Prediction of death associated with heart failure

Introduction:

Heart failure in layman’s terms can be stated as a condition under which the heart can no longer bear its workload. When our heart isn’t working properly, i.e., it isn’t pumping enough amount of blood to various parts of the body the homeostasis associated with the cardiovascular system is affected. When homeostasis is affected, the heart stops pumping blood to less important parts of the body, and thin blood vessels to maintain pressure to make up for the heart’s inability, this, in turn, leads to various conditions which can be termed as the probable symptoms of a heart failure.

* The estimated amount of money spent on cardiovascular disease is estimated to be about 21 billion.
* The direct and indirect expenditures associated with cardiovascular disease amounted to $363.4 billion for the years 2016 and 2017. This consists of direct expenses totaling $216 billion and indirect costs totaling $147.4 billion due to death and lost productivity.
* The treatment of cardiovascular disease consumes almost one in every six dollars spent on healthcare in the United States.

Dataset:

* Age: People who are getting older and are already elderly are at an increased risk of developing cardiovascular disease. Age is a risk factor in and of itself for cardiovascular disease (CVD) in adults; however, the risks posed by age are increased by additional factors such as frailty, obesity, and diabetes. It is well established that the presence of these factors both complicates and exacerbates the cardiac risk factors that are typically linked with the beginning of old age.
* Anemia: It is a condition in which there isn’t enough supply of oxygen to the cells and organs in the body, In order to keep up with the supply of red blood corpuscles, the heart pumps more blood which in turn increases resting heart rate.
* Creatinine Phosphokinase: Creatine Phosphokinase is an enzyme typically found in the heart and its levels can be used to detect damage to myocardial cells. During incidents of a heart attack, the levels of CK-MB raises rapidly and return back to normal after 36- 48 hours. The normal range of CPK in males is between 39- 308U/L and in females, it is close to 26- 192 U/L.
* Diabetes: If you have diabetes, you have a younger onset of heart disease and a higher risk of having a stroke than people who do not have diabetes, even if they live to a similar age. If you have diabetes for a long period of time, your risk of developing heart disease increases. If you have high blood sugar for an extended period, it might harm your blood vessels as well as the nerves that control your heart. People who have diabetes have an increased likelihood of having other illnesses that boost the risk for cardiovascular disease.
* Ejection Fraction: The ejection fraction, often known as EF, is a measurement of the amount of blood that is pumped out of the left ventricle with each contraction. It is given as a percentage. If your ejection fraction is 60 percent, it indicates that each time your heart beats, 60 percent of the total volume of blood that is contained in your left ventricle is expelled. Heart failure can be diagnosed and monitored with the use of this measurement of how efficiently the heart pumps blood out of the body. The ejection fraction of a healthy heart typically falls somewhere between 50 and 70 percent. The presence of heart failure or cardiomyopathy may be inferred from an ejection fraction value that is less than 40 percent.
* Platelets: Abnormal clotting can occur as a result of cardiovascular disease, which can lead to either a heart attack or a stroke. Blood vessels that have been damaged as a result of smoking, high cholesterol levels, or high blood pressure create cholesterol-rich buildups (plaques) that line the blood vessel. These plaques have the potential to burst, which in turn causes platelets to clump together and form a clot. Platelets may feel when a plaque has ruptured, and when they do, they become perplexed and believe that an injury has occurred that would produce bleeding. This occurs even when there is no actual bleeding taking place. A clot forms in an unbroken blood vessel, and as a result, blood flow is restricted rather than being sealed off to prevent bleeding as it would be in the case of an injury such as a cut.
* Serum Creatinine: An elevated amount of serum creatinine is associated with an increased risk of both cardiovascular disease and kidney disease. People who have kidney disease have a significantly higher risk of heart disease, and heart disease is the leading cause of mortality among patients who have severe kidney disease (also known as end-stage kidney disease).
* Smoking: The ability of your blood to carry oxygen is impacted by the presence of carbon monoxide in cigarette smoke. Because of this, your heart has to pump blood at a faster rate in order to provide your body with the oxygen it needs. Smoking also adds to the accumulation of lipids in your blood vessels, which causes the vessels to constrict, which in turn increases the risk of thrombosis and blood pressure. In addition to this, it is the cause of chronic obstructive airways disease, which is characterised by shortness of breath and symptoms that are similar to those of heart failure.

Analysis:

In this project, we are studying the data set and using regression analysis to study the relationship between various enzymes and components in blood, various health issues, and other causes of heart failure and ultimately death. Moreover, since heart disease is of a life-threatening issue, using machine learning and analysis to predict heart diseases would possibly reduce death related to heart disease, early detection, and also reduce the amount of money spent on heart disease.

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