Developing an Intensive Community Covid-19 Management Strategy: Helping Our Patients Access Patient-Centered Care across a Continuum of Covid-19 Disease Needs

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The Covid-19 pandemic is overwhelming hospital and emergency response systems in the US, and is expected to affect provision of care years to come. Community management of Covid-19 reduces strain on inpatient resources and on patients. We describe our experience developing a community Covid-19 management strategy, what we have learned, and our next steps.

Background

The Covid-19 pandemic is overwhelming hospital and emergency response systems in the United States. Healthcare systems are rapidly increasing the number of inpatient beds, managing health care worker shortages, and working to ensure adequate supplies of personal protective equipment (PPE). Despite these intensive efforts, most healthcare systems are struggling with resource limitations. Rural communities and communities of color are most affected, exacerbating inequities. At the same time, experts warn that the pandemic is likely to affect healthcare systems for years to come, suggesting that health systems will need to develop a longer term Covid-19 management strategy.
Avoidance of unnecessary hospitalization can be beneficial to patients by reducing hospital-acquired infections and other complications, and avoiding the emotional toll of being isolated from visitors while hospitalized.

While there is a clear need for inpatient management of patients with a disease trajectory requiring ventilator support, there is no proven benefit of hospital support for other Covid-19-positive patients. Avoidance of unnecessary hospitalization can be beneficial to patients by reducing hospital-acquired infections and other complications, and avoiding the emotional toll of being isolated from visitors while hospitalized. Fewer hospitalizations benefit healthcare workers by reducing potential Covid-19 exposures and the physical and emotional strain of caring for large numbers of hospitalized patients.

However, many patients with Covid-19 are left with few options for care outside of the hospital. Primary care practices have limited in-person visit evaluations or have closed entirely. ED systems in many areas are stretched thin, and are not the best care setting for many patients who don't need to be admitted to the hospital.

To alleviate the pressure on these resources, healthcare systems are developing outpatient management processes. However there is no roadmap for how to do this in the US context. The most successful model available for managing Covid-19 comes from China. In this model, patients with symptoms are evaluated in person at a "fever clinic." Patients with symptoms consistent with Covid-19, regardless of severity, are referred to the hospital. China implemented this approach as a containment strategy, to provide supportive housing that served the public health need for social isolation. This strategy does not transfer well to the U.S. system, where hospitals are used for medical management and their cost structure makes them unsuitable for use as housing. Seeing all patients in person before referring them to inpatient evaluation would also be an inefficient use of resources in the US context.

In the US, many outpatient health systems have rapidly adapted to the Covid-19 crisis by increasing the availability of telemedicine, creating an opportunity to manage care at home. Yet, to optimally manage resources, telemedicine needs to be optimized to assess Covid-19 patients, and needs to be coordinated with in-person evaluation and a population health management approach to ensure the safety of patients.

We describe a community Covid-19 management strategy, early lessons learned, and our next steps.

**Developing an intensive community Covid-19 management model**

[Cambridge Health Alliance](https://www.cha.org/) is a community teaching public hospital system in Massachusetts. Cambridge Health Alliance Primary Care serves a diverse patient population of about 130,000, through 290,000 annual visits to 11 ambulatory care centers and 3 teen centers. There are
approximately 10,000 discharges per year between two hospitals. A quarter of patients receive care in a language other than English and approximately 65% are publicly insured or uninsured.

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We have developed an intensive community management strategy for Covid-19 (See Appendix). The goals are to provide patient-centered care, avoid exposing healthy primary care populations, reduce strain on emergency and hospital systems, and conserve PPE by managing patients at home when appropriate. The pillars of the Covid-19 community model are prevention, identification of cases, early management at home, escalated management in a specialty respiratory clinic, late management at home and, finally, escalated management in the ED and hospital.

The model reflects our understanding of the disease process, based on the literature and refined through management of thousands of patients with suspected or presumed Covid-19. This experience has shown that although presentations are heterogeneous, there are somewhat predictable patterns. Pulmonary involvement develops before pathophysiologic consequences, and often follows a classic trajectory with viral upper respiratory symptoms at roughly four days, worsening cough and dyspnea at around seven days, and severe respiratory symptoms around 10 days after onset of symptoms. In addition to this disease trajectory, our model is built on the understanding that Covid-19 cannot be excluded on the basis of clinical signs or symptoms alone, and that clinicians must fully evaluate patients to avoid missing other important disease processes.

Our model spans the continuum of care and includes six key components: high-risk outreach, telephonic primary care, a phone triage system, a community management group, a respiratory clinic, and integrated emergency room/hospital care (Figure 1).
**High-risk outreach.** Medical assistants in the primary care clinics reach out to primary care patients at higher risk for complicated disease, principally patients with multiple medical comorbidities (such as age 65 or older, diabetes, congenital heart disease, heart failure, coronary artery disease, end stage renal disease, end stage liver disease, chronic obstructive pulmonary disease, pregnancy). These primary care team members use a single call to provide information on social distancing and other protective measures like handwashing, and to ensure that these patients have needed prescription refills.

**Primary care teams.** In addition to continuing to provide primary care, primary care teams perform two key functions. First, they refer any symptomatic patients to the triage center. These patients are identified during routine care—in that is, during televisits, in-person visits, and patients calling into routine primary care telephone triage lines. Nurses at these primary care triage lines refer patients with any one of the following symptoms to the Covid-19 triage center: fever, cough, shortness of breath, anosmia, sore throat, myalgias, rhinorrhea, and diarrhea. Second, any patients triaged by the triage center as having only low-risk symptoms, such as loss of taste and smell, are instructed to call their primary care team if they experience changes. The primary care team
manages these patients in three ways. First, they assess these changes in symptoms to identify other possible etiologies. Second, they give instructions on symptom management. Finally, they refer any patients that show evidence of more complicated disease to the triage center for further management by the Community Management group.

**Triage center.** All patients who call CHA with symptoms of coronavirus or questions about coronavirus have been routed to a dedicated triage center since community spread was detected in the state of Massachusetts. The triage center is a dedicated group of nurses supported by on-site physicians who (1) determine whether patients’ symptoms are clinically consistent with Covid-19 using a symptom checklist, (2) risk-stratify patients for severe disease complications using risk stratification criteria (Table 1), (3) determine whether patients meet criteria for testing, (4) conduct robust education (about 10-15 min) on home care with attention to self-isolation and self-quarantine and (5) evaluate patients for symptoms requiring urgent in-person assessment at the respiratory clinic based on identification of potential pulmonary involvement. Patients are referred to the respiratory clinic if they have 1) dyspnea especially at or after the fourth day since symptom onset; 2) fever/cough and COPD/asthma/other pulmonary disease; 3) increased use of inhalers or supplemental oxygen; 4) any respiratory symptoms and a history of cardiac or pulmonary disease; 5) any other reason for in-person evaluation.

**Community management group.** The community management group draws from a pool of 49 providers (MDs, NPs, PAs) from diverse disciplines. The total time they devote to this function equates to about 20 FTE. A quarter are internists, 50% are from other primary care disciplines (such as pediatrics and family medicine), while 25% are from other disciplines (e.g., neurology, surgery, women’s health). Providers are drawn from these specialties for several reasons. First, diverse disciplines were helpful given the diversity of symptoms. Second, primary care providers were in short supply due to deployment to the hospital. Third, these specialties give the group the ability to provide care for all patients, including pediatric patients and pregnant women. Providers are trained in Covid-19-related management through a combination of an orientation video, daily huddles, continuing education sessions, and printed guidance on management and processes.

These providers are organized in two teams that take on “panels” of suspected and confirmed Covid-19 patients who are at higher risk for severe disease. Collectively these teams managed roughly 2900 patients in total during the first four weeks. Patients were originally assigned by triage center nurses to high risk or moderate risk panels using risk stratification criteria (Table 1),

| Moderate risk | High risk |
|---------------|-----------|
| Chronic kidney disease or end stage renal disease | Adults>65 |
| Cirrhosis | Patients with current/active pulmonary disease (asthma, chronic obstructive pulmonary disease, interstitial lung disease, bronchiectasis, cystic fibrosis, obstructive sleep apnea etc.) |
| Neurodevelopmental or neurological disease (prior stroke, spinal cord injury, amyotrophic lateral sclerosis, multiple sclerosis, muscular dystrophy), dementia/cognitive impairment | Patients with heart disease (congenital heart disease, coronary artery disease, heart failure) |
| Pregnancy | Patients enrolled in complex care management program |
| Age < 1 year | Diabetes |
| Immunosuppressed patients (patients with active cancer, solid organ transplant, immunosuppressive medications, human immunodeficiency virus) | Hypertension |
| Patients identifying as black or Hispanic/Latinx | Body mass index>40 |
| Smoking | |

Source: Cambridge Health Alliance
but individual patients’ risk level can be modified by providers based on other factors, including symptomatology and medical or social complexity. These criteria were developed based on the literature and refined by our experience, and are modified over time as new information becomes available. The high risk team manages patients at high risk for complications or with evidence of significant pulmonary involvement and is largely composed of primary care providers who are accustomed to evaluating diseases that include multiple organ systems with complex biopsychosocial components. The moderate risk team manages patients at moderate risk for complications and is largely composed of providers who are volunteering to work outside their usual scope of practice.

The managers follow patients longitudinally by telephone from their first triage center call, scheduling follow-up at points in the disease process that are known to be associated with sudden changes in clinical course. Community managers reach out to patients based on a schedule guided by our understanding of the typical Covid-19 clinical course, and at a minimum on days 4, 7, and 10, with many patients receiving outreach significantly more frequently or for a longer time.

Managers pay careful attention specifically to evaluation of respiratory symptoms, treating alternative diagnoses when appropriate, and identifying patients with symptoms that suggest severe or worsening disease. Patients with severe or worsening respiratory symptoms are referred to the respiratory clinic or in emergent cases to the emergency room. Community management providers also have training in advance care planning conversations and, along with patients’ PCPs, connect patients and family to palliative care at home if that is the patient’s preferred management choice.

The community management group is supported by a team of MAs. This team provides additional guidance and counseling to patients based on referral from the community managers. These MAs also reach out to all patients referred to community management, regardless of risk level, for a one-time call to review self-isolation and self-quarantine instructions. The outreach team also identifies patients with any new or worsening symptoms, and connects these patients to nurse triage through a warm handoff. Finally, the MA team provides additional support to patients who request documentation for work or other resources in the setting of self-isolation.

The respiratory clinic. The respiratory clinic focuses on in-person evaluation of patients with concerning respiratory symptoms and clinical management of Covid-19 patients who are at risk for poor outcomes. The clinic is staffed by 16 primary care physicians and physician assistants. The clinic administers supportive therapies, provides connection to resources (including crisis counseling), and determines appropriate disposition (emergency department vs. home with home care instructions and close monitoring). Unlike a typical urgent care setting in which disposition may be decided based on limited algorithms, the patients in the Respiratory Clinic setting are evaluated in context of their chronic disease and accompanying risks, including medical, behavioral and social factors. Patients who develop evidence of severe illness are referred to the ED. The Respiratory Clinic has a highly optimized workflow that limits the amount of PPE required per patient to one gown - approximately one-fifth of what might be required in emergency care settings.
Integrated emergency department and hospital system. An integrated emergency department and hospital system evaluates patients with hypoxemia and severe disease. The ED is able to refer stable patients back to the community with close monitoring. Similarly, patients discharged from an inpatient admission are linked back to community management, allowing inpatient teams to consider that resource in their discharge planning. All patients with results pending at the time of discharge from the ED or hospital are also referred to community management.

Challenges

We faced a series of challenges in developing this system:

- Because we had no roadmap, we had to study our outcomes frequently (initially, on a daily basis) to collect and analyze the data we needed to modify the program from its initial design.

- Payment systems continue to create incentives to hospitalize patients, so we needed to reach alignment within our institution to take an approach that prioritized community needs over payment mechanisms, which we were able to do quickly.

- As we developed this system, our health system was already overstretched, working on expanding inpatient capacity, managing PPE needs, and healthcare worker shortages.

- Finally, this process required convening team members from diverse disciplines quickly; our community management strategy required input from a variety of disciplines (pediatrics, family medicine, internal medicine, pulmonary, infectious disease, obstetrics) and services lines (emergency, inpatient, primary care).

Lessons learned

During the first four weeks, we triaged 7,500 patients with suspected or confirmed COVID telephonically. Our community management group televisits grew to 250 daily. The numbers of patients seen in the respiratory clinic increased steadily from 30 per day during our first week to 77 per day in our fourth week (Figure 2). In total, the respiratory clinic conducted 1,117 visits during the first four weeks. This experience yielded a few key insights.
FIGURE 2

Respiratory Clinic Visits and Subsequent Emergency Department or Hospital Admissions

The majority of patients requiring in-person evaluation were managed in the community. In the first four weeks, this model managed 7,500 patients symptomatic for Covid-19, including roughly 2,900 at moderate to high risk for complicated Covid-19 disease. Among the moderate to high risk patients, roughly 1,800 were managed exclusively by telephone and 1,117 were seen in the respiratory clinic. Half of those seen in the clinic had moderate to severe symptoms. We managed 92% of patients with moderate to severe symptoms in the outpatient setting: that is, only 8% were subsequently seen in the emergency room and/or admitted to our hospitals.

Telephonic triage was feasible. Our triage nurses were able to identify patients requiring in-person evaluation, while other patients were managed exclusively telephonically. Of those referred to in-person evaluation at the respiratory clinic, only 6% required subsequent emergency room evaluation and half of these were discharged home after ED care with respiratory clinic follow up, suggesting that patients can be telephonically triaged successfully by a team of dedicated nurses. Patients managed by telephone exclusively may also have visited the ED.

This model may reduce emergency room visits and hospitalizations. Estimates for hospitalization rates for patients with Covid-19 are 9% in our state\(^5\) and 21-31% nationally.\(^6\) We
examined the number of emergency room visits, hospital stays and days for a panel of 7500 symptomatic patients at our institution, compared with averages in our state and nationally (Table 2). Because most patients lack access to in-person outpatient evaluation for Covid-19 symptoms, we assumed that all patients needing in-person evaluation outside of our system were seen in the ED. We currently lack data on our full population, so we conservatively assumed that all patients had emergency room and hospitalization rates similar to that of our respiratory clinic patients; because respiratory clinic patients are the sickest patients, this method likely leads to an overestimation. Conversely, we can only track visits in our system; thus leading to an underestimate of hospitalizations and ED visits. We assume the inpatient length of stay is four days, based on our experience for non ICU patients.

In the first month, we estimate that the intensive community Covid-19 management program managed 7,500 patients with 1,117 (14.9%) respiratory clinic visits, 645 ED visits (8.6%, including visits associated with hospitalizations), and 226 (3.0%) hospitalizations. Using state and national averages, these patients would have had 3 to 12 times more hospitalizations, or 675 and 1950, respectively.

**Community Covid-19 management provides patient-centered care during an emotionally vulnerable time.** Patients with suspected Covid-19 or Covid-19-positive tests are particularly vulnerable. These patients face difficult choices with very little reliable information available and few options for care. We have learned that community Covid-19 management allows patients to share decision-making. We hear from our patients that scheduled telephonic follow-up is reassuring and provides much-needed information and support. Additionally, having providers explain the disease and discuss options (such as community management and palliative and hospice care) provides solace, comfort and empowerment during a time when patients otherwise experience very little power.

"The goals for the coming weeks are to integrate behavioral health and social needs support into the model."

### Table 2. Estimated resources used with intensive community COVID management program data, compared with state average and national average

|                                | Intensive community COVID management program | State average state average% hospitalization rate | National average national average% hospitalization rate |
|--------------------------------|--------------------------------------------|-----------------------------------------------|------------------------------------------------------|
| Patients                       | 7500                                       | 7500                                          | 7500                                                 |
| Respiratory clinic visits      | 1117                                       | 0                                             | 0                                                    |
| Emergency department visits    | 645*                                       | 1117                                          | 1950                                                 |
| Hospital admissions (days)     | 226* (904)                                 | 675 (2700)                                    | 1950 (7800)                                          |

Sources: Cambridge Health Alliance, Mass. Dept. of Public Health, CDC. Emergency department visits includes visits for patients that were hospitalized from the emergency department. Based on data from respiratory clinic patients who are moderate to high risk with severe or worsening dyspnea, which would lead to an overestimate of ED visits and hospitalizations for less severely affected patients. We are unable to track hospitalizations and ED visits outside of our system.
Our model is evolving by the day and we have many steps ahead. The goals for the coming weeks are to integrate behavioral health and social needs support into the model. We are striving to understand which touchpoints are of greatest value to our patients and clinicians. We also will need to modify the model as we learn more about the disease process. As we look to the next phase of the Covid-19 response, we are developing a strategy that would allow the system to both evolve but also grow or shrink in a nimble fashion in response to the changing prevalence of Covid-19 in our community.

We recognize that the looming surge will eventually fade, and we will need to have a long-term strategy in place to manage our patients. For now, our community Covid-19 management strategy allows us to meet our patients’ needs, prepare for the illness to come, and provide the basis to more effectively manage our community’s Covid-19 needs in the future.

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Cambridge Health Alliance Covid Community Management Handbook

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