Hospitalization at Home: Mount Sinai Health System Experience (New York, NY)
December 2020
Linda V. DeCherrie, MD
No conflicts of interest

Dr. DeCherrie is a full time employee of the Icahn School of Medicine, which in turn has an ownership interest in a joint venture with Contessa Health, a venture that manages acute care services provided to patients in their homes through prospective bundled payment arrangements. Dr. DeCherrie has no personal financial interest in the joint venture.
Mount Sinai Health System’s History

2014
Mount Sinai received Center for Medicare & Medicaid Innovation award to create Hospitalization at Home. Received funding from The John A. Hartford Foundation.

2017
Building on initial award phase success serving over 700 patients, Mount Sinai & Contessa form a joint venture to increase patient access to our clinical models.

2020
Mount Sinai Hospitalization at Home admits patients from 4 Mount Sinai hospitals including Mount Sinai Hospital.
Hospitalization at Home Prior to new CMS waiver
Mount Sinai's Hospital at Home – Plus

Admission
- Eligibility and home situation reviewed
- Services organized
- Transport home

Acute Care
- 3-5 days
- Daily MD & nursing visits
- IV medications, oxygen, x-ray, lab tests
- 24/7 support
- Discharge

Post-acute
- Services available for 30 days
- Follow-up visits by team
- Intensive disease specific care management
The Hospitalization at Home (HaH) model delivers all the essential elements of inpatient care in the safety and comfort of a patient’s home.

**CLINICAL MODEL**

- **Initial Hospitalization**: Patient evaluated by Provider and Care Coordinator (meets inpatient / enrollment criteria)
- **Hospitalization at Home**: Hospital Replacement Services (30-day episode / ~150 DRGs)
- **Observation Pathway**: Hospital Replacement Services
- **Completing Hospitalization at Home (cHaH)**: Completion of hospitalization in the home utilizing hospital replacement services (Average LOS 1 – 3 days)
Hospitalization at Home Under new CMS Waiver
Admissions
The Hospitalization at Home Model
Under CMS Waiver

CLINICAL MODEL

- Patient evaluated by Provider and Care Coordinator (meets inpatient/enrollment criteria)
- Initial Hospital Observation Unit
- Hospital Replacement Services
- Hospitalization at Home
- Completing Hospitalization at Home (cHaH)
- Initial Hospitalization

Admissions 8am-10 pm Monday-Friday
**Extensive Focus on Clinical Protocol Development**

**H A H**

- COPD
- CHF
- Pneumonia
- UTI
- Cellulitis
- DVT / PE
- Asthma
- Dehydration

General Medicine Protocol for any patient that could be safely treated at home

Includes 44 episodes & 151 DRGs

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**Top DRGs Treated in HaH**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>16%</td>
</tr>
<tr>
<td>Cellulitis</td>
<td>14%</td>
</tr>
<tr>
<td>CHF</td>
<td>13%</td>
</tr>
<tr>
<td>COPD</td>
<td>10%</td>
</tr>
<tr>
<td>UTI</td>
<td>10%</td>
</tr>
<tr>
<td>DVT/PE</td>
<td>5%</td>
</tr>
<tr>
<td>Asthma</td>
<td>5%</td>
</tr>
<tr>
<td>Gastro</td>
<td>4%</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>21%</td>
</tr>
</tbody>
</table>
Hospital at Home Capabilities

What treatment modalities can be used in the home?

- Labs
- Imaging
- Arranging visits with consulting specialists
- Supplemental oxygen up to 4 liters per NC*
- Established CPAP/BiPAP patients
- Respiratory treatments
- IV diuretics
- IV antibiotics (continuous and intermittent)
- Continuous IV fluids
- (PD/HD patients with established treatment plan)
- Wound vacs
- Intermittent catheterizations
- Chest tubes to gravity

What treatment modalities can’t be used in the home?

- Oxygen requirements greater than 4 liters per NC*
- New orders for CPAP/BiPAP
- Cardiac drips
- Heparin/insulin drips
- Blood transfusions
- Continuous cardiac telemetry monitoring
- Continuous pulse oximetry
- Continuous bladder irrigation
- NGT to suction
- Frequent neuro checks
- IVP/IM narcotics

*Patients with baseline oxygen use above 4L can be considered for HaH admission based on their clinical presentation including past medical history

A patient could receive treatment in the ED or Observation prior to transitioning to Hospital at Home
## Example Specific Exclusion Criteria

### Diagnosis #1: Congestive Heart Failure (CHF) Exclusion criteria in HAH

<table>
<thead>
<tr>
<th>Exclusion Criteria</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Associate with hemodynamic instability</td>
<td>Exclude patients with hemodynamic instability including severe arrhythmias, symptomatic bradycardia/tachycardia, HR &lt;40 and HR &gt; 120</td>
</tr>
<tr>
<td>2. Associated with known or suspected severe valvular disease of aortic or mitral valve</td>
<td>Exclude patients if CHF associated with aortic stenosis with valve area known to be in critical range or associated with gradient &gt;40mm or severe mitral stenosis. ECHO need not be obtained solely to screen for severe valvular disease to excluded patient from HAH care if clinical suspicion is low.</td>
</tr>
<tr>
<td>3. Suspected pulmonary embolism and a CHF exacerbation at the same time</td>
<td>Exclude patient if he/she is suspected of having a PE and the diagnosis of PE cannot be excluded before admission</td>
</tr>
</tbody>
</table>

* Not complete inclusion/exclusion criteria for CHF diagnosis
Mostly admitting patients for our cHaH pathways, where patient is first in hospital for a few nights and has demonstrated improvement but still requires hospitalization.

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>If no respiratory symptoms can admit from ED if meets criteria for other presenting symptom</td>
<td>Clinical trial participant</td>
</tr>
<tr>
<td>If respiratory symptoms, day 6+ post-onset Covid symptoms (may have been home prior to ED for a # of days)</td>
<td>Requires aide services</td>
</tr>
<tr>
<td>Stable/improving (O2 requirements stable/down trending, clinical trajectory stable/improving)</td>
<td>Ambulates with assistance from another person (can use an assistive device but uses independently)</td>
</tr>
<tr>
<td>If still febrile, other sources of infection have been ruled out</td>
<td></td>
</tr>
<tr>
<td>If requires O2: &gt;12 hours maintaining SpO2 &gt;= 92% on no more than 4L NC and &gt;=88% on 4L with ambulation</td>
<td></td>
</tr>
</tbody>
</table>

* Not complete inclusion/exclusion criteria for Covid-19 diagnosis
<table>
<thead>
<tr>
<th>Mount Sinai/Contessa</th>
<th>External Vendors</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD, NP</td>
<td>Home Health RN, PT, OT, ST</td>
</tr>
<tr>
<td>SW</td>
<td>Infusion Pharmacy</td>
</tr>
<tr>
<td>ED care coordinators (RN)</td>
<td>DME company (Oxygen and equipment)</td>
</tr>
<tr>
<td>Virtual care coordinators (RN)</td>
<td>X-ray/Ultrasound company</td>
</tr>
<tr>
<td>Pharmacy – oral and injectable</td>
<td>Courier for food</td>
</tr>
<tr>
<td>Inpatient lab</td>
<td>Ambulance company</td>
</tr>
<tr>
<td>Community Paramedics</td>
<td>Telehealth (scale, pulse ox and BP cuff)</td>
</tr>
<tr>
<td></td>
<td>Medical courier service</td>
</tr>
</tbody>
</table>
Ongoing care
### Example day after admission schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>Phlebotomist</td>
</tr>
<tr>
<td>8:45 am</td>
<td>Flip card rounds (not with patient): MD, NP, SW, RN, Care coordinator</td>
</tr>
<tr>
<td>9:00 am</td>
<td>RN visit</td>
</tr>
<tr>
<td>10:30 am</td>
<td>NP visit</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Delivery (DME, infusion, food)</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>SW call</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>Flip card rounds (not with patient): MD, NP, SW, RN, Care coordinator</td>
</tr>
<tr>
<td>7:00 pm</td>
<td>RN visit</td>
</tr>
</tbody>
</table>

Patient has telehealth kit and 24/7 access to care team
Electronic Medical Record
EMR – EPIC at Sinai

- 2014 - Outpatient EPIC
- 2018 - Outpatient EPIC with Therapy plans for active order set
- 2020 - Inpatient EPIC with certain functionality turned off (dietary, pharmacy, labs etc.)
- RNs from home care agency not on same EMR but we have developed work around
HomeHospital
Hospital-Level Care at Home for Acutely Ill Adults
Disclosures

Biofourmis: PI-initiated study and co-development of software
IBM: PI-initiated COVID-19 study
Need for Home Hospital

Right care to the right patient at the right time in the right place

Highest Acuity
- ICU
- Medical Floor
- Home Hospital
- Rehab
- Home Health
- Tele-health

Lowest Acuity

Home Hospital
Bringing the Hospital Home

Home based provision of services usually provided in the acute inpatient setting.

Transfer to Home

Substitutive with ED

Substitutive without ED

Brigham Timeline

Hospital-Level Care at Home for Acutely Ill Adults: a Pilot Randomized Controlled Trial

2016
Pilot randomized controlled trial

2017-2018
Largest randomized controlled trial

2018
Single arm innovation service

2019
Studies within home hospital

2020
New tech, diagnoses, and care models
Note the decision-making and process of the ED team is unchanged.
Conditions

- Cellulitis
- Complicated UTI
- Pneumonia
- Heart Failure
- Asthma COPD
- AF w RVR
- DM + Complications
- Anticoagulation Needs
- Gout Flare
- CKD w volume overload
- HTN Urgency
- Desires only Medical Management

Inclusion/exclusion for protocols published and open source

Home Hospital Care

- 2 daily nurse/medic visits
- 1 daily doctor visit
- 24/7 availability
- IV medications
- Remote vital signs monitoring
- Diagnostic testing

If needed: specialist consultation, home health aide, physical therapy, social work, food delivery
Build vs Buy

- Infusion
- Pharmacy
- Monitoring
- Software
- DME
- Personnel
- Diagnostics
- Food
Stuff You Need – MVP

Mantra: *build for what you need and need what you build*

- Oxygen concentrator
- Infusion gadget: pump vs elastomeric ball
- Monitoring gadgets: continuous vs intermittent
- Commode
- Scale
- Encrypted video, audio, text
People You Need – MVP

Mantra: *use your hospital wherever you can*

- Physician
- Nurse
- Program associate
- +/- PT, OT, SLP, SW
- +/- APP
- +/- mobile integrated health paramedic
- +/- home health aide
## COVID-19 Adaptations

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Low volume of non-COVID diagnoses</th>
<th>Sufficient volume of non-COVID diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>Sufficient</td>
<td>Insufficient</td>
</tr>
<tr>
<td>PPE</td>
<td>Deep bench</td>
<td>Small specialized bench</td>
</tr>
<tr>
<td>Staff</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pulse oximetry</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Oxygen</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Users Group

- 25+ programs
- Developed
  - Practice standards
  - Quality measures
  - Regulatory framework
- Research
- Advocacy

hahusersgroup.org
World Hospital at Home Congress

WORLD HOSPITAL AT HOME CONGRESS™

Vienna, April 19-21, 2021
We piloted a prototype rural home hospital model using mock admission in September 2019.

Pilot components at rural home hospital site – Vernal, Utah

Portable ultrasound with real-time delivery

Portable satellite broadband

Treatment, counseling & education through remote physician

In-person paramedic presence
We have focused on break-through innovations without a matching investment in follow-through innovations.

-Atul Gawande
Design Methodology 101

**Phase 1**
*It might work*

**Phase 2**
*It does work*

**Phase 3**
*How we work*

Interest

Measurable Outcome

Impact

Credit: David Asch, MD MBA
HOMEHOSPITAL
Hospital-Level Care at Home for Acutely Ill Adults