

## Title Page

**Title:** COVID-19 Enhanced Home Care Treatment Model: A Primary Care and Accountable Care

Organization Collaboration

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2 tables, 3 figures

## **Abstract**

COVID-19 caused health systems across the United States to provide innovative care within a short time period. [redacted] Health System of Northeast Florida took a proactive, collaborative approach to rapidly develop and implement an enhanced home support model for patients with COVID-19 in partnership with [redacted] Primary Care, [redacted] Home Health Care, and durable medical equipment companies. The model was evidence-based and protocol-driven allowing patients to be safely cared for in the home setting. It also helped decompress hospitals by preserving finite health system bed and care team capacity, both of which would have otherwise been exceeded during surge peaks. Low rates of emergency department visits and inpatient hospitalizations demonstrated excellent quality of care. Experience gained from building this model allows its replication for chronic, high-risk conditions to align with long-term value-based care strategies.

## **Keywords**

Innovation, COVID-19, homecare, telehealth

## **Abbreviations**

[redacted] Health System (BHS)

[redacted] Physician Partners (BPP)

Accountable Care Organization (ACO)

[redacted] Primary Care (BPC)

Clinical Transformation Workgroup (CTW)

Enhanced Home Support Model (EHSM)

[redacted] Home Health Care (BHHC)

Durable Medical Equipment (DME)

Person Under Investigation (PUI)

## Introduction

In the spring of 2020, COVID-19 predictive models painted a dire picture for the State of Florida. Shortly into the COVID-19 pandemic, it became apparent that there would be significant strain on healthcare operations. [redacted] Health System (BHS) of Northeast Florida is a five-hospital, non-profit, locally governed health system serving a five-county area. It includes [redacted] Children's Hospital, which also serves a large region of the panhandle and South Georgia. BHS has 977 beds, including 140 adult intensive care beds, 447 adult medical/surgical beds, 273 progressive beds, and 141 beds at [redacted].

[redacted] Physician Partners (BPP), the clinically integrated network and Accountable Care Organization (ACO) for BHS comprises over 1,000 physicians of which approximately 160 physicians are part of our employed primary care group, [redacted] Primary Care (BPC).

BPC partnered with the ACO to build an enhanced home-based model to help decompress the hospitals in the event of a surge. The ACO has a quality arm, the Clinical Transformation Council, which includes physician, nursing, informatics and administration thought leaders within BHS. The Clinical Transformation Council accomplishes its work through physician-led clinical transformation workgroups (CTWs). Figure 1 provides a visual representation of the BPP clinical transformation governance structure. These multidisciplinary workgroups of subject matter experts focus on the development of clinical guidelines implemented across the clinically integrated network. A new CTW was formed to develop the Enhanced Home Support Model (EHSM) for patients with COVID-19, with the goal of treating patients in the home setting and avoiding, when possible, unnecessary utilization of hospital resources.

We had robust representation from BPC, a physician-governed employed group that provides primary care services at 62 locations and includes family medicine, pediatric medicine, and internal medicine specialties with 164 physicians and 47 advance practice professionals. BPC also encompasses and

providers direction for our ambulatory geriatric program, the AgeWell Institute. We also had representation from the ACO's care coordination team that is composed of 25 nurses, five social workers, and eight assistants, and two health coordinators who manage contracted lives within these primary care offices and the post-acute setting.

An integral component of the EHSM includes [redacted] Home Health Care (BHHC), a subsidiary of BHS. Over recent years, BPP has built a home care preferred partner network inclusive of BHHC and other high-quality home care agencies in the community. Additionally, BHS has well established relationships with multiple independent durable medical equipment (DME) vendors within the community.

### **Methods**

The COVID-19 CTW developed an innovative model of care for patients in the home setting to avoid unnecessary utilization of hospital resources. We were a multidisciplinary group with representation from internal medicine, family medicine, geriatric medicine, hospitalists, pulmonary/critical care, cardiology, and emergency medicine physicians, home health care, care coordination, clinical informatics, administration, risk management, pharmacology, pathology, nursing leadership, finance, and pastoral care.

We met multiple times within a two-week period to develop a detailed standard home health protocol for patients referred from BPC. At the time of development, literature was scarce so the CTW reached consensus based on available data and tailored the protocol periodically over ensuing months as new evidence became available. The protocol addressed laboratory and COVID-19 testing as well as routine orders related to symptom relief. Clinical Informatics prioritized EMR build efforts to ensure current practices aligned with the latest protocol.

Having no previous virtual visit capacity, BPC stood up a telehealth platform over a 10-day period in late March 2020. Before COVID-19, BPC typically averaged around 3,000 in-person visits per day across

practice locations. By April 2020, BPC visit volume shifted to 2,500 per day with a combination of in-person (15%) and virtual visits (85%).

Operationally, primary care physicians initiate the EHSM protocol after a virtual visit with the patient/family. The physician discusses with the patient their candidacy for the program and sets expectations surrounding availability of current medical treatments, navigating the illness at home with home health support. Referral considerations include COVID-19 positive patients or persons under investigation (PUI) with symptoms based on the following:

- Stable with low risk: self-monitor at home
- Stable with elevated risk due to comorbid conditions: refer to EHSM
- High-risk for deterioration or unstable: send to ED for evaluation.

Additionally, the home environment is a factor in determining eligibility, as there needs to be a caregiver, ability to maintain self-isolation, proximity to a hospital in case of worsening symptoms, and access to basic services.

EHSM enrollment occurs for patients who meet the above criteria. The home health care agency makes an introductory call to determine patient stability and reinforce expectations prior to the initial home health visit. Within 4-6 hours of referral receipt by BHHC, a home health care nurse arrives at the patient's home. Care is initiated with vital signs (including oximetry) and review or drawing of laboratory data. Patients with mild acute hypoxia receive an oxygen tank. Figure 2 provides EHSM protocol details as of December 31, 2020. If the patient requires ongoing oxygen support, the home health care nurse contacts the DME company to coordinate an oxygen concentrator delivery. High-risk patients with an oxygen requirement of >5LPM (later lowered to >3LPM) or rapid acceleration of symptoms are referred to the ED for evaluation.

Patient visits occur daily for five consecutive days by the RN (in-person or virtual visits) when symptoms, resting and ambulatory oximetry, and vital signs are reviewed. After this period, visits occur every other day for five additional days. Self-monitoring equipment, including a pulse oximeter, thermometer, and incentive spirometer is available to all patients. The physician determines the frequency of physician virtual visits based on patient acuity and the number of symptomatic days, averaging every 24-48 hours from enrollment and subsequently up to every 72 hours. Providers instruct patients to present to the ED if symptoms significantly worsen prior to their home health evaluation or at any time during their episode of care. Additionally, a social work team is available for consultation to address social determinants of health when applicable.

We added dexamethasone and low-dose aspirin therapies to the EHSM protocol upon the emergence of evidence-based literature. Additionally, we created a referral process for outpatient monoclonal antibody therapy after the FDA Emergency Use Authorization (1).

BPC distributed COVID-19 self-monitoring kits that included a thermometer, pulse oximeter, surface sanitizer, masks, and patient education material, acquired through a third-party vendor. A COVID-19 response team within the existing care coordination service was rapidly established to work through weekends when home health capacity was particularly limited. The care coordination team extended their focus to provide care for all patients with a COVID-19 diagnosis and PUIs in addition to contracted lives. The team checked in routinely with the patients and then monitored the patients until the home health resource could establish start of care.

We survey patients via telephone post-home health discharge and physicians via electronic survey for model improvement purposes.

## **Results**

Patient population descriptors are located in Table 1. As of December 31, 2020, BHHC accepted 341 referrals of which 329 (96.5%) patients enrolled in the EHSM. There were 134 (40.7%) patients age 65 years or older and no patients were younger than 18 years. Oxygen support was needed for 81 patients (24.6%). After start of care, 42 (12.8%) patients were hospitalized (12.8%) and 26 (7.9%) patients had an ED visit without a hospitalization. There were six patients who expired; five who expired in the hospital after treatment and one who expired at home.

Virtual visits conducted by BHHC (excluding primary care) totaled 2,457. Patient and physician satisfaction survey results are located in Table 2.

Figure 3 shows daily census for the four BHS adult hospitals and [redacted] Home Health care, with COVID-19 volume surges in July and December, 2020. A direct relationship between inpatient and home health care census exists.

## **Discussion**

COVID-19 significantly and disproportionately affects older adults. Among deaths that occurred in the US, greater than 80% were in patients 65 years or older (2). As such, it was paramount to provide a model of care that would care for our older adults in a way that would balance their safety and the finite resources available for inpatient and intensive care. Furthermore, medical literature highlights that hospital admissions, especially when prolonged, are associated with functional decline, increased frailty, and loss of independence with activities of daily living in the geriatric population (3-4). We built our model on this premise.

### ***Decompressing Hospitals***

The EHSM expanded the reach of primary care to patients that would have otherwise been hospitalized, decompressing the inpatient volume to allow for care of patients with a higher acuity. Figure 3

demonstrates the daily census of patients with COVID-19 in the four adult hospitals and the EHSM, which expanded finite health system bed and care team capacity during peak surges. Without the EHSM, the demand for inpatient beds would have exceeded capacity and care team resources likely would have been overwhelmed.

### ***Primary Care***

Primary care physicians were at the forefront of EHSM development and utilization due to long-standing patient-provider relationships and knowledge of medical and social determinants that shape care. This also came at the time when face-to-face office visits were declining and virtual visits were escalating rapidly. BPC responded rapidly to adopt virtual visits, which played a significant role in the care for patients with COVID-19 that did not require a hospital admission. Frequent provider follow-up visits and the use of oximetry devices were important cornerstones of the model.

Communication was critical to accelerated adoption. A new initiation of virtual meetings with all BPC providers and administrative staff began early on in the pandemic to ensure swift adoption of protocol updates. Positive satisfaction survey results reflected robust physician engagement as physician feedback was widely encouraged.

### ***Home Health Care***

Home Health's commitment to timely arrival (within six hours of referral receipt) and equipping patients with a pulse oximeter and thermometer, if not already owned, were also key components. This workflow proved essential for data collection for future virtual visits.

In addition to the primary care focus, protocols were also developed for patients discharged from the emergency department and hospital. This continued to fulfill the purpose of keeping patients stable at home while creating capacity within the ED and hospital.



Existing health system relationships with DME companies expedited implementation. Adequate planning allowed BHHC to obtain oxygen tanks and develop operational processes prior to the first community surge. Securing oxygen equipment in a timely manner permitted BHHC to care for patients with an oxygen requirement at home.

Relaxed CMS home health care requirements for patients with COVID-19 also accelerated implementation. Noteworthy changes encompassed a COVID-19 diagnosis included in the homebound definition, expanded use of telecommunications technology, and a higher threshold for initiating oxygen therapy (oxygen saturation <92% changed from <88%).

The death rate for patients enrolled in the EHSM was 1.8% (n=6). Only one patient expired at home, a 66-year-old male with multiple chronic conditions who died in his sleep. His vital signs and oxygen saturation on that day had been normal on room air. The other patients who expired had high-risk pre-existing medical conditions and were of advanced age. These five patients transitioned from the EHSM to inpatient care following clinical decompensation.

### ***Limitations***

Virtual visits are convenient to some patients and necessary to others. They also provide a safety measure for staff, providers, and non-infected patients but certainly have limitations. Reported challenges included unfamiliarity with virtual visit technology, connectivity issues, and limited physical exams.

At this time, disparate EMRs within our health system hindered interoperability causing manual transfer of data in some cases. Additionally, we periodically encountered shortages with home health staff, COVID-19 kits, and oxygen supplies.

### ***Strengths***

When the first COVID-19 surge began in Northeast Florida, it became apparent that home health care agencies participating in the EHSM may be overwhelmed with patients. COVID-19 kits were instrumental in decompressing the home health services, empowering patients to self-monitor, decreasing anxiety and allowing our PCPs to have more meaningful virtual follow up visits. We distributed kits in a proactive manner, along with assignment to a nurse care coordinator, to patients with certain risk factors to self-monitor. Kit distribution allowed patients who were stable with low-risk factors or stable with elevated risk factors due to comorbid conditions to self-monitor with instructions until a home health resource arrived at their home, when appropriate.

Existing ACO resources, including the Clinical Transformation Council and the care coordination team served as effective conduits for development and implementation of the EHSM. The Clinical Transformation Council, as a part of the ACO's formal governance structure, responded in an agile manner driving model development and updates. The care coordination team was instrumental in monitoring patients who received kits while waiting to transition into the EHSM. The care coordination team also answered COVID-19 related questions and addressed social determinants of health.

Despite challenges with virtual visits, physicians and patients shared an overwhelmingly positive experience, which lays the groundwork for care at home model expansion outside of COVID-19.

Finally, we also have physicians with expanded knowledge of EMR functionality within BPC. This added expertise proved essential to streamlining referral and subsequent documentation and data reporting.

## **Conclusion**

We proactively built the EHSM through collaboration with BPC, BHHC, and the ACO. This model decompressed the adult hospitals during COVID-19 surges and allowed numerous patients to receive care and recover safely in the comfort of their own homes. The low number of ED visits and inpatient hospitalizations along with excellent satisfaction survey results demonstrated program success. This

success was due to frequent updates and revisions to the home health protocol as new evidence emerged. Additionally, effective ongoing communication among stakeholders and collaboration with community partners served as integral components to achieving and sustaining superior outcomes.

Many studies have demonstrated that patients prefer treatment in the home setting (5). With well-defined clinical parameters, communication across the care continuum, and telehealth, this model has paved the way to care for patients with other chronic conditions, such as congestive heart failure and chronic obstructive pulmonary disease in the home setting. Expanding this model to these patient populations aligns with existing value-based strategies, while reducing avoidable utilization, increasing quality of care, and enhancing the patient experience.

### **Acknowledgements**

[redacted]

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1. Figure 1. [redacted] Physician Partners Governance Structure

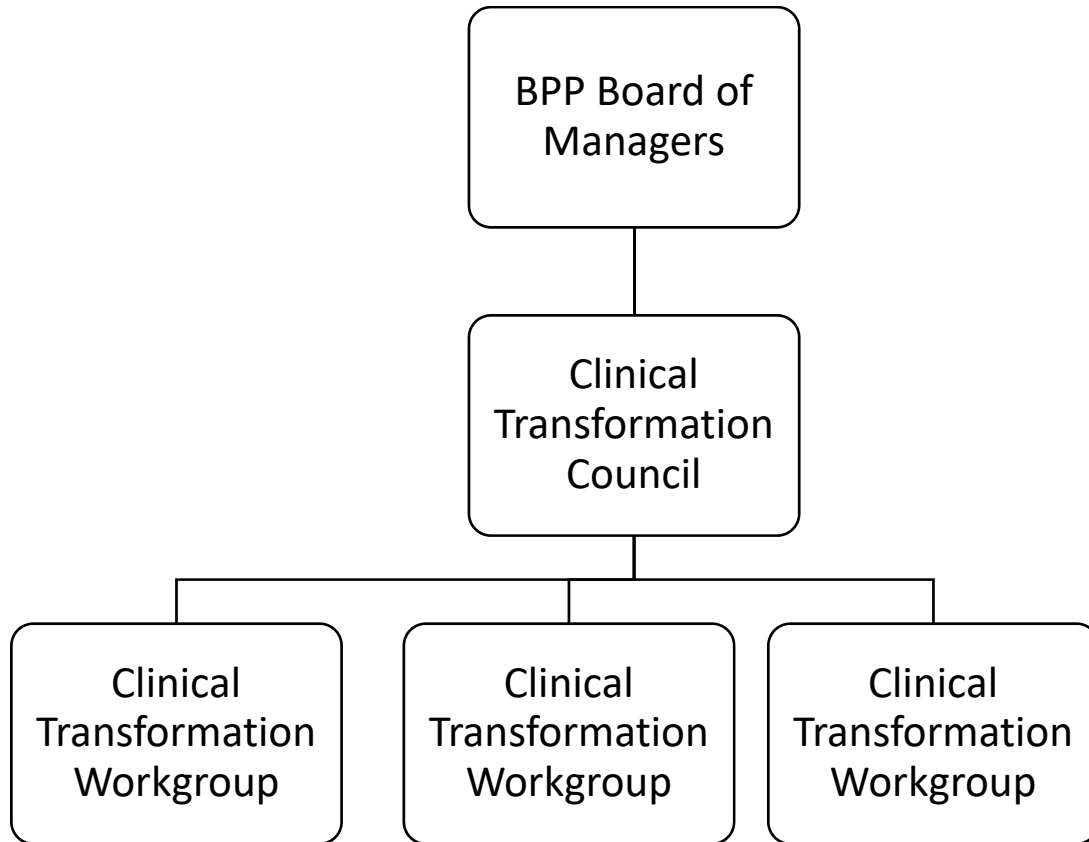


Figure 2. [redacted] Home Health Care Standing Orders as of December 31, 2020.

<p><b>Oxygen:</b> If O<sub>2</sub> sat &lt;92%, start O<sub>2</sub> on patient and titrate LPM to maintain O<sub>2</sub> sat ≥92% not to exceed 3 LPM via nasal cannula at rest.</p> <ul style="list-style-type: none"><li>• If &gt;3 LPM required at oxygen initiation, send to ED immediately and do not initiate protocol.</li></ul> <p><b>Start of Care Labs:</b></p> <ul style="list-style-type: none"><li>• CBC with diff and BMP.</li><li>• Obtain specimen for following test if supplies are available:<ul style="list-style-type: none"><li>○ Test for COVID-19 if not previously tested.</li><li>○ If patient not previously tested for COVID-19 or tested negative, or pending results for COVID-19, AND symptoms less than 48 hours, test for Flu/RSV.</li></ul></li></ul> <p><b>Repeat Labs:</b></p> <ul style="list-style-type: none"><li>• At 48 hours, CBC with diff and BMP.</li><li>• Additional labs at physician discretion.</li></ul> <p><b>Skilled Nurse:</b> Daily x5 consecutive days (to be re-evaluated on a regular cadence by physician) via virtual or in home visits for assessment and vital signs, then every other day for an additional 5 days, 3 PRN visits for troubleshooting worsening symptoms and vital signs, call primary care physician for further orders.</p> <ul style="list-style-type: none"><li>• Arrives within 4-6 hrs (primary care referral)</li><li>• Arrives with e-tank (with regulator and nasal cannula), oximeter, thermometer, BP cuff, and incentive spirometer</li><li>• Check patient O<sub>2</sub> saturation every visit.</li><li>• Walking oximetry daily regardless of O<sub>2</sub> therapy.</li><li>• Reinforce education for incentive spirometer</li><li>• Order O<sub>2</sub> per parameters above, if not already ordered.</li><li>• Instruct patient to rest and breathe calmly until O<sub>2</sub> concentrator arrives from DME company, follow up to ensure it was delivered.</li><li>• If patient O<sub>2</sub> saturation consistently &gt;96%, wean oxygen down to maintain O<sub>2</sub> sat &gt;92%. Do not remove concentrator until order is received from physician.</li><li>• <b>Refer to ED at any time during course of treatment if:</b> O<sub>2</sub> saturation &lt;92% on 3 LPM at rest and/or any dramatic increase in symptoms <b>OR</b> patient consistently requires &gt;3 LPM to maintain O<sub>2</sub> saturation 92% at rest <b>OR</b> if walking oximetry is &lt;80% or if fails to recover to O<sub>2</sub> saturation ≥92% within 2 minutes after activity.</li></ul> <p><b>Medications and Other Standing Orders:</b></p> <ul style="list-style-type: none"><li>• <b>Monoclonal Antibody Therapy:</b> If patient does <b>NOT</b> require oxygen, call PCP for antibody therapy consideration</li><li>• <b>Aspirin:</b> Upon enrollment, contact PCP for initiation of aspirin therapy (81 mg PO once daily). Discontinue after EHSM discharge.</li><li>• <b>Dexamethasone:</b> If patient requires oxygen, call PCP to initiate: 6mg PO once daily x10 days.</li><li>• <b>Fever &gt;100.4°F:</b> Tylenol 650mg every 4-6h as needed (max dose 4g daily for age &lt;65; max dose 3g daily for age &gt;65; for patients with liver disease, reduce dose by 50%).</li><li>• <b>Cough:</b> Robitussin or Delsym as directed.</li><li>• <b>Nausea/Vomiting:</b> Ondansetron 4mg PO every 6-8h as needed; for patients with liver disease, 4mg PO every 12h as needed; (max dose 8mg daily).</li><li>• <b>Diarrhea:</b> Kaopectate, Pepto-Bismol, or Imodium.</li><li>• <b>Hydration:</b> Encourage PO intake.</li></ul> <p><b>Patient Education:</b></p> <ul style="list-style-type: none"><li>• Teach patient/caregiver use of pulse oximeter. If reading is &lt;92% on current liter flow, take deep breath, increase O<sub>2</sub> to no more than 3 LPM, monitoring and recording results every 8 hours or more often if SOB.</li><li>• For patients on dexamethasone who have diabetes, reinforce blood glucose monitoring education.</li><li>• Instruct patient/caregiver to call 911/proceed to ED if O<sub>2</sub> saturation is &lt;92% on 3 LPM at rest or worsening symptoms.</li><li>• Instruct on care and safety of O<sub>2</sub>.</li><li>• Instruct patient to be out of bed for meals and ambulate as able.</li><li>• Instruct patient to wear mask and quarantine from rest of family.</li><li>• Instruct patient to maintain prone position (or side-lying position if proning is not possible) when patient is in bed.</li></ul>
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<b>Table 1</b>		
<b>Population characteristics of patients enrolled in the [redacted] Health Enhanced Home Support Model, April 14, 2020 - December 31, 2020</b>		
	Number of patients	Percent of total
Total patients who started care	329	-
Age ≥65 years	134	40.7%
Received oxygen support	81	24.6%
New hospitalizations after EHSM start of care	42	12.8%
ED visits after start of care (not admitted to hospital)	26	7.9%
Deaths	6	1.8%

<b>Table 2. Satisfaction survey results</b>	
<b>Results for patients who were enrolled in the [redacted] Health Enhanced Home Support Model (n=40)</b>	
<b>Question</b>	<b>Strongly Agree/Agree (%)</b>
Virtual visits with their BPC physician were valuable	92.5%
My BHHC nurse worked well with my primary care doctor and other providers	97.5%
BHHC contacted me in the timeframe that met my needs	95.0%
My BHHC nurse came to my home in the timeframe that met my needs	95.0%
BHHC had equipment to help monitor my condition in my home	95.0%
I was satisfied with the amount of time BHHC spent addressing my needs	95.0%
My BHHC nurse involved my family and caregiver, based on my preference	95.0%
I had a clear understanding of my plan of care	95.0%
Video calls with my BHHC nurse were valuable	97.5%
In-person visits with my BHHC nurse were valuable	97.5%
This program helped me avoid going to the emergency room	85.0%
This program helped me avoid an inpatient hospitalization	88.5%
Having a home health care nurse has improved my COVID-19 condition	100.0%
It was easy for me to reach someone at BHHC	92.5%
<b>Results for physicians who enrolled patients in the [redacted] Health Enhanced Home Support Model (n=26)</b>	
<b>Question</b>	<b>Strongly Agree/Agree (%)</b>
EHSM is a valuable program for the care of patients with COVID-19	100.0%
Communication provided from leadership about the EHSM was sufficient	96.2%
I would use this model for other complex medical conditions	92.3%



Figure 3. Daily Census Overlay: BHHC and Hospitals (excluding [redacted])

