Ruben Amarasingham, MD, MBA,
President and CEO of
Parkland Center for Clinical Innovation (PCCI)

Advanced Models for Health Hearing
Advanced Health Models and Meaningful Use Workgroup
Health IT Policy Committee
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Good morning and thank you for inviting me to testify today. My name is Ruben Amarasingham, MD, MBA, President and CEO of Parkland Center for Clinical Innovation (PCCI). PCCI is a non-profit health care technology firm in Dallas, Texas that develops solutions to help make health care safer, simpler, and less stressful.

Our conception of an advanced health model began at Parkland Health & Hospital System (Parkland), the safety-net health system serving all of Dallas County. First opened in 1894, Parkland is now one of the largest public hospital and health systems in the country, averaging more than 1 million patient visits annually.

In one of my early roles as a medical director at Parkland in 2007, I observed numerous patients readmitted to the hospital for situations that were predictably outside of a hospital's control. We concluded that by applying predictive analytics to accurately identify high-risk patients in real-time well before discharge from the hospital, we could accelerate targeted care pathways and interventions to help allocate scarce resources and thus reduce readmissions.

On this basis, my team and I built a software platform called Pieces™ in an effort to accomplish this mission. Pieces™ reviews a hospital's Electronic Medical Record (EMR) in real-time and identifies patients at high-risk for adverse health outcomes such as readmissions and mortality. This software has since helped reduce readmissions at Parkland and a number of hospitals and is being rolled out nationally. As a result of this success, PCCI was subsequently chartered as a stand-alone non-profit to further develop this work.[1] [2]

[1] R.A. Amarasingham, P. C. Patel, K. Toto, et al., "Allocating scarce resources in real-time to reduce heart failure readmissions: a prospective, controlled study," BMJ Quality & Safety, 2013 22(12):998-1005.

[2] D. Kansagara, et al. "Risk prediction models for hospital readmission: A systematic review," *Journal of the American Medical Association*, 2011 306(15):1688-98.

As we continued down this path, however, we began to realize that we needed to bring our real-time predictive analytics concepts into the community in a more fundamental way. Parkland has a long history of serving vulnerable populations whose health is impacted by a broad range of social and economic factors. We saw firsthand how caring for patients from lower socioeconomic groups presented significant challenges to a hospital system, including poorly modifiable risk factors and limited access to resources.

Over two decades of research suggests that unmet social needs contribute to adverse health events as diverse as early mortality, hospital admission and readmission, emergency room visits, and chronic disease complications.[3] [4] [5] [6] Indeed, potentially as many as 40% of health outcomes are attributed to social and economic factors.[7]

- Unmet social needs are drivers of more illness, shorter life expectancy, and increased health care spending. [8]
- Social factors such as income, education, housing instability, and hunger have substantial impact on patient health and longevity.[9]
- One study attributed some 133,000 deaths to individual poverty, 245,000 to low educational attainment, and 162,000 to weak social support (a lack of social ties and relationships) – these figures are comparable to deaths occurring from acute myocardial infarction and cerebrovascular disease – two of the leading reported causes of death in the US. [10]

[3] E. Blas and A.S. Kurup, "Equity, social determinants, and public health programs," World Health Organization (2010).

[4] L. A. Lebrun-Harris, T. P. Baggett, D. M. Jenkins et al., "Health status and health care experiences among homeless patients in federally supported health centers: findings from the 2009 patient survey," Health Services Research, June 2013 48(3):992–1017.

[5] H. K. Seligman, A. F. Bolger, D. Guzman et al., "Exhaustion of food budgets at month's end and hospital admissions for hypoglycemia," Health Affairs, Jan. 2014 33(1):116–23.

[6] L. Calvillo-King, D. Arnold, K. J. Eubank et al., "Impact of social factors on risk of readmission or mortality in pneumonia and heart failure: systematic review," Journal of General Internal Medicine, Feb. 2013 28(2):269–82.

[7] B. C. Booske, J. K. Athens, D. A. Kindig et al., "Different perspectives for assigning weights to determinants of health," (Madison, Wis.: University of Wisconsin Population Health Institute, Feb. 2010).

[8] D. Bachrach, H. Pfister, K. Wallis et al., "Addressing patients' social needs: an emerging business case for provider investment," (A Commonwealth Fund Report, May 2014).

[9] *Ibid*

[10] S. Galea, M. Tracy, K. J. Hoggatt et al., "Estimated deaths attributable to social factors in the United States," American Journal of Public Health, Aug. 2011 101(8):1456–65.

- A California study found that in the fourth week of the month, low-income individuals had a 27 percent greater risk of hospital admission for hypoglycemia than in the first week of the month, suggesting that their monthly food budget was insufficient.[11]

Unmet social needs such as lack of transportation, lack of insurance, housing instability, and the need for financial assistance can present barriers to accessing health care. Our advanced health model is premised on the belief that to change health outcomes we need to address aspects of health that are outside of the delivery system itself. However, we also recognize that coordinating the care of patients with these challenges is extraordinarily difficult.

Vulnerable populations often require services from non-medical community based organizations (CBO) such as homeless shelters, food aid organizations, and social assistance agencies, which are distinct and complementary to services from hospitals and clinics. Current methods to address unmet needs and coordinate care across sectors are highly manual and time and resource intensive. Aligning the efforts of health care organizations and CBOs represents a massive logistical feat rarely achieved within today's clinical environment.

The advent of technologies such as EMR systems, CBO case management systems, and health information exchanges (HIE) offer opportunities to solve some of these problems. These technologies can generate massive data about a community's health and social environment. However, these data repositories are also fragmented and incomplete, with patients' histories often residing in separate systems. We believe that providers need integration tools to access comprehensive data that truly reflect a patient's clinical and social environment. The data in these repositories also remain largely underutilized. For example, information about a diabetic patient's medications, transportation needs, or problems in social support networks may be buried in a free text note in a CBO record system, unlikely to be uncovered during a brief clinical visit, if even available. These challenges in data fragmentation and utilization lead to missed opportunities for necessary and preventive interventions. Technologies with advanced analytics that find, filter, extract, and utilize these data effectively can forecast complications in a new way.

CBOs also have fewer viable and cheap electronic systems available to them. With so much of health care taking place outside of the hospital and clinic walls, it is necessary to have access to both clinical and social data to improve care delivery. We need technologies that can help CBOs effectively and efficiently capture client data and seamlessly integrate with electronic medical records.

By coordinating care and addressing the ways that social factors affect health, PCCI aims as part of its advanced health model to:

- Improve the health care experience and quality of life of patients
- Improve quality of care and experience of providers and staff

[11] H.K. Seligman, A.F. Bolger, D. Guzman et al., "Exhaustion of food budgets at month's end and hospital admissions for hypoglycemia," Health Affairs, Jan. 2014 33(1):116-23.

- Reduce cost to the county, state, and federal governments
- Reduce health and social disparities
- Build a model that is sustainable and can be replicated throughout the nation

In 2014 the W.W. Caruth, Jr. Foundation at Communities Foundation of Texas awarded PCCI a multi-million dollar grant to build, operationalize, and implement the Dallas Information Exchange Portal (IEP) over five years. The effort is to build a novel, electronic, real-time integration platform that will enable a two-way exchange of social and health information to facilitate care coordination, improve disease management, and reduce readmissions for the most vulnerable patients across medical and social service sectors.

Separately, we have also learned that CBOs have a need to connect to one another, understand the impact of their work, and improve their day-to-day operations and reporting. Our intent is to connect all of a community's assets—hospitals, clinics, shelters, food aid, employment, and recovery programs—in a radical way around the patient. The Dallas IEP will leverage client-centered case management technologies, a robust data sharing infrastructure, and advanced analytics to achieve collaborative, community-wide care.

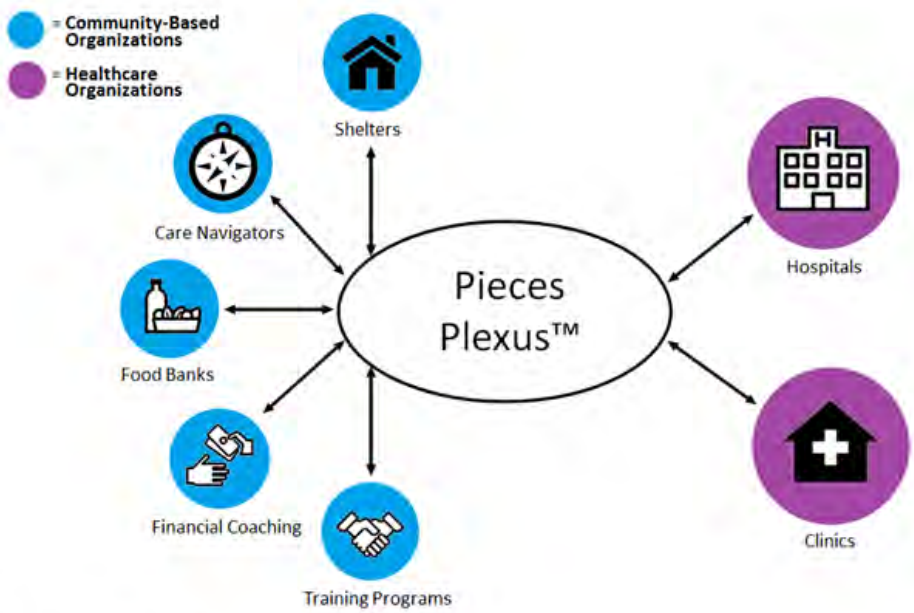

Figure 1: The Dallas IEP Data Sharing Network: Pieces Plexus™

The Dallas IEP consists of the following technologies:

The Pieces™ Software Platform

The Pieces™ software platform will run prescriptive algorithms that calculate a patient's risk of adverse health events, using a combination of clinical and social risk factors. The system will then recommend targeted interventions appropriate to the patient's level of risk. We are constantly evaluating the performance of these algorithms on clinical and social outcomes.

Pieces Iris™

A low-cost, configurable, and easy to implement full service case management and client tracking tool designed for community-based organizations.

Pieces Plexus™

An electronic platform that will enable health care providers, community groups, and social service agencies to share medical and social information via a secure information exchange network. The shared information will enable network members to coordinate care for patients more effectively around both clinical and social issues (e.g., homelessness, joblessness, hunger, substance abuse).

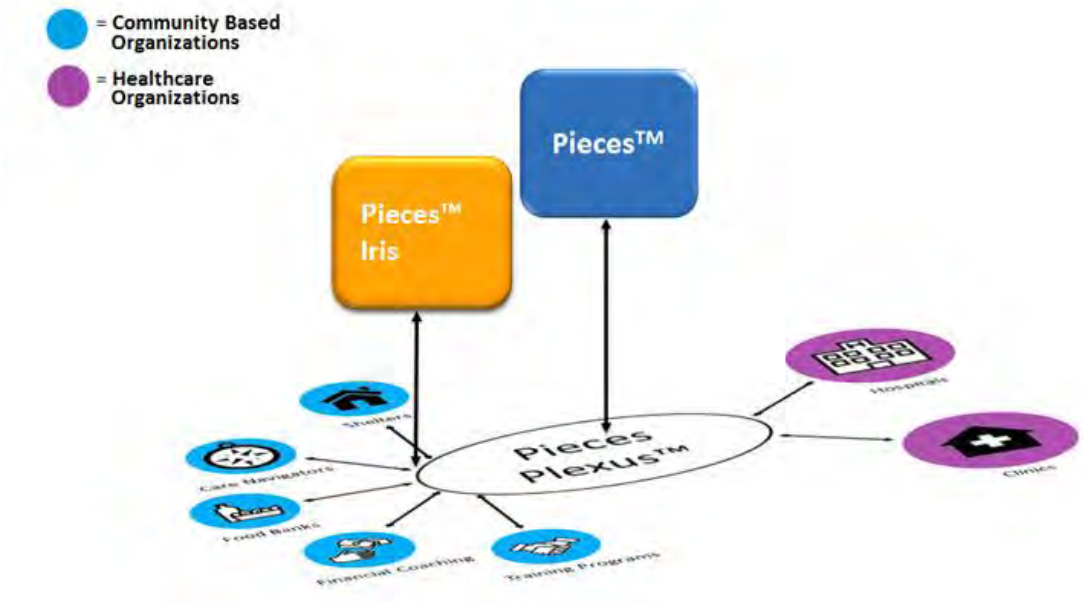

Figure 2: Dallas IEP Technologies

Data is collected from hospitals and community-based organizations via Pieces™ and Pieces Iris™, respectively. The Pieces™ software platform sits on top of the exchange for improved decision-making at the point of care. Data captured includes all relevant client-level/patient-level data as clients/patients receive services at various points across the community. Leveraging these big data sets, Pieces™ will be

able not only to forecast adverse events, but also to support the decision making of both clinical and social care providers.

We believe Dallas IEP technologies could assist with some of health care's toughest challenges by empowering organizations that have not normally been involved in traditional clinical delivery. The clinical outcomes that could be impacted by such a network are broad, including emergency room utilization, avoidable hospitalizations, and readmissions for ambulatory care sensitive conditions.

Our partners have fallen into three categories:

1. Early adopters and visionaries. The leaders of these organizations immediately saw the vision and promise of the Dallas IEP and have signed on as pilot partners.
2. Organizations that need technical assistance and help with managing data and everyday work.
3. Groups who are significantly influenced by funding and umbrella organizations and want to strengthen those alliances.

CBOs often have limited budgets and limited IT staff and support. They have many reporting systems, requiring double and triple keying of information, and they have different levels of training and experience with an average turnover rate of 16 percent with entry level and frontline staff members, making it difficult to adjust their workflows.[12] We have tried to address these challenges by creating Pieces Iris™ as a low-cost, easy to use, intuitive case management system.

Interagency referrals and communication is of keen interest to these CBOs and funders. They want to understand how their services have a broad impact on other organizations and on the community. We have designed our system to be able to report outcomes of interest to these funders, thus further aligning community assets.

We have developed a formal framework to evaluate the intervention impact of the Dallas IEP. Outcomes are categorized on three levels: the patients, the CBOs, and the community as a whole. Quality measures at the provider level will be tracked as part of the evaluation. We are also including return-on-investment calculations from the perspectives of both the individually participating organizations and the community as a whole.

While each community is different, we anticipate that the results of the interventions will be applicable and generalizable to most communities across the country, as the intervention is designed to address common barriers.

We are currently exploring self-sustaining models to support these cross-sector programs. The adoption of health delivery models that connect patients to community-based public health and social service programs requires long-term financing sources and payment models with incentives to encourage ongoing integration. One promising strategy is to foster joint accountability and to establish shared-savings arrangements between health care organizations and local CBOs. By coordinating their efforts to improve patient outcomes and reduce costs, each participating organization can benefit financially from

[12] N. Lewis (2014, March 10). Nearly half of all nonprofits plan to add jobs this year. Retrieved May 19, 2015, from https://philanthropy.com/article/Nearly-Half-of-All-Nonprofits/153477

the savings. In 2014, The Commonwealth Fund, a national private foundation based in New York City that supports independent research on health care issues and makes grants to improve health care practice and policy, awarded PCCI a grant to examine existing shared-savings arrangements across sectors. PCCI is developing a novel shared-savings financial model, Pieces Catalyst, which will realign incentives across social and clinical services sectors to enhance care provision to the Dallas community. By encouraging utilization of existing social resources to holistically address patient health, we hope Pieces Catalyst will improve collaborative care, reinforce capacity building within community organizations, and drive collective community impact. The Dallas IEP technologies will collectively enable Pieces Catalyst in the following ways:

- **Pieces™** identifies specific patient populations to include in shared-savings arrangements (e.g., patients at high risk for select adverse health care outcomes).
- **Pieces Iris™** enables community-based organizations to capture client-level data and seamlessly participate in a shared-savings arrangement (e.g., services rendered can be recorded.)
- **Pieces Plexus™** provides the necessary data-sharing and care coordination infrastructure between health and social service providers. This infrastructure allows for patients to be tracked as they move within and between care settings and services with consents.

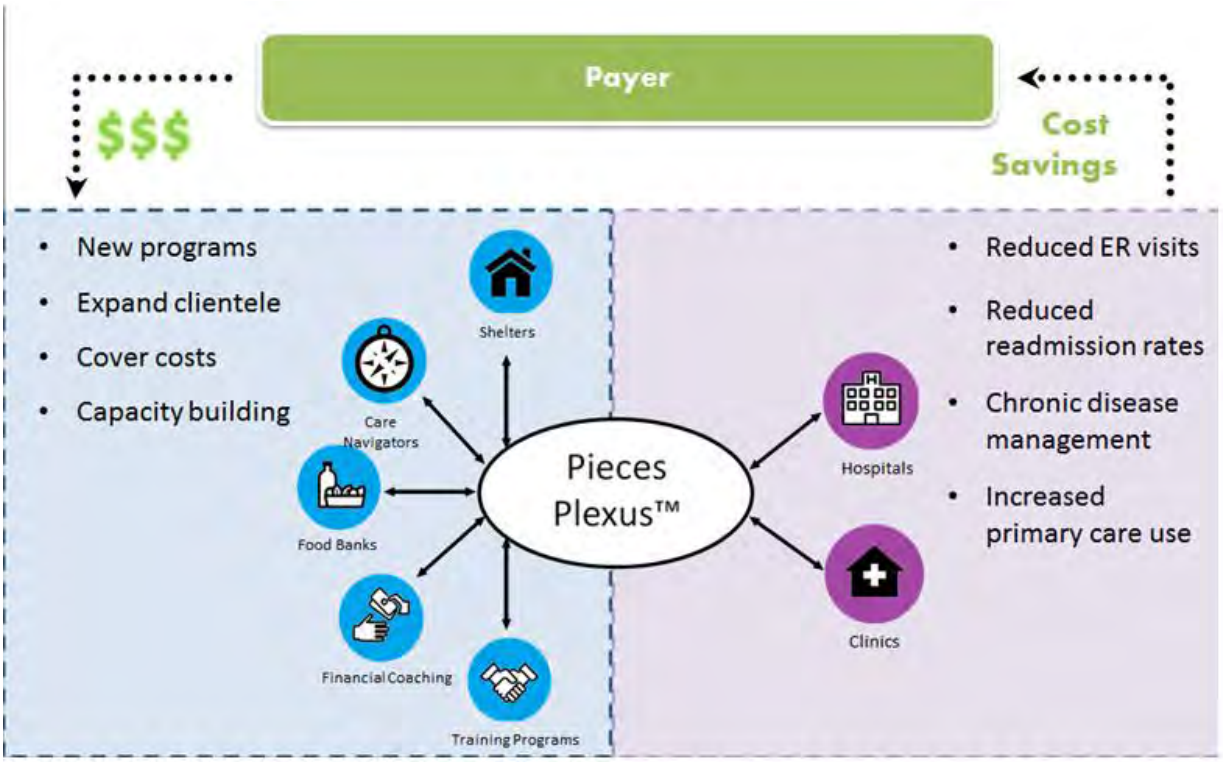

Figure 3: Pieces Catalyst Shared Savings Framework

In March of 2015 with funding from the United Way Metropolitan Dallas, PCCI launched Pieces Catalyst as a proof of concept (POC). The main goal of the POC is to improve clinical outcomes for high-risk, homeless patients. This is a collaboration effort between Parkland and The Bridge North Texas (The Bridge) homeless shelter in which 1) limited and relevant patient health data is securely exchanged between the two organizations to inform care provision and 2) outcomes-based incentive payments are awarded to The Bridge for their influence on successful clinical outcomes.

With respect to empowering patients, our belief is that the best way to engage patients is through trusted partners and organizations that provide services to patients. We believe that working through the effector limbs of the health care system and social service organizations creates value for vulnerable individuals.

Conclusion

Through the Pieces Iris™ / Pieces Plexus™ approach, we believe we are addressing some of the key obstacles raised for advanced health models. However, there are a number of barriers that would benefit from federal and local policy innovation. As one example, substance abuse is a significant challenge for CBOs. Currently, it is difficult to fully address the problems of patients with substance abuse. Laws and policies designed to protect patients lack the clarity necessary to help these same patients through data sharing. In some areas there is little legal consensus around substance abuse confidentially regulations. In our dialogue with entities engaged in social, behavioral, or health information exchanges, we have found varied, at times ambiguous, guidance and interpretations of the rule around disclosures to social service agencies. This may be due to a lack of legislative and statutory clarity around what CBOs interpret can or cannot be done. Even where there is clarity, many of the organizations do not have the resources or legal and privacy technical support necessary to understand the data sharing and legislature and governance.

There are significant opportunities to engage community based organizations more fully into the health care framework. We believe that bringing all of a community's assets to bear on an individual's problems represents a new and advanced health model with enormous potential. In Dallas, we are trying to realize this vision. Thank you for giving us an opportunity to present our story.