In this lecture, we discuss the idea of predictive analytics in medicine.

Specifically, we introduce the idea of using clustering methods for better predicting heart attacks.

Heart attacks are a common complication of coronary heart disease, resulting from the interruption of blood supply to part of the heart.

Heat attack is the number one cause of death for both men and women in the United States.

About one in every four deaths is due to heart attack.

A 2012 report from the American Heart Association estimates about 715,000 Americans have a heart attack every year.

To put this number into perspective, this means that every 20 seconds, a person has a heart attack in the United States.

It is also equivalent of September the 11th repeating itself every 24 hours, 365 days a year.

Nearly half of these attacks occur without prior warning signs.

In fact, 250,000 Americans die of sudden cardiac death yearly, which means 680 people every day die of sudden cardiac death.

A heart attack has well-known symptoms-- chest pain, shortness of breath, upper body pain, nausea.

The nature of heart attacks, however, makes it hard to predict, prevent, and even diagnose.

Here are some statistics.

25% of heart attacks are silent.

47% of sudden cardiac deaths occur outside hospitals, suggesting that many patients do not act on early warning signs.

Only 27% percent of respondents to a 2005 survey recognized the symptoms and called 911 for help.

How can analytics help?

The key to helping patients is to understand the clinical characteristics of patients in whom heart attacks was missed.

We need to better understand the patterns in a patient's diagnostic history that link to heart attack and to predicting whether a patient is at risk for a heart attack.

We'll see, in this lecture, how analytics helps to understand patterns of heart attacks and to provide good predictions that in turn lead to improved monitoring and taking action early and effectively.