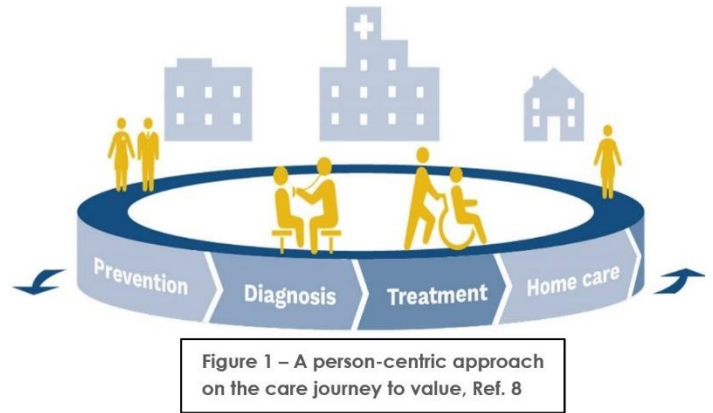


Crisis as a Catalyst for Innovation

INTRODUCTION

Putting All Patients at the Center of Care

This paper focuses on innovation opportunities fueled by the COVID-19 crisis that help catalyze better outcomes and continuity of care with unprecedented demand for patient-centered Hospital-at-Home (HaH) models (pioneered & **trademarked** by Johns Hopkins Medicine).



HaH models aren't new; what is new is a trend toward delivering the most genuine Person-Centered Care that truly brings the entire care team to the patient/family center. HaH is also referred to as Virtual Home Hospital (VHH), Home Hospital Care (HHC) or Acute Hospital Care at Home by the Centers for Medicare & Medicaid Services (CMS) **Hospitals Without Walls** program. Although still in a transitional phase, **Acute Hospital Care at Home Programs** have



Figure 2 – Innovation born out of necessity in a multi-faceted health care ecosystem

been gaining traction with **episode-based payment models**. In a \$4 trillion health-care market, in-home hospitalizations **save \$5,000-\$7,000 per episode**. Interactive patient care solutions are rapidly evolving to serve new constituents, such as family members and caregivers, across the entire care continuum — before, during and after care.

Consumer demand, unique market needs, and urgency to change during the pandemic challenged us all – public and private sector alike – to re-think the status quo and reimagine a more equitable and affordable healthcare ecosystem. We shine a light on evolving virtual and acute-care solutions that enable decentralized healthcare delivery in the home, when and where it is needed.

HaH models combine human and technology resources in hybrid on-site settings and remote locations to coordinate care services 24/7 for non-ICU hospital patients (e.g., home infusion therapy, palliative services, chronic condition management that otherwise would have been provided in the in-patient setting). This model has been used in **international** health systems since the 1970's (**UK**, Canada, Italy, France, Brazil, Australia, and New Zealand). It has been slower to catch on in the **US**. Many signs now point to the future of healthcare shifting to value-based programs that combine virtual and in-person care to improve population health outcomes at lower cost. Estimates say **U.S. healthcare spending could shift up to \$250 billion** toward virtual care over the coming years.

The **HIMSS Innovation Committee** interviewed multi-disciplinary experts on a myriad of operational, financial, and clinical issues facing at-home healthcare innovation. This thought leadership summary distills forward-thinking perspectives on regulatory, social, and cultural transformation required by payers, providers, and patients. Common themes look at the *economic benefits and human impact of hospital at home programs; the true test of their value are the outcomes and experiences they generate for patients.*

How the Pandemic Accelerated Virtual and In-Home Healthcare



Figure 3 –At-home care opens doors to health equity

HaH innovation during the COVID-19 crisis opened doors to both patients and physicians with a more flexible, affordable, engaging care experience that allows clinicians to monitor and stay in touch with patients remotely during their acute and recovery phases, enabling better assessments of a person's overall physical, mental, and social needs.

The pandemic accelerated change through multiple healthcare channels, globally. It created a clear rationale for avoiding hospitals when possible and prompted Medicare to allow providers to bill for treatments delivered at a patient's home, in hotels, or other post-acute settings and non-hospital long-term care facilities (skilled nursing facilities, SNF-at-home). COVID-19 created regulatory pressure and accelerated the market to **reduce administrative documentation burden**, virtual E-Consults, real-time Remote Patient Monitoring (RPM) and lowered reimbursement barriers with consistent care plans for chronic disease management. These criteria are all vital requirements for effective HaH programs.

Gartner predicts "**By 2025, 40% of healthcare providers will shift 20% of hospital beds to the patient's home through digitally enabled hospital-at-home services, improving patient experience and outcomes and reducing the cost of care**". On average, **HAH total cost reductions** have been shown to be **between 19% and 30% lower** than traditional **inpatient care**. Compelling evidence has existed for a while about the significant **clinical benefits** of providing **acute care hospital services** from the patient's home. Medicare historically has not paid for acute care services delivered outside hospitals. Without the FFS payments or waivers, hospitals have little financial incentive to invest in this high-value treatment alternative. However, given the success of hospital-at-home delivery models, it's difficult to foresee a return to pre-COVID treatment norms.

As of Oct. 2021, there are **82 health systems and 186 hospitals in 33 (USA) states** approved for **Medicare's Acute Care at Home** program. Under the current USA Public Health Emergency (PHE) waiver, CMS is reimbursing at full hospital in-patient DRG rates, where

“ If you would have asked me in November [2020], what's the number of hospitals that would go after Hospital-at-Home waivers [USA CMS], I think folks would have said maybe 40 on a good day and we're up to over 186! And more are applying.

- Bruce Leff, M.D. the geriatrician and researcher who developed initial Hospital-at-Home study and medical eligibility criteria at Johns Hopkins ”

patients that land in the ER and meet eligibility criteria for admission and conditions of participation are approved for HaH programs. The big question is what happens when the PHE waiver ends?

As the PHE waiver expires, the new **CMS final rule** accelerates nationwide expansion of **Home Health Value-Based Purchasing Model (HHVBP)** and makes **policy updates** to the Medicare payment rates for Calendar Year 2022. See **CMS Innovation Center 2021 Strategy Refresh – Putting All Patients at the Center of Care** (lessons from CMMI first decade and 50+ models).

There's no place like home

More and more, home is also where better healthcare is given. The familiar setting at-home is where people (patients) want to be. An important advantage of treating patients in their own environment is that it provides a window into their daily lives and the factors impacting their health.

As staffing shortages and demand for real-time services increases, HaH patients have rising expectations —around the level and quality of care they receive in their home, about the caliber of the staff they welcome into their living spaces, and around the user experience at-home —and critically, between—visits. Additionally, what HaH gains in convenience and comfort, it can potentially lose in patient or medical staff safety— particularly if patients aren't active participants in their own care. For all of these reasons, healthcare systems **are pulling together** around the patient experience by competing on a **new playing field**, where HaH programs have potential to reduce health disparities and risk.



Figure 4 – Hospital /Acute care at home hybrid models require clinical coordination, virtual health expertise, digital upskilling

Decentralized at-home care delivery



Figure 5 – Coordination is vital across the care continuum. Who looks at what across the patient journey, often comprised of multi-disciplinary clinical teams, delivery channels, and geographies

CMS Care At-Home Testimonials

show broad adoption of value-based models that take a whole-person, longitudinal view of the patient and place greater responsibility on providers for keeping patients out of the hospital, while allowing them

to share in the financial and economic benefits potentially well beyond the pandemic.

More providers may be incentivized to adopt at-home programs given **CMS's new strategy for accountable quality improvement programs**, rigorous assurance auditing, and accreditation. Reinforcing inclusion criteria may address other concerns about backfill issues. Beds freed by treating patients at home will be filled with patients needing more complex and intensive services.

Incentives to look at the full continuum of care experience

Misaligned incentives and interests between payers and providers present significant collaboration challenges needed for HaH value-based care success. Consumers are often confused about their responsibility for payment due to conflicting information and inaccurate estimates about their out-of-pocket costs that result from complex and disconnected administrative activities across providers and payers.

The admission eligibility criteria and protocols that physicians and other caregivers use to ensure care is standardized and safe include approximately **100 diagnostic-related groups (DRGs)**, paid as in-patient services. Hospital at home programs have proven effective in reducing complications while **cutting the cost of care by 30%** or more for ambulatory treatments, such as infusions, bloodwork, and monitoring (tests, X-rays. This is typically for patient populations that are frail, immunocompromised, or otherwise vulnerable to hospital acquired infections. Payment is a significant barrier in HaH programs.

The COVID-19 crisis amplified the multi-faceted inadequacies of health systems to limit acute care to the number of beds available in bricks-and-mortar (ED, OR) settings. While hospital-at-home care is not appropriate for everyone, it shows promise for patients that have conditions with well-defined treatment protocols, such as pneumonia, congestive heart failure, chronic obstructive pulmonary disease (COPD), diabetes or cellulitis.

HaH hybrid value-based models often fuel consumers' confusion over appropriate care management responsibilities, duplicative actions, who is managing which long- or short-term care functions, safety, **staffing** (RN positions in the hospital), insurance coverage, medical and payment policies, medical suppliers and partner relationships that constantly evolve. What are key challenges from a patient (consumer), care provider, and payer perspective?

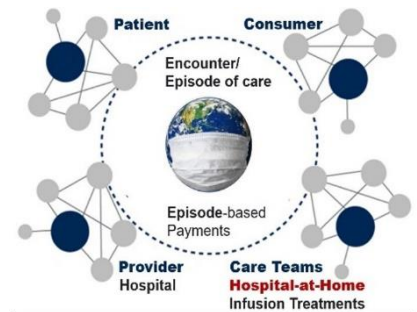


Figure 6– Patient-centered value-based care across a multifaceted, evolving health space

- Consumers worry that healthcare bills will not be affordable, and that next steps (such as scheduling a diagnostic test or obtaining a referral for specialty care) occur seamlessly — regardless of whether a payer or provider organizes that next step. In the U.S., new healthcare consumer price transparency regulations and the No Surprises Act aim to address treatment cost confusion.
- Providers may see a payer's value-based contract proposal as a way to limit initial revenue, as opposed to establishing long-term financial incentives to improve clinical quality and reduce the total cost of care.
- Payers suspect some providers will use the administrative provisions in value-based payment arrangements (such as delegation of prior authorization approvals to the provider) as a way to loosen cost and payment integrity controls throughout their contracted provider networks.

“ In addition to developing clinical and operational plans and financial models. Hospital-at-Home requires significant work understanding regulations, reimbursement and member benefits with the health plans. There is not a benefit category for this hybrid space and the member responsibility for inpatient benefits varies significantly from member responsibility for outpatient benefits.

- Christine Lipson, Director of Home Services at Castell, the population health division of Intermountain Healthcare

Future of Home Health, Achieving Equity, Value Outcomes

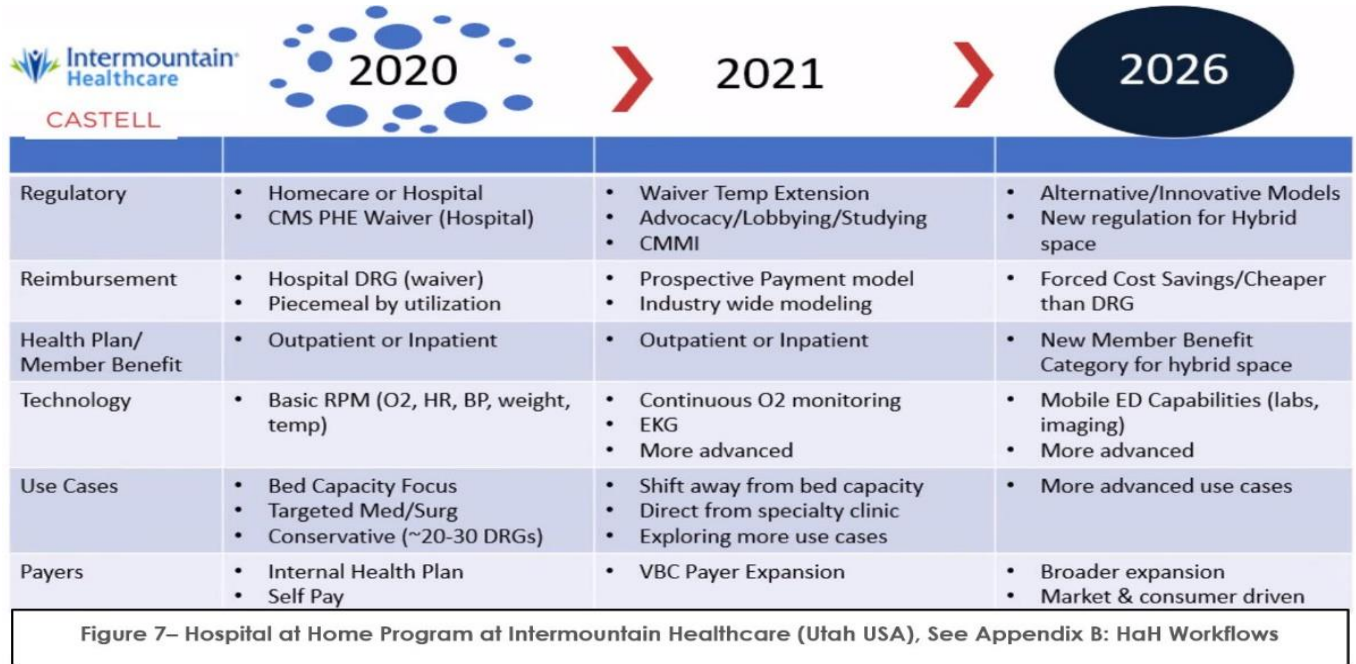
Home-based care has a bright future with many factors in its favor: accountable services delivered more safely and affordably; a fuller view of the patient's health from being treated where they live; advancements in policy, tech tools, and automated processes that free up hospital resources to allow for an increasingly wide spectrum of care in the home.

Most importantly, home-based care provides opportunity for an improved patient experience—and thus, better health outcomes.

“ Equity is super important to us [Intermountain Healthcare], we are seeing tremendous population growth, and moving care into the home as part of the future and I don't see it going away ... [HaH] is just too popular, it saves money, and it's really high-quality care if done right.

- Nathan Starr, DO, Medical Director of Home Services at Castell and Intermountain Healthcare Tele-Hospitalist

The cumulative impact of the COVID-19 crisis helped unpack complex interactions aimed at getting to the right diagnosis and treatment at the right time.



Reported Outcomes:

- Mt. Sinai Health
 - Launched its program in 2014 after receiving a 3-year, \$9.6M grant from the CMS Innovation Center. In their trial, they found that patients included in the HaH program had an 8.6% 30-day readmission rate, compared to 16.1% of similar patients. Moreover, patients also had fewer ED visits and reported an overall better experience.
- Hospital- Level Care at Home for Acutely Ill Adults: A Randomized Controlled Trial
 - The adjusted mean cost of the acute care episode was 38% (95% CI, 24% to 49%) lower for home patients than control patients. Compared with usual care patients, home patients had fewer laboratory orders (median per admission, 3 vs. 15), imaging studies (median, 14% vs. 44%), and consultations (median, 2% vs. 31%). Home patients spent a smaller proportion of the day sedentary (median, 12% vs. 23%) or lying down (median, 18% vs. 55%) and were readmitted less frequently within 30 days (7% vs. 23%).
- Association of a Bundled Hospital-at-Home and 30-Day Postacute Transitional Care Program with Clinical Outcomes and Patient Experiences
 - HaH patients had a shorter length of stay 3.2 days vs 5.5 days; lower rates of readmissions 8.6% vs 15.6%; less ED revisits 5.8% vs 11.7%; and SNF admissions 1.7%

vs 10.4%; and were also more likely to rate their hospital care highly 68.8% vs 45.3%.

The pandemic accelerated HaH innovation and brought together operational and clinical workflows, enabling healthcare providers to holistically evaluate intersections between these previously disparate processes in a more coordinated fashion.

Our interviews found that HaH models show promising outcomes and quality of life. However, HaH is not without its issues. Issues like interoperability and digital health literacy to unlock value will likely define the future of HaH.

As we move into a recovery period, it is critical to build upon the progress made during the pandemic crisis with continued focus on:

- People and their values to advance health access & equity.
- Solutions that reduce costs, readmissions and mortality.
- Lower costs and improved decision making from diagnosis to therapy in value-based care delivery through interoperable frameworks, real-time digital capability, coordinated care tools, education (upskilling). Advanced Technology services and digital device solutions in support of HaH programs, might include **Smart Hospital** services, **virtual ICU (eICU)**, RPM tool kits, and command center functions that come to the patient. Smart hospital revenue growth is expected to be approximately **US\$ 77.8 billion by 2026.**

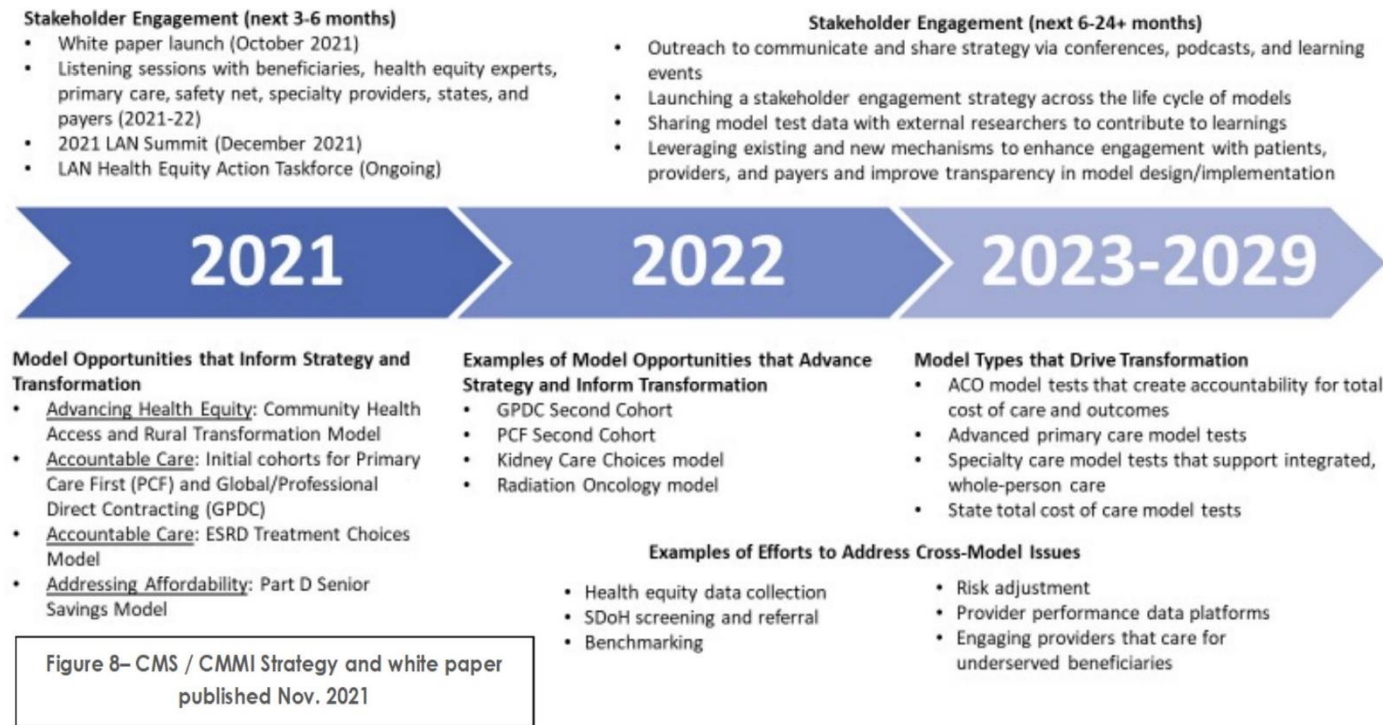


Accelerating Payment and Social Reform

In the US, it has been hard to imagine how our complex medical system will change to accommodate such a fundamental shift from fee-for-service (FFS) to value-based healthcare delivery. CMS is expanding the **Home Health Value Based Purchasing Model (HHVBP)** nationwide. The HHVBP Model is one of four Innovation Center models that have met the requirements to be expanded in duration and scope since 2010. The first performance year of the expanded HHVBP Model will be CY 2023, with quality performance data from that year used to calculate payment adjustments under the expanded Model in CY 2025.

- The federal agency responsible for developing new healthcare **payment models** wants every **fee-for-service** Medicare beneficiary to be getting care from a provider who is part of an **accountable care organization** by 2030. HaH models are a key part of the drive to value.

CMS Innovation Center Strategy – Moving to Implementation.



- That goal is presented in a recent **white paper** from the Center for Medicare and Medicaid Innovation (CMMI), “Driving Health System Transformation—A Strategy for the CMS Innovation Center’s Second Decade. **“This goal would not only aim to have all beneficiaries in value-based-care arrangements, but for them to be in care arrangements where their needs are holistically assessed and their care is coordinated within a broader total cost of care system”** the paper states.

See CMMI’s **strategic plan** (Nov. 2021, Figure 4.) that focuses on **five strategic objectives** to guide its healthcare payment and delivery models and priorities over the next decade: **drive accountable care**, advance health equity, support innovation, address affordability, and partner to achieve system transformation.

Appendix A: List of Contributors

Healthcare Information and Management Systems Society (HIMSS)

HIMSS Innovation Committee thanks the many collaborators on this paper: Subject Matter Experts (SMEs) interviewees, KOL reviewers, thought leaders who contributed lessons learned on the care journey to value and everyone influencing a person-centric approach to live healthy lives and transforming health for humanity.

HIMSS Innovation Committee Members

<https://www.himss.org/membership-participation/himss-innovation-committee>

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- Kimberley Garriott, Chief Innovation Officer, Healthcare NetApp
- Dinesh Divakaran, MBA, PhD, Director, Digital Innovations at Office of Licensing & Ventures, Duke University and Duke Health

HIMSS Innovation Committee Presentations

Crisis as a Catalyst for Innovation Presentation, Kathleen McGrow, Sri Baharadwaj

The global healthcare crisis is bolstering digital innovation and new ways of working. The HIMSS Innovation Committee will explore meaningful outcomes by shining a light on virtual care delivery, clinical decision-making processes, and resilient workflows: **HIMSS21 Innovation Live - [H21 Education Link](#)**

Innovation Committee Presentation – Maternal Health White Paper, Michael Liebman

Optimal maternal and infant health remain global challenges. The opportunity for innovative approaches, consisting of both technology and novel concepts, requires identifying the critical issues that confront patients and healthcare systems: **Global Health Equity Week - [Maternal Health Link](#)**

Encouraging Lifelong Learning in a Chaotic Environment – Marianna Imenokhoeva

Health education, life-long learning and digital literacy are vital to transformation: **[HIMSS Education](#), [MobileHealth News](#) - Connecting digitization and value-based healthcare**

Appendix A: Subject Matter Experts Interviewed



- **Elizabeth Fowler**, Ph.D., J.D., Deputy Administrator and Director of the Center for Medicare and Medicaid Innovation (CMS Innovation Center)

Johns Hopkins JOHNS HOPKINS MEDICINE

- **Bruce Leff**, M.D. Professor of Medicine, Director of the Center for Transformative Geriatric Research. Johns Hopkins (USA) is widely seen as the pioneer of the original hospital-at-home. Awareness of the risks of infections and the debilitating impacts of hospital stays, particularly on patients who are frail, have cognitive impairments, or other vulnerabilities, prompted Dr. Bruce Leff to develop **medical eligibility criteria and the clinical model to establish the first hospital-at-home program in 1995.**

Intermountain Healthcare

- **Christine Lipson** is the Director of Home Services at Castell, the population health division of Intermountain Healthcare
- **Nathan Starr**, Medical Director of Home Services at Castell and Intermountain Healthcare Tele-Hospitalist Program
- **Brad Murrell**, Director Marketing and Communications at Castell

Franciscan Healthcare

- **Erik Mikaitis** MD, MBA, FACP, CPE, Vice President of Medical Affairs / Chief Medical Officer at Franciscan Health Crown Point
- **Jennifer Daniel, Craig Miller**, FACHE, Senior Executive Franciscan Alliance, Inc.

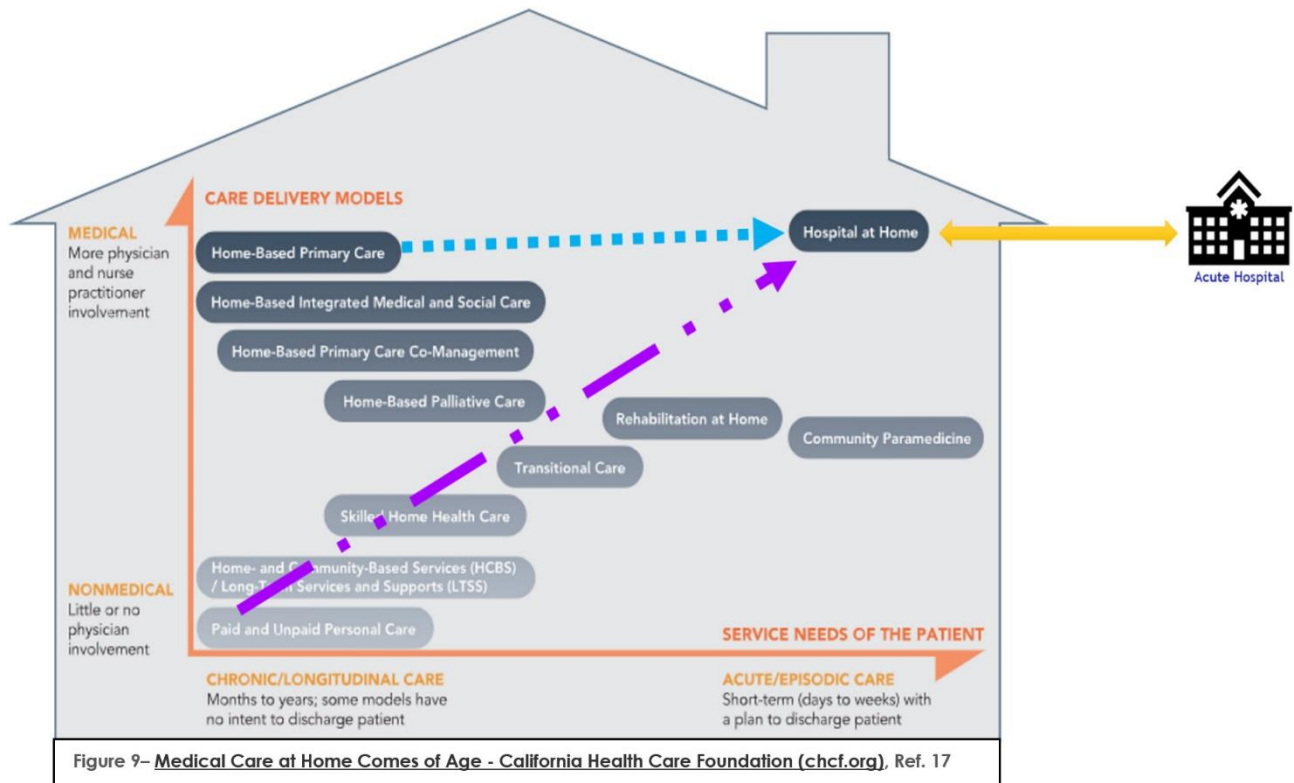
HIMSS

- **Jeff Coughlin**, Senior Director, HIMSS Government Relations (6/9), Provided an update from the hill around the many healthcare initiatives the US government is pushing forward
- **Christina Caraballo**, MBA, HIMSS Director Informatics (6/9) Innovation & Interoperability
- **Robert Havasy**, Sr. Director, Personal Connected Health Alliance
- **Jodi Hoffman**, Personal Connected Health Alliance
- **Lee Kim**, Director, HIMSS Thought Advisory – Privacy & Security
- **Mary P. Griskewicz**, MS, FHIMSS. Director, Federal Affairs, Cigna & HIMSS Government Relations Liaison

Appendix B:

HIMSS Innovation Committee tapped experts for real world examples of innovation born out of the COVID-19 crisis that may be driving meaningful change. A series of interviews with provider and payor organizations gleaned lessons about HaH, digital technology process, or clinical workflow solutions (out of necessity) that potentially make the US health system better for all people, including those who have not had reliable access to healthcare previously.

Home-based Care; one of the most studied models in health delivery reform



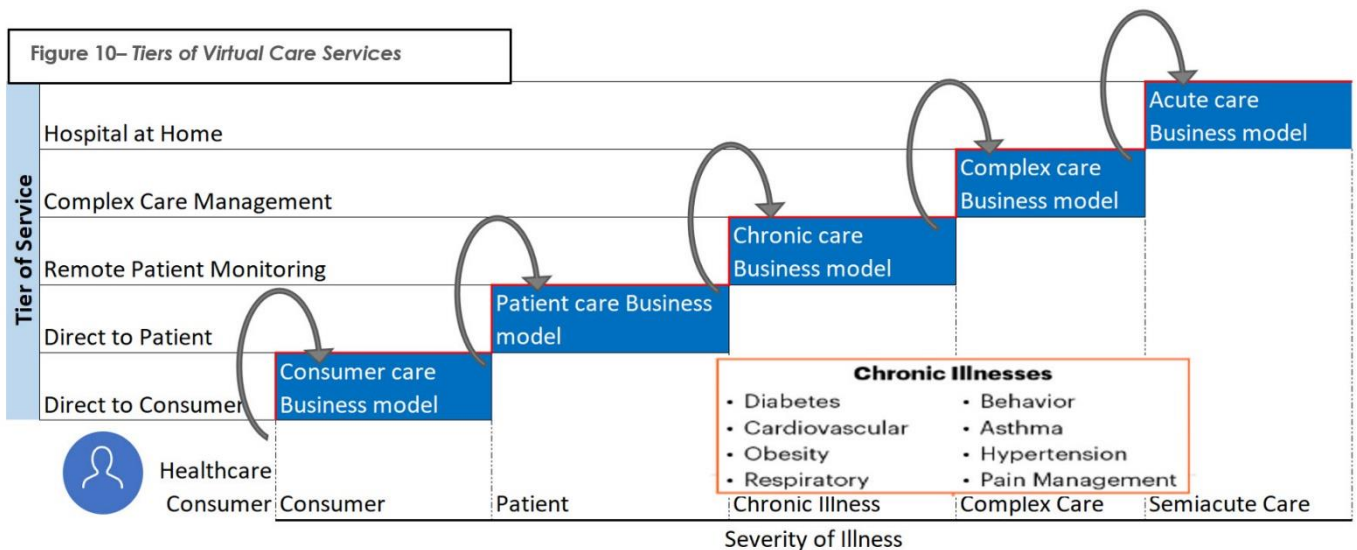
While different types of home-based medical care models can serve a variety of people, one of the core high-need, high-cost populations served by HaH is homebound older adults. Completely or partially homebound older adults represent almost 21% of people age 65 and older and are among the costliest to care for. They have higher rates of hospitalization, more social vulnerabilities, and poorer overall health than non-homebound older adults.

HaH hybrid (inpatient & ambulatory) models reward providers for improved outcomes, increased patient satisfaction, reduced readmissions, and lowered administration costs with value-based contracts that span primary care, rehabilitation, and palliative care.

Many gaps exist in managing the transition from FFS to value-based payment (VBP). Research has shown, that for an acute-care episode, hospital at home doesn't save a lot of money. It's when the contracts are extended to the 30-day episode in Medicare Advantage agreements that ROI is realized. Even more money is saved by avoiding readmissions. Hospitals operating mostly on **fee-for-service** may not be incentivized to enter into **value-based contracts**.

Decentralized healthcare, Hybrid at-home delivery models

Although HaH programs have been operational in a limited number of health systems for years, the COVID-19 pandemic accelerated their implementation. This resulted from the need to reduce hospital census to free up in-patient for admission of COVID-19 patients, keep vulnerable patients away from hospitals and the associated infection risk, and the CMS decision to implement waivers during the Public Health Emergency (PHE) that allowed hospitals to receive the same in-patient reimbursement at home as they received for in hospital care.



How Does a Hybrid Program-to-Program Transition Work? Currently HaH is generally administered as a distinctly separate “in-patient” program; while others (SNF, home care) are post-acute ambulatory programs. Significant challenges exist given implementation logistics and liability for remote monitoring, video, and other telehealth tools to oversee patients’ care (which this paper will not address).

- Is there a “natural” care & payer transition from traditional home care/RPM to full HaH, with support for managing processes, secure services, risk and liability?
- Will staff be separate staff or blended with other “home care” industry services?
- How to partner effectively (medical vendors, payers, specialties, legal, regulatory) to achieve interoperable healthcare system transformation.
- How to evaluate the patient's home for safety and the ability to receive care at home.
- Coordination between providers, ranging from staff preparedness to consistent care plans that adapt to changing market dynamics, continuously monitor vital signs around-the-clock, support for devices, nutrition, transportation, social well-being.
- In HaH programs, the patient could only be admitted through the hospital emergency department. A physician evaluation is required before admission to home, a nurse or paramedic, evaluates the patient twice daily (could be virtual, remotely conducted).

“Normal” Day to Day Routines Are Different in Hospital and Home



Figure11 – See Appendix B, HaH workflows

It's important to recognize that, as with other tech-enabled care models, HaH could leave some patients on the wrong side of the digital divide. Culture, education, and digital upskilling are essential for advanced practice providers, paramedics, nurses, phlebotomists, technicians, therapists, and patients. The selection of good candidates for HaH programs include not only patients, but also clinical staff and medical vendors. Other considerations include a list of implementation considerations:

How to evaluate the patient's home for safety and the ability to receive care at home?

Coordination between providers, ranging from staff preparedness to consistent care plans that adapt to changing market dynamics, liability, continuously monitor vital signs around-the-clock, support for devices, nutrition, transportation, social well-being.

- Ability to replicate acute-level care in a secure home environment: scale digital technology infrastructure (connected smart device kits, predictive, automated services), and provide just-in-time accessible testing and imaging when needed.
- Identifying high-risk patients, which populations to manage (bundles).
- Confusion on payment criteria (shift from FFS to value), policies, logistics coordination.
- What can health systems do to augment their patients' support systems, including dealing with challenges stemming from Social Determinants of Health (SDOH).

Who is responsible for what, monitoring hybrid inpatient/ambulatory workflow processes?

As commercial insurers and other payers begin enter into HaH health system programs, what framework support is needed for connecting hybrid workflows, complex integration of data points to drive insights and unbiased decisions?

- What medical conditions warrant both in-patient hospitalization and meets criteria for the home? Given changes to policy, licensure, liability (device regulations), safety (privacy), standards for equity, data quality (false or misinformation, selection bias).
- Will reduced payments + return to “normal” post-pandemic hospital in-patient occupancy rates + LOS favorable rates reduce health system interest in HaH programs and result in withdrawal? What criteria is needed for reimbursement, rate adjustments as more actual cost-of-care information are accumulated?
- How will reductions in post-acute care (e.g., SNF or home care) be factored into payment scenarios and reduce variability by region?

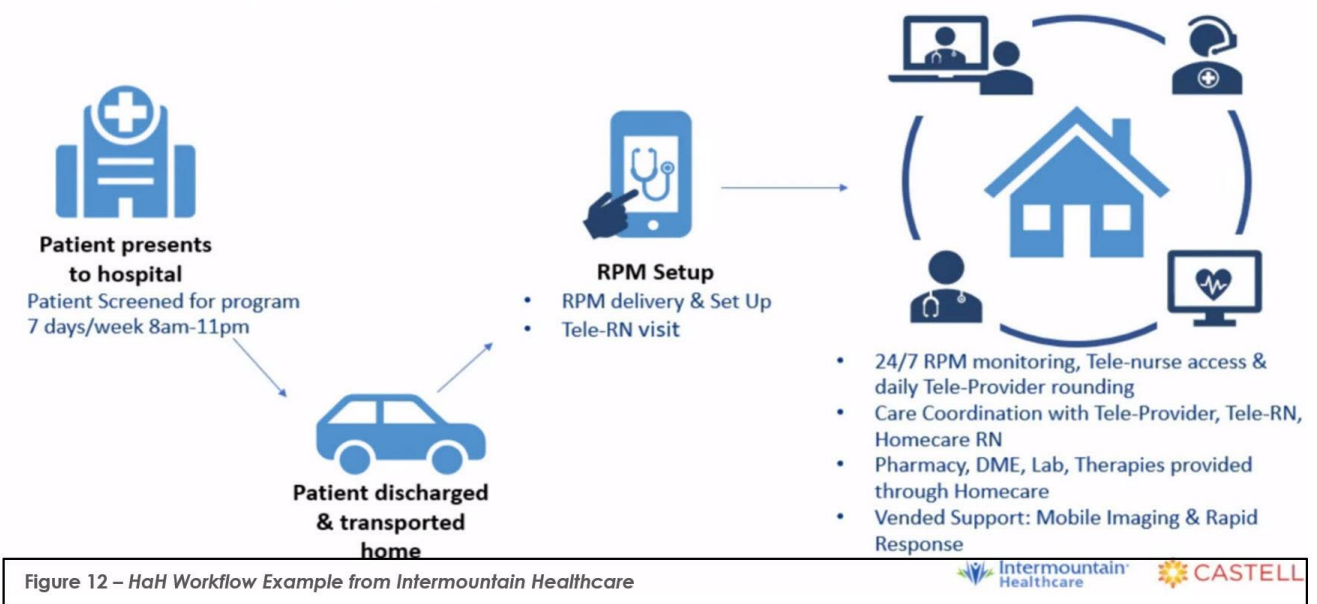
While different types of home-based medical care models can serve a variety of people, one of the core high-need, high-cost populations served by these models is homebound older adults. Completely or partially homebound older adults represent almost 21% of people age 65 and older are among the costliest to care for. They have higher rates of hospitalization, more social vulnerabilities, and poorer overall health than non-homebound older adults.

Recent studies suggest value for other high-need, high-cost populations. The opportunity to care for such patients in the home is increasingly recognized by health plans and health systems as they respond to the shift to value-based care.

During the pandemic, HaH models facilitated early discharge of patients hospitalized for reasons other than COVID-19 and thus cleared beds for COVID-19 patients; allowed monitoring of lower-acuity COVID-19 patients at home; and avoided bringing frail, immunocompromised, or other vulnerable patients needing acute care to the hospital. As the pandemic wanes and as breakthrough or new variant or long-COVID-19 cases strain hospitals, the in-home care environment provides a safe and timely solution with accessible hospital-level services.

The Patient Journey - HaH Delivery Model

Offering the right level of care to safely treat acute patients at a lower cost



At what point in the process are you bringing in patients and family members as additional data is collected that ensures quality of care, outcomes, and patient and care provider satisfaction remain high?

How are we making sure that our patients are at the table at every point in the process, and not just as a final check-in at the end?

For example, by treating health emergencies in the home, not only is the need for an ER visit eliminated and potential for a hospital stay (LOS, HAI, readmission) is reduced given the high probability that an elderly person with complex medical issues will be admitted for observation even when it may not be medically necessary.

Hospital at Home Programs: Step by Step

HaH Workflow

Target Population Steps 1 - 4

Eligibility Criteria

- Risk factor based for severe disease course
- Patients need ≥ 2 risk factors:

- Age ≥ 65
- CKD
- CAD
- CHF
- HTN
- ESLD/cirrhosis
- COPD/Asthma
- Malignancy
- Obesity
- Diabetes
- Immunocompromised

Clinical Staff

- Primary Care and Urgent Care Providers
- Clinic Based RN's
- Clinic Based MA and Care Navigators
- Occasional Resident Physicians

Steps 5-6

Step 7

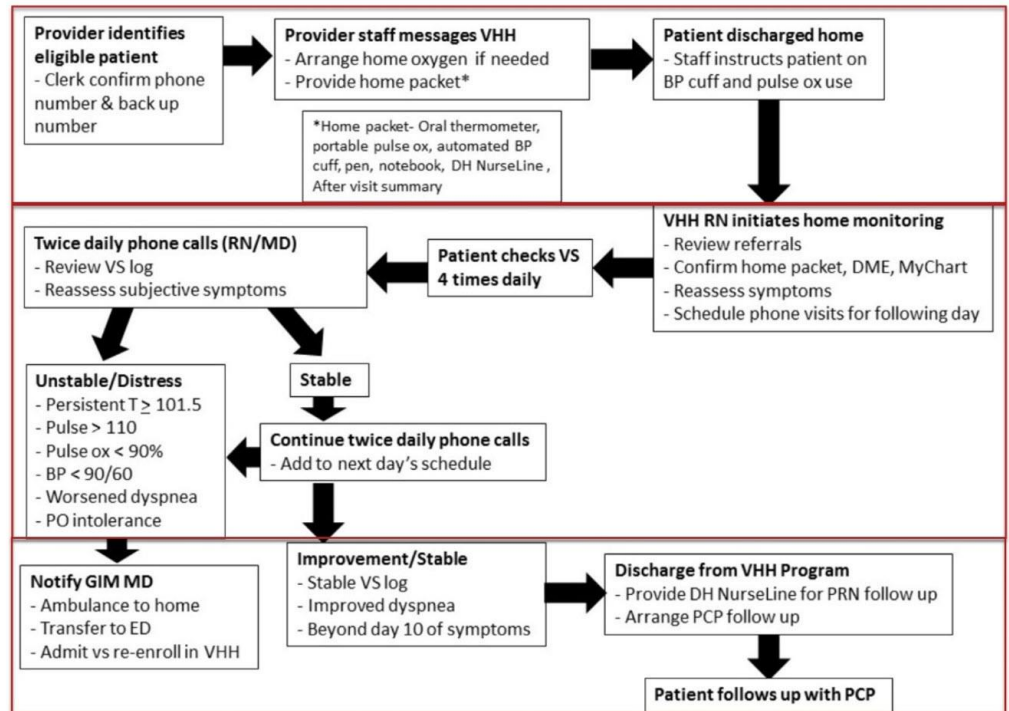


Figure 13 – Adapted from Healthcare Operations during the COVID-19 Pandemic- Speaker Series



DENVER HEALTH
est. 1860
FOR LIFE'S JOURNEY

ASPR
ADVANCED SURVIVAL PREPAREDNESS AND RESPONSE

TRACIE
HEALTHCARE EMERGENCY PREPAREDNESS INFORMATION GATEWAY

1. An emergency department or community physician identifies a patient who is sick enough to be hospitalized but stable enough to be treated at home. Narrowly defined eligibility criteria help distinguish patients who need intensive services and/or multiple visits from specialists—and therefore should be treated in hospital settings—from those whose needs may be met at home by visiting physicians, nurses, and other clinical staff. Conditions with defined treatment protocols, such as congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), community-acquired pneumonia, and cellulitis, are a natural fit.
2. The suitability of the home is assessed to confirm it has air conditioning, heat, and running water, internet connectivity, safety, social and family support.
3. Responsibility for care is assigned to a physician. A greeter meets the patient in the emergency department or elsewhere to discuss the program, arrange transportation, and deliver the biometric and communication devices that will be needed to oversee care. The patient receives training from a nurse on how to use the technology, which begins when the patient is hospitalized.
4. A caregiver meets the patient at home and a physician—either in person or via video—explains the treatment protocol. Orders are written and clinical staff, including respiratory therapists, physical therapists, and other caregivers arrive as needed to administer intravenous medications and fluids, provide nebulizer treatments, and conduct tests, including ultrasounds, X-rays, and electrocardiograms. Meals are arranged if necessary. The patient's vital signs are monitored electronically. The

hospital patient goes home with a telehealth kit, which includes an iPad-like tablet, a blood pressure cuff, pulse socks and a scale.

5. Patients must receive two nursing visits a day, per state regulations, which can include visits from paramedics. Patients also receive one provider visit per day, and about half of the provider visits are virtual versus in-person. The program has a phlebotomist and a physical therapist who come into the home. A social worker is available for virtual or in-person visits, depending on what's needed.
6. The program is available 24/7, and it can send out paramedics anytime to rapidly see a patient. The paramedic will then video with the physician who is online. The physician (or nurse) visits the patient daily, or in some models, communicates with the patient via telemedicine equipment. To capture any decline in the patient's condition when clinicians are off site, providers monitor patient using telemedicine equipment.
7. Once the patient is stabilized and well enough to return to their normal routine, he or she is handed off to his or her primary care physician. In one model, providers maintain oversight of the patient for at least 30 days, to ensure he or she is keeping appointments and is not suffering any adverse consequences. During this period, the physician provides updates to the patient's primary care physician.

Full-episodes and bundled payment models

Patients and clinicians are learning how to co-produce care pathways, define person-centered outcome measures, and engage at the table at every point in their healthcare process. Hospitals tend to have measures about what is happening in the hospital but not have any real view into what is happening with quality in the post-acute care or outpatient space.

We know that healthcare doesn't begin when the patient enters the provider's office or hospital—and it doesn't end when they exit. **Episodes-of-care** refers to an all-inclusive health-and-payment model in which a single, bundled payment includes all services associated with the treatment for an illness, condition or medical event, rather than a separate fee-for-service (FFS) model.

The challenge of developing patient-centered outcome measures is figuring out how to define those with patients with different conditions, and how then to assess which other outcomes matter and how to measure them?

Bundle Structure

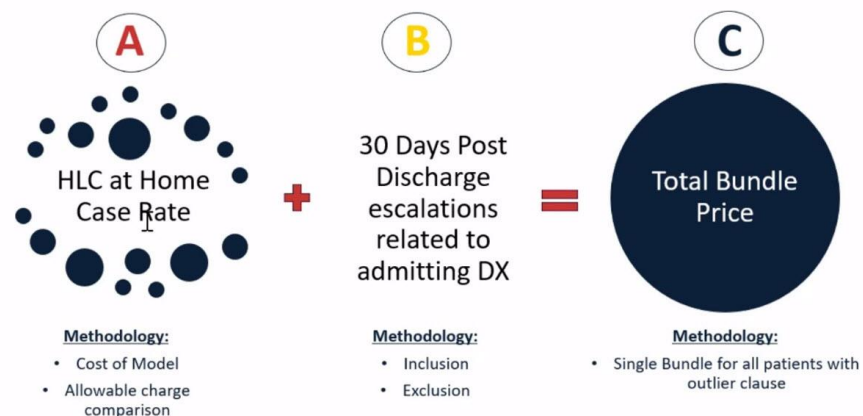


Figure 14 – Bundled care diagram from Intermountain Health, see Fig.

How does HaH get integrated both functionally and financially with ambulatory programs including home care, remote patient monitoring, diagnosis and chronic disease management?

Episodes-of-care programs are designed to address all financial realities for an episode-of-care single-payment model such as all physician, inpatient and outpatient care for a knee replacement procedure vs. separate payments for each aspect of treatment. Similarly, it would include all the care for a person who has one or more chronic conditions.

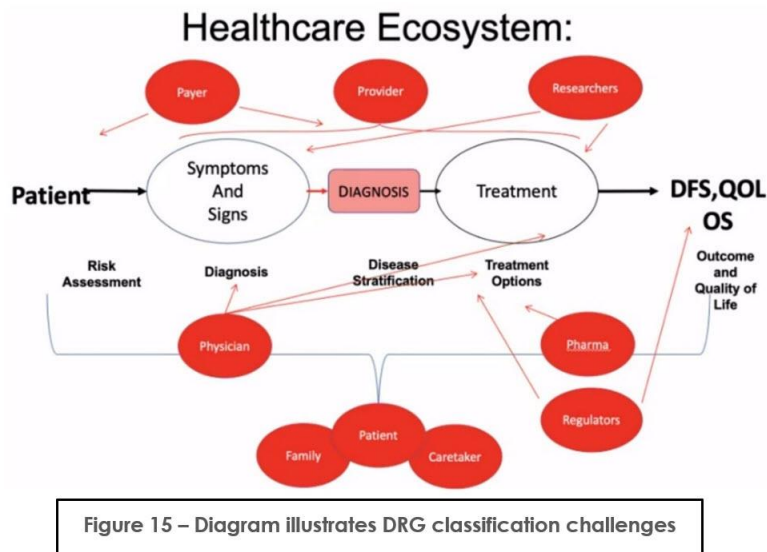
An episodes-of-care payment program can help drive systemic and sustainable healthcare delivery reform that provides greater spending control and predictability, eliminating point solution exhaustion.

- Will reimbursement for an episode of care (e.g., DRG for in-patient care) prove to be the optimal structure, and if so, which services (e.g., home care, skilled nursing facility) will be incorporated into the payment?
- Will commercial health plans follow CMS and establish reimbursement mechanisms for HaH? Will site-of-care waivers be incorporated into reimbursement agreement following the PHE? Will future reimbursement under fee-for service payment by CMS and commercial health plans be sufficient to cover health system expenses?
- As reimbursement mechanisms shift from fee-for-service to value-based payment will the value to care providers be recognized on a wide-scale as a major driver in cost reduction and quality enhancement?
- When the end of the PHE is reached and hospital census returns to normal, will hospitals be willing to forgo the in-patient revenue?

The episodes-of-care model in action

We asked industry thought leaders to share perspectives on HaH use cases, processes, and technology implementations—including what is needed, major challenges ahead of us and recommendations for spearheading collaboration and continued progress to achieve a shared vision of a global health ecosystem where health information is accessible when, where, and how it is needed.

- How is clinical diagnosis and treatment (disease outcomes) coordinated across care teams and managed in a hybrid HaH model?
- See Ref. 2, Multiple Sclerosis white paper, and [Reimagining Healthcare Innovation to Overcome the Real-World Challenge of Maternal Health White Paper | HIMSS](#)



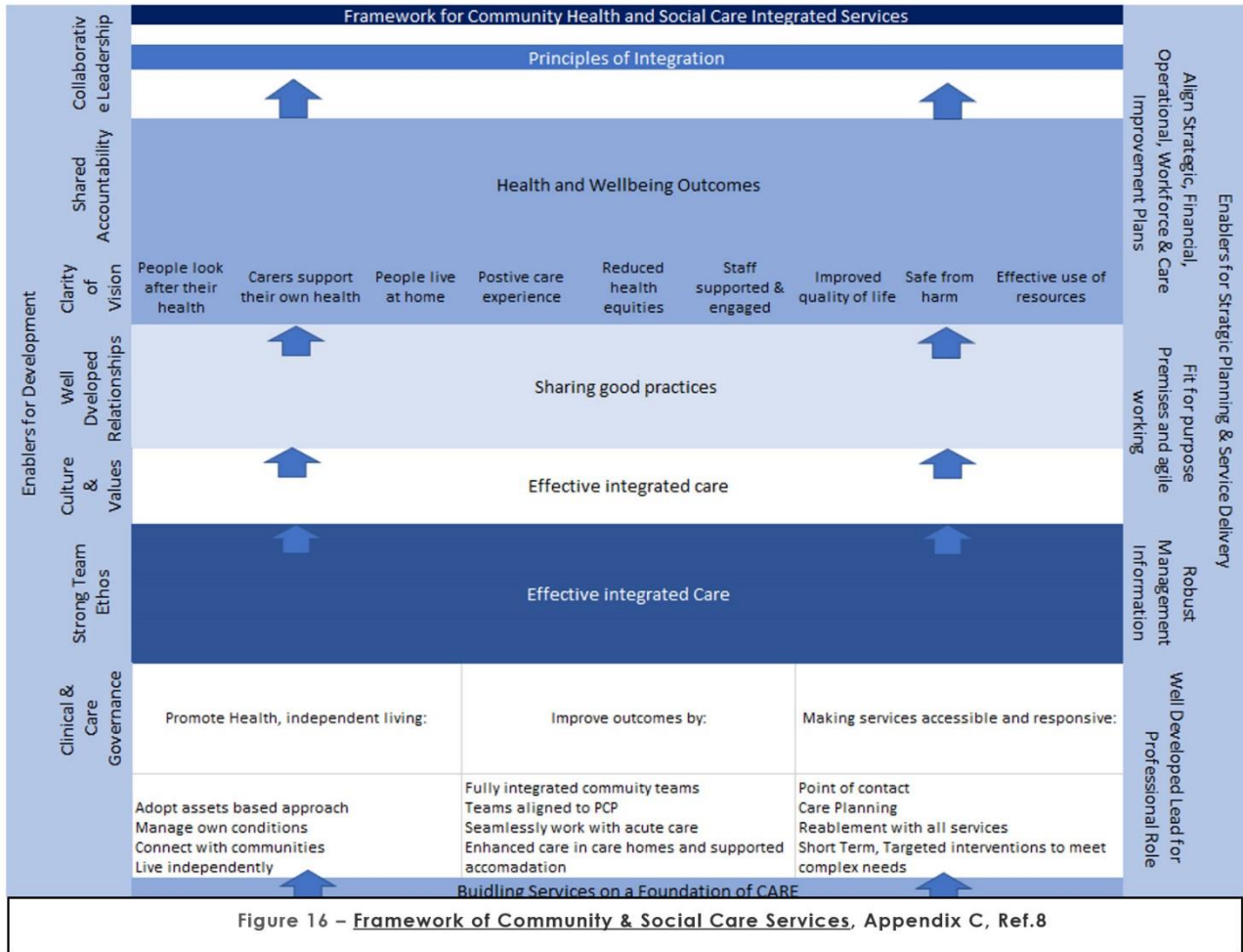
Technology Innovation in support of HaH Programs

Adoption includes a broad set of virtual care capabilities such as virtual visits, remote patient monitoring (RPM) and automated clinical triage that offer significant opportunities for safely maintaining and increasing activity levels to facilitate backlog reduction and demand management during recovery.

Implementations enable care team collaboration (CTC) tools that integrate clinical communication, and core clinical systems to help improve transitions of care, keep staff connected and informed across virtual and physical delivery models, and help prioritize new capabilities to improve HaH programs:

- Approaches that address digital data management, alert fatigue, vendor interoperability, empowering healthcare decisions (Dx, Rx, etc. augmented decisions), capability to allow consumers to govern quality data.
- Understand ethical, legal, and regulatory considerations per Digital Healthcare; track, access, update, utilize call/monitoring centers, direct alerts to clinicians, manage nurse call center operations.
- Deriving value from digital solutions (EHR, medical devices, cloud computing, unbiased AI/ML algorithms (automation, augmented decisions, clinical analytics).

Digital Interoperability, Frameworks, Trusted Healthcare Information



Framework of Community & Social Care Services

HIMSS Innovation 2020 white paper - Holistic model of how to approach, identify, and understand multi-faceted healthcare in a contextual framework.

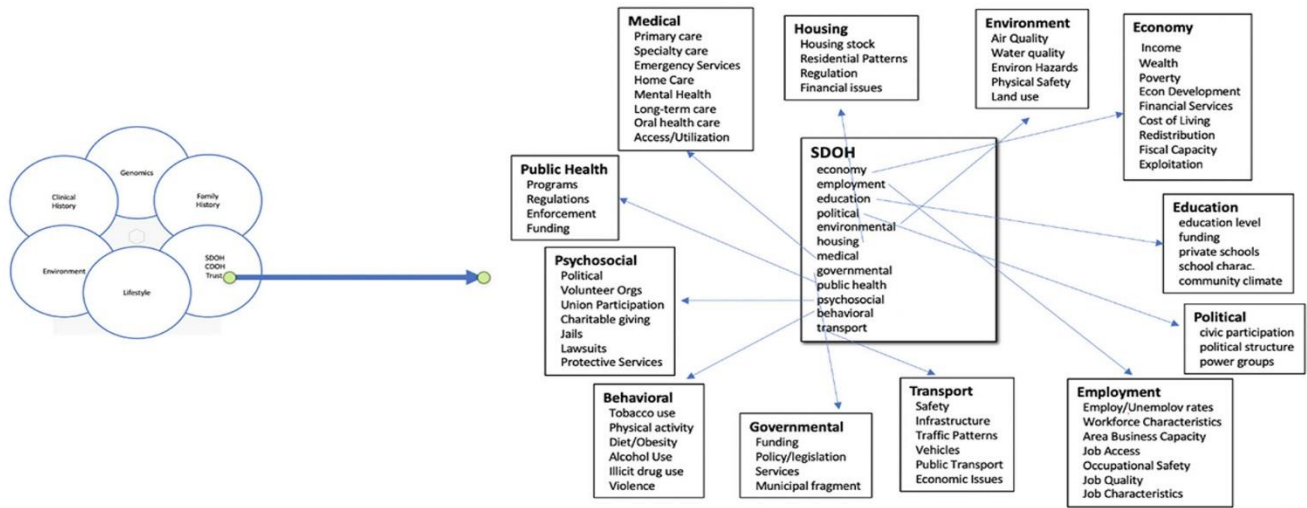


Figure 17 – SDOH Framework, Ref. 1, *Reimagining Healthcare Innovation to Overcome the Real-World Challenge of Maternal Health White Paper* | HIMSS

Real-time Health System Command Center Environment

A command center pertains as much to the orchestration of people, resources and processes as it does to technology.

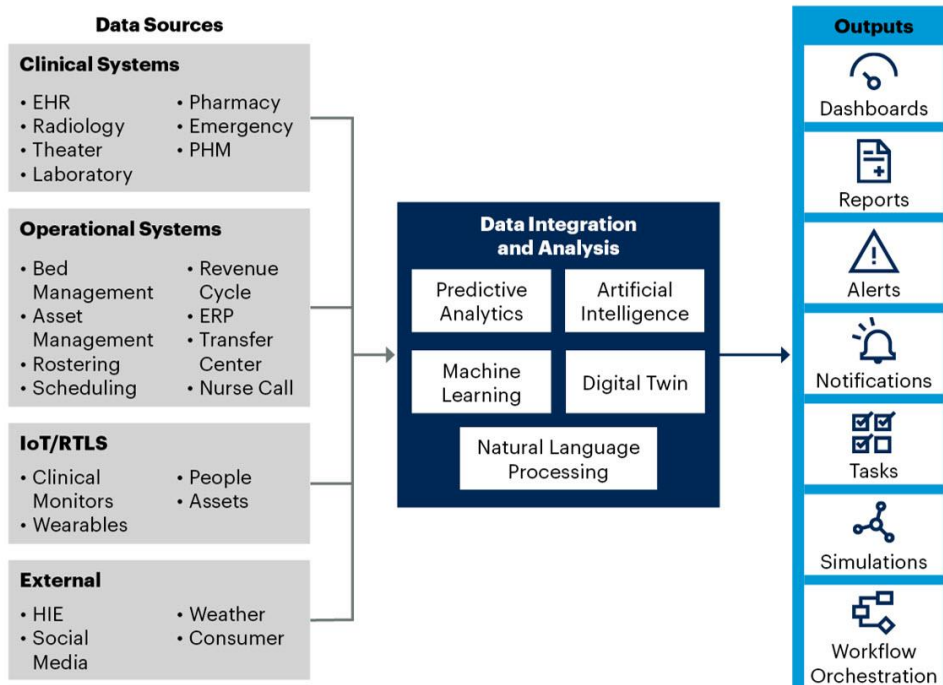


Figure 18 – Gartner, *Innovation Insight for Real-Time Health System Command Center*, Published 22 September 2021 - ID G00754268

Command centers are not just a collection of dashboards displayed across multiple screens in a central facility. They converge and correlate clinical operations and administrative monitoring with virtual care/remote patient monitoring into a centralized management unit with dedicated, specialized staff to respond to alerts and triggers. It includes integration of many data points, rules, workflows and actions (most of which are highly complex to configure). It also

collocates organizational resources, many of which have never worked side by side, uprooting traditional ways of working.

Startup Innovation investments

Several startup companies now offer logistical support and technology to facilitate hospital-at-home programs, as well as help contracting with commercial payers. Broader spread, however, has been stymied by the fact that Medicare does not pay for acute services provided outside of hospitals for fee-for-service beneficiaries.

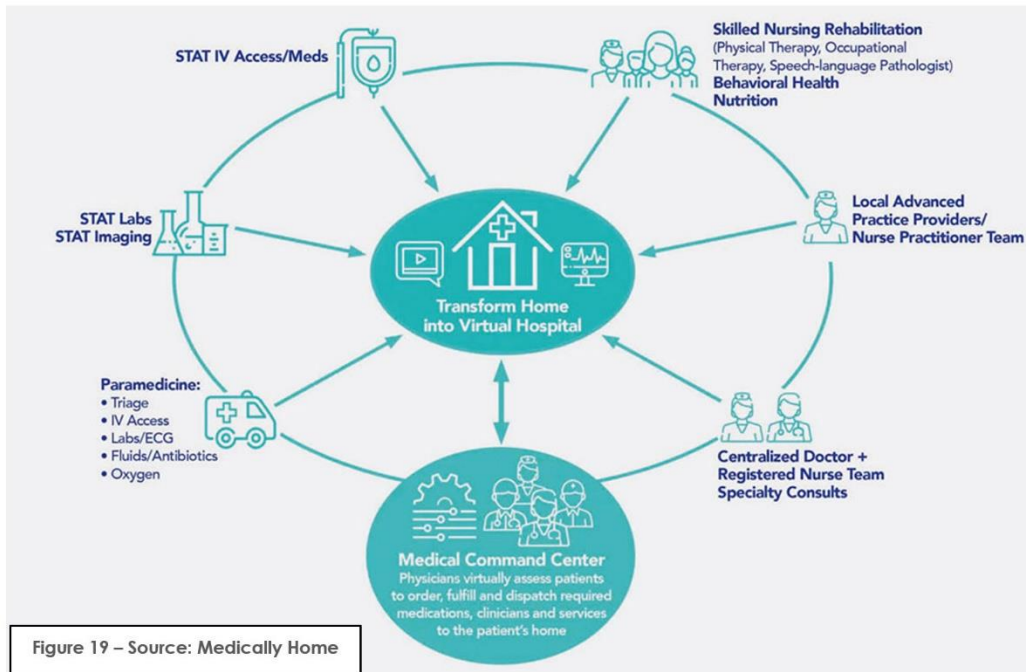
- *Call center support for HAH command center dispatch EMT responders.*
- *Virtual care, RPM, Internet of Medical Device (IoMD) things & safety.*
- *Modular services accelerate digital & data access.*
- *Interoperable EHR tech capabilities supporting hybrid inpatient /outpatient models (e.g., Epic Dorothy, HAH SaaS platform).*

Creating interoperable digital health IT frameworks is the key to unlocking the future of health and healthcare. Machine learning and AI are key pieces of the digital transformation taking place in healthcare around the globe. Given the promise (and hype) of digital technology to augment medical decisions, it is important to appraise which problems are best suited for an AI solution and how AI adds value.

Medically Home draws on its health system partners (See Ref. 3 Advanced Care at Home Coalition) and community resources, including local paramedics and equipment suppliers, to build a virtual hospital.

- <https://www.medicallyhome.com>
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