



# STRATETHON

## SEASON 3

### Engineering Track

#### Case Study

# Ensuring Medication Adherence

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## About UnitedHealth Group & Optum

Ranked Fortune #5 and with over \$257 billions of annual revenue, UnitedHealth Group (UHG) is the largest health care and wellness solutions company in the world. **Optum**, the fast-growing part of UnitedHealth Group, is a leading information and technology-enabled health services business. Our teams are dedicated to modernizing the health care system and improving the lives of people and communities. Serving virtually every dimension of the health system, we work with a diverse set of clients such as those who diagnose and treat patients to those who pay for care, manage the delivery of health services, and those who supply treatment and disease management solutions in the form of medications and devices. Optum provides technology and tools that enable unprecedented collaboration and efficiency across various levels of healthcare delivery. As a result, we can tap into valuable health care data to uncover insights and develop strategies for better care at lower costs.

At Optum, our mission is to help people live healthier lives and to help make the health system work better for everyone. We are tackling the biggest challenges in health care by designing multifaceted solutions, creating actionable insights and partnering with stakeholders across the entire ecosystem. Together, we are transforming health care for a better future for everyone we serve.

## Problem Statement

Medication adherence usually refers to patients taking their prescribed medications at required frequency (e.g: twice daily and duration (e.g : 3 months) without any omission of doses. Medication nonadherence, either willful or inadvertent, can include the following:

- failing to initially fill or refill a prescription
- omitting one or multiple doses

- prematurely discontinuing medication
- taking a dose at an incorrect time
- taking medication prescribed for someone else
- taking medications with prohibited foods, liquids, or other medications
- taking medications that are expired, damaged, or stored improperly
- improperly using medication devices (e.g., inhalers, syringes)

## UnitedHealthcare & Nonadherence

Medical nonadherence puts huge burden on already stressed healthcare ecosystem. Ensuring medical adherence can ease burden from healthcare ecosystem and reduce overall healthcare cost for all the stakeholders including UnitedHealthcare, largest health insurance company in the U.S. with approximately 70 million members.

### Size

A 2017 review in the Annals of Internal Medicine estimates in that a lack of adherence causes nearly 125,000 deaths, 10 percent of hospitalizations and costs healthcare system between \$100–\$289 billion a year in US. Other reports published later in 2018 takes this number up to \$300 billion a year. Not only in US but other countries are also facing this challenge across the world.

## Scope & Target Population

To address problem of non-adherence we are going target following category of population:

- Elderly Population: Medication Nonadherence in elder population exist more than in younger population. As the population continues to age, chronic disease becomes more prevalent. This translates to an increase in the volume and complexity of medication regimens, increasing the risk for nonadherence. Follow the [study](#) for details.
- Low Literacy Population: Patients who come from traditionally disadvantaged social groups or who have limited educational attainment, self-efficacy medication management is likely a hurdle.
- Minority Groups (e.g., People of Color, People from Asian countries, Red Indians etc.) – As per a survey report from 2019, average adherence rates of Blacks and Hispanics were at least 7.5 percentage points lower than those of Whites.

## Expected Solution

Come up with a holistic solution that covers following areas:

1. Analytics to find out
  - a. population based upon demographic, ethnicity, gender and so on with highest contribution to non-adherence.

- b. top contributing factors
2. Finding potential members who may fall in the bracket of non-adherence in future using AI
3. Providing solution to ensure adherence

Some of the pointers to build solution approach:

- Each patient takes a different path to medication adherence: one patient may be compliant to their allergy medication when prompted by a smart phone notification while another uses a calendar to keep track
- Utilizing predictive analytics and behavioral technology can be considered to give patients the personalized support they need to achieve greater adherence
- Identifying where the patient is in his treatment journey and maintaining engagement throughout each stage

Creative solution may include mobile apps, portals, dashboards, UI/UX experience. It can be powered by modules, AI models, algorithms, Wearables, IoT or any other artefacts. This solution should be deployed and presented. The code for solution needs to be shared over the GitHub.

## Data

For the data, you are going to use synthetic patient data in CSV (comma separate values) format available in public domain.

Link for the sample

data: [https://d8it4huxumps7.cloudfront.net/files/616d761088e87\\_sample\\_data\\_csv\\_1.zip](https://d8it4huxumps7.cloudfront.net/files/616d761088e87_sample_data_csv_1.zip)

Following table has detail about each of the csv files one can get when they extract the data. Patients Data set can be used to determine Minority Groups and Low Literacy Population.

File	Description	Imp for Case Study
<a href="#">allergies.csv</a>	Patient allergy data.	Yes
<a href="#">careplans.csv</a>	Patient care plan data, including goals.	No
<a href="#">claims.csv</a>	Patient claim data.	No
<a href="#">claims_transactions.csv</a>	Transactions per line item per claim.	No
<a href="#">conditions.csv</a>	Patient conditions or diagnoses.	Can be referred
<a href="#">encounters.csv</a>	Patient encounter data.	Can be referred
<a href="#">imaging_studies.csv</a>	Patient imaging metadata.	Can be referred
<a href="#">immunizations.csv</a>	Patient immunization data.	Can be referred

File	Description	Imp for Case Study
<a href="#">medications.csv</a>	Patient medication data.	Yes
<a href="#">observations.csv</a>	Patient observations including vital signs and lab reports.	Can be referred
<a href="#">organizations.csv</a>	Provider organizations including hospitals.	No
<a href="#">patients.csv</a>	Patient demographic data.	Yes
<a href="#">payer_transitions.csv</a>	Payer Transition data (i.e., changes in health insurance).	No
<a href="#">payers.csv</a>	Payer organization data.	Can be referred
<a href="#">procedures.csv</a>	Patient procedure data including surgeries.	Yes
<a href="#">providers.csv</a>	Clinicians that provide patient care.	Can be referred
<a href="#">supplies.csv</a>	Supplies used in the provision of care.	Can be referred

The detailed data dictionary for the above is available in the following location:

<https://github.com/synthetichealth/synthea/wiki/CSV-File-Data-Dictionary>

## References

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<https://www.nacds.org/news/the-cost-of-medication-non-adherence/>

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