**IQVIA**
INSTITUTE
FOR HUMAN DATA SCIENCE

# Data can be used to predict COPD rehospitalizations or diagnose AFib in individual patients

*Frequent hospitalization among COPD patients and lengthy clinical care options for patients suffering from AFib can negatively impact patients and be expensive for the healthcare system.*

## Situation

Human Data Science is an integral contributor to personalized medicine, supporting customized treatment approaches that offer care and regimens tailored to individual patients and ultimately mitigate risk. Applications of artificial intelligence, machine learning, and predictive analytics in healthcare are proliferating. Integrating these tools into patient care enables smarter decisions for more personalized patient care. Algorithms can be built to predict and prevent rehospitalizations or diagnose disease, thereby improving patient health, preventing disease, and reducing costs.

## Challenge in COPD

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory lung disease that causes obstructed airflow from the lungs that can be exacerbated by infections or inhaling irritating substances. Almost a third of COPD patients are re-hospitalized shortly after leaving the hospital, which is stressful for the patient and expensive for the healthcare system.

## Approach and Solution

Machine learning algorithms can be used to predict disease progression and alert healthcare providers for better patient management. IQVIA created a machine learning algorithm to predict and prevent re-hospitalizations due to severe exacerbations of COPD. From exploratory data analyses, it became apparent that the short-term risk of re-hospitalization after a severe hospitalization can be predicted, in part, on factors including the number of exacerbations prior to hospitalization, number of visits to a physician in outpatient care before hospitalization, and the length of hospital stay.

Using patient-level data from electronic health records and patient registries to feed the algorithm — including detailed information about consultations, diagnoses, prescriptions, lab testing, hospitalizations and socioeconomic factors — the model demonstrated it was possible to predict re-hospitalizations due to COPD.[1] This model is an example of how human expertise, data science, disease understanding, and patient insights can be used together to inform healthcare decisions.

## Challenge in AFIB

Atrial fibrillation (AFib) is an irregular heartbeat that can lead to stroke, heart failure or death. As patients may experience only mild symptoms or be asymptomatic, this leads the condition to be underdiagnosed.

## Approach and Solution

Researchers from the Mayo Clinic were able to train an artificial intelligence-enabled electrocardiograph (ECG) to identify AFib in patients at point-of-care. The authors concluded that their artificial intelligence model could accurately differentiate between patients with a history of atrial fibrillation using a single, routine ECG. Currently diagnosis requires additional and sometimes burdensome testing (e.g., 24-hour Holter monitoring).[2] This method could potentially identify patients with an unsuspected but critical risk factor for stroke and other heart complications using a routine test, and is an example of how human expertise, human data and advanced analytics can bring about change to routine clinical practice and improve patient outcomes.

### IMPACT OF HUMAN DATA SCIENCE

Data-driven and actionable predictive analytic models, like training a machine learning model with real world datasets to predict the probability of re-hospitalization of COPD patients, or using ECG diagnostic data to train an artificial intelligence model to identify AFib in undiagnosed patients, can enable patients and clinicians to make better, more informed healthcare decisions.

Human Data Science has the potential to impact routine clinical care and improve patient outcomes by combining human expertise with advanced analytics and real world patient data. Advanced analytic programs and algorithms can be used to inform decision-making and predict outcomes, disease risk, or acute health episode risk.

**REFERENCES**

1. Mueller M, Luczko M, Wolk A. IQVIA 1st Data Science Conference; 2019 Feb 19-20, 2019; Steigenberger Airport Hotel, Frankfurt, Germany

2. Attia ZI, Noseworthy PA, Lopez-Jimenez F, Asirvatham SJ, Deshmukh AJ, Gersh BJ, et al. An artificial intelligence-enabled ECG algorithm for the identification of patients with atrial fibrillation during sinus rhythm: a retrospective analysis of outcome prediction. Lancet. 2019 Aug 1. pii: S0140-6736(19)31721-0

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*Human Data Science was used to build artificial intelligence algorithms to predict re-hospitalizations and diagnose unknown disease at the patient level, thereby increasing overall patient health, preventing future disease complications, and reducing costs to the health system.*

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