

Analytics Enables Rapid Identification of Patients with COVID-19 Qualifying for Monoclonal Antibody Therapy



In just nine days, ChristianaCare leveraged DOS and data science tools to **develop and implement** a COVID-19 bamlanivimab eligibility **machine learning model**.



Automating the identification of eligible patients **accelerated the organization's ability to deliver monoclonal antibodies** for the treatment of COVID-19.

PRODUCTS

- ▶ Health Catalyst® Data Operating System (DOS™)
- ▶ Healthcare.AI™

EXECUTIVE SUMMARY

The U.S. Food and Drug Administration (FDA) issued an emergency use authorization permitting the use of bamlanivimab, a monoclonal antibody therapy, for the treatment of mild-to-moderate COVID-19 in adults and pediatric patients at high risk for progressing to severe COVID-19 and/or hospitalization.¹ ChristianaCare received a limited amount of bamlanivimab from the FDA. To receive more doses, it needed to adhere to the strict FDA eligibility criteria and effectively distribute the therapy. ChristianaCare needed the ability to rapidly identify high-risk patients with COVID-19 who qualified for therapy. It leveraged its analytics platform, including data science tools and predictive analytics, to identify patients who qualify for the use of bamlanivimab.

IDENTIFICATION OF PATIENTS ELIGIBLE FOR MONOCLONAL ANTIBODY THERAPY

The FDA offered a limited amount of bamlanivimab to ChristianaCare, but the organization anticipated high demand for monoclonal antibody therapy. Depending upon the organization's success in adhering to eligibility criteria and the effectiveness of its distribution efforts, the FDA would make additional doses available.

ChristianaCare was challenged to rapidly identify and reach out to high-risk patients who were COVID-19 positive, met the strict FDA criteria, and qualified for the therapy outlined in the emergency use authorization. The organization also desired monoclonal antibody therapy distribution be equitable. ChristianaCare wanted to ensure that it was able to identify all patients who met the criteria and wanted to avoid inadvertently developing processes that offered the therapy to a privileged few or only to the well insured.

USING PREDICTIVE ANALYTICS AND MACHINE LEARNING TO IDENTIFY ELIGIBLE PATIENTS

ChristianaCare leveraged the Health Catalyst® Data Operating System (DOS™) platform and a robust suite of analytics applications, including data science tools and predictive analytics, to identify patients who meet the requirements for authorized use of bamlanivimab. The organization developed a machine learning model to stratify the risk of hospitalization in outpatients with mild-to-moderate COVID-19 who meet eligibility requirements.

Each day, the machine learning model identifies patients with an increased likelihood of hospital admission. The model assigns a risk score to each patient, identifies the symptomatic patients at the highest risk of admission, and automates bamlanivimab eligibility, efficiently identifying outpatients who:

- Have tested positive for COVID-19 within the last five days with either a PCR nasal swab diagnostic or rapid antigen saliva test.
- Have symptoms that are mild to moderate and have started within the last ten days.
- Weigh at least 88 pounds and meet at least one of the following criteria:
 - Body mass index ≥ 35 .
 - Chronic kidney disease.
 - Diabetes.
 - Receiving immunosuppressive treatment.
 - Age ≥ 65 years.
 - Age ≥ 55 years and have any of the following: cardiovascular disease, hypertension, or COPD/other chronic respiratory disease.
- Adolescents aged 12 to 17 who meet additional eligibility criteria.



Leveraging the Health Catalyst data science tools to stratify the risk and automate the identification of eligible patients allowed us to distribute monoclonal antibody therapy to our patients with COVID-19 efficiently and equitably. It is available to anyone who meets the criteria, often within hours of their positive COVID-19 test.

Ed Ewen, MD, Director, Clinical Data and Analytics, Center for Strategic Information Management



ABOUT CHRISTIANACARE

ChristianaCare, headquartered in Wilmington, Delaware, is one of the country's most dynamic healthcare organizations centered on improving health outcomes, making high-quality care more accessible, and lowering healthcare costs.

The prioritized patient list is then sent to care coordinators. Care coordinators contact eligible patients, perform the initial screening to assess the patients' symptoms, and confirm if they have an immunosuppressive disease, which requires additional eligibility criteria and provider input. Eligible patients who express interest in treatment are referred to ChristianaCare's virtual practice. The organization uses secure text messaging to communicate with team members when an eligible patient desires treatment. Two providers independently review the eligibility criteria, review the patient data, and confirm if the patient meets the requirements defined by the FDA emergency use authorization.

Care coordinators then reach back out to the patient and schedule them for their bamlanivimab infusion. ChristianaCare reconfigured space to create an infusion center for patients receiving bamlanivimab, ensuring patients with COVID-19 are kept separate from patients receiving chemotherapy or other infusions. ChristianaCare uses the data platform to track the number of patients receiving monoclonal antibodies for COVID-19 and the impact of treatment on outcomes, including COVID-19 related hospitalizations and emergency room visits within 28 days of treatment.



It was important to us that we distribute the monoclonal antibodies equitably to those most likely to benefit. We leveraged predictive analytics to stratify the risk of hospitalization and the Health Catalyst DOS platform to identify all eligible patients. We leveraged the learning gained through our partnership with the Health Catalyst data science team and built a predictive model that accounted for the excess risk associated with race and ethnicity.

Ed Ewen, MD, Director, Clinical Data and Analytics, Center for Strategic Information Management

RESULTS

ChristianaCare was able to rapidly identify high-risk patients with COVID-19 who qualified for therapy, achieving the following results:

- **In just nine days**, ChristianaCare leveraged DOS and data science tools to **develop and implement** a COVID-19 bamlanivimab eligibility **machine learning model**.
- ChristianaCare has automated the identification of eligible patients, **accelerating the organization's ability to deliver monoclonal antibodies** for the treatment of COVID-19, dramatically improving time to treatment for all patients.
- ChristianaCare can **quickly identify eligible patients in less than 24 hours, accelerating patient outreach and enrollment** before the patient progresses to severe COVID-19 and/or requires hospitalization.



WHAT'S NEXT

ChristianaCare's outcomes data for patients receiving bamlanivimab will inform future therapeutics that can be used in the battle against COVID-19. 📌

REFERENCES

1. U.S. Food and Drug Administration. (2020). *Coronavirus (COVID-19) update: FDA authorizes monoclonal antibody for treatment of COVID-19* [Press release]. Retrieved from <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-monoclonal-antibody-treatment-covid-19>

ABOUT HEALTH CATALYST

Health Catalyst is a leading provider of data and analytics technology and services to healthcare organizations, committed to being the catalyst for massive, measurable, data-informed healthcare improvement. Our customers leverage our cloud-based data platform—powered by data from more than 100 million patient records, and encompassing trillions of facts—as well as our analytics software and professional services expertise to make data-informed decisions and realize measurable clinical, financial, and operational improvements. We envision a future in which all healthcare decisions are data informed.

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