



Public Sector case study

Virtual AI clinician diagnoses symptoms with 98% accuracy

An interactive virtual clinician developed for a national healthcare agency uses generative AI to diagnose patients with non-urgent symptoms and advise a course of action.

The challenge

A national healthcare agency (HA) had identified the potential for generative AI to provide medical advice to patients with non-emergency symptoms. It envisioned a human-like avatar that would use large language models (LLMs) to triage symptoms and recommend a course of action.

This 'virtual clinician' would be capable of listening to patients describe their symptoms and asking the same kinds of clarification questions that a human doctor would ask. Using knowledge absorbed from reams of peer-reviewed medical literature, it would arrive at a diagnosis and advise the patient on what to do next.

An AI clinician to take pressure off healthcare services

The HA could use the virtual clinician to generate major efficiencies in healthcare processes. It could augment national non-emergency call centers, helping more patients to get the right help faster. It could also reduce payer costs associated with medical triage, take pressure off clinicians at risk of burnout and even increase diagnosis accuracy.

There was only one problem: the HA in question didn't have the expertise internally to build a sophisticated generative AI clinician. It turned to Cognizant's global AI and Analytics team for help.

At a glance

Industry

Public Sector

Location

Europe, Middle East and Africa

Challenge

Develop a generative AI-based virtual clinician capable of accurately diagnosing non-emergency medical conditions.

Products and Services

Generative AI

Success Highlights

- 5,000 patient-clinician conversations conducted to date
- 15,000 pages of peer-reviewed medical literature ingested
- 98% accuracy in clinical diagnoses for non-emergency symptoms

Our approach

Our initial discussions with the HA clarified that the vision was to use an animated AI avatar to replicate the clinical pathways that real-world doctors take to drive diagnosis and suggest next steps.

To orchestrate that vision, we designed a generative AI solution that works at four interconnected layers.

Intent: The top layer is used to determine the symptoms by having patients talk online to an animated avatar representing a friendly, thoughtful doctor.

Information: The AI takes the symptoms gleaned over several exchanges between the patient and the virtual doctor and gathers information to support the diagnosis.

Cognition: The symptoms and expert information are analyzed by 30 separate AIs, each trained on a single field of medicine, such as neurology, emergency medicine or dermatology. Each one generates a diagnosis and a confidence of this being correct, and a final clinical governance AI reviews the diagnoses and selects the diagnosis with the greatest consensus.

Presentation: The virtual clinician safely and efficiently presents the result to the patient. This diagnosis can either be presented directly to the patient or used to recommend a next best action, like going to a pharmacy or booking an appointment with a primary clinician or specialist.

A working virtual clinician in just three weeks

Working closely with clinical specialists at the HA to define real-world triaging questions, including counterfactual questions to minimize misdiagnoses, Cognizant built a working virtual AI clinician in just three weeks. Project phases encompassed:

Ideation and scoping: We defined and prioritized virtual clinician use cases, settling on a model that could triage symptoms of 918 individual conditions across many clinical pathways and arrive at a diagnosis. For the processing power needed to run the AI clinician, we prepared a Cognizant cognitive architecture with Microsoft Azure OpenAI.

Building and layering LLMs: Using Cognizant's cognitive architecture, we curated data for system tuning, initiated first pass optimization and set up layers of LLM orchestration to understand intention, detail and context and to consider and present outputs. The cognitive architecture was fed 15,000 pages of peer-reviewed medical literature, along with other data to anchor AI-powered diagnosis.

Refining based on SME feedback: We established a quantifiable feedback loop with HA subject matter experts (SMEs) to evaluate and feed back on the system output. We used that feedback to retune the systems for higher fidelity results, more personalized interactions and more clinical accuracy.

Scaling and launch: A broader test was conducted with over 100 doctors to non-scientifically evaluate the system's capabilities and uncover generative variability. They provided positive feedback on the user experience and confirmed a 98% accuracy rate in the AI diagnoses, enabling us to move the clinician into pre-production for limited beta testing.

Beta testing with internal and external stakeholders: More than 500 beta testers, from the HA and the general public, spoke with the AI-powered avatar about their medical concerns and questions. Careful oversight from clinicians confirmed that the beta testers were receiving science-backed advice as informed and as effective as if they had visited their primary care physician in person.



Business outcomes

The virtual AI clinician has now been proven as a single, scalable solution with built-in clinical governance, capable of diagnosing many common medical concerns across an entire population.

Significant outcomes to date include:

- **5,000 patient conversations** handled during testing phases
- **918 individual conditions** capable of being triaged
- **Many clinical pathways** covered, including neurology and dermatology
- **15,000 pages** of peer-reviewed medical literature ingested to inform diagnoses
- **98% accuracy** in AI-powered diagnoses

Ready for adoption as part of a suite of telemedicine or digital healthcare services,

the clinician is capable of serving as an always-on, always-available first line of medical support—with particular value for rural communities and minority language speakers—and for relieving pressure on overloaded non-emergency call centers.

A window into the future of telemedicine

This successful deployment of a generative AI-powered virtual clinician offers a glimpse of the future of telemedicine and digital therapeutics. Designed, built, tested and launched in just a few weeks, the solution provides an efficient, accurate and cost-effective service for first-line medical care. It can help resolve multiple operational challenges facing modern healthcare systems—for example by alleviating pressure on healthcare contact centers, removing some of the diagnostic burden from busy clinicians and enabling patients to get rapid, accurate and science-based advice for a wide range of symptoms.



Cognizant (Nasdaq-100: CTSI) engineers modern businesses. We help our clients modernize technology, reimagine processes and transform experiences so they can stay ahead in our fast-changing world. Together, we're improving everyday life. See how at www.cognizant.com or [@Cognizant](https://twitter.com/Cognizant).

World Headquarters

300 Frank W. Burr Blvd.
Suite 36, 6th Floor
Teaneck, NJ 07666 USA
Phone: +1 201 801 0233
Toll Free: +1 888 937 3277

European Headquarters

280 Bishopsgate
London
EC2M 4RB
+44 207 297 7600
Email: infouk@cognizant.com

India Operations Headquarters

#5/535 Old Mahabalipuram Road
Okkiyam Pettai, Thoraiyakkam
Chennai, 600 096 India
Phone: +91 (0) 44 4209 6000

APAC Headquarters

1 Fusionopolis Link, Level 5
NEXUS@One-North, North Tower
Singapore 138542
Phone: +65 6812 4000
Email: inquiry@cognizant.com

© Copyright 2024, Cognizant. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the express written permission from Cognizant. The information contained herein is subject to change without notice. All other trademarks mentioned herein are the property of their respective owners.