The healthcare revolution at home.

How to leverage turn-key solutions to launch and scale a successful hospital at home program.
Introduction.

In the United States, acute care has traditionally been delivered in the hospital setting. The hospital at home care model was first introduced in 1994 but did not gain widespread adoption until recently. Multiple clinical studies demonstrating improved patient outcomes and reduction in costs have led to a shift in regulatory policy and payer acceptance, thus enabling healthcare institutions across the country to develop and deploy hospital at home.

In an effort to mitigate hospital capacity constraints and triage care appropriately during the COVID-19 pandemic, healthcare organizations widely launched or scaled up their existing virtual care programs. In addition, the Centers for Medicare and Medicaid Services (CMS) introduced its Acute Hospital Care at Home program in November 2020, which allows approved hospitals to treat eligible patients in their home and receive full Medicare Severity Diagnosis-Related Group reimbursement for these patients. Since November, the list of approved health systems has grown from 6 to now over 92, comprising over 203 hospitals across the country.

As programs are created across the country, we have crafted this guide to provide an overview of hospital at home and related considerations when starting a program.

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Benefits to hospital at home.

Hospital at home programs reduce healthcare costs, improve patient outcomes, and increase patient satisfaction. A randomized controlled trial published in the *Annals of Internal Medicine (2020)* looking at Brigham & Women’s Home Hospital program showed a 38% reduction in cost and 70% reduction in readmission rates when compared to traditional inpatients. This study looked at patients who presented to the emergency department (ED) with decompensated heart failure, community-acquired pneumonia, chronic obstructive pulmonary disease exacerbation, and cellulitis.

Patients in Brigham’s Home Hospital program are given the option to be treated in their home or the hospital setting. If admitted home, patients get a daily visit from an attending physician and two daily visits from a registered nurse or mobile integrated health paramedic. Patients receive intravenous medications, imaging, point-of-care testing, and respiratory therapy if warranted, just was they would in the brick-and-mortar hospital.

Importantly, Brigham’s Home Hospital patients receive continuous remote monitoring through a medical-grade wearable sensor that monitors vital signs, including heart rate, respiratory rate, and temperature as well as physical activity and falls. Along with tracking sensor data, patients and clinicians can communicate by text, audio, and video through the patient’s tablet device and patient-facing app any time during the admission.

In the same study, Brigham’s Home Hospital patients had a median of three laboratory tests compared with fifteen for hospital patients. Likewise, 14% of Home Hospital patients required imaging studies compared with 44% of hospital-admitted patients, and only 2% of Home Hospital patients were ordered for specialty consults compared to 31% of hospital-admitted patients. Home Hospital patients also spent 12% of the day sedentary compared to 23% of hospital-based patients and spent only 18% of the day lying down compared to 55% of hospital-based patients.

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**Brigham & Women’s Home Hospital Program vs. Similar Hospital-admitted Patients**

- **Reduction in cost**
  - 38%

- **Reduction in readmission rates**
  - 70%
Other institutions have experienced similar positive outcomes with their hospital at home programs, including improved patient outcomes and experience. For example, a systematic review of nine randomized clinical trials, including 959 adult patients with a chronic disease, found patients receiving home-hospital care had a lower risk for readmission by 26% and a lower risk for long-term care admission relative to the in-hospital group. Patients who received home-based care also had lower depression and anxiety scores than patients receiving in-hospital care.

### Comparing Patients in Home Hospital and Patients in Hospital

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<thead>
<tr>
<th></th>
<th>Patients in Home Hospital</th>
<th>Patients in Hospital</th>
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<tbody>
<tr>
<td>Median number of lab tests</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Percentage requiring imaging services</td>
<td>14%</td>
<td>44%</td>
</tr>
<tr>
<td>Percentage requiring consultations with other physicians</td>
<td>2%</td>
<td>31%</td>
</tr>
<tr>
<td>Percentage of day spent sedentary</td>
<td>28%</td>
<td>48%</td>
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Why should you do hospital at home?

Even prior to the COVID-19 pandemic, delivering care in the home was slowly increasing. Since the pandemic, the use of telemedicine and RPM exponentially increased and improvements in such technologies has allowed for more complex care to be delivered seamlessly and effectively in the home. In addition, the pandemic has further reinforced the effectiveness of home-based care, and the CMS waiver has helped accelerate the growth of home-based programs across the country. Furthermore, health system leaders are recognizing the opportunity and are adopting care at home models because of the clear clinical and financial value proposition these solutions offer.

During the pandemic, telehealth experienced a 154% increase in activity in the last week of March 2020, compared to the same period the previous year. While telehealth activity has leveled out since, it is believed that the positive consumer experience with telehealth during the pandemic will maintain these adoption levels in the coming years. An August 2020 consumer survey from Accenture, for example, found that 57% of consumers are open to remote monitoring of ongoing health issues through at-home devices and 54% are open to receiving virtual healthcare services from their traditional providers.

Likewise, consumer sentiment appears to favor care virtualization even for complex medical needs. When asked if their insurance would cover “home recovery care” or “hospital at home,” 80% of consumers in April 2020 reported they would be likely to use it, while 37% said they would be “very” likely to use it.

Consumers today are open to remote monitoring and virtual healthcare.

Open to remote monitoring of ongoing health issues through at-home devices

57%

Open to receiving virtual healthcare services from their traditional providers

54%

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Reimbursement and CMS requirements.

Historically, in the United States, CMS and most private payers have not reimbursed for hospital at home. During the pandemic, CMS implemented the Acute Hospital Care at Home waiver program to allow and reimburse approved hospitals to treat eligible patients in the home. Patients, who need to have at least one of 60 designated diagnostic related groups (such as infection, asthma, heart failure or chronic obstructive pulmonary disease), can be managed for their illness at home with proper screening, monitoring, and treatment protocols.

According to CMS guidelines, patients can be admitted from emergency departments or inpatient units at the patient’s discretion. Prior to admission, an in-person physician evaluation is required, followed by once daily physician visits (either in-person or virtual) and twice daily nursing or mobile integrated paramedic visits.

To support the Acute Hospital Care at Home program, CMS has launched an online portal to streamline the waiver request process and enable

The requirements set forth by CMS include:

- Participating hospitals are required to have appropriate screening protocols before care at home begins to assess both medical and non-medical factors that may impact care.
- An evaluation of each patient by a physician or advanced practice provider once daily, either in person or remotely.
- Twice-daily visits by either a registered nurse or mobile integrated health paramedic, based on the patient’s care plan and hospital policy. If a patient receives both in-person visits by MIH staff then a remote visit/evaluation must be done by a registered nurse.
- Capability of immediate, on-demand remote connection (audio) with a clinical team member who can connect the patient to either an RN or MD.
- Ability to respond to a decompensating patient in 30 minutes.
- Using an accepted patient evaluation process to ensure that only patients requiring an acute level of care are treated.
- Providing or contracting for other services required during an inpatient hospitalization.
- Tracking several patient safety metrics with weekly or monthly reporting and establishing a local safety committee to review patient safety data.
hospitals/health systems to submit the necessary information to ensure they meet the program’s criteria to participate. CMS also monitors the program to safeguard patients by requiring hospitals to report quality and safety data to CMS on a regular schedule that is based on their level of experience with acute care at home.

CMS has stated this program will expire along with the COVID-19 Public Health Emergency; however, significant lobbying to Congress by a broad group of stakeholders has resulted in the recently introduced bill called the Hospital Inpatient Services Act that allows for a two-year extension of the federal acute hospital-at-home waiver. Many are hopeful that the initial CMS waiver program and this subsequent bill will highlight the benefits of hospital at home and lead to a permanent reimbursement plan.
What role does technology play?

Although relatively new in the United States, hospital at home programs abroad have existed for decades and are driven primarily by home visits from clinicians. Some of these programs are less reliant on technology and require patients to obtain and report their own vital signs to the care team. Recently, however, remote patient monitoring has dramatically changed the landscape of care in the home. Instead of using the traditional devices such as a blood pressure cuff or thermometer, advanced medical-grade wearable biosensors continuously monitor and collect data on a patient without requiring them—or a family member—to input or interpret those values on their own, improving patient experience and care delivery. To supplement this, patients can provide subjective data to their care team utilizing the same platform.

Artificial intelligence (AI) and machine learning algorithms can take objective data as well as patient-reported information and medical history to personalize care and create a unique physiologic baseline for each patient. This approach provides clinical teams with a real-time view of the patient’s trajectory which they can use to drive clinical decision making.

Certain technology solutions can also potentially use such algorithms to make care teams aware of a worsening condition based on an individualized biometric signature that is dynamically updated. Continuous analysis and refinement of a patient’s biosignature can alert clinicians to signs of decompensation (in some cases many hours) before a medical event would have otherwise occurred. When such a warning sign is generated, clinicians can intervene earlier and prevent deterioration, improving clinical outcomes and decreasing resource utilization.

Integrated platforms allow for bidirectional communication between the clinical team and patient through messaging, audio and video as well as between members of the care team, centralizing the care plan and improving compliance. Furthermore, these technology-based solutions are designed to be user-friendly and give patients ownership of their medical care.

As you start to build your hospital at home program, it is important to not only consider appropriate clinical staffing and effective operational workflows but also implementing a robust technology platform to deliver care and scale your program. Successful programs take time to build. Each hospital or health system is

Leading remote patient monitoring technology can use algorithms to predict a worsening condition.

Remote patient monitoring has changed the landscape of care in the home dramatically.

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unique and no one program is the same. Starting with a small group of patients and a limited set of diagnosis is ideal to gain experience before growing.

A wealth of information is available on the Hospital at Home Users Group, including a Technical Assistance Center containing case studies and implementation tools, resources on special topics, and information on the CMS waiver.

**What to consider before building a program.**

**Clinical Staff and Workflows**
Dedicated clinical staff including physicians, advanced practice providers, nurses, and mobile integrated paramedics should be recruited for patient care. Developing pathways with hospital-based ancillary services such as social work, case management and physical/occupational therapy to provide virtual or in-person consults is critical. Designing workflows with the hospital laboratory, pharmacy, and radiology services should be done to streamline care delivery. In addition, creating care algorithms with specialty consult teams helps expand clinical support for patients should it be needed.

**Patient Monitoring Platform**
A centralized platform to monitor patient vital signs develop care plans and communicate with patients is crucial to deliver safe and effective care.

**Electronic Health Record (EHR)**
Customizing modules within the EHR can help care delivery. This should include dedicated orders/order sets and admission/discharge pathways as well as seamless transition between care areas/teams (ED vs. inpatient to the home). In addition, ensuring access to relevant data during home visits through a smartphone or tablet-based app improves the efficiency of visits, as well as patient and care team experience.
Conclusion

Developing and scaling a successful hospital at home program requires appropriate clinical staffing, well-crafted operational workflows, and a robust technology platform. Biofourmis’ Hospital@Home™ turnkey solution has been specifically designed to help clinicians deliver acute care at home. The platform enables any hospital to customize and quickly deploy the necessary workflows and technologies to care for patients through AI-driven continuous monitoring, FDA-cleared analytics engines, customizable clinical care plans, encrypted communication systems and care coordination tools for a geographically-dispersed clinical team. In parallel, Biofourmis has built a virtual care team and created in-home partnerships to provide an end-to-end solution for our health system partners looking to build their hospital at home programs.

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To see a demo and learn more about Biofourmis’ Hospital@Home™ solution and our other care-at-home solutions for post-acute care and chronic condition monitoring, please contact care@biofourmis.com.

With personalized predictive care delivered at the right time, you can improve patient outcomes and minimize cost and burden.