ECRONICON OPEN ACCESS

EC NURSING AND HEALTHCARE
Case Report

# Using AI for Patient Navigation during COVID-19 Pandemic: A Case Report

**Fenghao Chen[1,4]*, Tu Lan[1,2], Zheyi Chen[1,3] and Ronghui Zhang[4]**

[1]*COVID-19 Research Consortium, The Hopkins Club for Innovation and Entrepreneurship, Baltimore, MD, USA*

[2]*Department of Civil and Urban Engineering, Tandon School of Engineering, New York University, New York City, NY, USA*

[3]*Department of Computer and Information Science, Towson University, Towson, MD, USA*

[4]*LINKSciences LLC, Baltimore, MD, USA*

***Corresponding Author:** Fenghao Chen, COVID-19 Research Consortium, The Hopkins Club for Innovation and Entrepreneurship, Baltimore, MD, USA.

**Received:** June 23, 2023; **Published:** July 06, 2023

## Abstract

The COVID-19 pandemic has posed numerous challenges for patients seeking care, including limited availability of medical resources and access to information. In this case study, we present the use of an AI-powered patient navigation platform to support more informed decision making and help contribute to successful recovery of the patient during COVID-19 infection through knowledge navigation and augmented referrals. This case highlights the potential of AI-powered solutions to support patients during pandemics and could inform future use of such technology in similar situations.

***Keywords:*** *COVID-19; Patient Navigation; AI; Big Data; Pandemic; Public Health*

## Introduction

COVID-19 is a highly infectious respiratory illness caused by the novel coronavirus SARS-CoV-2 [1]. The virus was first identified in December 2019 in the city of Wuhan, China and has since spread to become a global pandemic [2,3]. On March 11, 2020, the World Health Organization declared the outbreak a pandemic, marking a significant escalation in the spread of the virus [4,5]. As of Dec 2022, the COVID-19 pandemic has infected over 650 million people and resulted in over 6 million deaths worldwide (WHO). The United States has been one of the countries hardest hit by the virus, with over 99 million confirmed cases and over 1 million deaths [6].

The impact of the COVID-19 pandemic has been felt around the world, with widespread disruptions to the economy, healthcare systems, and daily life. Among varieties of challenges, seeing care COVID-19 during pandemics is a daunting task for regular patients. While there has been a focus on studying the population level and healthcare system in relation to the impact of COVID-19 [7-11], but little attention has been paid to individuals and their decisions regarding seeking care.

This study aimed to address this gap by utilizing a data-driven and AI-powered solution to support a single patient during the pandemic. By providing access to reliable and current information about the virus, prevention methods, and the use of medical resources, this

technology helped the patient make informed decisions about their care and aided in their recovery. This case demonstrates the potential for technology to assist patients in making healthcare decisions and highlights the potential of AI-powered solutions to support patients during pandemics. This information could inform the future use of such technology in similar situations.

## Presentation of Case

We present a case study of a 45-year-old patient who was diagnosed with COVID-19 and used an AI-powered solution to augment his access to care.

In brief, the patient experienced symptoms of coughing, fever, and fatigue and was tested positive for COVID-19 by PCR. Due to shortness of breath, he was admitted to the hospital. The admitting diagnosis included COVID-19, a urinary tract infection, and cough. A chest X-ray was conducted and showed no signs of fibrosis in the lungs. The patient was discharged the same day with instructions to self-isolate and manage their viral respiratory infection. Codeine-guaifenesin was prescribed, and the patient recovered within two weeks.

Before admitting to the hospital, the patient used Dr HAIEL for COVID-19 (Dr HAIEL), an AI-powered patient navigation platform to augment their access to care and support their career-seeking plan [12]. The use of this technology helped the patient to better understand the pandemic situation, care-seeking options, and communication with the providers, and may have contributed to their successful recovery.

Upon experiencing symptoms, the patient used Dr. HAIEL's self-checker, a questionnaire based on the guidelines of the Centers for Disease Control and Prevention (CDC), to assess their risk of having contracted the COVID-19 virus. The self-checker asks for basic information such as the individual's temperature and travel history, as well as any symptoms they may be experiencing. Based on the information provided, the patient was determined to be at high risk for COVID-19, and a test was suggested.

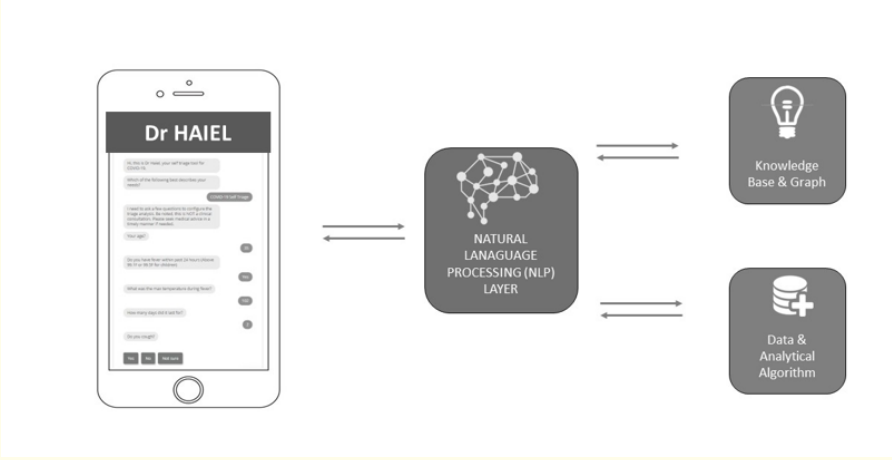


***Figure 1:*** *Schematic illustration of Dr HAIEL for COVID-19.*

Using the medical resource map provided by Dr. HAIEL, the patient was able to find the nearest testing location. This map is backed by the largest database of such information, which is manually curated from the internet. The patient made an appointment at the testing location, took the test, and began self-isolating at home as recommended by public health officials. Through the chat function on

Dr. HAIEL's platform, the patient was able to access guidelines and recommendations for self-isolation and other measures to take if they were exposed to or at risk for COVID-19.

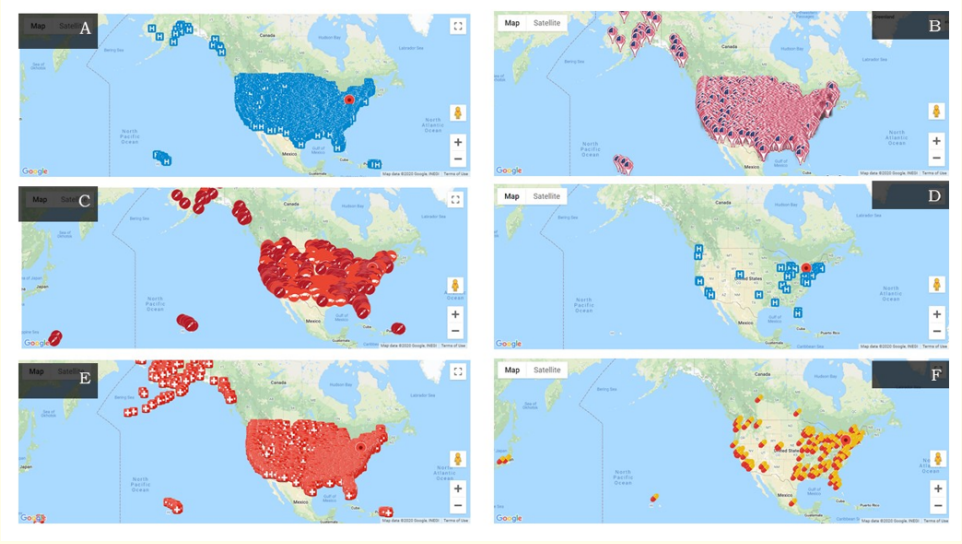


***Figure 2:*** *Map of COVID-19 medical resources in the United States, illustrating A. Hospitals receiving COVID-19 patients; B. Federally supported HESA clinic; C. COVID-19 test sites, including both institutional and drive through; D. Field Hospitals; E. Department of Health in every county; F. Clinical trials for COVID-19 vaccine and therapeutics.*

After testing positive for COVID-19, the patient's symptoms worsened over the next two days. They began experiencing severe coughing, a high fever, and difficulty breathing. At this point, the patient knew they needed to see a healthcare provider for medical assessment as soon as possible. However, they were concerned about the limited availability of medical resources in hospitals due to the high demand for care caused by the pandemic.

Using Dr. HAIEL's platform, the patient was able to find out that there was only one intensive care unit (ICU) bed available at their nearest hospital. However, Dr. HAIEL also provided information about another hospital that had over 10 ICU beds available, drawing on data from the Atlas of America's Hospitals, which lists all the hospitals in the United States. This information allowed the patient to make an informed decision about where to seek care.

Based on the information provided by Dr. HAIEL, the patient decided to go to the hospital with more available medical resources, even though it was farther away and would require an additional hour of driving. This decision allowed the patient to access the care they needed, even in the midst of a highly challenging situation.

## Discussion

During the COVID-19 pandemic, it can be challenging for patients to receive medical treatment, especially during periods of high infection rates and in regions with limited healthcare resources. The rapid spread of the virus has caused a significant increase in demand for medical services, leading to difficulties for hospitals in meeting this demand. This was evident in New York City during the initial wave of

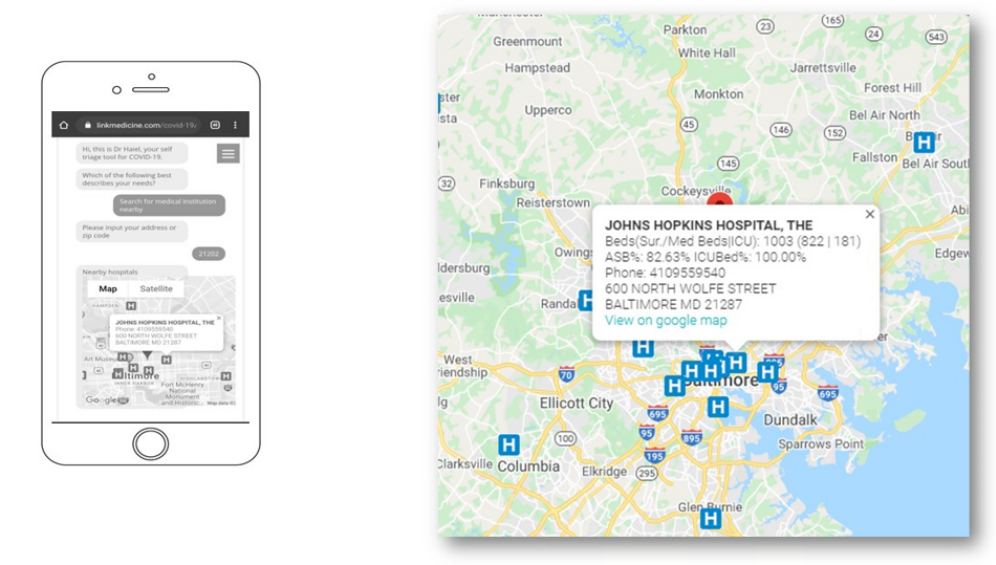


***Figure 3:*** *Digital visualization in Dr HAIEL for medical sources availability for COVID-19.*

| Patient: | 45-year-old male |
|---|---|
| Chief Complaint: | Severe dry cough with blood in sputum and shortness of breath |
| History of Present Illness: | The patient is a 45-year-old male with no underlying medical conditions. He tested positive for COVID-19 on December 29 and experienced symptoms such as severe dry cough, fatigue, and drowsiness for about 7 days. His symptoms have worsened since December 30, with the development of severe dry cough, blood in his sputum, and shortness of breath. The patient's roommate had symptoms of coughing three weeks ago, but tested negative for COVID-19. Recently, the roommate's coughing symptoms have worsened. |
| Physical Examination: | The patient appears to be in moderate distress due to his severe dry cough and shortness of breath. He is not experiencing any fever or other obvious symptoms. |
| Assessment and Plan: | The patient will be hospitalized for further evaluation and treatment of his severe respiratory infection. He will be monitored closely and treated with appropriate medications to help manage his symptoms and prevent complications. It is important for the patient to follow his healthcare provider's instructions and to seek medical attention if his symptoms worsen. |

***Table 1:*** *Medical history of the patient.*

the pandemic in April 2020, when Mount Sinai Hospital set up a field hospital in Central Park to treat coronavirus patients due to the lack of available beds for critically ill patients at the hospital [13].

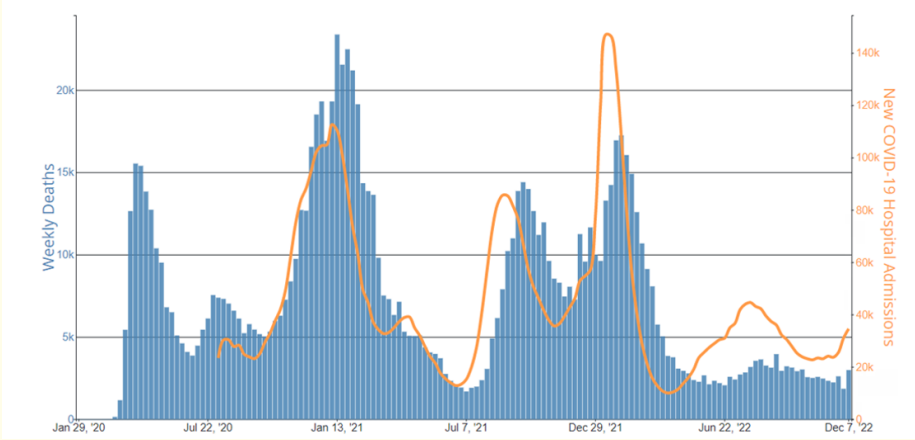


***Figure 4:*** *The trend of COVID-19 death and patients admitted in United States. Bar: Weekly Death count; Line: New COVID-19 hospital admission count.*

At the end of 2020 and beginning of 2021, several regions experienced unprecedented spikes in COVID-19 cases, resulting in the highest death tolls to date. In times of crisis like these, it is crucial to provide patient navigation services to help individuals diagnosed with COVID-19 access the necessary medical care [6].

Patient navigation programs can be incredibly valuable, especially during times of crisis such as the COVID-19 pandemic. These programs provide support and guidance to patients as they navigate the often-complex healthcare system, helping them to access the care they need. However, there is currently a shortage of patient navigators, making it difficult to scale these programs to meet the demand. Training new navigators can be expensive and time-consuming, and the fast-moving nature of the COVID-19 situation has made it difficult for navigators to access information about where to go for treatment and how to navigate the healthcare system. This lack of information can lead to delays in seeking care and ultimately result in poorer outcomes for patients.

To address this challenge, technology-based solutions can provide personalized support and guidance to a large number of patients. Digital technologies have been widely adopted in mitigation of pandemic [14,15]. This case study illustrates the potential benefits of using technology, such as big data, AI, and digital visualization, to support care planning during public health crises. In this specific case, an AI-powered algorithm was used to help a patient with COVID-19-induced acute respiratory distress syndrome make a decision about where to seek medical treatment. The algorithm provided the patient with information about the availability of medical resources in their area and ultimately led them to choose a hospital with more available resources, even though it was farther away. This decision may have been critical in ensuring that the patient received the necessary medical care. In addition to helping patients make informed decisions about their care, technology can also help to mitigate the impact of public health crises on the healthcare system. By using algorithms to manage the flow of patients, hospitals can avoid being overwhelmed and reduce the risk of a medical surge, helping to ensure that patients receive the care they need and that the healthcare system remains effective during times of crisis.

## Conclusion

This study demonstrates how AI-powered solutions can assist patients in navigating the healthcare system and making informed decisions about their care, especially during a global pandemic like COVID-19. The case showcases the potential benefits of using AI-powered

solutions to support patients during the COVID-19 pandemic by providing them with accurate and up-to-date information about the virus and its treatment. This can help patients make informed decisions about their care and support their recovery, as well as potentially alleviate some of the strain on the healthcare system during the crisis. Overall, technologies can be a valuable resource for patients and the healthcare system during times of crisis.

## Acknowledgement

This research was supported by COVID-19 Crisis Relief Program, initiated by the Hopkins Club for Innovation and Entrepreneurship, an alumni and faculty led 501(c)3 organization in Baltimore, Maryland.

The authors are grateful for the patient who gave full consent for the case report. The authors also would like to thank the following personnel for the contribution to COVID-19 Research Consortium related to the case study: Sherryn Sherryn (Johns Hopkins University, School of Public Health), Xuming Zhang, Frankie Shi, Yibo Ma (Johns Hopkins University, Carey Business School), Estelle Wu (Northeastern University), Yuyi Chang (International Technological University), and Westley Wu (Massachusetts Institute of Technology).

The report was inspired by a journal (undisclosed at this preprint) invitation for a COVID-19 case report. The authors chose to utilize ChatGPT, an open access developed by OpenAI (https://openai.com), for the writing of this manuscript. The authors would like to thank all the engineers and other members at OpenAI behind the tool. This work is another example of how AI can facilitate scientific writing as well as research and discovery at large.

## Bibliography

1. Zhu N., *et al*. "A Novel Coronavirus from Patients with Pneumonia in China, 2019". *The New England Journal of Medicine* 382 (2020).
2. CCDC. National Health Commission Update (2020).
3. WHO. WHO Statement regarding cluster of pneumonia cases in Wuhan, China (2022).
4. WHO. WHO Coronavirus (COVID-19) Dashboard (2022).
5. WHO. Listings of WHO's response to COVID-19 (2021).
6. CDC. COVID Data Tracker (2022).
7. Wallace DW., *et al*. "An adapted emergency department triage algorithm for the COVID-19 pandemic". *Journal of the American College of Emergency Physicians Open* 1 (2020).
8. Wu G., *et al*. "Development of a clinical decision support system for severity risk prediction and triage of COVID-19 patients at hospital admission: An international multicentre study". *European Respiratory Journal* 56 (2020).
9. McRae MP., *et al*. "Managing COVID-19 with a clinical decision support tool in a community health network: Algorithm development and validation". *Journal of Medical Internet Research* 22 (2020).
10. Liu Y., *et al*. "A COVID-19 risk assessment decision support system for general practitioners: Design and development study". *Journal of Medical Internet Research* 22 (2020).
11. Vrel JP., *et al*. "A COVID-19 Decision Support System for Phone Call Triage, Designed by and for Medical Students...Medical Informatics Europe, Public Health and Informatics Conference (Virtual), 29-31". *Studies in Health Technology and Informatics* (2021).

12. Dr Haiel for COVID-19, Your Zone Defense for Coronavirus (2020).

13. Yuan L., *et al*. "Field Hospitals: A Study on Public Health Emergency Response to COVID-19". *Med Rxiv* (2020).

14. Ting DSW., *et al*. "Digital technology and COVID-19". *Nature Medicine* 26 (2020).

15. Gardner L., *et al*. "A need for open public data standards and sharing in light of COVID-19". *The Lancet Infectious Diseases* 21 (2021).

**Volume 6 Issue 1 January 2024**