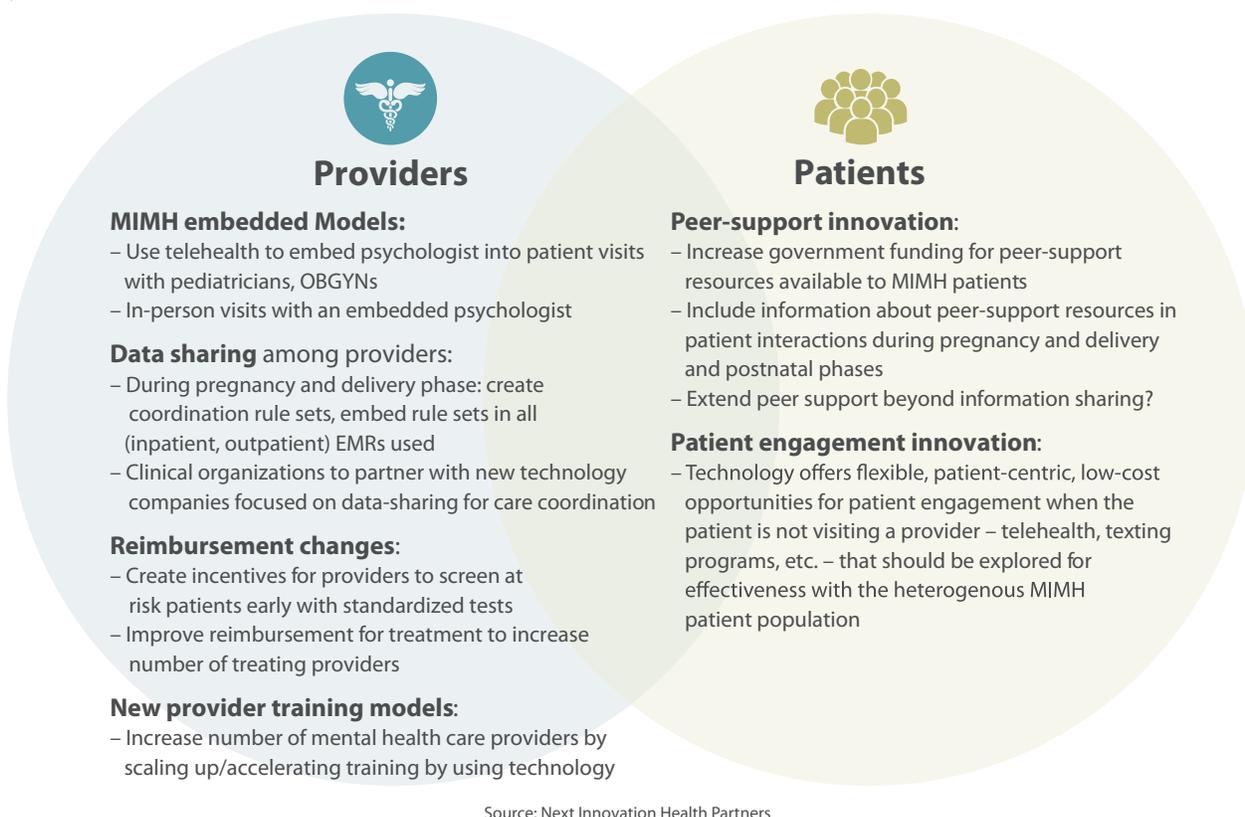
This type of directory is unlikely to be provided by a commercial entity and would best be supported by a not-for-profit organization or with mostly public funding.

Just like breast cancer and autism carried a stigma many years ago, but now have reached more mainstream acceptance, in the minds of patients depression and anxiety still carries a very significant stigma.

To overcome the stigma – as well as the concern that the mother risks losing her baby if she flags her MIMH struggles with a care provider – it is both important to destigmatize the illness with patients directly, as well as with all those who the patients interact with. A diverse, large-scale awareness and education campaign supported by a not-for-profit would be needed on a state or national level.

The **postnatal visit** is often a major breakdown in engagement for MIMH patients. Improving this rate of participation is in sync with CMS’ MIMH initiatives and **educating** patients about the need for this visit during the pregnancy and delivery phase can be an important avenue to increasing participation in the postnatal visit.

Figure 12. Action Improvement Initiatives Supporting Patients and Providers



For the Action Improvement recommendations highlighted in Figure 12, often the problem and the solution are known. But for various reasons, training, patient engagement and workflow solutions are not adopted. Participants identified that innovative new delivery methods are now available to solve many of these issues. Central to many of the solutions discussed is better coordination of available resources.

At the same time, it is important to document where gaps remain after improvement initiatives are piloted or implemented. For example in many cases screening is not performed because there are no known providers to refer diagnosed patients to.

Providers often cite that there are not enough resources available to screen, diagnose and treat all patients. The two most promising approaches are **embedding** psychologists into patient visits with other providers (e.g. OBGYNs, pediatricians) and **using technology** (e.g. telehealth) to make such embedding less costly and easier to execute.

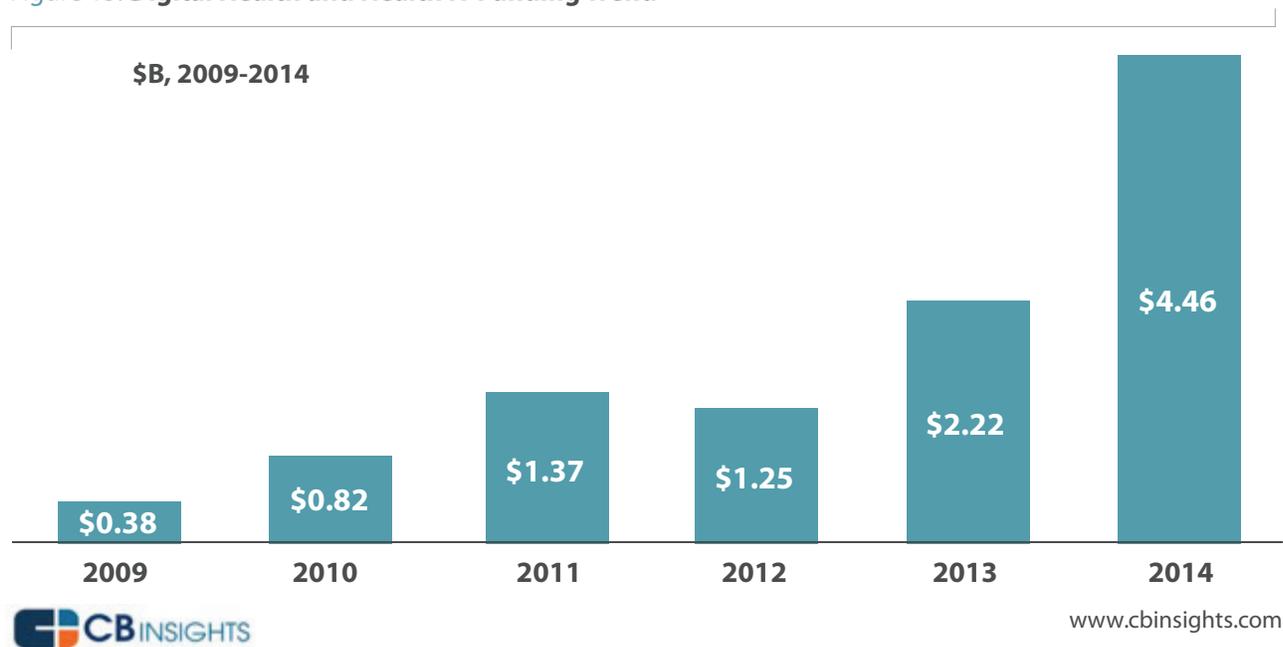
Another area for resource productivity improvement is **provider training**. The infusion of technology to train providers so that they can do more advanced risk assessment /screening of the mother, can be valuable in getting patients treatment earlier and thus improving outcomes for both mother and baby.

For patients, MIMH is well suited to a **two-generation intervention model**, as the infant's health is highly dependent on the mother's mental health status. The mother also interacts with many health providers during the pregnancy and potentially after delivery, during the early years of the child's development. This would make family conversations with providers and other trusted community resources a good fit.

Analysis:

Former Chief Technology Officer of Health and Human Services Todd Park has said "data is oxygen for innovation" in health care. Starting in 2010, the federal government ramped up funding for the digitization of medical data by increasing the adoption of electronic medical records throughout the U.S. This has led to an enormous – and still accelerating – growth in innovation funding as highlighted in Figure 13.

Figure 13. Digital Health and Health IT Funding Trend



For MIMH, more robust data collection will help quantify the challenges as well as document the efficacy of early and coordinated interventions.

Similarly, a recent article in a major health publication stated: "Why aren't venture capitalists (VCs) investing in mental illness? Only \$900 million has been invested by VCs into psychiatric drug development from 2004 to 2013. This figure's particularly stark when placed in comparison with the \$9.1 billion invested in oncology – and the \$4.6 billion that went into neurology. Yet mental illness is inordinately widespread – and expensive.

There's a dearth of information on the systemic costs of schizophrenia, but a widely cited 2002 figure indicates that the cost is \$62.7 billion annually."⁵

In MIMH there are four types of data gaps that stand in the way of fueling innovation and/or attracting more private sector funding:

- a) **Coordination gaps** – for action to be informed by an evidence base, mother and baby’s data need to be coordinated between providers, which can be difficult and takes a longer term investment in changing EMRs, workflows and securing parent consent.
- b) **Time-horizon gaps** – to measure the impact of the disease (or the benefits of certain interventions) data needs to be collected over a longer time horizon than stakeholders are accustomed to.
- c) **Field (health/education) gaps** – the health and education fields use different terminology, utilize different data systems and view outcomes from different perspectives. Effectively supporting MIMH however will have both positive health and educational outcomes that need to be shared by both fields.
- d) **Access gaps** – it is hard to get information and data from patients once they deliver, different at-risk groups have differences in accessibility and compliance with provider instructions.

Participants agreed that a smaller workgroup would be formed post-Innovation Day to focus on better understanding and prioritizing ways to address the data gaps. Several participants were also open to highlighting MIMH as an area of focus within their systems in the coming weeks and months. A recommendation was made to establish a working group that focuses on:

- Mapping out the four data gaps in coordination, time horizon, between fields and in access.
- Prioritizing data gaps to address initially. This would likely be a combination of impact and execution feasibility and a then deciding on the scope of impact to focus on.
- Identify specific pilot projects and timing to address the data gaps.
- And finally, creating a central data repository and/or data sharing system that is available to members of the workgroup as well as other practitioners, researchers and patients/patient advocates.

To close the day, the Packard Foundation thanked participants for informing the conversation on ways to bring innovation to Maternal and Infant Mental Health issues and encouraged interested participants to think about future collaborative efforts to bring light to this important two-generation health and education approach.

For more information, email Joanne Tong at JTong@packard.org or visit www.packard.org

¹ Wisner et al. JAMA Psychiatry. 2013;70(5):490-498; Gavin et al. Obstetrics Gynecology. 2005 Nov;106:1071-83; Banti et al. Comprehensive Psychiatry 52 (2011) 343–351; Dietz et al. Am J Psychiatry 2007; 164:1515–1520.

² American Psychological Association on maternal postpartum depression (www.apa.org/pi/women/programs/depression/postpartum.aspx)

³ Field Infant Behavior Development 33(2010).

⁴ Field Infant Behav Dev 34 (2011) 1–14; Brand et al., Clinical Obstetrics Gynecol 52(3), 441–455

⁵ Medcity News, Apr 28, 2015, “Why aren’t venture capitalists investing in mental illness?”

Bios of the Participants and Organizers:

Health care Systems and Hospitals

Stanford Hospital and Clinics

Dr. Natalie Rasgon

A member of the Stanford faculty since 2002, Dr. Natalie Rasgon is a professor in the Department of Psychiatry and Behavioral Sciences and Obstetrics and Gynecology in the Stanford School of Medicine. Dr. Rasgon holds a courtesy appointment in the Department of Obstetrics and Gynecology. In addition to her research, teaching, and clinical activities, she is also co-chair of the Women's Faculty Forum at Stanford. Currently, she is an Associate Dean of the Stanford University School of Medicine, Director of the Stanford Center for Neuroscience in Women's Health, and Director of the Stanford Faculty Mentoring Program. Dr. Rasgon is also Director of the Women's Health and Neuroscience emphasis program at Palo Alto University, a collaborative Ph.D. program between Palo Alto University and Stanford University.

Dr. Rasgon received her M.D. and Ph.D. in Obstetrics and Gynecology and Pathological Physiology in the U.S.S.R. She began her distinguished career at UCLA School of Medicine, and in 2002, she established the Center for Neuroscience in Women's Health at Stanford. The primary aim of the center is to generate a higher standard for women's mental health services through the integration of biomedical research, clinical practice and education, which has been propelled by Dr. Rasgon's multidisciplinary research experience and diverse clinical background. Having authored over 130 peer-reviewed publications, more than 25 book chapters, and a reviewer for 30 professional journals, Dr. Rasgon is considered a renowned expert in neuroendocrinology and women's mental health. With over 20 years of research experience investigating the relationship between reproductive hormones and mood, Dr. Rasgon's predominant focus has been on the various manifestations and responses to treatment of depression in women, the impact and use of hormonal interventions during menopause and the effects on mood and cognitive function, and the interplay between endocrine function and women's mental health.

Dr. Katherine Williams

Dr. Katherine Williams co-founded the Women's Wellness Clinic (WWC) in the Department of Psychiatry at Stanford University with Dr. Regina Casper in 1993. She is now the clinic director and she has over 20 years of experience in the management of pregnant women on antidepressants, and the evaluation and treatment of perinatal mood and anxiety disorders.

After graduating from Stanford University, Wake Forest University Medical School, and Adult Psychiatry Residency at Stanford, she completed a National Institute of Health Biobehavioral Postdoctoral Research Fellowship at Stanford, focused on reproductive psychiatry. Dr. Williams' research has focused on the clinical characteristics and risk factors for postpartum depression.

Dr. Williams has been responsible for educating of over 100 advanced psychiatry resident about postpartum depression, and she gives lectures locally and nationally about risk factors, prevention and evaluation and treatment of perinatal mood and anxiety disorders.

Dr. Thalia Robakis

Dr. Robakis received her MD and PhD degrees at Columbia University College of Physicians and Surgeons, with a doctoral thesis in developmental neurobiology. Her residency training in psychiatry was at Stanford University, and she is board-certified. She completed a 3-year T32- supported research fellowship in perinatal psychiatry under the mentorship of Dr. Natalie Rasgon in 2014, and is now an instructor in the department of Psychiatry at Stanford.

During her research fellowship she conducted a prospective study of the relationship between maternal personality traits and the development of postpartum depression. At present, in addition to her clinical work in perinatal psychiatry and women's mental health, she is exploring epigenetic correlates of the maternal personality traits that predispose to postpartum depression, supported by a Young Investigator Grant from the Brain and Behavior Research Foundation.

Dr. Deirdre Lyell

Clinical Focus: Maternal - Fetal Medicine, Obstetrics and Gynecology

Academic Appointments

- Associate Professor - Med Center Line, Obstetrics and Gynecology - Maternal Fetal Medicine
- Member, Child Health Research Institute

Administrative Appointments

- Associate Fellowship Program Director, Division of Maternal-Fetal Medicine (2006 - 2011)
- Dean's Task Force on Clinical Excellence, Stanford Medical School (2007 - 2009)
- Quality Assurance Committee, Department of OBGYN (2007 - 2014)
- Dean's Billet Cap Committee, Stanford Medical School (2012 - 2013)
- Director, Program in Placental Disorders, Division of Maternal-Fetal Medicine, Department of OBGYN (2010 - Present)
- Credentials Committee, Lucile Packard Children's Hospital (2011 - Present)
- Fellowship Program Director, Maternal-Fetal Medicine (2011 - Present)
- Alternate Principal Investigator, Eunice Kennedy Shriver N.I.C.H.D. Maternal-Fetal Medicine Units Network, Washington DC (2013 - Present)

Honors and Awards

- Harvard Medical Student Teaching Award, Harvard Medical School (1999), Stanford University Residents Outstanding Fellow Award, Stanford University, Department of OBGYN (2001), Residents Obstetrics Teaching Award, Stanford University, Department of OBGYN (2004)
- Roy M. Pitkin Research Award, American College of Obstetricians and Gynecologists (2009)
- Resident's Obstetrics Teaching Award, Stanford University Department of OBGYN (2012)

Professional Education

- Medical Education: George Washington University (1996) DC
- B.A.S., Stanford University, Biology and History (1990)
- Residency: Brigham and Women's Hospital Harvard Medical School (2000) MA
- Fellowship, Stanford School of Medicine, Maternal- Fetal Medicine (2003)
- Board Certification: Obstetrics and Gynecology, American Board of Obstetrics and Gynecology (2004)
- Board Certification: Maternal and Fetal Medicine, American Board of Obstetrics and Gynecology (2007)

Mount Sinai Hospital

Dr. Elizabeth Howell, Icahn School of Medicine at Mount Sinai

Elizabeth A. Howell, MD, MPP is an Associate Professor in the Departments of Population Health Science and Policy, Obstetrics, Gynecology, and Reproductive Science, and Psychiatry at the Icahn School of Medicine at Mount Sinai. She is also Associate Director of the Center for Health Equity and Community Engaged Research at the Icahn School. Dr. Howell's research focuses on quality of care and racial/ethnic disparities in maternal and child health. She has conducted a series of studies investigating the association between personal, environmental, and contextual factors with postpartum depression and has received NIH funding to conduct randomized controlled trials to test behavioral educational interventions aimed at preventing its occurrence. Her other research interests include quality of care in postpartum women's health, maternal morbidity, and infant mortality disparities.

Dr. Howell is a nationally recognized expert on racial/ethnic disparities and quality of care in maternal and child health. She has served on several national expert panels at the National Institutes of Health, The Joint Commission, and the Institute of Medicine. She was on the Institute of Medicine's Committee on Depression, Parenting Practices, and the Healthy Development of Young Children and the Institute of Medicine's Committee on Lesbian, Gay, Bisexual and Transgender Health Issues and Research Gaps and Opportunities. Dr. Howell is the past Vice Chair of the American College of Obstetricians and Gynecologists Committee on Health Care for Underserved Women. She also serves on the Steering Committee for the New York City Pregnancy Risk Assessment Monitoring System (PRAMS).

Dr. Howell earned her BS degree in Biology at Stanford University, her MD degree from Harvard Medical School, and her MPP degree from Harvard's Kennedy School of Government. She completed her residency in the Department of Obstetrics and Gynecology at Cornell/ New York Hospital in New York City and completed her postdoctoral training as a Robert Wood Johnson Clinical Scholar at Yale Medical School in New Haven, Connecticut.

Dr. Kimberly Klipstein

Board Certified in both General Adult Psychiatry and Psychiatry of the Medically Ill, Dr. Klipstein has been working clinically in the field of Medical Psychiatry for the last 8 years. She is an Assistant Professor of Psychiatry and the Director of the Consultation Psychiatry Service at the Mount Sinai Hospital. She is also the Director of the Psychosomatic Medicine Fellowship at the Mount Sinai Medical School. After receiving her MD from Cornell Medical College, she completed her residency at New York Hospital Cornell and the University of California, San Francisco.

Dr. Klipstein runs the psychiatric consultation liaison service for the general hospital and does specialty work with liver and kidney transplant patients in the Recanati Miller Transplant Center. In addition to her clinical role, she is currently conducting research on postpartum depression. Her areas of interest include: pregnancy and postpartum, oncology, organ transplant, psychopharmacology, chronic medical and neurologic illness and forensic issues.

Dr. Michael Silverman

Michael E. Silverman, Ph.D. is a dual trained psychologist, having completed his clinical training at Boston University and cognitive science training at the Graduate Faculty at the New School for Social Research. Dr. Silverman completed post- doctoral training at Harvard University and a fellowship in neuropsychiatric functional neuroimaging at Weill Medical College of Cornell University.

Dr. Silverman is currently an Assistant Professor of Psychiatry at The Icahn Medical School at Mount Sinai. His current research focuses on forwarding the understanding of mental health issues during pregnancy and the period following childbirth. Dr. Silverman is currently the primary investigator on two NIH studies addressing the pattern, magnitude and epidemiologic risks for postpartum depression in large population based samples. One of these studies is also directed towards understanding the long-term childhood outcomes associated with early maternal depression.

Dr. Silverman's publications include the first functional neuroimaging study of postpartum depression, the first study to demonstrate the relationship between a history of abuse (physical/sexual) and the subsequent development of depression after childbirth, and the largest U.S. population based epidemiological study of postpartum depression risk ever conducted.

In addition to his research activities at Mount Sinai, Dr. Silverman maintains a psychotherapy practice on the Upper East Side of Manhattan specializing in perinatal mood and anxiety.

Dignity Health Medical Foundation

Dr. Margaret Lynn Yonekura

Margaret Lynn Yonekura, M.D., F.A.C.O.G. is a board certified obstetrician-gynecologist with subspecialty certification in Maternal-Fetal Medicine. She is a recognized expert in the fields of infectious diseases in ObGyn and perinatal substance abuse. She was on the Ob/Gyn faculty at LAC+USC Medical Center from 1980-86 and the Chief of the division of Obstetrics/Maternal-Fetal Medicine at Harbor/UCLA Medical Center from 1986-1992. Since 1992 she has been based at California Hospital Medical Center (CHMC), a non-profit public benefit hospital serving Central and South Central Los Angeles, where she has been director of community benefit since 2000 and associate professor of clinical Ob/Gyn at both USC and UCLA Schools of Medicine.

Throughout her career Dr Yonekura has established comprehensive care programs to address her patients' complex needs, including:

- **Options for Recovery: Harbor/South Bay** (www.optionsforrecovery.com) at Harbor/UCLA Medical Center is a comprehensive treatment program for pregnant and parenting chemically-dependent women and their children.
- The **Hope Street Family Center** (www.hopestreetfamilycenter.org) at CHMC promotes the health and welfare of our community's children and families through a variety of co-located federal, state, private and locally funded initiatives. These initiatives include early childhood education, school readiness, family literacy, behavioral health, primary health care, after school and academic enrichment, and other family support programs.
- **Los Angeles Best Babies Network** (www.labestbabies.org) at CHMC is dedicated to achieving healthy pregnancies and births throughout Los Angeles County by providing training and technical assistance, advocacy and support to increase the capacity of community partners to succeed in these efforts.

Dr. Yonekura is a member of the Women's Health Policy Council of L.A. County's Office of Women's Health, the California Breastfeeding Roundtable, and the Preconception Health Council of CA.

Nancy Bussani

Nancy Bussani is Vice President of Philanthropy at Dignity Health. She joined Dignity in 2012 to establish the Dignity Health Foundation, a system-wide organization to provide nonprofit leadership and strategic planning in support of key system initiatives.

Nancy has over twenty five years of nonprofit and philanthropy leadership experience. Her career responsibilities include board development, strategic planning, corporate governance, program development, corporate and foundation fund development, community relations and public affairs. She also teaches on the faculty in the San Jose State University College of Business.

Bussani holds a BS in Accounting from the University of Idaho and an MBA with an emphasis in organizational development from Washington State University. She serves on the board of directors for the Silicon Valley Leadership Group Foundation, the MW Kids' Foundation and the No Bull Challenge Foundation.

Suzanne Wiesner

Suzanne Wiesner is the Director for Maternal Child Health Services in Patient Safety for Dignity Health, supporting 29 of the system's hospitals that provide perinatal services. Suzanne has been with Dignity Health for 22 years. Most of her nursing career has been in obstetrics, including various leadership roles within the organization.

In her current position, Suzanne values the importance of standardization of care, the implementation of evidence-based practices and a culture of safety, where learning from errors and near misses is key to improving quality and safety.

Dr. Meryl Rappaport

Meryl Rappaport, PhD, LCSW is Executive Director, Behavioral Health at Mercy Medical Group, a service of Dignity Health Medical Foundation. Mercy Medical Group is an award-winning multi-specialty group with 21 locations throughout the greater Sacramento area, providing service to thousands of patients.

Dr. Rappaport is responsible for integrating the services of the large outpatient behavioral health specialty department whose services include individual and family counseling, medication evaluation and management and behavioral health classes and groups, and two Children's Centers. Dr. Rappaport earned her Bachelors and Masters Degrees from U.C. Berkeley's Social Welfare program and is a Licensed Clinical Social Worker. She earned her Ph.D. from the University of California, San Francisco in Medical Sociology and Health Care Policy.

Dr. Rappaport's first involvement in integrated behavioral medicine was in her role as a social worker on a multi-disciplinary team at a geriatric and Alzheimer's clinic at the Veterans Administration in Palo Alto. Her passion for program development led her to establish and teach in a multi-disciplinary team training program, and to found and direct a home health care program at the V.A.

She has been involved in a spectrum of programs for the elderly including home health care, geriatric day care, team training, geriatric clinic, hospice and respite, as well as hospital discharge planning. Under her leadership role at Dignity Health Medical Foundation, the Behavioral Health department has delivered quality outpatient mental health services to clients with various private health care insurances, and has had an evolving variety of contracts with Sacramento County to provide Children's Services, Geriatric, Juvenile Justice and Recreation Therapy specialty programs. A current area of focus is to expand the integration of behavioral health services to meet evolving health care initiatives such as patient centered medical home, patient engagement and improved health outcomes.

Emerging Technology Companies

Leah Sparks, Co-founder and CEO, Wildflower Health

Leah co-founded Wildflower Health in 2012 to build smartphone-based programs that help new parents better navigate the health care system. Her company's first program, Due Date Plus, helps women have healthier pregnancies while helping payer clients reduce medical costs.

She has spent more than a decade in the health care industry, including leadership roles at McKesson Corporation and Medco. She was also one of the first members of the management team at DNA Direct, a personalized medicine startup that was acquired by Medco. She lives in the San Francisco Bay Area with her husband and son.

Julian Cohen, President, Breakthrough

Julian Cohen brings over 30 years of health care experience including hospital, provider and payer organizations. Julian is a recognized industry leader in managed behavioral health with successful revenue and national membership growth initiatives reaching sales targets of \$100M annually.

He has held key senior leadership roles including CEO of Cigna Behavioral, Chief Sales and Marketing Officer at United Behavioral Health, Senior Vice President of Sales at APS Healthcare, SVP Strategic and Business Development WellCare/Harmony Behavioral Health, and President of the Northwestern Memorial Hospital's Institute of Psychiatry. Julian holds a Bachelor's degree in social work and a Masters degree in Public Health from University of Pittsburgh.

Eve Phillips, Co-founder and CEO, Empower Interactive

Eve Phillips is the CEO and Co-Founder of Empower Interactive, Inc., a leader in digital behavioral health. Eve is an experienced Silicon Valley product builder, entrepreneur and investor with expertise in assembling diverse teams to solve hard problems.

Eve started her career as a product manager at Trilogi, an enterprise ecommerce software company, working on new ventures. From there, Eve held product, strategy and business development roles in software and internet businesses including Microsoft, Zazzle and eCert. Eve has also been a member of the investment teams at Amadeus Capital Partners, Vector Capital, and Greylock Partners. Prior to co-founding Empower, Eve was a Research Affiliate in the Synthetic Neurobiology Group at the MIT Media Lab.

Eve holds an MBA from Stanford University and an SB and an M.Eng in Computer Science from the Massachusetts Institute of Technology.

Julia Bernstein, Strategy and Sales Operations Lead

Julia Bernstein has a passion for using technology to make the health care system easier to understand for all stakeholders. She currently drives Strategy and Sales Operations efforts at Ginger.io.

Ginger.io's pioneering platform combines a mobile app that uses smartphone sensors to passively collect information about an individual's daily behaviors with an analytics engine (based on research from MIT's Media Lab) that turns that raw data into health insights. Information is provided back to patients or clinicians who can act on it to ensure that at-risk patients receive the right care at the right time.

Ginger.io has become part of the care solution at institutions such as Kaiser Permanente, Novant Health, UCSF, and Centerstone Research Institute. Previously, Julia was a consultant in McKinsey and Co's Boston office, where she focused on health care. She also worked for the e-commerce start-up Citrus Lane (acquired by Care.com). She received her AB from Dartmouth College and her MBA from the Stanford Graduate School of Business.

Sarah Seegal, Director of Coaching, Lantern

Sarah Seegal is a health care entrepreneur passionate about humanizing mental health through design and technology. She is currently Director Of Coaching at Lantern. Prior to Lantern, Sarah worked with Harvard, medical start ups like One Medical Group, Breakthrough.com (acquired by MDLIVE), and founded The Listening Center, a peer counseling service.

Sarah's G8 Innovation Summit project was presented to the UK Prime Minister, David Cameron, and the United Nations.

Patient Advocates

Katie Albright

Katie Albright, an attorney, is the Executive Director of the San Francisco Child Abuse Prevention Center, a community-based non-profit dedicated to preventing child abuse and neglect, promoting healthy families and the mental health of children. Ms. Albright has 20 years of experience advocating for children throughout her career working in the public, private and non-profit sectors in California and Washington, D.C.

Before joining the San Francisco Child Abuse Prevention Center, Ms. Albright served as a San Francisco Deputy City Attorney, as well as Acting General Counsel and Deputy General Counsel for the San Francisco Unified School District. She co-lead policy development and outreach efforts at both the San Francisco Education Fund and Preschool California. Ms. Albright was an associate at Latham and Watkins, LLP in Los Angeles and clerked for Chief Judge Motz on the United States District Court in Maryland. She co-founded and taught in the Kayole-Gitau Nursery School and Community Center in Nairobi, Kenya.

Ms. Albright received her law degree, graduating cum laude, from Georgetown University Law Center and received her Bachelor of Arts with honors from Williams College. Ms. Albright serves on the San Francisco Juvenile Probation Commission, as well as the board of her children's school. Ms. Albright previously served on the San Francisco Board of Appeals and the boards of NARAL Pro-Choice America and Planned Parenthood Golden Gate, as well as other nonprofits and municipal committees dedicated to women, education, and children's rights.

Katherine Stone

Katherine Stone is the founder of Postpartum Progress Inc. (<http://postpartumprogress.org>), a national nonprofit focused on raising awareness of perinatal mood and anxiety disorders and providing support to the women who have them.

She is also the creator and publisher of PostpartumProgress.com, the world's most widely read blog on postpartum depression and related illnesses, with 1.6 million page views annually. The New York Times has listed her blog among its "must read" blogs for parents.

In 2014, Katherine won the Iris Award for *Industry Influence - Philanthropic Work* in a category filled with such nominees as the UN Foundation's Shot@Life, ONE, Every Mother Counts and the Make A Wish Foundation. The Iris Awards are given for quality and excellence in parenting social media and blogging. In 2012, she was named one of the fiercest women in America as part of More magazine's annual Fierce List. She also has been selected as a Health Hero by WebMD, and won a Media Award from Mental Health America. Katherine has been featured by CNN, the Huffington Post, Yahoo, AOL, PBS, The To-day Show, HLN, ABC News and the *Washington Post*, among others. She has also served as a United Nations Foundation Social Good Fellow.

Prior to her maternal mental health advocacy work, Stone spent seven years in corporate marketing at The Coca-Cola Company. She lives in Atlanta, and is a survivor of postpartum OCD and a mother of two. Follow her on Twitter at @postpartumprog.

Foundations

Jim Bildner, Managing Partner, DRK Foundation

Jim joined the DRK Foundation from the Harvard Kennedy School of Government where he is an Adjunct Lecturer in Public Policy and Senior Research Fellow at the Center for Public Leadership and Hauser Center Institute for Nonprofit Organizations. Jim's brings to DRK more than thirty years of experience in the public, private and non-profit sector and will be splitting his time between our Menlo and Boston offices.

At Harvard and his board service, Jim focuses on strategies that can increase the capacity of foundations, non-profits and social enterprises to solve complex societal problems such as systemic poverty, access to health care, social justice and community development; as well as expanding the range of existing investment opportunities for private and philanthropic capital to help address these issues. At DRK, Jim will be working with the team to expand our portfolio, pipeline, out-reach, donor and talent base.

His prior experience includes 22 years in the private sector, including serving as the CEO of two public companies, while his government service includes serving as a legislative aide and speechwriter in the United States Senate, and an appointment by the United States Secretary of Health and Human Services to the Advisory Panel on Medicare Education of the Centers for Medicare and Medicaid Services of the Department of Health and Human Services.

He earned his AB from Dartmouth College, his MPA from Harvard, his J.D. from Case Western Reserve School of Law and a M.F.A. from Lesley University. He is a member of the Bar of the Commonwealth of Massachusetts.

Stephanie Teleki

Stephanie Teleki is a senior program officer for the foundation's Market and Policy Monitor program, which promotes greater transparency and accountability in California's health care system. Teleki works primarily in the area of public reporting, provider transparency, and health care consumer decision making. She has more than 15 years' experience as a health policy analyst and project manager, particularly in the areas of public reporting and transparency, consumer and physician decision making, quality measurement and improvement, and pay for performance.

Prior to joining CHCF, Teleki was a policy analyst in the health unit of RAND Corporation, where she conducted health policy research for such clients as the Agency for Healthcare Research and Quality, the Centers for Medicare and Medicaid Services, the Assistant Secretary for Planning and Evaluation, and private-sector health plans. Teleki has also held research and management positions at Kaiser Permanente, MD Anderson Cancer Center, and the UCLA Center for Health Policy Research. Teleki received a bachelor's degree in English and history from Amherst College, a master's of public health in health services research and policy from the University of Texas at Houston School of Public Health, and a doctorate of philosophy in health services research and policy from the University of California at Los Angeles School of Public Health.

Organizers

Packard Foundation

Carol Larson

Carol S. Larson is President and CEO of the David and Lucile Packard Foundation, a position she has held since January 2004. She is responsible for the overall management of the Foundation and its grantmaking activities. In 2013, the Foundation awarded over \$287 million in grants domestically and internationally in the program areas of Conservation and Science; Population and Reproductive Health; and Children, Families, and Communities.

Carol served as the Packard Foundation's director of programs from 1995 through 1999 and was appointed a vice president of the organization in 2000. In these roles, her duties included supervising senior program directors and working with them to implement programmatic guidelines and plans for the future. Carol joined the Foundation in 1989 as director of Research and Grants, Law and Public Policy, at the Foundation's Center for the Future of Children. In that role, she worked on child health and welfare issues, and edited and wrote for numerous Future of Children journal issues. Prior to joining the Foundation, Ms. Larson was a partner in a Los Angeles, California law firm specializing in civil litigation. She also worked in the nonprofit sector on behalf of persons with developmental disabilities.

Ms. Larson currently serves on the boards of the ClimateWorks Foundation and the American Leadership Forum — Silicon Valley. Previously, she was a board member of the Council on Foundations where she served as board chair from 2010-2012. She is also a prior board member of Northern California Grantmakers and Grantmakers for Children, Youth and Families.

Carol received her undergraduate degree from Stanford University and her law degree from Yale Law School. Upon graduation, she served as a law clerk to the Honorable Warren J. Ferguson, United States District Court, Central District of California.

Dr. Liane Wong

Liane Wong, Dr.P.H. is a program officer in the Children, Families, and Communities (CFC) Program and leads the health subprogram at the David and Lucile Packard Foundation. Her grantmaking and investment portfolio focuses on advancing the Foundation's goals of ensuring all children and families have access to health care and coverage appropriate to their needs and more recently, directing the launch of two new strands of work in early child nutrition and at the nexus of early learning and health. She also currently leads CFC initiatives on leadership development, technology and social media, and program related investments in health and education at the Foundation.

Prior to joining the Foundation, Liane was director at the Institute for Health Policy Solutions California and founded California's Innovation in Coverage and Access Forum (ICAF) that highlighted local and state innovations in expanding access to care for vulnerable populations. Earlier she held senior policy positions at University of California Office of the President and as a senior manager at the UCLA Center for Health Policy Research. She first began her career in the philanthropic and nonprofit communities at The San Francisco Foundation across the health, economic development and education programs. Liane received her doctorate in health policy and management from the University of California at Berkeley and holds a master's degree in public health from the University of California at Los Angeles.

Liane currently serves on the Board of Directors for Asian Americans and Pacific Islanders in Philanthropy, and is a founder of the Silicon Valley chapter. She is a member of Grantmakers in Health, Grantmakers for Effective Organizations, and the Aspen Institute's ThinkXChange.

Dr. Meera Mani

Meera Mani is director of the Children, Families, and Communities (CFC) Program. She joined the Foundation in February 2009 as program officer, and in 2010 assumed responsibility for leading the preschool, after-school and summer enrichment subprogram in CFC. Prior to joining the Foundation, Meera served as research director for Preschool California, where she monitored and advised national and state research and evaluation efforts, provided expertise and strategic support to ensure effective policy development, field operations, communications and messaging.

Before working for Preschool California, Meera served as the president of The Clayton Foundation in Denver, Colorado. Under her direction, the foundation focused on operating high-quality programs for children from

birth to five-years-old and on providing education and professional development opportunities for the early childhood education workforce. Her leadership was also instrumental in developing initiatives, organizations and government programs focused on building a comprehensive system of high-quality early care and education in Colorado.

Between 1999-2001, Meera led and managed the day-to-day operations of Educare Colorado, now known as Qualistar Early Learning, a statewide initiative dedicated to improving children's early learning experiences through the implementation of a quality rating and improvement system.

Additionally, Dr. Mani served on various task forces, committees and collaborative projects including the Mayor's Early Childhood Education Commission. Meera has a master's degree in child development from M.S. University in India and a doctor of education in Educational Leadership and Administration from Boston University.

Dr. Bernadette Sangalang

Bernadette Sangalang is a Program Officer for the Children, Families, and Communities (CFC) program. She is responsible for grantmaking in both the early learning and health portfolios, and also oversees evaluation and learning across CFC.

Bernadette has worked for nearly 20 years in support of children and families, with a focus on evaluation and applied research. In this regard she has held various positions, including consulting with foundations and nonprofits on evaluation and research, and as evaluation director at a large community-based health services nonprofit. She also previously served for four years as the evaluation officer at the David and Lucile Packard Foundation, working with program staff on monitoring and evaluating grantmaking strategies. Bernadette has worked at University of Hawaii, University of California at Berkeley, and University of North Carolina at Chapel Hill conducting applied research and evaluation in the areas of maternal and child health, child welfare, family wellbeing, and health and social services for vulnerable children and families.

Bernadette received her PhD in social work from the University of North Carolina at Chapel Hill, and received postdoctoral training in public health at the University of California at Berkeley. She also holds an MSW from University of Washington and a BA from University of California at Berkeley.

Susan Phinney Silver

Susan Phinney Silver is the PRI Program Manager at the David and Lucile Packard Foundation. She oversees the Foundation's \$180 million Program-Related Investment (PRI) and mission investing program, which targets a range of loan and equity investments in the fields of: environmental conservation, climate change, oceans/fisheries, U.S. health care access, international reproductive health and rights, children's education and issues in the U.S., and local Bay Area initiatives.

Before joining Packard, Susan consulted with the MacArthur Foundation and California Community Foundation on their PRI programs, among other social investment and nonprofit clients. For 13 years previous to that, at The Development Fund in San Francisco, she led the creation of innovative financing programs that generated over \$600 million in new private investment nationally from banks, insurance companies, and other corporations for funds targeted to: affordable housing, community economic development, and environmental clean-up.

Earlier in her career, Susan was an overseas auditor for Catholic Relief Services in Africa, and a consultant with McKinsey and Company in New York. She has degrees from Princeton (undergraduate) and Yale School of Management (MBA). She enjoys exploring nature with her family, including hiking, camping, and kayaking.

Next Innovation Health Partners

Marco Smit - President, Next Innovation Health Partners

Marco leads NIHP, mentors startups in the Thiel Fellowship program, companies at UCSF's Lean Launchpad program and in Stanford's StartXMed program.

He has a long track record of success helping organizations understand – and respond to - health care transformations in the US and abroad. Marco worked with the ONCHIT leadership to organize White House Innovation Roundtables, helped leadership teams of Fortune 500 companies and not-for-profit organizations (e.g. Gordon and Betty Moore Foundation, CHART) understand and respond to the rapidly changing health innovation landscape. NIHP started and managed Health 2.0 Advisors from 2008 until 2013.

Prior to that Marco led successful initiatives in various leadership positions at Affymetrix, Spectral Genomics (acquired), Monitor Company (acquired) and A.T. Kearney. Marco has a master's degree in economics from Erasmus University in Rotterdam (NL).

Judy Luk - Senior Director, Healthcare Analytics, Next Innovation Health Partners

Judy has had a successful multi-faceted career in health care and technology. Judy has led teams, launched products, and developed innovation/growth strategies as a strategy consultant (Monitor Company, ZS associates), health care innovation advisor (NIHP/Health 2.0 Advisors), and enterprise technology product manager (Dell - Enterprise Markets). Judy has degrees from Northwestern and Harvard's Kennedy School of Government (MPA, International Development, Economics).

Brian Liu – Analyst, Next Innovation Health Partners

Brian joined NIHP in 2013 and has worked on a variety of projects that are similar to this project already. Brian used to be involved with clinical trials at Johns Hopkins Hospital, but transitioned to Stanford in 2012.

