UNIVERSITY of MARYLAND
BALTIMORE

Mobile Health *in* Baltimore

Consensus Conference Report

MARCH 19, 2024

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BRANDON M. SCOTT
MAYOR
100 Holliday Street, Room 250
Baltimore, Maryland 21202

Dear Baltimore,

Our city has long been at the forefront of innovative public health initiatives, including leading the nation in deploying mobile health services to connect residents in underserved communities with access to quality, affordable health services. Through programs like our Community Paramedicine Program – a partnership with the Baltimore City Fire Department, University of Maryland Medical Center and the University of Maryland, Baltimore, we demonstrated success leveraging mobile integrated health to reduce health disparities, decrease emergency room visits, and prevent hospital readmissions. In communities with disproportionately poor health outcomes, we know that access to mobile integrated health can help bridge the access gap and get our residents access to the treatment they need in a convenient and cost-effective manner.

The Baltimore Mobile Health Consensus Conference led by the University of Maryland School of Medicine bought together stakeholders to create a strategic roadmap to guide the coordination and sustainability of mobile health services in Baltimore. This roadmap will be instrumental in addressing the challenges and opportunities we face, ensuring that our mobile health initiatives are not only effective but also resilient and adaptable to the evolving needs of our population.

To this end, the City of Baltimore reaffirms our commitment to mobile integrated health as a strategy to reduce healthcare fragmentation and deliver services to residents in out of hospital environments.

We support:

- Establishing a Mobile Healthcare Board that will oversee joint mobile healthcare efforts and coordinate efforts for data sharing and sustainable funding.
- Integrating mobile healthcare into the city's healthcare systems to improve coverage, targeting, coordination, and referral for patients who need longer, more complex care.
- Developing plans for long-term sustainability that includes payers, City and State governments.
- Establishing a means to link data systems to allow transfer of patient information and secure communication between the units providing care and within the healthcare systems.
- Integrating community health workers/community advocates into all mobile healthcare efforts.

By taking on these efforts, we can work to ensure that every resident has access to the care they need.

In Service,

Brandon M. Scott
Mayor
City of Baltimore

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Councilmember
District 10

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Introduction

In Baltimore, during the COVID-19 pandemic, mobile health care was essential for expanding COVID-19 testing and vaccination efforts to communities and for delivering routine medical care via telehealth during the COVID-19 restrictions to keep patients and medical teams safe. As the US reimagines health care post-pandemic, the concept of mobile health care has emerged as a strategy to address population health, health equity, access, and social determinants of health. Mobile health care or "Mobile Health" broadly includes vehicle-based health services, facilities equipped with telehealth capability, and care delivered over mobile devices (e.g. tablets, phones). Mobile health care seeks to bring medical services to people within their community. Mobile health care helps patients to overcome lack of access to medical services due to little or no insurance coverage, long wait times to see a provider, lack of transportation, lack of healthcare facilities near their residence, or fear and mistrust of the healthcare system.

Mobile health care units or vehicle-based care provide an array of services such as prevention screenings (e.g. sexually transmitted infection, vision, mammography for breast cancer and low-dose CT scan for lung cancer), primary care (well visits and management of hypertension and diabetes), and substance use disorder treatment to prevent overdose. While providing this care to those most in need, a challenge for mobile health includes being the sole entity providing care to a particular population (e.g., undocumented, unhoused) without the seamless linkage to a health system to provide more comprehensive medical and social services. Another challenge is that mobile health units often are unaware of other units providing similar services in the same area, as they are unable to communicate with one another in real time. Thus, an integrated and well-coordinated mobile health care delivery system, similar to the EMS system, is an essential approach to increasing access to primary and preventive services and to improving population health and health equity in Baltimore.

Since the end of the COVID-19 pandemic, many conversations have occurred throughout Baltimore city among academics, city officials, community leaders, and the healthcare system leaders about how to expand medical services within the community and whether mobile health care is the approach to achieve this. Questions that arose from the conversations included:

> "What do our mobile health services look like in Baltimore?"
> "Who are we serving and not serving?"
> "How are the mobile health units being funded?"
> "How is mobile health impacting the various health systems?"
> "How is communication about patients occurring between Mobile health care teams and the larger healthcare systems?"

Lessons can be learned from cities like Detroit, where data-driven mobile services engage patients in preventive services; many of whom have not received care in the traditional office-based settings. In Detroit, innovative health leaders such as Dr. Phillip Levy, Professor of Emergency Medicine and Physiology, Associate Vice President for Translational Science Wayne State University, and Director of Wayne State Mobile Health Unit program have established with payors capitated rates for mobile preventive services and a strategic vision for a state-funded mobile health system with the state legislature.

The Baltimore City Mobile Health Consensus Conference was held March 19, 2024, at the University of Maryland, Baltimore campus and was an initial step in developing a strategic approach for integrated mobile health delivery. The conference brought together experts, thought leaders and stakeholders from academia, healthcare, business, nonprofit organizations, city government, and community leaders to contribute their ideas, solutions and best practices. The main goal of the conference was to examine the concept of mobile health care, and how and to whom mobile health care is delivered, funded and evaluated for impact on health outcomes and cost in Baltimore.

Five objectives framed the conference proceedings:

1. Provide an overview of the health needs of Baltimore City and identify those who are not being reached by current medical services.
2. Provide a historical perspective and current examples of the breadth of mobile health services in Baltimore.
3. Examine how mobile health units use technology and data systems to address health systems gaps and improve access.
4. Examine the financial profiles of mobile health units to determine sustainability, cost effectiveness, and impact on the total cost of care.
5. Identify strategies to improve coordination, communication and integration of mobile health services into the health care system to improve patient access and continuity of care.

Conference Themes

1. Overview of City Health Needs: Who is and is not Being Reached by Health Care
2. Mobile Health in Baltimore: Past & Present
3. Mobile Health Use of Data Systems & Technology Panel
4. Mobile Health Funding & Sustainability Panel
5. Identify Strategies to Improve Coordination, Communication and Sustainability of Mobile Health Services

The conference format was modeled after the National Academy of Science, Medicine and Engineering workshop conferences which are designed to examine a current problem, identify the needs and gaps in care delivery for communities, discuss and provide solutions, share best practices, and network during the conference day. The conference was highly engaging and interactive with a mix of leadership from city government, academic institutions and expert speakers to frame and define the issues along with panel and small group discussions for participants to share their views, provide input, and work collaboratively to identify strategies and recommendations. There was opportunity for networking and touring several of the exemplar mobile units from various healthcare systems.

All the talks, conversations and input from participants were captured in a variety of ways and are reflected in this report. The deliverable from the conference is this Consensus Report that consists of the recommendations on the coordination, integration and sustainability of mobile health care services in Baltimore. While this report is to provide an approach for Baltimore City, recommendations may be applicable for wider adoption at the state and even national level.

Baltimore's Health Landscape: Navigating Health Needs in Baltimore City

*Tamara Green, MD, Chief Medical Officer, Baltimore City Health Department opened the conference by providing an overview of the health needs in Baltimore and used a personal account of seeking care for her daughter to illustrate barriers to care experienced by the community. The following is a summary of her presentation***.**

Physicians go into their particular specialty for specific reasons. I went into emergency medicine for many reasons, but two of the reasons were that dark rooms make me very sleepy, so radiology was out of the question and rashes all look the same to me, so, dermatology was also out of the question.

The problem with not being able to recognize and diagnose a specific rash is very challenging. My daughter, like me, has very dry skin. So, when she was little, she would often break out. I thought it was eczema, because I had eczema as a child, so I tried to treat it as best as I could with different treatments at home. But as she got older her rash changed. She would explain that the rash felt "like prickly needles everywhere."

I was able to get a pediatric appointment within one to two weeks. Which really, isn't that bad for this time of year. But her skin didn't get any better. So, I decided to make an appointment with a dermatologist. That appointment would take weeks at best. And what if I want her to see a dermatologist of color whom I could be sure would recognize rashes on someone of color? She's about five years away from college, so sometime between now and maybe grad school, right?

For me, wait time is a slight inconvenience, however, for our patients, access barriers like wait times are much larger concerns. Data from our most recent citywide community health needs assessment (see Table 1)—which was a collaborative effort between the Baltimore City Health Department and our city health systems—reinforces the following comments from residents:

"Wait times for appointments are so long. People resort to walking in for care…people don't have the time to sit and wait for hours to be seen."

"I sat in a health care setting for hours, then just left."

"Medical services may exist in the community, but you need transportation to get there! If there's no Uber or Mobility available, how are you supposed to get to your appointments?"

Table 1: Baltimore Community Needs Assessment

Data from 2023 Baltimore Community Needs Assessment	**% Residents**
Cost of health care was too high, and they could not pay	**69 %**
Struggled without health insurance	**57%**
Struggled with settings where their insurance was not accepted	**21%**
Lack of trust in the health care professionals as a reason for lack of health care access	**20%**
Cited lack of transportation to appointments	**21%**

"In urban areas we're often plagued with the same issues that are usually expected in rural areas: trust, transportation.

Some of these access barriers are addressed through Health Department programs and services that focus on health disparities. These are designed to create opportunities for Baltimoreans to live, thrive and achieve their best health. In addition, the Health Department's mission is to protect the health and eliminate disparities through education, coordination, advocacy, and direct service delivery.

The Department's more than 800 employees are dedicated to addressing the health and social needs of our city residents daily, working to close gaps in care whether it's being under-insured or uninsured, having lower incomes, or living in neighborhoods that just don't have access to primary care.

If you know Baltimore, then you know, we cannot discuss our current persistent differences in health without discussing the historical practices and policies that got us here. The concept of the Black Butterfly was coined by Dr. Lawrence Brown, a research scientist from Morgan State's Center for Urban Health Equity. Dr. Brown used the shape of the butterfly to highlight differences in the city based on neighborhood location. The L, or the center corridor, represents predominantly white neighborhoods that include the Inner Harbor and the central corridor that historically received favorable resources, such as bank lending and community investment practices (Figure 1).

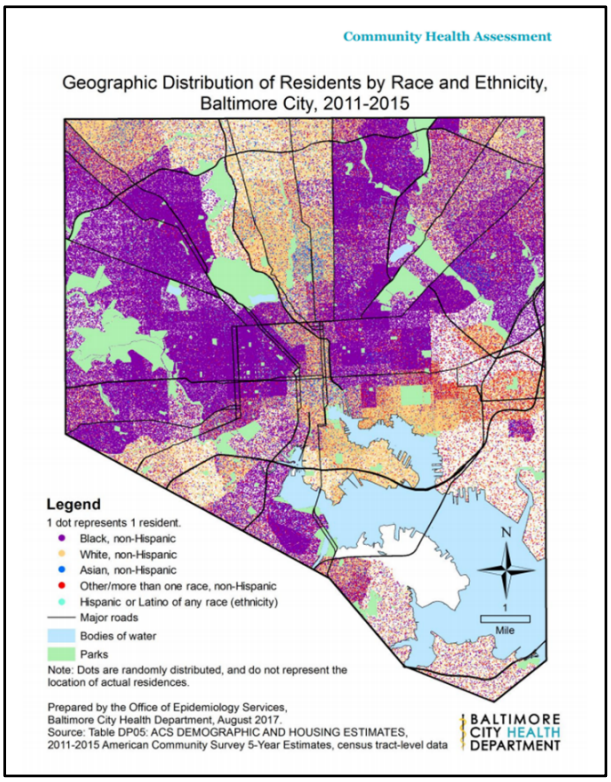

Figure 1: The "Black Butterfly" (purple) and "White 'L' (orange)

To identify areas of risk for new federal housing loans in the 1930s, the Homeowners Loan Corporation sent surveyors to 239 cities in the US. They surveyed neighborhoods and identified the areas of risk often based on people of color living in those neighborhoods. Areas coded green and blue represented more desirable parts of the city that were believed to be lower investment risks. These came to represent Dr. Brown's "White L." The yellow and red areas on the 1938 "redlining map" received lower grades and represented medium or high risk for federal loans (Figure 2). These restrictive policies shaped Black neighborhoods and resulted in limited community resources.

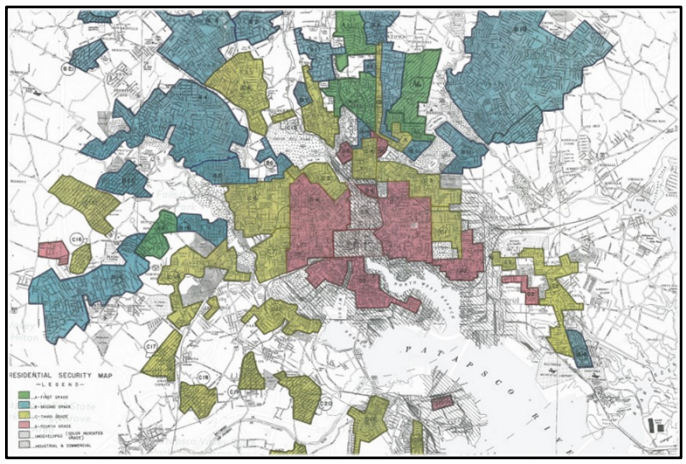

Figure 2: 1938 Redlining Map of Baltimore: Red and Yellow considered "hazardous" or "declining" relative to the risk for federally backed housing loans

These maps are important because they predict practically every important health outcome for our city and represent city areas where we see the largest differences in health and quality of life (Figure 3). For example, asthma prevalence is highest in Dr. Brown's "Black Butterfly" with average rates of 13% or higher, significantly higher than the national average. The same is true for diabetes, heart disease and essentially all the key health indicators one might consider in Baltimore City.

It is the mission of the Baltimore City Health Department to address these disparities and the vision of the Department to see an equitable, just and well Baltimore where everyone can be healthy and thrive. This is essential. To that end, the Health Department divisions include youth wellness and community health, aging, and population health and disease prevention; care services are also provided within these divisions.

The Department's school-based clinics, which include health suites, provide care to over 200 schools serving 84,000 students. There are also home visits through the B'more for Healthy Babies program, a home birth program that follows infants out to one year and sometimes longer, as well as an asthma and lead poisoning prevention program that does in-home care services.

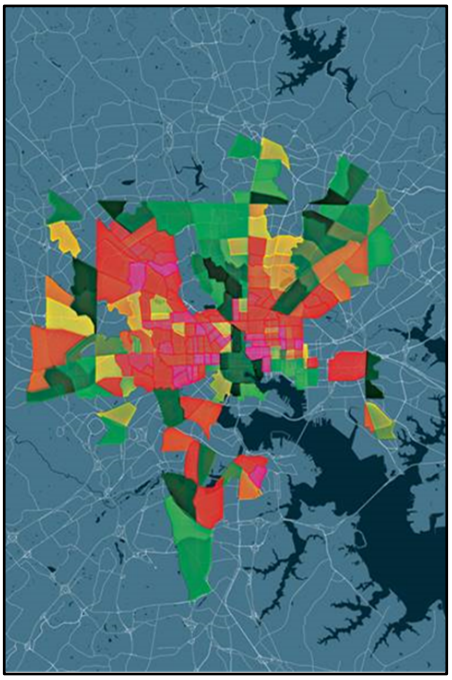

Figure 3: CDC Social Vulnerability Index: Red and Yellow denote high vulnerability

The Baltimore City Health Department also has in-home and community-based services available through our Division of Aging and Community Support programs. These programs include health and wellness services at senior centers and care management for the aging. Finally, the mobile health program, "the SPOT Van" that addresses the needs of individuals experiencing homelessness, where patients can receive vaccinations, testing and treatment for sexually transmitted diseases and other services. Despite our diversity of services for our low-income, uninsured, and underinsured persons, gaps in care still exist within the city.

Lastly, my hope for us in Baltimore is that we take the mobile health lessons that we learn from our community and from Dr. Philip Levy and other experts at this conference, along with inspiration from Dr. Lawrence Brown's equity work, and partnerships between government, philanthropy, cooperations, and community-based organizations to continue to ensure that there are mobile and place-based solutions to close these gaps in care.

Mobile Health in Context: A Historical Perspective

Pediatrician Chuck Callahan, DO, took participants back to the days in the 19th and 20th centuries when health care delivery used to be mobile (albeit via a horse-riding doctor). He examined how health care became more efficient timewise for the doctor but less mobile and more place-based due to urbanization. Today, the indirect costs for health care have shifted almost entirely back to patients.

Health care used to be simple. A couple hundred years ago, people who were sick sought a doctor to heal them of illnesses for which there was seldom any real cure. If you absolutely needed a doctor, the chances were that you or a loved one were facing an inevitably fatal or seriously debilitating condition.

The Country Doctor 1869, Alfred R. Waud

Health care was delivered in the home. Doctors were summoned to the patient's bedside. Diagnosis and treatment were rendered in the same room, and the family was responsible for the ongoing nursing care. All the ownership of the processes to deliver health care belonged to the patient and family. In return for services, the physician received "fee-for-service" in kind; in many cases it was in a basket, on a leash or in a cage. This was how much of health care was delivered in the United States until the late 19th century.

In the decades between the late 19th and early 20th century, the delivery of health care changed dramatically. In the 1800s, the average physician was able to see five to seven patients a day riding from one home to another on horseback (1). Distances were long and travel slow. For both families and physicians, the indirect costs of this care delivery model were tremendous. An emissary was required to travel to find the doctor, wait for him to return from another visit, to then be escorted to another patient's home. An entire day of farm or shop work was often lost by the emissary who was sent to fetch the doctor. The indirect costs of travel and lost time at work were felt by both the doctor and the patient's family as this system inconvenienced both. However, the impact in many cases was greater on the physician, who because of low reimbursement rates, low practice capacity, high travel cost and the inherent inefficiency of the model often needed a second source of income to survive.

1899 Decauville Automobile advertised to doctors

At the beginning of the next century, one of the biggest disruptive innovations for medical care was the automobile. Physicians making house calls were among the automobile's earliest adopters. While the initial cost of an automobile was high, the cost to operate the vehicle per mile was in many cases less than a horse and buggy. Most importantly, the speed of the automobile decreased the time required per visit and increased productivity from an average 5-7 patients per day to 18-22 patients per day. Urban or rural this was a 300% increase in productivity. "It is the same as if the day had forty-eight hours instead of twenty-four" an Iowa doctor wrote (2). Patients still had to

travel and then wait for physicians at their offices, but at least the doctor showed up sooner.

Physicians were also early adopters of the telephone at the end of the 19th and early 20th centuries. In 1877, the first telephone exchange in the U.S. linked to the Capital Avenue Pharmacy in Hartford Connecticut. Twenty-one physicians were part of the exchange, allowing the physicians to connect with the pharmacy which served as a central message center for their patients. As communication with patients became easier, the physician's time and practice became more efficient, and the indirect costs of travel, waiting and lost time at work became greater for the patient and their family than for the physician, a trend that has continued to the present (3).

1888 Telephone Exchange, Montreal Canada

Meanwhile, a separate revolution was taking place with the development of hospitals. In 1873, there were fewer than 200 registered hospitals in the nation. The bulk of patient care was delivered in the home, even for the critically ill. With the industrial revolution and relocation of people to urban centers due to growth of industry, physicians also increased efficiency visiting urban tenements and apartments for house calls and ultimately by cohorting patients on hospital wards. The numbers of hospitals in the United States increased rapidly. By 1910, there were 4,000 hospitals and by 1940 there were 6,000 across the U.S. (4). The federal Hill-Burton Act, which provided funding for hospital construction between 1947 and 1971, increased U.S. hospital capacity markedly, particularly in counties with low median family income, in the South and in rural areas (5).

Urbanization drew families away from rural settings into concentrated urban areas where they lived in smaller spaces, and families were no longer able to care for loved ones at home. In an urban environment it was much easier to access a physician's office, often located near a hospital which made inpatient and outpatient rounds for the physician more convenient. Over that same period, industrialization brought unaccompanied and unattached individuals to urban settings where there was no one else to care for them if they fell ill. These individuals became the early patients of the hospitals that were being established, while the public perception of hospital care was gradually improving (6).

During the early decades of the 20th century with the evolution and broad acceptance of medical insurance, reimbursement rate for home health care dropped while reimbursements for hospital visits increased as hospital care became increasingly more efficient. One physician wrote at the beginning of the 20th century he could see three or four times the number of patients on one day working through the hospital than he could see in his office. The emerging reimbursement models reinforced this increased efficiency (7).

Percent of Health Care Delivered at Home from 1930-1980
1930 40%
1950 10%
1970 5%
1980 1%
(Kao, 2009, Ensign 2019)

Social and cultural drivers between the middle of the 19th and 20th centuries changed and improved health care delivery. Despite insurance availability—especially under the Patient Protection and Affordable Care Act of 2010 (PPACA, or ACA)—the persistent inefficiencies, shifted the total cost of care away from physicians and back onto patients and families.

The cost of health care includes not only the direct costs (provider fee, hospital charges, lab and radiology costs) but also the indirect costs of transportation and loss of income for the patient and family. In the 19th century, a ten-mile ride on horseback to summon a physician who might well be out on a house-call the same distance away would cost the farmer a full day's work. In the 21st century, the indirect costs for families in urban settings without access to an automobile include the cost and inconvenience of public transportation as well as the loss of wages for those who are hourly workers. A visit to the doctor can cost a mother or father a full day's work as well.

Currently, nearly all ambulatory patient care in the U.S. is being delivered in physician's offices or healthcare institutions, while the indirect costs have shifted almost entirely back to patients and families. Mobile health care provides an opportunity to reverse that trend, to make patient access and convenience a priority and to add real substance to the notion of "patient-centered care."

Footnotes

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Car Advertisement
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Auto Phone exchange
https://commons.wikimedia.org/wiki/File:Telephone_exchange_Montreal_QE3_33.jpg

Current Examples of Mobile Health Care Programs in Baltimore

There is a breadth of mobile health care programs in Baltimore that provide an array of services from primary care, sexually transmitted infections screenings, preventive services (immunizations and cancer screenings) and HIV and substance use disorder treatment. The mobile health care programs that were featured at the conference represented the healthcare systems—University of Maryland Medical System, Johns Hopkins Medicine, MedStar, St Agnes Hospital and Total Health Care—and the Baltimore City Health Department. These mobile health units provided snapshots of their operations, composition of their teams, the funding and administrative cost, and the challenges and opportunities to delivering effective and efficient care to those in under resourced areas in Baltimore.

The Breathmobile | University of Maryland Children's Hospital

MaryBeth Bollinger DO and Lisa Bell CRNP

The University of Maryland Children's Hospital Breathmobile has provided care for children with asthma in the West Baltimore community since 2002, where an estimated 20% of children have asthma, a major reason for children to miss school. The Breathmobile visits schools and Head Start sites on a rotating basis providing the ideal example of "place-based care."

Figure 4: The University of Maryland Children's Hospital's Breathmobile

In the past two decades the team has cared for more than 4,000 children with a mean age of 6.8 years, nearly 90% of whom self-identified as Black/African American. The children provided care by the Breathmobile experienced a 55% reduction in Emergency Department visits, 76% reduction in hospitalizations and a 65% reduction of children missing five or more days of school. Additionally, the Breathmobile program achieved all the goals necessary to reduce avoidable health care utilization and help children stay in school, with hope that better school attendance facilitates greater success and ultimately a high school diploma, which is among the better predictors of middle age health. A national study looking at the same model at six mobile program sites (including the University of Maryland Children's Hospital Breathmobile) and more than 7,000 patients demonstrated the same improved outcomes, including improved school attendance (1, 2). A financial evaluation of the Breathmobile program demonstrated a return of investment of $5-7 for every dollar invested (3). Like many similar programs in the city, this proven model has struggled to maintain funding and has been temporarily suspended.

Footnotes

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The Baltimore City Spot Van | Baltimore City Health Department and Johns Hopkins Medicine
Bobby Harris, MSN, MPH and Amanda Rosecrans MD

Mobile health has been shown to be successful at expanding health care access in communities that are socially marginalized; those for whom our traditional healthcare system does not typically work. Mobile health care facilitates a different type of relationship with patients and the community by meeting people where they are. Our experience has led us to strongly believe that mobile health can best level health disparities, not just as a standalone service but also as a component of a broader integrated care continuum; a continuum that is deliberately designed to build longitudinal patient relationships through care delivery in nontraditional settings.

Figure 5: The Spot Van, Baltimore City Health Department

One of the greatest health challenges in Baltimore that mobile health can attempt to address is the opioid overdose pandemic. In 2022 alone, over 990 people died of an overdose in Baltimore City. Beyond the overdose complications of drug use, HIV, Hepatitis C, sexually transmitted infections, skin and soft tissue infections are all unfortunately highly prevalent in this population. These individuals are often undertreated because of high barriers to care and the social stigma related to drug use.

Medications for opioid use disorder (MOUD) including buprenorphine have unequivocally been shown to reduce mortality risk, support retention in care, and impact other health care needs. Despite this, access to MOUD remains severely limited and treatment access is not equitable. Historically underrepresented racial and ethnic groups, and people experiencing homelessness are less likely to be engaged in buprenorphine treatment. And unfortunately, traditional drug programs have many requirements that make it challenging for people to initiate treatment and sustain it. Yet models of care, including mobile treatment care integrated with harm reduction programs and low threshold models have been successful at increasing buprenorphine and other treatment engagement, especially amongst marginalized groups.

In 2016, an opportunity to repurpose an old mobile clinic arose and the team decided to focus on the overdose epidemic drawing on decades of expertise from the Health Department's community risk reduction team as well as the sexual wellness, sexual health clinics to develop services designed to meet the needs of people who use and people experiencing homelessness.

The work of the Spot Van is grounded in humanism, social justice and harm reduction, with an aim to reduce health disparities and improve wellness by providing a continuum of low-barrier stigma-free, and person-centered health care created for people who use and who are experiencing homelessness.

The initial service locations were chosen using data around high rates of Syringe Services Programs (SSP) utilization and overdose and expanded to include seven different sites visited on a regular two--week schedule. The Spot Van mobile unit provides services from 8:30 in the morning to 2:00 in the afternoon. There are between four and eight staff on site at any given time, depending on the number and complexity of the visits scheduled for that day. The ethos of the staffing model is flexibility from the community health workers, who do phlebotomy and drive the trucks, and the case manager, who drives the truck and accompanies patients to their health visits, to the registered nurses and providers, who literally do all tasks including patient registration. Professional roles are often blurred in order to

complete the tasks needed to operate the mobile clinic on a given day. COVID-19 accelerated the use of telemedicine, which has been incorporated into the Spot Van to connect with patients about medical and/or medication issues or to provide emotional support.

The Spot Van offers clinical services to support the health needs of clients:

- testing and treatment for HIV
- pre- and post-exposure prophylaxis
- testing and treatment for hepatitis C
- wound care, including antibiotic treatment for skin and soft tissue infections
- treatment for anxiety and depression
- vaccine administration, including COVID-19 influenza and vaccines for hepatitis
- naloxone education
- distribution of condoms.

The case manager helps enroll or renew people's insurance, helps them with vital documents, supports linkage and coordination with primary care and mental health, and even helps get people into housing.

The Spot Van's intensive, integrated, wraparound service that brings trusted providers in a mobile health setting is essential to support specific underserved patients across the health care continuum. As a case example:

Justin (not his real name) is a patient cared for by the Spot Van team. They met him in October 2023 outside Charm City Care Connection, a harm reduction organization north of Hopkins on Wolf Street, and a place where the Spot Van mobile unit has been co-locating for the last few years. When Justin met the team, he said that he had been incarcerated at age 18 years old; he was released 40 years later directly to street homelessness. When he was incarcerated, he started using heroin and was never offered drug treatment. He also contracted hepatitis C while incarcerated and was started on interferon, but unfortunately was not able to complete his treatment. When he was released, he was determined to live his life to the fullest and not return to incarceration. Even though he worked as a general laborer, he did not make enough to cover living expenses and began drinking and using drugs heavily, and currently is living by himself in an abandoned school.

Since the team met Justin, they have worked with him to navigate his urgent health issues and started him on medications for some of his chronic care conditions: opioid use disorder and hepatitis C. He has established a primary care provider and is working with case managers to complete applications for SNAP benefits, disability, and housing.

Justin visits Charm City frequently for food, respite, support, and care by the Spot Van team. The relationship that the team continues to build with Justin and patients like him demonstrate what is possible and underscore the importance of figuring out how to sustain and scale the work. The cost of care for this incredible gentleman is estimated to be approximately $1,500 (based on the average cost of service for Spot Van patients, based on its total annual budget and patients served), which is one tenth of the cost of a single hospital admission.

Mobile health is about partnerships. The organizations operating in this space have created a network of support for caring for the same patients. For example, the Spot Van team can partner with Healthcare for the Homeless to care for the same patient on a shared care plan. Pharmacists are available across the city may be helping patients with their insurance issues. Syringe Services Program teams participate in

shared care plans. Even though they represent different teams they have the same shared experience of the issues and the barriers to patient care. These are the networks that matter in mobile health, and this work is one of the most important pieces in the treatment for opioid use disorder with buprenorphine, representing about 80% of patients.

The Spot Van has been funded through State and Federal grants, and though there are efforts to begin billing for services, it is likely that any resulting revenue will cover only a small portion of the program's operating costs. Despite the generosity and appreciation for philanthropic donors, operating mobile health care based on short-term grants is extremely challenging in order to grow the program and meet the ever-evolving needs of the patient base. There remains a significant gap between what is possible to improve patient and health system outcomes and the care that the team is able to provide.

One of the biggest challenges for the Spot Van team is the mental burden of the daily exposure to the unimaginable human trauma and suffering that their patient's experience. The team frequently witnesses patients become incredibly sick, die of overdose or violence, or have dehumanizing experiences within the health system and other social institutions. Not having sustainable solutions for this unnecessary suffering makes finding a life-balance for team members nearly impossible. Thus, it is critical while providing care in the community to be mindful of how to protect and support healthcare workers and professionals so they can continue to provide these essential services and endeavor to amplify the voices of the people served.

Mobile health can be an opportunity for us to build trust and longitudinal care relationships that lead to improved individual wellness, population health and healthcare system outcomes. We should continue to define, develop and evolve to find synergy and solidarity in this mobile health care platform. The vision for mobile health is driven by experiencing the patients' immense need, significant trauma and incredible resilience; a vision that continues to evolve. These mobile "place-based" programs can offer much more, and the Spot Van's example should challenge us to continue to think how mobile health programs can be dynamic and integrated in their ability to serve a multitude of complex health and social needs.

MedStar Mobile Health Center
Andrea Gaspar, MD

Figure 6 MedStar Mobile Health Center

The Medstar Mobile Health Center (MMHC) was established in 2020. Its aim is to reduce critical barriers to people in hard-to-reach neighborhoods in Baltimore city—particularly in South Baltimore within the catchment area of Harbor Hospital, an area relatively devoid of accessible primary care. The idea for the Mobile Health Center emerged to meet this primary care deficit, which was brought to light in MedStar's community health needs assessment. The MMHC became available at the beginning of the COVID-19 pandemic. The capability was leveraged to provide COVID-19 vaccination and testing, and it played a key role in the organization's COVID-19 efforts.

Since the end of the pandemic in 2022, the focus pivoted back to full adult primary care, which has become the enduring mission. MedStar is a large organization covering a broad area with high demand for primary care services. The Medstar van visits different sites in the community four days per week,

and the same sites are visited weekly to promote trust through consistency. A second van is under construction and will be used to serve Baltimore County and northeast Baltimore City residents.

The MedStar Mobile Health Center team includes the medical director, who cares for patients 2-3 days per week, and a nurse practitioner, who works three days per week. The nurse practitioner has expertise in psychiatry and mental health. The medical assistant functions as a community health advocate, helping to connect patients to resources. The van's driver also serves as a patient service coordinator and registrar completing all the necessary paperwork for the visit. Like other similar teams, individuals often serve multiple roles.

The unit provides a wide range of primary care services. While walk-ins are accepted, most patients are scheduled. Most of the day-to-day work is helping patients manage complex chronic diseases in addition to disease screenings and vaccinations. Like other primary care clinics, the MMHC incorporates screening and point-of-care testing. They do their own lab work so that patients do not have to make extra stops to complete this critical part of their medical care. One unique aspect of the population served is the prevalence and pervasiveness of both substance use and mental health disorders. The MMHC is equipped to provide medication for opioid use disorder with suboxone and/or naltrexone for patients who are interested. Additionally, both providers address a variety of mental health concerns with their patients daily and refer to psychiatric services as appropriate.

Many of the unit's new patients are transitional care visits after hospitalizations or emergency room visits. These patients often have multiple chronic conditions and challenging social situations; they tend to not have established outpatient primary care before hospitalization. Thus, mobile health units are able to service those patients who would have otherwise fallen through the cracks.

The MMHC's team cares for patients in several different parts of South Baltimore. The City of Refuge, located in Brooklyn, has a food pantry on Mondays that brings a lot of foot traffic generating awareness and interest in our primary care services. On Tuesdays, the MMHC is also in Brooklyn at the Transformation Center, which serves a large population of Spanish speaking patients. On Wednesdays, the van cares for patients at The Well, a women's organization in Curtis Bay. On Thursdays the van is in Cherry Hill homes and serves a predominantly African American population.

The unit is funded through a range of sources including grants and philanthropy. Patients who have insurance are billed for services. MedStar Health is a nonprofit and the care costs can also fall under its charitable mission and the hospital's community benefit. The total operational budget is approximately $375,000 per year which does not include depreciation of the van.

The biggest challenge to the MedStar Mobile health program is finding resources for uninsured patients. Since the hospital is not a Federally Qualified Health Center, the reimbursement rates do not cover the cost of operations nor provide for all the social services the patients need. Thus, the team generates creative solutions to meet the needs of underserved patients. The fact that the MedStar organization is large and crosses state boundaries means that there are many competing corporate priorities, so the team continues to advocate for this mission and the patients served.

Another challenge is the lack of space which limits incorporation of other clinical elements to the mission, for example the important "warm handoffs" to other care providers. Mobile primary care does not generate high numbers of patients but continues to have high value by servicing people who otherwise would have fallen through the cracks. By demonstrating this essential role to stakeholders and

funders, powered by creative research methods including qualitative and quantitative research approaches, the program will be able to attain more sustainable funding that will consistently enable this multidisciplinary approach.

The number of uninsured or underinsured patients experiencing barriers to medical care continue to increase, especially in South Baltimore. There are numerous medical needs for this population that the healthcare system will encounter at some point—if not as an outpatient than as an inpatient. Moving forward, it is important to continue to invest in and compile resources to serve this population before their chronic conditions become advanced and costly. Mobile health care centers and vans are a potential part of the solution.

Ascension St. Agnes Mobile Health Program | Ascension St Agnes Hospital

Dawn O'Neill, MPH

The Saint Agnes mobile health program began as most other mobile health programs have, in response to the COVID-19 pandemic. The mobile health team provided the community with COVID-19 vaccines in people's homes, around neighborhoods, in parks, in places where constituents lived. During this period, it became apparent to the hospital leadership team that the medical center needed to provide medical care where the community lived.

The journey towards sustaining this program began by considering the population: those who are medically underserved and those who did not have ready access to care, a significant issue in Southwest and West Baltimore. The team has been surprised at how many non-English speakers were being seen in West Baltimore and how the demographics of the community were changing. The team examined CRISP and electronic medical record data for emergency department (ED) utilization and the top zip codes for ED utilization, particularly those codes that were related to ambulatory care and conditions that should be addressed in a primary care office. We identified our top zip codes which are primarily those surrounding the medical center. The conditions we noted in patients coming from those zip codes represented those typically seen in a primary care office. Next the mobile health team identified already existing partner sites in the zip codes of interest and engaged the partners that we established during our COVID-19 response and capitalized on the work they were already doing in the community. The Baltimore City Community Needs Assessment was another tool that drove our research and planning.

The medical center partnered with Mission Mobile Medical from whom the St. Agnes program leases its van on a lease-to-own basis. The advantages to this arrangement are the lease partner coordinates the practical aspects including parking the van, fueling, and maintenance as well as providing the driver.

The mobile health team consists of a family nurse, practitioner, the team lead, a medical assistant, a community health worker, and a Mission Mobile Medical driver. The services provided by the mobile health program focus on primary preventive care for adults and caring for children up to age five. They provide limited point-of-care testing and some vaccinations. The work around community health education is developing as is the capability to address the social needs of the patients served. Currently the van rotates between four sites: St. Joseph's Monastery, Access Art, Baltimore Highlands Elementary School Food Project, and Carlton Ridge. The patient demographic at each site is significantly different. The sites were chosen by conducting a needs assessment at each of our sites with careful weight on identifying the top health and community concerns.

There are a few challenges to the St Agnes mobile health program including staff safety for those working in some of our challenged communities. For the patients, addressing complex mental health issues is important. The team works to coordinate billing for those with insurance and leveraging other programs in the city to determine how to care for those without insurance. Translation services have also been critically important.

Before the St Agnes mobile health program formally started, the team conducted community outreach every three months to make sure we had connections to the residents in those communities to understand their health needs. In those preliminary visits as many as 60% of the patients had hypertension that appeared to be uncontrolled, so the need was very apparent.

Figure 7: St Agnes Mobile Health Unit

In the first three months approximately 120 individuals received care. Of these patients, 40% were Latino and 45% did not speak English. The Baltimore Highlands site has been most consistently using the St Agnes mobile health program, but all of the sites are maturing.

The project is funded by the Ascension St. Agnes Foundation as well as Harry and Jeanette Weinberg, Kelly Hart, Abell Foundation, and individual donors including Vernon Reid, a staunch local supporter of the St. Agnes mission.

Finally, as the primary care-based mobile health program begins to work in the community, the goal is to create a health fair-like environment with each weekly visit, bringing along other service providers with the St. Agnes team to address the full spectrum of patient and family needs including food insecurity and health education. The initial draw might be the availability of health care, but the ultimate goal for our patients is improved health.

University of Maryland Children's Hospital TEAMS Initiative

Jasmine Pope, BS and Vicki Tepper, PhD

The University of Maryland Children's Hospital "TEAMS" initiative (Teaming up for Engagement Access and Mobile Services) is co-led by Jasmine Pope, Director of Programs and Strategic Partnerships. Jasmine brings her experience as a community advocate, organizer, and parent of a patient within the same system. Recognizing the need for affirming and accessible specialty services, she collaborated with Drs. Rebecca Carter, Division Chief General Pediatrics and Vicki Tepper, Division Chief Pediatric Immunology & Rheumatology to develop this program. The initiative aims to provide primary care and specialty services beyond the hospital walls, prioritizing the reduction of health care disparities and addressing social determinants of health in all TEAMS activities. Like many other programs, the COVID-19 pandemic exposed the city's health care disparities and highlighted gaps that were previously known but became more apparent when children lost access to social supports, especially due to pandemic-related school closures.

In the face of a global emergency, what do regular doctor's appointments look like? What does an immunization program entail? What defines well-child visits when they cannot be conducted

traditionally? TEAMS employs a multidisciplinary approach to engage with the community and deliver both specialty and primary care services when, where, and how community members have requested.

The TEAMS vision is shaped by its leadership:

"We're going to talk a little bit about anticipated trauma in medical spaces. We're going to talk a little bit about how this work is a restorative practice for our institutions. In addressing some of the reasons that we keep saying there's a lack of access to care in a city where we have powerhouse medical homes. Why are people not accessing the care? And how do we have to change the model to not take just what's offered in the hospitals and in our institutions to community, but to do it in a way that is trauma-informed and led by the narratives of the people who are engaging in our care?" (Jasmine Pope).

The mobile health care model is not limited to vehicles on wheels. Ms. Pope continued, "*A lot of us have been doing this work in community spaces without a vehicle, in tiny closets, hauling stuff in our trunk. We've been doing that work for years and years, but advancements and technology and models have made it so that we can kind of take this show on wheels and expand what it is that we do and address some of the things that we saw come up when we were doing this without vehicles*."

In 2002, The Children's Hospital started the University of Maryland Children's Hospital Breathmobile program (mentioned above), which addresses disparities in asthma care among Baltimore City youth. The program provides free, preventive asthma care in schools in partnership with Baltimore City Public Schools, Head Start centers, the Baltimore City Health Department, the Greater Baltimore Asthma Alliance, and Mobile Asthma Care for Kids.

Figure 8: University of Maryland Children's Hospital STAR TRACK Mobile Health Unit

In the early nineties the STAR TRACK Adolescent Health Program, was launched by the University of Maryland Department of Pediatrics to address the HIV epidemic in youth and young adults in Baltimore City. It was one of the first programs to provide HIV prevention and treatment specific for youth in the state at no charge to the patient. The program is trauma-informed, grounded in community voice, and cares for vulnerable and marginalized adolescents and young adults. STAR TRACK uses a model of health care that operates "outside of walls." During the early years of the HIV epidemic, STAR TRACK traveled to bars to do HIV testing. STAR TRACK showed up at people's houses when requested and community members hosted parties to talk about how we could respond to the epidemic because traditional health care models were not adequate. Based on the data from these initiatives, the team was able to determine which strategies worked to connect patients to routine care.

This community partnership model was expanded with the development of the TEAMS Initiative in 2022. At the height of the COVID-19 pandemic, Dr. Rebecca Carter was approached by Baltimore City Schools as well as University of Maryland Medical System to address the need for a pediatric component to COVID-19 testing and vaccinations. Dr. Carter and Dr. Tepper were able to establish several sites using a mobile model to provide pediatric COVID-19 vaccinations. Through a partnership between the University of Maryland Adolescent and Young Adult Center and New Psalmist Baptist Church, we expanded to provide childhood immunizations to students who could not access them through their primary care providers during COVID-19 because of the closure of many pediatric primary care offices. Our partnerships continue with Baltimore city schools, universities, colleges, and community-based

organizations. These partnerships are essential as the program continues to adapt to the needs defined by the communities served.

The TEAMS initiative is an opportunity for the Children's Hospital residents and medical students to participate in care in the community. It creates a model that demonstrates the need in the communities that surround the Children's Hospital and it encourages medical trainees to "show up as a full provider to provide care to a whole person." It is a unique opportunity that allows clinical learners to develop culturally responsive and affirming care practices, to work to end negative health experiences, and ultimately to improve medical outcomes in vulnerable communities in Baltimore.

The STAR TRACK mobile health unit in collaboration with the TEAMS initiative has served more than 1,200 youth in Baltimore City and the surrounding counties with primary health care services, HIV and sexually transmitted infection testing and treatment, and with specialty care, including cardiology. The service delivery model is malleable and flexible in responding to the community's needs. One example was an engagement with Harlem Lacrosse Baltimore program. The initial request from the program was for sports physicals for the athletes however after the initial screenings we learned that some students required additional cardiac follow up to be cleared for their sport. We partnered with Pediatric Cardiology to provide cardiac screening and follow-up exams. The project required modifications in equipment and billing procedures but demonstrated that specialty care can also be delivered in a mobile setting.

The initial investment for the STAR TRACK Adolescent Health Program was provided through the Maryland Department of Health Infectious Disease Prevention and Health Services Bureau. The funding was provided to purchase the van, support the driver and staff, and the HIV and sexually transmitted infection testing and treatment. With the recent expansion, the team includes a medical assistant, a registrar, a social worker and the provider staff. Partnerships have been established with managed care organizations to identify families who have care gaps and ensure that the program will receive payment for billable services provided on the mobile unit as well as when the program operates in a community space. There continues to be opportunity to expand mobile health services by incorporating a single coordinator as the primary touchpoint for the program, to coordinate the different missions, assure the correct equipment and personnel are available for a specific site and assure adequate funding.

The greatest challenge to mobile health care delivery is comprehensive care coordination and caring for uninsured patients. The systems are not yet seamless which create inconveniences for patients and decreases their trust. Mobile health care coordination will require additional personnel (e.g. community health workers, social workers and registrars) and a robust system for scheduling and follow-up to ensure that patients are connected to the needed services. Patients are challenged by not having transportation, which is often covered by small amounts of grant funding.

While mobile health care can improve adherence to treatment, reduce emergency department and hospital admissions, two important goals are sustainability and improving patient narratives. First, sustainability means working very closely with our community partners and requires consistently showing up to parent nights and other community events to provide education. The consistent presence in the community helps to build trust. Second, a patient treated in a dehumanizing fashion in any hospital setting creates a narrative of the system and those who work for the system. Medical centers can have the best specialists in the world, but if the patient has a dehumanizing experience in the care they receive, their trust is eroded and they often will seek care elsewhere or not at all. Patients served by

the mobile health program often feel seen, heard and valued, and tell a story that their need was met and when they experienced a barrier someone was there to walk them through it.

Mobile health is an important component in eliminating barriers and disparities, but it is not a complete fix. It does not eliminate the trauma community members experience in health care spaces. However, the team has built an integrated model of care that allows families to access comprehensive medical services in an intentional and coordinated manner within their own communities. Mobile health is bridging that gap by addressing barriers to engagement, helping access specialty care, reducing unnecessary visits to the emergency department by connecting patients to primary care, reducing hospital admissions and length of stay, and changing the stories of Baltimore City patients who are engaging in our system. To eliminate the health disparities will require all stakeholders—community members, policy makers, health care providers, students, and community health workers to work together to improve the wellness of our communities.

Total Health Care Mobile Health Program | Federally Qualified Health Center

Darien Nolin, MBA

A Federally Qualified Health Center (FQHC) is designed to offer affordable, accessible health care including primary care to communities. They are intentionally located within communities of need. As all systems learned during the global COVID-19 pandemic, when people are not able to come to you, you extend yourselves to reach them where they reside.

Figure 9: Total Health Care's Mobile Health Unit

In the summer of 2020, Total Health Care partnered with New Psalmist Baptist Church to provide drive-up COVID-19 testing. While Total Heath Care has had an outreach component of support by Ryan White funding for patients with HIV for some time, this was the launch of extending mobile health as part of their primary care mission. In October 2020, Total Health Care extended service for patients by partnering with Johns Hopkins to provide COVID-19 testing booths. In April 2021, the first Total Health Care mobile health outreach unit began operation. The organization will add two mobile health units to its outreach programming in spring of 2024.

The drive through COVID-19 testing at New Psalmist Baptist Church and the Johns Hopkins-partnered COVID-19 testing booths allowed for safe provision of testing for community members. The initiatives addressed health inequities related to both access and education, and expanded partnerships with community-based organizations; meeting people where they live, learn, play, and pray. More than 8,000 contacts were successfully completed through these engagement opportunities during the pandemic. The Total Health Care mobile health care team includes the clinical director who, while not serving on the unit, oversees clinical operations. Several nurse practitioners rotate duties on the unit alternating with their duties within the health centers. The driver doubles as a registrar (patient access specialist) and is also a community health worker by training. There is also a medical assistant supporting services provided by adult and pediatric primary care. Basic laboratory tests including pregnancy tests and immunizations are also provided. The mobile health program has enabled Total Health Care to close

operational gaps when there are facility challenges such as issues with water quality, a facility fire or other reasons the facility might be inaccessible. In those situations, the mobile health unit provides health care services to avoid the interruption in care.

A partnership with Ann Arundel County Public Schools has created an opportunity for a school linked school-based health model that allows for telehealth appointments for students during the during the school day. The project focuses on Title I and community-based schools where there are primary health care needs for students and families. Total Health Care mobile health operations provide opportunities to support these school communities with mobile health clinical events offering on-site health services in partnership with schools to support those communities in need. The mobile health program unit allows for additional professional collaborative relationships. For example, Total Health Care has begun working with the University of Maryland School of Nursing and the Department of Health to assure consistent access for community members that includes cross cultural relationship building.

Mobile health centers provide marketing and branding identity for an organization. Total Health Care has been operating since 1968 and it is important for the community to know that this has been over a half-century commitment to them. Total Health Care is both providing care and innovating with new models of care delivery. One such example is the introduction of pharmacy delivery services to our health system to remove barriers to medication adherence. Through the mobile health center, we will provide medication to persons receiving care on their day of scheduled service.

The Total Health Care Mobile health program has also provided opportunities for workforce development. For example, the mobile driver began as a security guard, became a community health worker, and now is the mobile health care unit driver as well as an outreach specialist. It has been an opportunity for community members to develop a career path within the Total Health Care organization that would not exist without the mobile health program. Additionally, it has enabled Total Health Care to contribute to career development and solve the challenges around staffing. The same is true for providers who are looking for participation in programs that include community outreach and innovative ways of health care delivery. Across the organization, Total Health Care staff are engaged and embrace this culture of service that extends past their daily roles, from custodial staff, patient access specialists to providers.

Similar to the other mobile health programs presented at the conference, Total Health Care Mobile Program funding has come from a number of sources. The initial funding for our “Connecting to Communities” (C2C) program in support of our work at New Psalmist Church, was resourced through The Gamma Boule Foundation, of Sigma Pi Phi Fraternity, Inc. and The Mamie & Jerome Todd Relief Fund. With federal funds, Total Health Care has been able to purchase our “Mobile Health Center” as well as an additional mobile health vehicle. The Mobile Health Center is a two-exam room, while the mobile health unit is a one-exam room vehicle. Private funding as well as patient revenue are ongoing sources of funding.

In terms of challenges to mobile health care deliver, the most difficult is saying “No” to a community partner. Unfortunately, there are limitations to the clinical offerings that Total Health Care can provide offsite as well as those that do not allow billable services. However, it is within those deepening collaborative relationships that enable Total Health Care to help partners find other pathways for a particular community engagement. There are also specific limitations to the clinical activities that can be done by an FQHC which may also make it challenging to meet the communities needs and requests. One unanticipated challenge in a city like Baltimore is assuring adequate, secure vehicle storage.

As this is a new program for Total Health Care, finding a safe and affordable place to park the van has been a challenge. Staff recruitment has been challenging as it has been for all health systems during the pandemic. Community engagement staff are essential to the core team; individuals who know how to connect persons to community resources. In general, the staff choose to work at an FQHC because they want to be engaged with the community. Total Health Care Mobile Health Program leverages staff engagement and has enabled the participation in a larger community through the Mobile Health Association, an organization that has proven to be a source of a wealth of information and networking. They provide expertise in revenue cycle, policy, funding and compliance.

The mobile health program at Total Health Care is an integral part of their community engagement and outreach strategy, and yet another way that they will demonstrate their half-century commitment to improve the health and quality of life of the Baltimore community.

Keynote Presentation | A Vision for Sustainable Mobile Health Care Delivery

Philip Levy, MD, Wayne State University, Detroit MI

Dr. Phillip Levy is a Professor of Emergency Medicine and Physiology and the Associate Vice President for Translational Science at Wayne State University (WSU) as well as the Director of Wayne Mobile Health Unit (WMHU) program which he founded in 2020. Dr. Levy trained at Bellevue Hospital in New York City and transitioned to Detroit Receiving Hospital 21 years ago.

In Detroit, one of his shocking observations was the age of the patients he was seeing with advanced heart failure, end stage kidney disease, and stroke. In New York it seemed that the patients didn't present with as severe disease until they were 70 or 80 years old, but in Detroit he was seeing patients in their 50's with the same degree of disease. This was corroborated by the OPTIMIZE Heart Failure registry, which enrolled more than 48,000 people, including nearly 2,400 of them by Dr. Levy and his team at WSU. The overall mean age of the registry was 73 years compared to a mean of just 58 years in Detroit (1).

Improving upon this, and other disparities in heart disease risk was at the root of the drive for the WMHU program to target prevention as a strategic focus. And in retrospect, despite what planners and health economists might think about mobile health, this strategic focus might be the most sustainable.

Dr. Phillip Levy was the keynote speaker at the Mobile Heath Conference and delivered a presentation titled, "A Vision for Sustainable Mobile Health Care Delivery." He shared how he led the development of a robust and sustainable Mobile Health Program in Detroit as an exemplary program that can be a model for building a robust program in Baltimore. A recap of his presentation is shared in this section to provide a detailed blueprint for building a coordinated city-wide mobile health care program.

The Problem

Heart disease is the leading cause of death in the US, but the rates are not uniform (2). The outcomes are very much local and are much worse in predominantly Black communities. Hypertension is the single most important risk factor for cardiovascular disease. No other risk factor is even close (3). This is particularly important in the Black population. In this group depending on the definition for heart disease, as much as 20% to 40% of the burden can be attributed to hypertension.

To make an impact on heart disease from the standpoint of prevention, hypertension control is the answer. Data from other mobile health programs suggests that as many as 60% of the people screened have hypertension either undiagnosed, untreated, or uncontrolled with treatment for a host of reasons. In data published in 2020, only 40% of people with hypertension (both medicated and unmedicated) had hypertension that was controlled (4). Recent data suggest that the rate of controlled hypertension might be as low as 20% in certain cities, Detroit being one of them.

To further demonstrate the challenge, only 60% of those with diagnosed hypertension who are on medications to treat the hypertension achieve control. Given that two out of every five people in the country have hypertension, and in Black communities it's almost three out of every five people, nationally health care systems simply need to do a better job controlling it. In Detroit–a city much like Baltimore—where probably 50-60% of the city has hypertension that involves delivering effective care at scale to hundreds of thousands of people.

How can this be achieved? A population health initiative focusing on hypertension and other cardiovascular disease risk factors through mobile health outreach and engagement is an answer. Population models suggest that three public health interventions can save as many as 94 million lives globally:

- Scaling up treatment of high blood pressure to 70% of those diagnosed with hypertension
- Reducing sodium intake by 30%
- Reducing systolic blood pressure by 15 mm Hg (5).

The key message from the research is that this effort will take 25 years. Ninety-four million is the number that people pay attention to, but they ignore the fact that this will take decades both in our nation and globally. Thus, when one looks at the value proposition of mobile health care, there's a lot of discussion about avoided emergency department visits and a reduction in avoidable hospital utilization. However, when considering population health outcomes, it's a long game, especially when you think about who can benefit most from prevention.

A 70-year-old with a new diagnosis of hypertension has only a few additional years to either optimize control of hypertension or suffer the long-term sequelae that contributes to premature death. A 25-year-old with a blood pressure of 140/90 is a ticking time bomb. Without intervention, this individual will be the 45-year-old who presents to the emergency department with a stroke or heart attack, exemplifying the travesty of a national health system philosophy that focuses on treating complex diseases while seemingly ignoring prevention.

There are many different areas suitable for the focus of mobile health. Recently, the case has been made to use such a resource to address the chronic diseases of those who have multiple comorbidities and use the emergency department frequently. These are individuals representing the 25% of the population who use 90% of the healthcare dollars in the US; they are seen frequently in emergency departments and often are readmitted within 30 days of a hospital discharge.

Based on this, it makes logical sense to have community paramedicine and other programs to preempt an emergency department visit to facilitate home based follow-up for patients at greatest risk for frequent visits and readmission. However, the best way to prevent a 30-day readmission is to never get admitted in the first place. Furthermore, the best way to avoid getting admitted is not to have the condition that requires hospitalization. Thus, efforts to prevent strokes and heart disease are the best long-term solutions to reduce readmissions. More effective treatment of hypertension, reducing sodium intake which helps improve blood pressure control and increasing the proportion of people without hypertension will impact outcomes at the population level.

In terms of heart disease, the city of Detroit is an outlier compared to the rest of the state and the nation. In 2019, the age adjusted mortality rate for heart disease was 285/100,000 compared to 195/100,000 for Michigan and 160/100,000 nationally. These are age adjusted mortality rates. In general, when you compare two communities where one is older than the other, the older community has a higher mortality rate simply because in general, older individuals are more likely to die than younger individuals. The solution to enable comparison is to age adjust mortality which, in almost every case leads to a reduction in the rate as younger, lower risk patients dilute the per capita numbers. When you age adjust mortality from heart disease in Detroit, the rate goes up as the risk of death is disproportionately *higher* in younger individuals.

The bottom line is that younger people in Detroit are dying from heart disease. Across Detroit people are dying from five to15 years younger than the Michigan state average. Since the leading cause of death is heart disease, it stands to reason that heart disease is the reason people are dying younger. This is likely true of any US urban environment with a large Black population. The excess mortality of young women and men saps the vibrancy of communities. It takes years of potential life lost out of communities. From a strictly pragmatic economic perspective, it removes taxpayers and weakens the community.

Life expectancy is related to income. Women at the highest household income percentile live 10 years longer than those at the bottom percentile. For men the difference is 15 years (6). The Pareto principle applies to the drivers of these adverse life expectancy outcomes. Eighty percent of health outcomes are unrelated to what happens in health care settings. In other words, there is no way to "health care" out of these discrepant health outcomes. For this reason, one of the major focus areas for mobile health initiatives is addressing social drivers of health in individuals receiving care. Detroit is among the most disadvantaged places in the entire country. The city has more children living in poverty, higher income inequity scores, and higher racial segregation scores than the US average and is worse off on several other metrics. As such, efforts that seek to improve on health outcomes in Detroit, and other similar communities, must include components to address social service needs as a core part of care delivery.

The net result of all of this is that Detroit, and other similar communities suffer from early vascular aging of their populations. Residents develop hypertension at younger ages. It often is untreated or not treated well. Individuals experience accelerated disease development and end organ damage. If the problem is not addressed early, people die at an earlier age from likely avoidable complications.

To move from a city plagued by early vascular aging to one that can achieve an average life course, we typically emphasize better care at the individual level, with one patient cared for by one provider at a time. However, if we shift to thinking of entire population dynamics, it requires a strategic approach to "fix" an entire community. Knowing that resources will always be limited, the solution to the problem requires a strategic intervention that will have the greatest impact.

The Preparation

Motivated by the concept of population-level blood pressure control, leaders at WSU asked the question: "How can we better understand our neighborhoods? How can we better understand what factors at a neighborhood-by-neighborhood level are contributing to these disparate health outcomes we're seeing?" To answer these questions, in 2016, WSU began development of a program called "PHOENIX: The Population Health OutcomE INformatIon eXchange" to integrate multiple different data sources to understand what's going on and what are the social factors contributing to outcomes at a neighborhood level. The goal was to target outreach into communities based on this confluence of information and then using aggregated data, to pull together and understand the impact at a neighborhood level (7).

When the WSU team began developing PHOENIX, there was a concept of "community blood pressure load" but no real means to compile data to understand it. Their initial objective was to determine neighborhood-by-neighborhood level average blood pressures with a goal to improve blood pressure over time. Rather than seeking to publish new scientific papers demonstrating what is already well known, such as reducing blood pressure to prevent heart disease, strokes or kidney disease, the team endeavored from the start to show that we could find communities at greatest risk and implement effective programs to reduce risk at the population level.

To use this data set at scale, it was critical to integrate data from multiple different sources including social determinant and person-level data from electronic health records and integrate it all into a resource that was easy and safe to use. The PHOENIX system was launched just before the COVID-19 pandemic and the alpha version was a "Hypertension Dashboard" developed using the visual analytics program Tableau, which had the ability to display confluent data at a census tract level. However, it lacked the functionality we wanted, and we migrated to the Google Cloud Platform and its program, BigQuery, which is an amalgamation engine to align multiple data sources geospatially, temporally, place and time.

Using as an example from Detroit, the census tract immediately adjacent to Wayne State and Detroit Medical Center is highly impoverished with median household income less than $14,000. per year, and the mean systolic blood pressure is 137mmHg, which exceeds the limit for hypertension diagnosis and control in the general population. Sixty-one percent of the households in this area live below the poverty level, 35% of individuals are unemployed, but only 12% are not insured. This is critical information as we consider options for sustainability of mobile health. Even in this impoverished census tract, most patients have health insurance. Another critical data point is that the Area Deprivation Index suggests the highest level of deprivation on this national comparative scale (8).

Of importance, is that the median age of this severely challenged community whose average systolic blood pressure falls into the hypertensive category is 29 years. The potential impact over time of this already measurable hypertension at the population level is incredible. The right population data can be used to identify community "hot spots" and design potential interventions that can impact health outcomes over an individual's lifespan to reduce the risk for heart disease, stroke, and kidney disease. The real value of these data and the mobile health care platforms was realized for the city of Detroit during the COVID-19 pandemic.

The Pandemic

As PHOENIX was being developed, Dr. Levy transitioned his career focus from the Emergency Department to population health, taking on a new role with WSU's physician practice group, Wayne Health. While plans were underway to use PHOENIX to identify high-risk communities and implement new programs to help address disparities, it was all put on hold in March 2020. At the onset of the COVID-19 pandemic, Michigan had very restrictive COVID-19 testing. Tests were only allowed for first responders, essential workers and healthcare workers. Dr. Levy's role shifted to focus on standing up the first drive through COVID-19 testing sites in Michigan at two sites, one operated by Wayne Health in Detroit and the other by ACCESS, the nation's largest Arab American health non-profit, in Dearborn, Michigan. The WSU team quickly tested 3,000 individuals in the first three weeks.

It soon became apparent in Michigan and across the country that people from predominantly Black and brown communities were having worse COVID-19 related outcomes than those from predominantly white communities. It was not that COVID-19 had a predilection for race, it was that race served as a confluence of many different factors, including socioeconomics, age and associated medical comorbidities. In this case, COVID-19 was an additional biological insult on top of accumulating chronic diseases such as hypertension, social determinants, and longstanding trauma and stress.

Using PHOENIX, the team identified the region surrounding Sinai Grace Hospital (SGH), one of the main safety net facilities in Detroit, as being the highest risk area in Detroit for COVID-19 disease and hospitalization. The community surrounding SGH suffers from high social vulnerability and has a great

density of more senior individuals. To prevent the population from unnecessarily coming to the hospital, Wayne Health partnered with the Ford Motor Company who loaned the team four Ford Transit Vans that the WSU team expanded from drive through to placed-based COVID-19 testing. The newfound mobile health unit capability allowed the team to test in high-risk areas and as the testing became increasingly available then tested anyone interested in being tested. They developed a closed loop, HIPAA-compliant system to enable data intake and provide results back to patients via cell phone. This WSU effort quickly became the leading resource in the state for mobile COVID-19 testing.

The culmination of this experience came from a partnership with Detroit Energy (DTE) who operates the Fermi nuclear power plant outside of Detroit. At one point early in the pandemic, the entire plant was forced to shut down because of COVID-19 exposures. The leadership of DTE requested that the WMHU test 2,000 people in a weekend and the team quickly set up on location with almost 50 staff to get it done.

While this was occurring, the State of Michigan leadership began to recognize the disparity that was occurring in brown and Black communities and created a Statewide Coronavirus Racial Disparities task force, led by Lt Governor Garlin Gilchrist. The WMHU became a pillar of this initiative because state health leaders recognized that people were “speaking with their feet,” and accessing the WSU clinical services onsite. The WMHU partnered again with Ford Motor Company who conducted form and function analyses to develop a fleet of nine mobile health units for the state. Five of these were delivered to the WMHU program (with the others going to four different local health departments) giving us eight vehicles total. To date, they worked with more than 250 different community partners, conducted over 4,000 events, cared for more than 92,500 people through mobile outreach including 54,000 COVID-19 tests and more than 15,000 vaccinations.

While COVID-19 quickly became the third leading cause of death in the US, at the same time death rates from heart disease also increased. With changes in access to health care, difficulty getting medication renewals, and newly diagnosed patients’ inability to get needed care for chronic medical conditions including hypertension, the age-adjusted mortality rate for heart disease in Detroit rose from 285/100,00 in 2019 to almost 325/100,000 in 2021, outpacing a similar trend for the nation overall.

Recognizing that the mortality rate for heart disease was worse than before the pandemic and knowing that the population was already coming out for testing and vaccination, the WMHU team realized the opportunity to use the same models for addressing other medical problems, especially those disproportionately impacting Black communities. At that time, the program was exploring the utility of blood testing for COVID-19 antibodies and thought, “Couldn't we also look at lipids or HgbA1C or basic chemistries to assess for kidney disease?”

Similarly, before the pandemic the WSU Department of Emergency Medicine was running the largest HIV screening program in the state in its emergency departments, testing almost 10,000 people a year. When the pandemic hit, testers were no longer allowed in the emergency department which prompted the idea of adding HIV screening into the mobile health program, which they successfully accomplished. Similarly, with the critical importance of the social determinants of health, the teams continue to screen for those determinants in patients within the mobile health setting. If someone has food insecurity, the team put a box of food in the back of their car before they drove away. Thus, what started as a COVID-19 intervention became the next step in a robust mobile health program addressing the key factors affecting patients’ health.

The Past: Learning from the Pandemic

The pandemic motivated the WHU team to consider using mobile health units for mass hypertension screenings. As it turns out, measuring blood pressure in the front seat of someone's car is measuring pressure in the ideal position: sitting with the arm heart height in a rested state and a temperature controlled, and a familiar environment without any white coats in sight. When the data began to accumulate, the team discovered that 63% of the patients were hypertensive including one third of whom were in the stage 2 hypertension range with a mean systolic blood pressure of 152 mmHg.

Through this work, it became clear that there was a population who were primed to favorably view delivery of health care in community settings. People had become used to going to the community to get a COVID-19 test and soon thereafter, COVID-19 vaccinations. Perhaps they could also begin to see the community as a place to have blood pressure and lab studies checked.

The team considered the possibility that the lessons learned in the pandemic could be applied to other aspects of health care. One of the key lessons learned is that, by disaggregating prevention from treatment, you could create a system that ensures ready access to needed care across the spectrum. Whether you are an 85-year-old adult with a dozen co-morbidities or a 53-year-old adult with very few medical needs, all the care flows through a provider's ambulatory office or a hospital-based clinic, and the visit reimbursement rate is based on standard time-based encounter increments.

Perhaps the model could be conceptualized differently. Healthy people who need health screenings do not have to go into a doctor's office. They could go to a mobile prevention-oriented screening site with community health workers and pharmacists under collaborative practice agreements coordinating with providers as needed using telehealth links.

Using this strategy, the WMHU program has now measured more than 10,000 blood pressures and obtained screening lab tests from more than 5,300 people: no appointment needed, no insurance necessary, no formal identification required. They have been able to provide these services through state and other grant support as well as philanthropy. Industry partners like LabCorps provided screening lab tests at a total cost of $14. A similar screening visit would cost several hundred dollars in a provider's office, where the bill would be passed onto the insurance payor and often to the patient depending on their level of co-pay.

The WHU Mobile Health Team collected screening data for social determinants of health, insurance information and disability rating from many thousands of individuals, and have found that as many as 25% of those attending mobile health sites self-report a disability and a similar proportion request assistance with social needs. Such data are recorded and uploaded to the PHOENIX population dashboards allowing the WMHU team to identify and even predict which of the patients screened will request and require assistance.

At the same time, the PHOENIX program itself has continued to evolve. The system now pulls from a combination of different data resources, person level medical data from health systems combined with population level, available data sets partitioned by either zip code or census tract covering six states. From Wisconsin and Michigan to Pennsylvania, the program now incorporates more than 70 different databases which have hundreds of different data elements. The tool provides evidence of longstanding, historic disparity in the community and a gives better idea of the health from a neighborhood-by-neighborhood level.

The Present: Adapting Practice After the Pandemic

To date the WMHU units have done more than 4,000 different events since April 2020, sending six to eight vehicles out into the city 6-7 days a week. The team has expanded to 80 people and on each of the vans, the team includes a medical assistant, patient service representative, community health worker, and a nurse or a nurse practitioner, with or without a pharmacist depending on the setting.

Units are deployed to match social vulnerability with hypertension prevalence. The WMHU team measures blood pressures in as many of these under resourced neighborhoods as possible and links individuals to medical care and social support. Decreasing blood pressure by 2 mmHg at the population level has the potential for a dramatic impact on health outcomes including a 25% decrease in strokes and heart attacks in the Black population and almost 50% decrease in the incidence of heart failure (9).

While the program's initial funding was through philanthropy and support from the State of Michigan, the Wayne State program has since received significant grant funding. First among these was an award from the American Heart Association Health Equity Research Network in partnership with Johns Hopkins School of Nursing, NYU Langhorne Health, University of Alabama at Birmingham, and Beth Israel Deaconess. Known as RESTORE, this network focuses on taking innovative models in the community to prevent hypertension and hypertension complications. The WSU component of this effort focuses on high blood pressure and use of mobile units to assure access in a project called "LEAP HTN: Linkage, Empowerment and Access to Prevent Hypertension." A key aspect of this study is to challenge the traditional delivery model of medicine that requires a physician and a physician's office to address hypertension, emphasizing the movement to disaggregate prevention and deliver care in the community with a care model using community health workers, in a novel approach called "PAL2: Personalized, Pragmatic, Adaptable Approaches to Lifestyle and Life circumstance." Beyond screening for and addressing social determinants typically within the purview of community health, we have developed a rubric with action items known to be effective for blood pressure reduction. Community health workers partner with patients to identify what they're willing to do and believe they can accomplish.

- Funding for LEAP HTN paved the way for an even larger grant from the NIH/National Institute for Minority Health and Health Disparities Health Equity Action Network, which includes 11 centers across the country. The WSU Center, "ACHIEVE GREATER" (Addressing Cardiometabolic Health Inequities by Early PreVEntion in the GREAT LakEs Region), includes four R01-level projects:
- ACHIEVE EPI: a longitudinal cohort study of our entire mobile health outreach program
- ACHIEVE Heart Failure: examines people with hypertension at high risk for heart failure
- ACHIEVE Coronary Heart Disease: is based in Cleveland and investigates early detection of coronary artery calcium
- PATHFINDER: aims to examine longer term outcomes associated with personal air cleaners for patients with acute heart failure.

With the winding down of the pandemic, the Michigan Racial Disparities Task Force was asked to provide summary recommendations and next steps in a final report. Dr. Levy led the development of the mobile health unit recommendations, which were included in the final approved FY24 budget. Specifically, the State of Michigan allocated $49.5 million to continue supporting racial disparity task force initiatives, including $7 million for mobile health units. With these funds, the mobile health program was further expanded and grew to encompass the entire state under an initiative called the Michigan Mobile Health Corps. Funding has allowed the addition of 10 additional vehicles in the summer of 2024 for a total of 19

units that will all be working together to prevent, screen for, address and treat hypertension and other cardiometabolic risk factors with the intent of improving outcomes at the population level.

Through this action, the concept of mobile health care in Michigan has overcome a major "political determinant of health" by working within the government for endorsement and support. Even more importantly, it has enabled the team to sustain a capability and capacity that has clearly demonstrated its effectiveness in addressing primary causes of disease and disability in the population, especially those who are socially and economically disadvantaged and at increased risk. With saved years of life, emergency department and hospitalizations avoided, the programs boast a return on investment of $18 for every $1 spent. It is not a difficult financial argument to make.

The Possibility: Getting a Pulse on Everyone's Pressure (and getting paid for it)

In 2015, an article in the *American Journal of Accountable Care*, the authors proposed that mobile health was underutilized and presented potential emerging models for sustainable funding: accountable care organizations, payors and employers (10).

In 2023, the WMHU began working with Molina Healthcare, the largest Medicaid Managed Care Organization in southeast Michigan with 90,000 covered lives. The organization approached the WMHU program and requested help locating their patients with uncontrolled hypertension. While Molina estimated that they might have approximately 5,000 such patients, they also realized that hypertension screening was underutilized. WMHU worked with them to analyze their data over a two-year period and found that almost half of their covered patients did not have an office-based blood pressure recorded. The teams agreed that the first step was to identify the patients in the community by address and send WMHU teams to measure blood pressure applying validated methods. The goal was to locate patients, measure blood pressure, refer for care and follow-up then develop a phenotype of patients based on medical and social needs while also developing a model for reimbursement for these efforts.

Why would a payor want to create a new model for reimbursement of prevention services? The motivating factor is hopefully to do what is best for the patients and to prevent the development of disabling disease complications that decrease health and shorten life spans. However, there are additional motivations. Measures of the Healthcare Effectiveness Data and Information Set (HEDIS) are tools developed by the Office of Disease Prevention and Health Promotion of the US Department of Health and Human Services. They are used by more than 90 percent of US health plans to measure performance on important dimensions of care and service delivery. Included in the measure sets are goals to reduce the proportion of adults with hypertension (HDS-04) and increase control of high blood pressure in adults (HDS-05), along with numerous other metrics. Payors want to optimize these metrics, and our approach can help achieve that goal. Additionally, accountable care organizations (ACOs) that sign on to manage covered lives must meet specific HEDIS measure targets and are penalized if they don't or receive incentive payments when they do. Helping payors and ACOs hit their HEDIS targets is a financial win all around. The Medicaid plans are reimbursed at least in part by the number of comorbidities identified and documented in a covered life population.

The goal has been to phenotype a population and develop new codes and reimbursement models that capture both the weight of chronic disease morbidity and the impact of the associated social drivers of health in patients living in areas with high degrees of deprivation. Working with Molina, WHMU has developed new billing codes including for example 99385, 99386 and 99387 codes, where the provider receives a bundled rate of $350 for our screening. This is a considerably larger reimbursement than

would be obtained in an office visit. As part of the assessment, patients also receive screening blood work paid for by the insurer. Additional HEDIS measures such as non-mydriatic fundoscopic eye exams, urine for albumin/creatinine ratios, and depression assessments are also included. This pathway toward sustainability that is replicable in other locations.

In addition, the WMHU team has started to incorporate z-codes, first introduced by the Centers for Medicare & Medicaid Services (CMS) in 2015 but not widely or consistently measured in most health encounters. These codes allow any healthcare organization to quantify the degree of social disparity contributing to ill-health and to document interventions initiated for the necessary services. While they are not necessarily part of reimbursement for services rendered there is good reason to believe that they should be.

Beyond this initial focus on cardiometabolic risk reduction, this year the program partnered with Meridian in Michigan and the Centene Foundation who granted the WMHU program $1M to support efforts to improve women's health. It is an area that the mobile health program is well prepared to address using PHOENIX to identify high-risk areas in the community and help mothers with their health before they get pregnant. Hypertension is a major cause of maternal morbidity and mortality. What's critical is determining that blood pressure before pregnancy is well-controlled before, during and after pregnancy.

To help reach the population most broadly, the WHNU team has introduced a wide range of communication strategies including radio with iHeart Media and traditional flyers with QR codes. They have developed and deployed a simplified health risk assessment tool that takes a few minutes to complete and calculates a physiological risk age which is juxtaposed with actual age (https://waynehealth.ghmcorp.com/). The team has found that very few things motivate individuals as much as demonstrating for them that they are 10 or so years older physiologically than their chronologic age. More importantly and bluntly, they are 10 years closer to death. They have also run effective television commercials advertising what care at our mobile community screening sites looks like. The limiting factor is cost, as a television commercial can cost up to $12,000 a week.

One important recognition that has come from this work is that to improve upon health disparities, an "all-in" approach is needed where emphasis is placed not only on the underserved but on the working class. This is because disparities in health outcomes by race remain even in populations of individuals who are employed and have commercial insurance, as many of these individuals may not access prevention services. For individuals paid by the hour, it is not easy to leave work and take half a day to get their blood pressure checked, especially when they have no current symptoms or associated disability.

Building upon COVID-19 testing and vaccination partnerships developed with the Detroit automobile manufacturing ecosystem during the pandemic, the WMHU team engaged employers such as Detroit Chassis, whose workforce includes individuals from Detroit and the surrounding counties. Detroit Chassis is a Black-owned business that is a Ford supplier; the owners pay their workers to use part of their lunchbreak to get preventive screening at the onsite WMHU team. To date, between Detroit Chassis and other businesses the WHMU team has worked with, nearly 600 employees have been screened. This effort has demonstrated to human relations and benefits managers the value proposition of keeping employees healthy. As evidence of the evolution in thinking, industry is talking less about absenteeism and more about presenteeism. Employers are willing to support efforts to keep employees healthy, and present on the job. Through more effective screening and prevention, workers are healthier and are

more productive. The benefits program saves on health care expenditures by not having to pay for complications that develop when prevention services are not used by employees.

The Paradigm Shift

The WMHU program continues to innovate and expand. They are currently focused not only on prevention services but also on how to deliver care beyond the current fee-for-service structure, stepping away from the traditional models towards a capitated arrangement. Such an approach removes the worry about how to pay for the delivery of services by professionals not included in existing models like nurses, community health workers or pharmacists in the field. The focus is no longer who provided the service but rather "was the goal met and did the patient or population hit the desired outcomes?". The ultimate vision of the program is to provide services beyond screening in the community to include direct distribution of pharmaceuticals based on a prevention-focused formulary onsite at a community or business location, making it more convenient for patients, while allowing for patient education (and sometimes direct observed therapy) and saving money for the payor as they must work with only one service provider.

Heretofore, much of mobile health has been paid for by health systems at a loss or supported through time-limited grants and it is clear a paradigm shift is needed with a significantly different sustainability model. To punctuate the opportunity, the WMHU program had no budget when it launched at the beginning of the pandemic. The annual budget now exceeds $4 million a year. Moreover, in each of its three years of existence, there has been a year-end budget surplus including $340,000 in revenue above expenses last year. By generating revenue through prevention, dollars are created that can be put back into the program with healthy margins allowing for expansion and ultimately more specific and efficient screening and care delivery.

Health happens at home. Mobile health is a means to provide what patients have always wanted and to allow for screening and the detection of disease that could spare people significant disease burden and disability later in life. Now with new models of reimbursement emerging that will allow these services to be sustainable, there are increasingly fewer reasons for patients to travel to offices and clinics for simple services. Mobile health care enables them to remain healthy and receive preventive services in the communities where they live.

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Data Systems Use & Technology to Address Health System Gaps & Improve Access

At the Mobile Health Consensus Conference, experts from a range of fields formed a panel chaired by a Maryland health system Chief Information Officer to discuss the present and future potential for the application of informatics to mobile health care. This session explored how and what technological capabilities currently exist or are needed to better connect providers to patients, how to improve coordination and communication between mobile health programs, and ways to integrate mobile health into the medical systems within Baltimore. This section is a recap of the panel discussion.

Moderator:

Joel Klein, MD, Chief Information Officer & Senior Vice President, University of Maryland Medical System

Panelists:

Megan Priolo, DrPH, MHS, Executive Director, CRISP
Warren D'Souza, PhD, MBA, Vice President Enterprise Data and Analytics, University of Maryland Medical System
Phillip Levy, MD, MPH, Professor of Emergency Medicine and Physiology, Associate Vice President for Translational Science, Wayne State University, and Director Mobile Health Unit Program, Wayne Health
Kathleen Page, MD, Associate Professor of Medicine, Johns Hopkins Hospital
Lisa LaCarrubba, MD, Medical Director, CloseKnit Health

Data Terminology

Electronic Health Record (EMR)
An electronic record of health-related information on an individual that can be created, gathered, managed, and consulted by authorized clinicians and staff within one healthcare organization.
Source: Center for Disease Control and Prevention (CDC). Examples: EPIC, Anthem.

Health Information Exchange (HIE)
Health information exchange (HIE) is the mobilization of health care information electronically across organizations within a region, community or hospital system. Participants in data exchange are called in the aggregate Health Information Networks (HIN). In practice, the term HIE may also refer to the health information organization (HIO) that facilitates the exchange. Source: Wikipedia

Electronic health information exchange (HIE) allows doctors, nurses, pharmacists, other health care providers and patients to appropriately access and securely share a patient's vital medical information electronically improving the speed, quality, safety and cost of patient care. Despite the widespread availability of secure electronic data transfer, most Americans' medical information is stored on paper—in filing cabinets at various medical offices, or in boxes and folders in patients' homes. When that medical information is shared between providers, it happens by mail, fax or—most likely—by patients themselves, who frequently carry their records from appointment to appointment. While electronic health information exchange cannot replace provider-patient communication, it can greatly improve the completeness of patient's records, (which can have a big effect on care), as past history, current medications and other information is jointly reviewed during visits. Source: (1). Examples: CRISP (Chesapeake Regional Information System for our Patients) Health Current, Delaware Health Information Network (2).

Context | Public Health, Population Health, Community Health, and Health Equity

Population health is the health outcomes of a group of individuals, including the distribution of such outcomes within the group. The field of population health includes health outcomes, patterns of health determinants, and policies and interventions that link these two (3).

Community health refers to non-clinical approaches for improving health, preventing disease and reducing health disparities through addressing social, behavioral, environmental, economic and medical determinants of health in a geographically defined population (4).

Traditionally community health assessments include surveys of major stakeholders in a geographic area including residents, community organizations, health systems, and civic groups. The data derived depends on the voluntary participation and response of those surveyed and the result is traditionally plagued by challenges with survey sample size.

Baltimore is at an inflection point in reimagining the conduct of community health assessments. The pandemic and the health inequities that became more visible are driving new assessments of health care within communities in order to understand their health issues and the social determinants of health.

To continue to improve on Baltimore's collective community health assessments we need:

- Increasing access to comprehensive data on the social drivers of health and illness
- Opportunities to develop systems that enable targeting of interventions, including mobile health
- Integrated systems that inform interventions by health issue and geography
- The ability to draw on data from mobile health units

"In Detroit, through our Phoenix platform, Wayne Health is challenging us to reimagine community health needs assessments, so that they are about drawing on available community information, collecting patient-level data, and integrating them," said Phillip Levy, MD, Executive Director of Wayne Mobile Health.

Data for Community Health Assessment

Where local, direct survey has been the standard for community needs assessment in the past, increasingly more robust data sets like regional health information exchanges (HIEs, e.g. Maryland's CRISP), electronic medical records (EMRs, e.g. EPIC, Athena, others) as well as a myriad of other data sources (CDC, Medicare/Medicaid health claims data, others) now provide a much richer picture of a community in terms of both clinical and social health drivers.

The terms social drivers of health, also referred to as social determinants of health (SDOH), and for individual patients, "health-related social needs," represent an effort to examine how social conditions influence both the availability of health care and consequent inequities in health outcomes. Along with epidemiology, assessment of SDOH is central in managing public health.

The U.S. Department of Health and Human Services defines social determinants of health as "the conditions in the environments where people are born, live, learn, work, play, worship and age that affect a wide range of health, functioning, and quality of life outcomes and risks (5). Social determinants are grouped into five domains: economic stability, education access and quality, health access and quality, neighborhood and built environment, and social and community context. Health-related social

needs (HRSN) are individual-level, adverse social conditions that can negatively impact a person's health or health care including food insecurity, housing instability, and lack of access to transportation (6).

CRISP (Chesapeake Regional Information System for our Patients)

Maryland's HIE, CRISP, is a non-profit organization that operates the health information exchange for Maryland and DC. Maryland's three largest hospital systems—Johns Hopkins Medicine, MedStar Health, and the University of Maryland Medical System—in conjunction with Erikson Retirement Communities established CRISP. In 2006, Erikson's Chairman and CEO, John Erikson, met with the chief information officers of the three hospital systems to discuss how to make medical records of seniors available when they visited the hospital. This led to the creation of CRISP in partnership with the Maryland Health Service Cost Review Commission (HSCRC), and with subsidies from the state and federal governments

"We experienced several inflection points with respect to CRISP," said Megan Priolo, CRISP Executive Director. "The first occurred when the HSCRC, the hospital regulatory agency, required hospitals to send feeds to CRISP, which instantly made CRISP a valuable service across the State."

The Maryland Health Information Exchange (CRISP) is a large collaboration with many stakeholders. "We could not exist or add value without all the stakeholder collaboration from the provider community, state regulators, Medicare and Medicaid, hospitals, and post-acute care," said Priolo.

Today, CRISP provides a platform for providers to input and retrieve patient-level clinical data. As clinical information is created and shared with CRISP, it is made accessible in almost real-time to participating health care providers who can securely access patient information through the internet using CRISP's tools.

Priolo contends that CRISP can play a key role in community health as it collects admissions, discharge, and transfer (ADT) data from participating hospitals, and then provides the data in standard-format, easily consumable and shareable. CRISP also includes Medicare and Medicaid claims data, creating "a very rich data set."

Priolo also notes that CRISP, and other HIEs, will play a critical role as the Centers for Disease Control and Prevention (CDC) establishes public health as the top health care priority and pushes for public health data modernization nationwide. "Before COVID-19, public health was one of our core services, but now I feel like it's *the* core service," said Priolo. "It's at the heart of our strategic conversations."

"During the COVID-19 pandemic," said Priolo, "we quickly stood up lots of reports, with probably a little less quality assurance than usual to be as helpful as we could. Some worked and some didn't, but we've been able to reuse and reflect on that reporting infrastructure, asking questions like 'How can we translate that report for public health needs more broadly?'"

Priolo noted that there are institutional data gaps yet to fill. Recently, CRISP has focused on connecting skilled nursing and post-acute care facilities. There are now 135 skilled nursing facilities connected. Still, other gaps remain. Ambulatory care remains a challenge as does integration with small, independent practices across the state.

Social Determinants of Health Data

Social determinants of health data, both for the individual and in the aggregate, are critical for understanding community health, ensuring public health, and addressing individual health. Panel participants discussed both opportunities and challenges for the development of robust comprehensive public health data.

Megan Priolo discussed the recent integration of Area Deprivation Index data into CRISP. Amy Kind, MD, PhD, and her research team at the University of Wisconsin-Madison (UW) developed the Area Deprivation Index (ADI) is based on a measure of neighborhood wellbeing developed by the Health Resources and Services Administration (HRSA) about 30 years ago. According to the UW Center for Health Disparities Research, Area Deprivation Index, "allows for rankings of neighborhoods by socioeconomic disadvantage in a region of interest (e.g., at the state or national level). It includes factors for the theoretical domains of income, education, employment, and housing quality. It can be used to inform health delivery and policy, especially for the most disadvantaged neighborhood groups" (7).

Priolo has stated that the state is now requiring hospitals to send CRISP social determinants of health screenings. "I'm hopeful that will mean there will be a lot more of these data flowing into CRISP. I think we only have about 8,000 screening data sets or so right now. So, it's progress."

Warren D'Souza, PhD, MBA, Vice President Enterprise Data and Analytics, University of Maryland Medical System (UMMS), discussed how UMMS has built "the foundational data fabric" for social determinants of health data. "In my view, while we have lots of data flowing into our EMR, we need to focus on those social drivers of health that are not easily manifested through the EMR," said D'Souza.

D'Souza added, "People spend more than 99% of their time outside of the doctor's office and yet we have very little data on the social drivers or the health care profiles of these individuals. There is a lot of rich information that is necessary within the EMR, but if we simply rely on those aspects, we're missing the other 75% or 80% of what constitutes the phenotype of an individual."

To remedy this, UMMS is focusing on the integration of SDOH data. First, UMMS is incorporating SDOH screenings into clinical care, which are conducted at the individual level, as discussed by Megan Priolo. Second, UMMS is also harnessing publicly available data at a population level. This intentional effort is scraping data from such sources as the U.S. Census Bureau, the Food Atlas, and Maryland transportation maps to look at how poverty, income, food insecurity, housing and transportation affect the health of individuals and communities. Most Maryland hospitals, in fact most hospitals nationally, are on the same journey.

Phillip Levy noted that in Detroit, Wayne Mobile Health has also incorporated publicly available data on social determinants of health but have turned to new sources of data to augment these with data on "what people think and feel in these communities." "Google is well ahead of us on this right now," said Levy. "They conduct sentiment analysis using social media feeds and search engine data aggregated at population levels. These data can really give you insights that a community health needs assessment just scratches the surface on."

Levy explained further, "Google said to me, nobody is more honest with anything than their search engine. And so, think about that for a second. If you could see what people are searching for and what they are looking at on social media in the aggregate, without tracing individual searches and posts back

to specific people, you'll have an understanding of what matters to a neighborhood at a moment in time. That is powerful."

"We have a tool that CareFirst uses called 'socially determined' that provides us a picture of neighborhoods at the zip code level," Lisa LaCarrubba related. "This is still rudimentary but has been helpful as we decide on locations for our services."

At the individual level, patients are asked to complete questionnaires in person or remotely. Lisa LaCarrubba, MD, Medical Director of CloseKnit Health, noted that non-clinical staff who interact with patients often learn social determinants information as they help them get specialists, transportation, community resources. They can enter these data into the EMR.

Data Acquisition, Management and Analysis Challenges

A critical challenge for SDOH data is the accuracy of reporting. Warren D'Souza explained that many intake staff are not properly trained on SDOH so fail in obtaining complete and accurate information. "An individual goes to see their primary care physician and the intake person just rattles off a whole series of questions on a survey, oftentimes not even making eye contact," said D'Souza. "This does not create the right environment for soliciting accurate information." The answer to this is two pronged: better training for intake staff and the use of publicly available data to fill in the gaps.

Another major challenge when it comes to community health is the lack of data on the "missing people," which can also be addressed through both data collection and analysis. According to Megan Priolo and Phillip Levy, there are little to no data on those who either do not or only infrequently access the healthcare system.

"There are these folks whom we don't really have any data on in medicine because they don't engage with health care except for an occasional emergency department or urgent care visit," explained Levy. "They're not included in any of our current epidemiological understandings, because they've never been part of it other than whatever they may have presented with. This has been one of the biggest lessons from our work in mobile health."

Lisa LaCarrubba wants to address this, in part, through "alerts about things that are not happening: the patient who has not been seen for a long time, the patient that hasn't had the labs that they need for a long time, whose HIV is really high, whose Hep C has not been treated."

Phillip Levy also argues that one can extrapolate from those who do interact with the system to understand the larger population. In Detroit, for example, they were able to estimate that if there were 5,000 patients in a community whose records indicated hypertension, then the true number of individuals in that community with hypertension could be as large as 45,000 based on population health data. This insight could inform community health intervention strategies.

From an analytical perspective, one concern is the unit of analysis. D'Souza also cautioned about the use of the zip code as the geographic unit of analysis. "For those of you who are familiar with Baltimore City," he argued, "I always like to point out zip code 21230 which is the poster child for economic disparities and social vulnerabilities in Baltimore and also includes the upper-middle class neighborhood of South Baltimore and Otterbein, Federal Hill and Riverside, neighborhoods with mean household income of more than $140,000 (8). And so, I would affirm that zip codes are highly unreliable and not granular

enough for community health assessment. At the medical system we have several million distinct patient records." Our medical system has geocoded every address within its EMR to the level of latitude and longitude to assign it to a census tract level. "We typically work with the census tract or block group level as opposed to zip code when examining community health vulnerabilities."

Another analytical concern is being overly determinative. "The interesting thing is that while they correlate, social determinants of health are not all mutually inclusive," said D'Souza. "Just because an individual lives in a majority poverty zone does not necessarily mean they're food insecure. Conversely, if an individual lives in an area where the median income is well over the poverty line, it's not a guarantee that they are food secure."

Top-Down, Bottom-Up Integration

As mobile health plays a more central role in community health, a key challenge is for hospital teams to think about what providing health care from a mobile unit in a complicated urban environment looks like and how it can be integrated into larger systems. "We need to be accountable for that, too," said Joel Klein, Chief Information Officer & Vice President, University of Maryland Medical System, "to engage in comprehensive planning, prevent duplicate care, and ensure appropriate reimbursement. To do so, we need to think about how to make our systems sufficiently nimble and flexible so that health care in these environments is fully integrated into the healthcare industry and its data systems."

The ability to network information from intake to stakeholders—onsite clinicians to follow up healthcare—is critical, but neither immediate nor easy. "When we first started trying to do remote patient monitoring with Athena," said Levy, "it just was a mess trying to get the set up the way we wanted, and we had to re-engineer the system. Having common platforms for this new layer of preventive care, disaggregated from treatment, is necessary to ensure you're getting the same type of information wherever you are in the city of Baltimore or the city of Detroit. A solution like that is useful for everybody, particularly when the data are uploaded to the state's Health Information Exchange."

Mobile Unit Technology

Panelists reported using a variety of EMRs in their operations, including EPIC, Athena, and Red Cap, often in the Maryland context with access to CRISP.

David Marcozzi, MD, MHS-CL, Chief Clinical Officer and Senior Vice President, University of Maryland Medical Center (UMMC), related how the Mobile Integrated Health-Community Paramedicine Program operated by the Baltimore City Fire Department and UMMC was the first to deploy EPIC in a mobile, integrated unit. "We talked to our UMMC EPIC experts about it," said Marcozzi. "They said, 'You want to do what?' But then they helped us make it happen. Now, we can go out in the rig with our team, document the home visit within EPIC just like an office visit, and then the next provider, nurse, or social worker will see the mobile integrated health team's note from when they saw the patient. This provides a comprehensive assessment and tailored plan to help deliver the best care."

Data are critical to success. "If you just have a good idea and great operations, but you don't have the technology to collect data, you will fail," said Marcozzi. Data analyses not only shape overall program operations and improve patient care but also allow for robust assessments on a macro level of the program's impact on the community. For example, outcome data (such as readmissions) were tracked

regularly in the Baltimore MIH program. This analysis showed decreased readmissions for patients enrolled in the program.

Mobile and virtual access to EMRs and the HIE are critical. Kathleen Page, MD, Associate Professor, Medicine, Johns Hopkins Hospital, who works with two mobile units said, “What I appreciate about EPIC is that I can get everything in one place, and thanks to CRISP, I can look at everything.” Lisa LaCarrubba, MD, Medical Director for CloseKnit Health added, “We use Athena, which is a little cumbersome for trying to effectively see patients in a virtual setting, but when I see patients virtually, with a lot of clicks it can capture some, though not all, of the social determinants of health.”

Panelists noted significant challenges that remain to optimize technology for mobile and virtual health care. Page offered, “EPIC can be difficult to navigate. I sometimes describe it as a huge city and you're trying to look for a house and an address. We also find that it is hard to train people to use EPIC. Those of us who use it all the time are familiar with it, but not everyone is.”

Phillip Levy added, “We use Athena, but Athena, EPIC, Cerner, none of them have a patient-facing keystroke entry by patient module. We have to use a third-party tool that we have to pay into. We worked with one called “Cure for You”, but a lot of those companies all sit under the lens of remote patient monitoring because they want to split the cost with the billables.”

Lisa LaCarrubba noted the difficulty of interoperability across technology platforms. “We’ve created an app for our patients,” she said. “I can’t communicate with the patients over the app through the EMR. It’s open on one of my two screens, but when I’m in the EMR I have to remember to check the app to see if the patient has communicated.”

“I dream that everything I say gets automatically captured and synthesized in the EMR,” said Kathleen Page. “That way, I won't have to write a note and click a million things, and it will also capture the most intimate, important pieces of the conversation that often happen at the end of the visit.”

Patient Technology

Panelists discussed the technology available to and used by patients for connecting with their medical team or managing their health and health care.

Smartphones and Data Plans

Phillip Levy said that, in Detroit, “About 9 out of every 10 of our patients have smartphones. Lisa LaCarrubba added, “Most people do have a smartphone. On occasion, we do get those people with flip phones. But I think the pandemic really changed everything. It's not age-related. We have plenty of Medicare patients who will use our technology.”

Yet, there are challenges. LaCarrubba agreed, saying “The level of sophistication with the technology is variable.” Phillip Levy qualified his statement saying said that, while most patients in Detroit have smartphones, “A lot of them are so-called “Obama phones” (phones provided free to federal benefit recipients during the Obama administration) and they also don't always have the functionality that you anticipate.” Kathleen Page noted, “While most people have phones, some people who are vulnerable, especially those who are unhoused and living in very precarious conditions, do not.”

Reliable access to internet and data plans provides another challenge. LaCarrubba said, “We do have some issues with folks who do not have reliable internet or cell phone access. So that makes it a little bit harder because you can’t just go to the library and use a public computer to have a sensitive medical conversation.” Kathleen Page related, “In terms of cellular access in the immigrant population, there are a lot of issues with cellular, like people don’t have data plans or buy cellular by the minute, and then they lose it. But most people can access Wi-Fi, even if it’s in a Dunkin Donuts. And so, WhatsApp seems to be a preferred way of communicating. For things that require emails, not everyone has emails.”

Providers also need to adjust to patient preferences. Kathleen Page noted, “People have different preferences, so we have to adapt to all of those people whom I see who are least accessible through tech.” Lisa La Carrubba elaborated, “We’re trying to gather data on who clicks on what, who likes and responds to emails, text messages, or in-app messages. We are experimenting now by sending the same message different ways to see who responds to what. When we have sufficient data, we will be able to develop patient profiles and use the best way to remind them they are overdue for a visit or a lab.”

Kathleen Page advised, “We need something that is fairly simple for patients to navigate, while allowing providers to message patients and providing them access to needed data.” She concluded, “We should always provide access to a phone number that people can call, because when they lose their phone just having a place that they can call and have a reliable answer is important. This applies to the immigrant work and to the Spot. If people lose their phone, it’s an important grounding spot.”

Trusted Messengers

Phillip Levy said that more important than the technology is “Who is introducing it to them, and who can help them understand how to use it within their context. So, if I say to a patient, ‘Hey, you know, this is a great thing,’ that’s not going to go anywhere. If it is a community member or community health worker, however, who’s saying, ‘You know, I’ve used this and this is how it works,” then patients are more receptive. The technology is only as good as the human interaction that brings it forth.

Kathleen Page agreed, saying “Especially in the most underserved communities, we need to think about hybrid models. The technology is not going to solve everything. You ultimately need a human connection. Whether it’s a community health worker or influencers in the community, trusted people can spread the word about things that work and then engage people.”

Patient Apps, Remote Screenings, and Questionnaires

Panelists had different views about the use of apps. Kathleen Page argued that, in the mobile environment, “Apps generally don't work.” Phillip Levy agreed, “Our patients don't like apps. They'd rather have something that they can directly connect to through a text link or something that does not require a password to register.”

Lisa LaCarrubba, on the other hand, noted that for CloseKnit’s virtual practice, “We've created an app for our patients that we use for communication. The clinicians and the whole care team will have one system that we will use that will have all the data that comes in from the app and from the other data connections like CRISP and community resources. We do find a lot of people who are a little bit resistant about using it for healthcare, but we just do a quick walkthrough, and they find it’s not hard to download and use. We want healthcare to feel more like what they do in their free time, because we want health

care to be more of a part of their lives, and not just 'once a quarter, I go to my doctor's office, and then I never think about it.'"

Patients also appreciate the agency and convenience that comes with remote devices and screenings. Kathleen Page said, "We have found that patients like being able to get tests delivered to their house, using them, and then having somewhere to reach out when things are positive." "Patients are very interested in remote devices that allow them to do care from home," said Phillip Levy. "They like using blood pressure cuffs, glucometers, scales, and similar devices." Levy added, "The entire ecosystem requires facile systems that, for example, include at-home blood pressure cuffs that have embedded cellular signals with someone on the back end who is receiving the information."

"We're also starting to send our patients questionnaires over the app," said Lisa LaCarrubba, "so they can take care of pre-visit tasks remotely, such as depression screens and social determinants of health surveys. We use we use two questionnaires, such as the questionnaire of the American Academy of Family Physicians. We are working to fully build them into the EMR."

Levy added that they have developed a patient-facing module. "Patients enter the data. This provides benefits for collecting sensitive social determinants data. "Patients are most honest when they can directly answer questions without concern about what intake staff might think about their answers."

Footnotes

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Mobile Health Funding and Sustainability

This section summarizes the panel discussion on funding and sustainability of mobile health care. At the mobile health conference, experts discussed current types of funding and payment models for mobile health care, the challenges to sustainability and they offered solutions to achieve sustainable funding and mobile health programs.

Moderator:

David Marcozzi, MD, MHS-CL, Chief Clinical Officer and Senior Vice President, University of Maryland Medical Center

Panelists:

Mallory Mpare, MPH, Director, Maternal & Infant Health Initiatives, March of Dimes
Nicki McCann, JD, Vice President Provider/Payer Transformation, Johns Hopkins Health System
Destiny-Simone Ramjohn, PhD, Vice President Community Health & Social Impact, CareFirst BlueCross BlueShield
Yolanda Ogbolu, PhD, NNP, Bill and Joanne Conway Dean, University of Maryland School of Nursing

The Maryland Model

Maryland has a hospital reimbursement model that differs from those in other states. It is regulated by a state agency called the Health Services Cost Review Commission (HSCRC).

Panelists described four aspects of the Maryland model:

1. **Rate setting:** Since 1971, under rate setting a state agency determines what hospitals can charge for each service and then all patients pay the same amount for those services, regardless of what their insurance might be. Whether you have Medicare, Medicaid, or commercial insurance, everybody pays the same rate. Elsewhere in the country, Medicaid pays about 70% of hospital charges, Medicare about 80%, and commercial payors from 100 to 200 percent as negotiated. Those who do not have insurance pay whatever the hospital bills them.

2. **Global Budgets:** In 2014, Maryland initiated the global budget revenue (GBR) model, placing caps on total hospital expenditures across all care sites (1). The GBR program aims to reduce unnecessary utilization while maintaining or improving care quality (2). They receive the same revenue they received in 2014, adjusted for inflation, regardless of the number of patients they see. Everywhere else in the country, hospitals are paid more if they increase volume or the services they provide. Additionally, in Maryland hospitals are held financially accountable for Medicare total cost of care growth

3. **Community Health Needs Assessments:** The state requires Maryland hospitals to conduct an assessment every three years. In Baltimore City, prior to 2024, each hospital submitted their own assessment. Beginning in 2024, all of the hospitals contributed to a shared, collaborative assessment. Hospitals are also required to submit a community benefit report that demonstrates each hospital's response to the Community Health Needs Assessment along with their plans to meet other community needs.

4. **Waiver:** Maryland operates the nation's only all-payor hospital rate regulation system. This system is made possible, in part, by a 36-year-old Medicare waiver (codified in Section 1814(b) of the Social Security Act) that exempts Maryland from the Inpatient Prospective Payment System (IPPS) and Outpatient Prospective Payment System (OPPS) (I(O)PPS is how hospitals are paid nationally for Medicare beneficiaries) and allows Maryland to set rates for these services. Under the waiver, all third parties pay the same rate.

Nicki McCann discussed two lenses used to think about this model: Utilization Reduction and Population Health:

- *Utilization Reduction:* The Maryland Model incentivizes hospitals with fixed budgets to reduce expenses. In response, individual hospitals have undertaken a range of actions from reducing the number of licensed beds to establishing mobile health units that engage in initiatives that reduce emergency department visits.

- *Population Health:* By investing in the population in our hospital's primary service areas, we can increase community health and thereby reduce hospital visits in general and emergency department visits in particular.

McCann argued, "As the model exists today, the rules are in favor of the utilization reduction model. We haven't really had that population health focus. If we can shift away from a model that rewards any and all utilization decline and instead rewards intentional, appropriate utilization decline, then we would readily adopt strategies like mobile health to address population health needs."

McCann argued further that the Maryland model provides opportunities for mobile health that don't exist elsewhere. Mobile health can help generate retained revenue for hospital systems and those systems could reinvest retained revenue in mobile health. Moreover, rather than each individual hospital having its own mobile health program, a coordinated mobile health strategy across hospitals could improve the coverage and increase the effectiveness of interventions.

Destiny-Simone Ramjohn concurred, arguing that while hospitals have focused on utilization reduction, they are also required to focus on community benefit. The state requires hospitals to conduct community health needs assessments every three years. This assessment must identify community health needs and provide an implementation strategy that outlines interventions to address those needs using retained revenue. Ramjohn asserted that, "If we were to have a coordinated effort around identifying community health needs, we would likely focus on mobile health interventions as an effective solution."

Financing Mobile Health Launch and Implementation

The panelists discussed how, within this unique model in Maryland, providers can develop and deploy mobile health (whether vehicle, auxiliary site, mobile team, telehealth) to promote health outcomes in a financially sustainable way. In general, panelists described the launch and implementation stages for mobile health units and the payor mix options.

The organizational stage involves:

- Perceived institutional or community need
- Preliminary target population(s) and intervention(s)

- Partnerships
- Fundraising

They noted that the launch stage involves:
- Vehicle purchase or lease (if vehicle based)
- Fuel and maintenance contracts
- Staffing

Funding for this phase could be obtained from philanthropy, state or federal grants, or hospital system investments.

The implementation stage involves:
- Deployment, intervention(s)
- Community outreach and trust building
- Financial operations (service fees, insurance reimbursement, grants, and contracts)
- Evaluation

Funding for this phase could be obtained by philanthropy, government grants and contracts, hospital system investments, external partner investments, service fees, and insurance reimbursements.

Panelists observed that, to obtain funding from any source, they needed a strong narrative about either money (financial return on investment) or public health (social return on investment).

Below, panelists discuss funding as follows:

David Marcozzi: A utilization reduction approach with a focus on grants and ROI
Phillip Levy: New revenue streams
Yolanda Ogbolu: A mobile unit supported primarily by state appropriations
Mallory Mpare: A mixed payor model that includes philanthropy, grants, and reimbursement
Destiny-Simone Ramjohn: The importance of social capital and trust

Financial Return on Investment: Utilization Reduction and New Revenue Streams

David Marcozzi, MD, MHS-CL

One narrative designed to secure funding is to propose a financial return on the investment made by a hospital system or other business partner. While grants may facilitate program launch, long-term sustainability is secured by financial returns obtained through utilization reduction or new revenue streams.

Dr. Marcozzi described two grant-funded utilization reduction initiatives designed to decrease emergency department visits and hospital readmissions. The University of Maryland Medical Center (UMMC) and the Baltimore City Fire Department partnered to develop and implement the programs. Maryland's Health Services Cost Review Commission, which regulates the state's hospitals, provided initial funding for these programs through a $2.2 million grant.

- The Minor Definitive Care Now (MCDN) program focused on low-acuity 911 callers, providing mobile urgent care at the scene or transport from the scene to appropriate destinations other than emergency departments. With an efficient model within West Baltimore, Marcozzi estimated the annual patient volume at approximately 1,600.

- The Transitional Health Support (THS) program focused on patients discharged to their homes after hospital admission. The target population was patients with complex medical, pharmacological, or social health-related challenges and provided patient-centered home-based care designed to support health and prevent readmission. THS saw a downward trend in the overall risk-adjusted readmission rate in its first operational year. For June-December 2019, THS had a 6.5% risk-adjusted readmission rate, less than half that of the comparison group's rate of 16.8%. Marcozzi estimated annual patient volume at approximately 500.

Despite the overall success of these programs in terms of health outcomes and reduced hospital utilization, they have not secured sustainable funding. Marcozzi related, “Even though we had some good news, we did not develop a sustainable funding model for our MIH program. We began with a grant from HSCRC for $2.2 million. That funding is now limited, and we are working with a skeleton crew.”

Marcozzi noted that grants by themselves provide sustainable funding. “If you walk into our emergency department, physicians and the hospital submit bills, and we collect on those bills. However, the [THS and MCDN] programs were not supported by billing and reimbursements but rather through grants and you can’t grant your way to success. We need an operational model that is sustainable and not dependent upon the next governor, legislature, president, or congress to establish grants and then consider whether they should be transitioned to sustainable models.”

Marcozzi asked Daniel Gingold, MD, MPH, Associate Professor, University of Maryland School of Medicine, and Medical Director of the MCDN and THS programs, to provide his perspective on why, despite their success, the programs have not been financially sustainable. Gingold shared that UMMC did not provide funding when the HSCRC grant ran out because the hospital’s leadership wanted to see not just cost effectiveness but a return on investment (ROI) and reduction in overall resource use. He noted that that standard is not consistently applied, however. “The same expectation is not made of clinical programs. They’re not saving money. They’re incredibly expensive. They do a lot of good for people. There’s only one thing in medicine that may save money: vaccines. We can (and should) compare the cost effectiveness of other interventions, but population health efforts are expected to not just be cost effective but cost saving. That standard is not applied any place else in medicine.”

Destiny-Simone Ramjohn also noted an asymmetry in the application of ROI assessment. She argued that high-cost machines seen by patients in hospitals once a year are not subject to the same level of ROI scrutiny as initiatives, like mobile health, that focus on social needs, social determinants, and investing in public health.

Marcozzi mentioned that mobile health programs may find financial sustainability by ensuring a return-on-investment analysis is performed and achieved. “In any evaluation, cost savings are important” he said. “But going even further, if a program also generates revenue, it helps ensure sustainability.” He further articulated that demonstrating cost savings does not ensure sustainability.

Marcozzi added that the THS and MCDN programs were designed to first ensure safe and effective care but also learn what their ROIs would be under varying circumstances. “We developed an economic model to assess how many calls we need to see for a period of time to understand how this model breaks even to realize cost savings,” he said. “We embedded a health care economist with the team to analyze our data and the cost savings associated with this model.”

Marcozzi posed several rhetorical questions about whether there were insurers or venture capitalists in the audience to make a point about ROI. “ROI and revenue generation are how a venture capitalist evaluates projects. We must think through how to tell our story, so an investor says, ‘This is worth my investment because I see a sustainable model that eventually is going to realize something back from this investment.’”

Marcozzi also noted the alternative, which is institutional operating funding. He described that the hospitals in our state exist within the Maryland Model/waiver and have a capitated budget. Through the BCFD MIH model, if it was found to promote health and keep people out of the hospital, the hospital could reinvest and continue the mobile health program. The challenge is that with an academic medical center with unlimited patient demand, the cost savings are not realized, which challenges the cost savings approach for continued funding.

Accountable Care Organizations

The Centers for Medicare and Medicaid Services (CMS) encourages Accountable Care Organizations (ACOs) to play a role in healthcare innovation.

“[ACOs] are groups of doctors, hospitals, and other health care providers, who come together voluntarily to give coordinated high-quality care to the Medicare patients they serve. Coordinated care helps ensure that patients, especially the chronically ill, get the right care at the right time, with the goal of avoiding unnecessary duplication of services and preventing medical errors. When an ACO succeeds in both delivering high-quality care and spending health care dollars more wisely, it will share in the savings it achieves for the Medicare program” (3).

Phillip Levy, MD, MPH, Professor of Emergency Medicine and Physiology, Associate Vice President for Translational Science, Wayne State University, and Director Mobile Health Unit Program, Wayne Health, has been engaged in this work in Detroit. Dr. Levy who was the keynote speaker at the conference was asked to provide input as he focuses on preventive care by identifying unengaged populations that can be targeted for mass screenings. “We have to stop pretending that our exam skills and what we do is the thing that actually is needed for prevention,” argues Levy. “From a prevention-oriented perspective nothing gets diagnosed with a stethoscope. What’s needed for prevention is blood pressure, lab work, and imaging. This was a key for us as we successfully requested that the insurers allow us to provide preventive care with doctors on site. Through a prevention lens, health care should be mass screening of as many people as possible. When these screenings identify a health issue, then the patient can then be referred to a provider or a physician.”

Levy said that the Wayne Mobile Health Unit Program has signed an agreement with Molina, a healthcare insurer, for this prevention work. “Molina pays us without a physician seeing the patient or even having to write a note. They pay because the agreement on the components is there. The insurers believed in the model and wanted to get the work done.” He did note that trust is critical in developing these agreements. In this case, he offered, the agreement was facilitated by a trusting relationship. “I’ve known the plan president for 20 years, so I wasn’t just some random provider coming in and suggesting something out of the ordinary. There was trust that was built up over years.”

Destiny-Simone Ramjohn also noted that, in Maryland, BlueCross BlueShield (CareFirst) has an innovation and investment arm called Healthworx. This venture capital and accelerator operation is constantly vetting and incubating startup companies to help infuse the healthcare ecosystem with innovative and intentional solutions working to address affordability, quality, equity, and accessibility. An audience member also raised the potential for using social impact bonds to facilitate healthcare innovations and financing mobile health.

Social Return on Investment: Population Health

Several panelists argued that an alternative to the financial ROI narrative to secure funding, is a strong narrative focused on population health. Malloy Mpare said, “During the COVID-19 pandemic, we made investments purely for public health and those investments saved lives. Despite their success, that approach did not fully stick. Now, we need to think of mobile health in terms of public health, as providing a public good, as improving outcomes and saving lives.” Destiny-Simone Ramjohn agreed, saying “What we must really try to do is go far upstream to understand the political, environmental, and social determinants of health and enact the policies that address them to directly impact the lives of individuals.”

Ramjohn noted that “Tech companies are really good at telling their story. We have a compelling narrative about the transformational nature of our services, but I’m not sure that those stories have made it outside of our own echo chamber. We need marketers in the room who can tell that story in ways that appeal to both the head and the heart.” Yolanda Ogbolu added, “We should also have community members in the room as well. When community members tell their stories they can be extremely powerful. We should have communication folks work with community members so that they can raise their voices to talk about how they've been transformed by mobile programs. That can go a long way in communicating the social impact story.”

Ogbolu described the Governor’s Wellmobile program operated by the University of Maryland School of Nursing. During its 30 years, the Wellmobile program has seen about 80,000 patients, and it is called a “program” because the health care is provided in the van most of the time, but also sometimes provided in a brick-and-mortar building or at a community event. It is one of the few mobile health programs (and perhaps the only) that is codified in state law and receives annual state funding. She said that this status “really helped us to sustain the program over the past 30 years, but not always with an appropriate amount of funding. There have been times when the funding has been level or cut, and we’ve had to supplement that with grant funding from HRSA.”

Ogbolu notes that a focus on public health has recently helped advocacy for increased appropriations for the Wellmobile. “The pandemic widened the lens on health disparities. So, it was an opportune time to go back to the Maryland General Assembly and say, based on your use of the Wellmobile and the way that we really expanded mobile health programs during the pandemic, you agree that mobile health programs have the potential to really reduce health disparities.” This line of argument succeeded. The state had been providing $285,000 a year, which was not enough to manage the program. Also, the Wellmobiles were old. The advocacy resulted in both increased operational funding as well as funding for new vans.

“Even though we’ve been fortunate with the new state funding,” said Ogbolu, “it’s not enough to fully sustain the program. Our mobile van is largely run by nurse practitioners. At least within the state of Maryland, nurse practitioners can practice to the full extent of their role, and they can also bill for services. So, we are using that reimbursement model to complement the state funding.”

Mallory Mpare described funding for the mobile health programs of the March of Dimes, a national organization focused on ending preventable preterm birth and preventable maternal death. The organization has mobile health units in Maryland, Arizona, Texas, New York, and Ohio, states with very different political, policy, and funding landscapes. “Compared to other states,” said Mpare, Maryland is further along on its journey of addressing or at least naming, social drivers of health and then

appropriately identifying potential policy solutions to address them. For example, under Medicaid expansion, Maryland is providing postpartum coverage for up to a year for pregnant people."

Mpare said that in Maryland, where she supports a mobile health program operated by University of Maryland Capital Region Health, "Our focus is on closing the health equity gap. We take a collaborative approach to funding in which we raise funding for the vehicle, which is a heavy upfront cost. Then we also serve as a fundraising partner to our clinical partners over the length of the partnership. We also fundraise mostly through grants to supplement or defray the cost of the mobile partner."

Mpare argues that, as with the Wellmobile, the March of Dimes and others can think more about insurance reimbursement as a source of revenue. "Right now, we tend to think of mobile health in terms of the population that we want to serve, that we are moved to serve. Many of us are mission-oriented in the work that we're doing, but there's an opportunity, for example, to broaden the scope of what mobile health can be. While we will continue to serve underserved populations, we could deploy mobile health as a convenience for folks, as telehealth was during the COVID pandemic. This broader service could lead to reimbursements for folks who do have insurance and that can offset that mission driven work that we're doing in communities. Also, Medicaid could be a driver of revenue for a clinical partner."

She notes, however, that the funding mix does vary by state, and, in some situations, mobile health has to operate as a charity. "We have one program, not in Maryland, but in a state in which 95 percent of the patients seen in the unit do not have access to state-based Medicaid because they are undocumented. Because of that, administrators have made a strategic decision to provide the unit as charity function of that institution, because the administrative burden of billing for only about 5% of the population that they see is too high. So, they are very strategic about seeking funding and telling the story of their program so they can sustain it over time."

The success of a mobile health program requires social as well as financial capital. Yolanda Ogbolu said. "Mobile health provides a direct benefit whose costs can be covered by the direct billing and revenue. However, community health workers are also essential to everybody's program. They require funding and we have an ethical obligation to ensure they improve their economic status and provide a career pathway. This serves these individuals, but also their families, communities, and the city."

Destiny-Simone Ramjohn described how trusted partners are also critical to the success of mobile health programs. "Prior to joining CareFirst, I spent five years with an integrative delivery system, supporting the implementation of a mobile health unit in West Baltimore, in partnership operationally with our clinical partners. Those partners were essential to our success. Some of you are familiar with Baltimore's history and enduring legacy of medical racism, and you may be even familiar with the term "night doctors." Stories dating back to the 1800s that so-called night doctors kidnapped Black children for medical experiments are vividly remembered in West Baltimore.

There is a deep distrust of the medical system among many African American residents, so residents were afraid to enter buildings and/or mobile health vans, because the perception was that people who went in didn't come out or get off. Because of outcomes like this, there is some deep-rooted mistrust that must be contended with, whether it is the four walls of a building or the four walls of a van. When we deployed the Mobile Health unit in West Baltimore, we set up outside of a barbershop. That first year we saw 97 individuals. Folks said that's a relatively low number for the amount of uncompensated care we were providing. Because of partnerships with strong organizations, though, like Bon Secours Community Works, Baltimore Healthy Start, which had community health workers, and the beauty

salons and barbershops that we were partnering with, we saw 400 people in the second year, 1,500 in the third year and by year five we serviced over 4,500 individual each season. There's something to be said about connecting those operating models to non-financial sources of currency like social capital and like trust that are a little bit harder to measure, but that do produce results. This contributes to your sustainability."

Footnotes

1. The Maryland All-Payer System 2024. https://www.cms.gov/priorities/innovation/innovation-models/maryland-all-payer-model
2. Offodile A el al. Association of Maryland Global Budget Revenue With Spending and Outcomes Related to Surgical Care for Medicare Beneficiaries With Cancer. JAMA Surg. 2022;157(6):e220135. https://jamanetwork.com/journals/jamasurgery/fullarticle/2790977
3. Accountable Care Organizations. Center for Medicare and Medicaid Services. https://www.cms.gov/priorities/innovation/innovation-models/aco. Accessed April 30, 2024.

Strategies to Improve Coordination, Communication and Integration with Healthcare Systems

This section is a summary from an interactive participant breakout session during the conference, which was facilitated by Wendy O'Donnell, Director of Strategic Projects & Communications, University of Maryland School of Medicine. The facilitated round table discussions involved 8-10 participants and were designed to elicit ideas, input, and solutions which were then shared out to the larger group. The purpose of the session was to identify strategies to improve coordination, communication, and integration of mobile health services into the healthcare system to improve patient access and continuity of care.

The following questions were posed in the round table discussions:

Topic 1: Mobile Health Landscape

1. What are the service gaps—geographic, demographic, medical specialty—that an integrated mobile health service could and should address?
2. What are the obstacles and challenges to providing consistent mobile health?
3. What are the opportunities for addressing these challenges?

Topic 2: Coordination and Communication

1. How can we maximize the best use of resources?
   Prompt: Share vans, limit van downtime, partner on grants, avoid duplication.
2. How can we coordinate mobile health efforts?
   Prompt: Central coordinating entity, technology, data, state's health information exchange (CRISP), clinical referrals.
3. How do we assure open, consistent communication?
4. What are challenges and opportunities of coordinating resources?
5. How do we collaborate/communication with the community?

Topic 3: Funding and Sustainability

1. What are the options for sustainable funding for an integrated mobile health effort?
2. How do we fund medical professionals, staff, systems, space, and other key organizational components?
3. How does this work within Maryland's all-payor model?
4. Who is not participating in this work who should?
5. What kind of pilot program could demonstrate cost effectiveness?

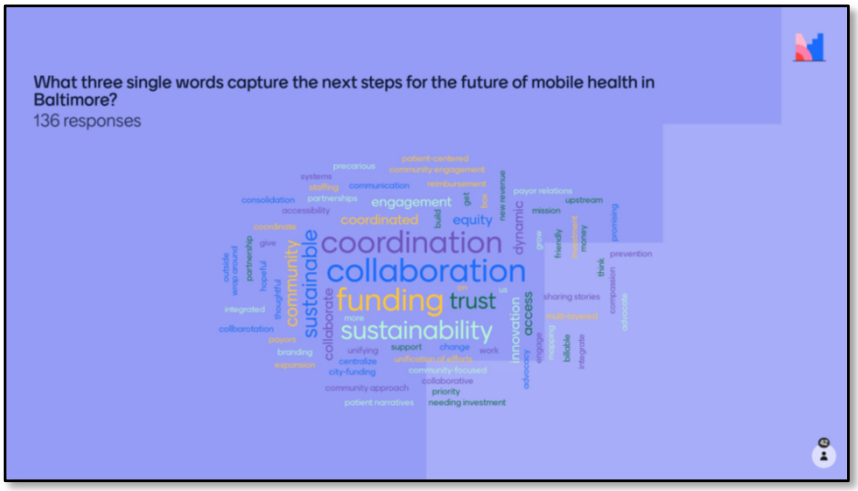

Figure 10: Word Cloud of Thoughts and Ideas for the Future of Mobile Health in Baltimore

Table 2: Summary of Table Discussions for Strategies to Improve Coordination, Communication and Sustainability of Mobile Health Services	
Mobile Health Landscape/ Service Gaps	
- Need to identify the population being served or needs services, no good data currently - Everyone should have access to the same standard of medical care - Mobile health is a stop gap – shows the need for more permanent services. - Finding people who do not access care in other settings – maybe this is the long-term solution for certain populations - MH services people in locations where they are living or working - Translate lessons learned via mobile health care to the broader health system - Need to create flexibility – not one size fits all. - Make a better mobile health care network by reinvesting - Address access issues by being flexible to patient need and location - Consider wider breadth of locations for services churches, schools, street, shelters, encampments, places of employment	- Advertise in media appropriate to the audience aiming to service with mobile health. - Just-in-time capability, off-hours availability - Linkage to eligible benefits and ability to fill in gaps financially - Incorporate social system navigators and health coaching services - Expand in in-home capability to facilitate telemedicine for specialty/PCP services. - Increase access and incorporate pharmacy services into Mobile health care - Offer dental, eye care, behavioral health services - Opportunities to address fall prevention older adults, chronic disease- asthma, hypertension and diabetes, heart failure, opioid use disorder - Opportunity for urgent care and follow-up services - Better identify and service the healthcare deserts and encampments
Coordination and Communication	
- Need a coordinated effort, rather than each entity operating similar overlapping services - Baltimore City Health Department or other entity should be charged with consolidating information about availability of services - Mobile health units should have the ability to make referrals, especially to specialty care - Utilization of CRISP for referrals, input and output of information, communication - Need to have more participation from the community, building of community capacity and organized - Maximize resources: Pool resources, data sharing, common data elements, align strategies across organization, outreach and education about ongoing efforts - Staff members need to be flexible. Flexible institutions and relationship with the institutions	- Closed loop referrals for social determinants of health - Build bus barn hub for centralized maintenance - Establish coordinating centers, consider partnering with 211, United Way, & GIS data - Need greater transparency - Abandon the ROI model and focus on public good as the concept to defend - Share vans and share staffing - Healthcare systems and teams to stop working in silos and come together around a shared priority for delivering mobile health care - Mobilize around specific services such as opioid use disorder, primary care, asthma, social determinants of health - Widen the net of service to not only focus on underserved but to provide access to anyone - Greater collaboration among the healthcare systems

Funding and Sustainability	
- Health systems need to fund the community to do the work - Could move to bundled payments. - Need payor/health system agnostic funding/collaborative community health - Should be separated from the idea of business and venture capital - Need upfront investors, such as philanthropy for start up - Multilayer-ROI, public good cost savings - Engage HSCRC - Change the city narrative to city health strategy - One approach- take inventory of all mobile units, all target areas, and then disperse to areas most need of service with one funding mechanism - Fee-for-service billing for “preventative visit” - Fund telemedicine	- In-rates funding from hospitals (pool resources) - City government fundings, shared with pooled hospital resources - Include in the state government budget - Primary patient care and prevention – have the infrastructure to do it - Coordination of mobile health care services at the city level to reduce cost - Critical to understand who is in the mobile health care space and linking programs - Mobile health clinic vs programs - Inclusion Health-Street Medicine should be included in the mobile health care model - Operations cell-City needs this coordination capability: legislative funding - Decrease administrative burden; Maryland all-payor model to create new codes for Mobile health care services
Data and Technology	
- EHR/CRISP linkage with hospitals/ outpatient clinics for care coordination and outcome measurement	- Explore every potential for artificial intelligence
Community Engagement	
- Medication/outreach about the importance of data sharing. - In-person & outreach is very important in-home - Link with community health workers	- Sensitivity training for health professionals - Focus on addressing trust and past trauma - Engage younger age group - Keep some roles consistent (e.g. drivers) - Engage college campuses

Table 3: Questions Generated for Further Consideration in Research, Policy and Practice Decisions	
Target Population & Community	
- Appears that mobile health outreach from the different health systems may be caring for the same, small population of patients, and thus a concern for over utilization of services by the same population, how do we identify and track patients across the multiple mobile platforms to ensure that all the populations that needs services can get them?	- Should mobile health care be positioned by population demographic, geography, diagnoses/conditions or other? - What strengths do community members bring to make mobile health care optimal? - What are the best practices for incorporating trusted community messengers into mobile health care work with the community?
Care Provided & Integration with Healthcare System	
- Should primary care by mobile health care replace placed-based primary care? How should we redirect patients when appropriate back to existing primary care practices? - How do you connect patients that use the mobile units to actual primary care and specialty services at the institutions? - For those uninsured patients, such as immigrants, who are only receiving medical care via a mobile health unit and need to see a specialist, how do they get referred or connected into specialty care? - What are the opportunities for community-based cancer screening using mobile units? Screening on mobile units vs connecting patients to an office or clinic? - For patients with heart failure, is there capacity to diuresis a patient on the mobile unit or do they have to go to the emergency department or to another site?	- What is the typical duration of care relationship for patients served by mobile clinics? And what should it be? - Has dental/oral health come up in any community health needs assessments? And if so, are there any partnership/ linkages with dentists or dental services using mobile units? - How should pharmacy be integrated into mobile health care? - Cost and affordability of medications was the #1 need identified in community needs assessment in s program. What resources are there to assist uninsured or underinsured patient with covering medication costs? - What role can pharmacist planyon the mobile health care team? To what extent is the role of nurse practitioners in patient medication management on the mobile health units?
Data Access, Storage & Management	
- What platforms do mobile health care (e.g., mobile units, telehealth) use to access and store patient data? - How are they integrated into other data systems within the hospital electronic health records? And if they are not, should they be and how would this work?	- How are patient/client data stored on the mobile units? - Do mobile clinics leverage their partner hospital EMRs to store or access patient data? - What opportunities are there to integrate mobile health patient data with CRISP?

Financial Models	
- How do we engage the payors and the MCOs in this effort to fund and sustain mobile health care in the city? - What are the various ways of billing for mobile services? - What are the considerations for caring for patients without insurance coverage, (e.g., sliding scale, charity care)?	- What are the barriers to billing? - What proportion of mobile health care services collected from billing Medicare/ Medicaid patients comes back into the program? - What percentage of Mobile health expenses are covered by billing?
Mobile Health Units Operations Logistics	
- Are there opportunities to share mobile health care units across city as opposed to everyone buying their own, especially if they are not always delivering services during the week? - Does each mobile unit need a fixed-site partner? - How are mobile health care staff hired? Are they hired through a hospital system?	- Do mobile health care staff have access to all the data systems (e.g., EMR, CRISP etc.) offered to in-hospital staff? - Parking and logistics for mobile units can be complex. What should be considered for maintenance, parking and other logistical aspects (e.g., disposal of hazardous waste and sharps) to owning and deploying mobile units?

Consensus Recommendations

The participants at the conference and those that had mobile health programs were united in seeing a greater coordination, collaboration and integration of mobile health care to expand access to care for underserved populations in Baltimore city. All of the input and ideas of participants, panel experts and speakers captured from the conference and post survey, led to the following specific recommendations that will provide a road map to enhancing and sustaining mobile health care in Baltimore.

Recommendation 1 | Board of Representatives

Establish a board of representatives from each healthcare system along with community partners to provide oversight for a city-wide mobile health effort that will include a central operational unit to coordinate services.

1. The City of Baltimore will establish a Mobile Health Care Board for Baltimore that will guide joint mobile health care efforts and coordinate data sharing and sustainable funding. The board will:
   - Include representatives from all participating healthcare systems and collaborating community, government, nonprofit, business and academic partners.
   - Include voices from the community for the planning and strategic operation of mobile health care.
   - Collaborate to establish central strategic health priorities for the mobile health care effort (e.g. hypertension screening, diabetes screening etc.) based on community health assessments undertaken by the city's healthcare systems and Health Department.
   - Work with medical systems, city agencies, state legislature, Medicaid Care Organizations and other payors to support this effort with sustained funding.

2. The Mobile Health Care Board will establish, identify and collaborate on a central, coordinating operations center for mobile health care. The operations center will:
   - Identify best place or agency for alignment and ideal infrastructure for sustainability.
   - Serve as the central coordination and collaboration body for city-wide mobile health care.
   - Consider all potential sites for care delivery (e.g., schools, faith-based communities, community centers, street-medicine etc.)

3. The Mobile Health Care Board will determine working vocabulary and definitions for mobile health or mobile health care based on national standards. (The term 'mobile health care' is likely preferable for mobile and placed-based care delivery platforms and strategies.)

Recommendation 2 | Healthcare Systems

Integrate mobile health care into the city's healthcare systems and community to improve coverage, targeting, coordination, and referral for patients who need longer, more complex care.

1. The city's healthcare systems will develop improved community health assessments. These assessments will:
   1. Better incorporate individual and population data on social determinants of health into data systems and use to improve community health assessments.
   2. Better understand the 'missing people' who never or rarely interact with the healthcare system.

2. The Mobile Health Care Board and operations center should:
   - Use these improved community health assessments to better coordinate and target mobile health units to determine target populations for mobile units based on demographics, geography, community needs, health conditions, etc.
   - Specifically target mobile health care to geographic regions where residents do not regularly engage with the healthcare system (e.g. unhoused encampments, undocumented residents etc.).
   - Focus mobile health care on underserved populations and provide a range of services for acute and chronic medical conditions (including primary care and preventive services), behavioral health and addiction medicine. Specialty care, dental, pharmacy and other services will be carefully coordinated by the operations center.

3. Mobile health care units should:
   - Improve training for staff who screen for health-related social needs and refer clients for support.
   - Assess and address social drivers of health and establish a closed loop system for assistance with referrals for health-related social needs.
   - Provide basic dental care and closed loop dental referrals.

4. Future mobile health care iterations will include options for cancer screening such as mobile mammography and lung cancer screening (e.g. currently developing partnerships with radiographic industry).

5. Health systems, nonprofit organizations and mobile health programs will establish pharmacist and community health worker (CHW) partnerships for ideal medication management within the community along the lines of the Detroit/Wayne State model. These partnerships will:
   - Deliver preventive care in the most efficient and cost-effective means. (Preventive services do not require a provider encounter.)
   - Offer a 'warm handoff' between mobile health care and fixed-facility staff and systems; this is an essential part of the model.

6. The Mobile Health Care Board in collaboration with healthcare systems, nonprofit organizations and payors will identify resources to help patients pay for medications (e.g. uninsured co-pays, deductibles).

Recommendation 3 | Long-term Sustainability
Develop plans for long-term sustainability that includes payors, City and State governments.

1. The Mobile Health Care Board will facilitate further stakeholder discussion about long-term financial sustainability of mobile health care programs. Consider billing, institutional funding, philanthropy, government grants, government appropriations, and other revenue sources.

2. The Mobile Health Care Board will work with State agencies, e.g. Maryland Health Services Cost Review Commission (HSCRC) and others as well as payors to determine new compensation models for mobile health including Current Procedural Technology (CPT) codes for preventive services, similar to those developed in Michigan by Detroit/Wayne State.

Recommendation 4 | Data Systems
Establish a means to link data systems to allow transfer of patient information and secure communication between the units providing care and within healthcare systems.

1. In collaboration with healthcare systems and the State Health Information Exchange (CRISP), the Mobile Health Care Board will:
   - Facilitate means to promote electronic medical records interoperability and explore the feasibility of additional technology to secure support communication and referrals across different mobile health care platforms as well as the continuum of the healthcare system.
   - Develop a central database that includes best and last contact information for frequently identified patients (e.g., CRISP and/or payors with databases may provide possible options) for secure patient communication and messaging.
   - Ensure technology solutions allow operability between all potential sites for care delivery, e.g. schools, faith-based communities, community centers, street-medicine, etc.
   - Capitalize on opportunities to establish telemedicine connectivity and referral capability based on community needs, service delivery model, and unit capabilities.

Recommendation 5 | Community Inclusion
Integrate community health workers and community advocates into all mobile health care efforts.

1. The Mobile Health Care Board will include voices from the community for the planning and strategic operation of mobile health care in the city.

2. The Mobile Health Care Board and health systems deploying mobile health care units will consider best practices for incorporating trusted community-based messengers to work with the community.

3. Operators of mobile health units should support the incorporation and career advancement of community health professionals (e.g., CHWs, doulas, health educators) into mobile health care delivery, including establishing certifications and career pathways for these professionals in the conventional healthcare system. These trusted resources in the community are essential in connecting people to the medical system for care.

4. As care for the caregivers is an essential component in caring for these underserved populations, mobile health care providers will draw on social, spiritual, and psychological professionals as partners in the work.

Mobile Health in Baltimore.
Building a Strategy for Coordinated and Sustainable Services
Consensus Conference 2024

Conference Agenda

March 19th, 2024
8:00 am – 4:30 pm ET
SMC Campus Center, UMB campus, 621 W. Lombard St., Baltimore, MD 21201

Conference Themes:

1. Provide an overview of the health needs of Baltimore City, who is not being reached by current medical services.
2. Provide a historical perspective and current examples of the breadth of mobile health services in Baltimore.
3. Examine how mobile health units use technology and data systems to address health system gaps and improve access.
4. Examine the financial profiles of mobile health units to determine sustainability, cost effectiveness, and impact on total cost of care.
5. Identify strategies to improve coordination, communication and integration of mobile health services into the health care system to improve patient access and continuity of care.

Time	Welcome and Meeting Context
7:30-8:00 am	Breakfast and registration Touring of mobile units parked on Greene St
8:00-8:15 am	**Welcome: Esa Davis, MD, MPH** *Associate Vice President for Community Health, University of Maryland, Baltimore* **Opening Remarks:** **Bruce Jarrell, MD** *President, University of Maryland Baltimore* **Phylicia Porter, MPH** *Baltimore Councilwoman, District 10*
	Session 1: Overview of City Health Needs: Who is and is not Being Reached by Health Care?
8:15-8:45 am	**Speaker: Tamara Green, MD, MPH** *Chief Medical Officer, Baltimore City Health Department* **Title**: ***Navigating Health Needs in Baltimore City***

	Session 2: Mobile Health in Baltimore: Past & Present
8:45-9:45 am	**Moderator: Charles Callahan, DO** *Clinical Professor of Pediatrics, University of Maryland School of Medicine* **Speakers:** 1. **Bobby Harris, MSN, MPH** – The Baltimore City Spot Van (BCHD & JHM) 2. **Andrea Gasper, MD** – MedStar Mobile Health Center 3. **Dawn O'Neill, MPH** – Ascension St. Agnes Mobile Health Program 4. **Jasmine Pope, BS** – University of Maryland Children's Hospital TEAMS Initiative 5. **Darien Nolin, MBA** – Federally Qualified Health Center Approach to Mobile Health
9:45-10:15 am	**Panel Discussion with Past & Present Panelists** **Moderator: Charles Callahan, DO** *Clinical Professor of Pediatrics, University of Maryland School of Medicine* **Panelists:** 1. **Amanda Rosecrans, MD, MHS**, *Infectious Disease Specialist*, *Johns Hopkins Hospital* 2. **Andrea Gasper, MD**, *Medical Director MedStar Mobile Health Center* 3. **Dawn O'Neill, MPH,** *Vice President Population Healt*h, *Ascension St. Agnes Hospital* 4. **Jasmine Pope, BS,** *Director, Programs & Strategic Partnerships*, *UM Pediatrics* 5. **Darien Nolin, MBA**, *Vice President Internal & External Affairs, Total Health Care*
10:15-10:30 am	**Break**
10:30-11:30 am	**Keynote Speaker: Phillip Levy, MD, MPH** *Professor of Emergency Medicine and Physiology and Associate Vice President for Translational Science, Wayne State University* *Director, Mobile Health Unit Program, Wayne Health* **Title: *A Vision for Sustainable Mobile health care Delivery***
	Session 3: Mobile Health Use of Data Systems & Technology Panel
11:30-12:30 am	**Moderator: Joel Klein, MD** *Chief Information Officer & Senior Vice President, University of Maryland Medical System* **Panelists:** 1. **Megan Priolo, DrPH, MHS**, *Executive Director CRISP* 2. **Warren D'Souza, PhD, MBA,** *Vice President Enterprise Data & Analytics*, *UMMS* 3. **Phillip Levy**, **MD, MPH,** *Director Mobile Health Unit Program*, *Wayne Health* 4. **Kathleen Page, MD**, *Associate Professor Medicine, Johns Hopkins Hospital* 5. **Lisa LaCarrubba, MD,** *Medical Director for CloseKnit Health*
12:30-1:30	**Lunch:** Tour Mobile Health vehicles, posters and network

	Session 4: Mobile Health Funding and Sustainability Panel
1:30-2:30 pm	**Moderator**: **David Marcozzi, MD, MHS-CL** *Chief Clinical Officer and Senior Vice President, University of Maryland Medical Center* **Panelists:** **Mallory Mpare, MPH,** *Director Maternal & Infant Health Initiatives, March of Dimes* **Nicki McCann, JD,** *Vice President Provider/Payor Transformation, Johns Hopkins Health System* **Destiny-Simone Ramjohn, PhD,** *Vice President Community Health & Social Impact, CareFirst BlueCross BlueShield* **Yolanda Ogbolu, PhD, NNP,** *Bill and Joanne Conway Dean, UMB School of Nursing*
2:30-2:45 pm	**Break:** Posters and Exhibits
	Session 5: Identify Strategies to Improve Coordination, Communication and Sustainability of Mobile Health Services
2:45-3:30 pm	**Facilitator: Wendy O' Donnell, MS** *Director of Strategic Projects & Communications, University of Maryland School of Medicine* **Interactive table discussions to capture ideas/input on the following topics:** - Mobile Health Landscape - Coordination and Communication - Funding and Sustainability
3:30-4:15 pm	**Closing Remarks:** **Mark Gladwin, MD** *Dean, University of Maryland School of Medicine* *Vice President for Medical Affairs, University of Maryland, Baltimore* *John Z. and Akiko K. Bowers Distinguished Professor and Dean* **Ihuoma Emenuga, MD, MPH, MBA** *Baltimore City Health Commissioner* **Esa Davis, MD, MPH** *Associate Vice President for Community Health, University of Maryland Baltimore*
4:15 -4:30 pm **4:30 pm**	**Networking** **Meeting Adjourns**

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Tiffany Wiggins, University of Maryland Medical System
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Wendy Zhang, Medstar Health
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