DELL Technologies

THE LEARNING HEALTH SYSTEM:

Leveraging the Power of Collective Data and AI-driven Research for Individual Impact

DIGITAL TWIN FIRST USE CASE: With an estimated 1 in 20 COVID-19 survivors experiencing long-term symptoms* such as profound fatigue, brain fog, headaches, cardiac arrhythmia, fevers and shortness of breath, Post-Acute Sequelae of SARS-CoV-2 (PASC) is the next public health crisis. The COVID-19 Long-Hauler Project, a partnership between Dell Technologies and i2b2 tranSMART is applying the power of research—accelerated by AI and other advanced technologies—to understand the causes of PASC and develop effective treatments. The Digital Twin effort has the potential to expand with data for up to two million digital twins in the next four years.

1 PATIENT ENROLLMENT: Maria Cacelli from Italy was healthy before COVID-19 but since her diagnosis and initial recovery she developed cardiac and respiratory conditions accompanied by mental fatigue and memory issues. After seeing several specialists and having a battery of tests, she has no clear diagnosis let alone a unified path to recovery. Maria learns she's considered to be a 'long-hauler' and finds an opportunity to accelerate PASC research. She provides consent for her de-identified health data to be utilized for large scale international studies.

PATIENT

DIGITAL TWIN

2 DATA COLLECTION AND DE-IDENTIFICATION: The Data Enclave collects Ms. Cacelli's existing health data in all forms and organizes it into a single record to create a de-identified digital twin that replicates Ms. Cacelli's health status.

Images · EHRs · Test results · Medications

Blood pressure monitor · Fitness tracker

Vital signs · Doctor's notes · Bloodwork · Lung scans

3 INDIVIDUAL TWINS CREATE POPULATION LEVEL DATA AND ENABLE POPULATION RESEARCH: Ms. Cacelli's digital twin resides in the Data Enclave, along with the digital twins of other patients from around the world. Similar digital twins are grouped in population based sets. All data is de-identified for patient privacy.

4 CONTINUOUS UPDATES REFINE THE DIGITAL TWIN: Ms. Cacelli monitors her symptoms with at home and mobile devices and continues to visit her doctors. The data from the devices, diagnostics, etc. are captured and de-identified by the Data Enclave, and the population level data is updated.

UPDATES

Comparison with other digital twins gives doctors valuable insights about key issues such as risk management and potential disease development. This knowledge, combined with traditional data, enables better-informed clinical decisions.

DATA FEEDBACK

5 CONTINUOUS DATA ANALYSIS AND FEEDBACK: As the Data Enclave continues to evaluate digital twins for similarities, the analysis reveals a drug that has been highly effective in patients who resemble Ms. Cacelli. A new pharmaceutical trial with a protocol linked to genetics is announced and Ms. Cacelli is recruited to participate. She opts in.

UPDATES

6 OUTCOME: As a result of the new clinical research and new therapies, long-haulers such as Ms. Cacelli have a shot at better health and quality of life while also contributing to the health of others.

7 FOLLOW-UP: De-identified data from follow-up visits to monitor Ms. Cacelli's additional symptoms will be used to further refine and shape the population-based statistical and mechanistic models.

DATA ENCLAVE

The Data Enclave is powered by an integration of Dell Technologies - PowerEdge, PowerStore, PowerScale, VMware Workspace ONE and Boomi - that enables researchers to power 70,000+ patients' tests, simulations and analyses, which will be shared with an international coalition of more than 200 hospitals.

This is where researchers gather, store and analyze de-identified data sourced from various monitoring systems and electronic health records and update the digital twins with real-time clinical data such as that collected through ventilators and cardiac monitors.

*https://directorsblog.nih.gov/?s=long+covid
**Fictional patient representation

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