**Washington State University  
MIS 420 – Business Intelligence Online**

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**T-SQL #3**

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**Introduction**

The project utilizes more than 70,000 patient health records of health and potential coronary artery disease indicators and focuses on the analysis of treadmill stress test. The goal is to use charts and matrices to discover problems and analyze them from various perspectives and finally provide a professional report.

**Data Analysis**

**테이블이(가) 표시된 사진

자동 생성된 설명**

**차트이(가) 표시된 사진

자동 생성된 설명**

From the above metrics and chart, there are 71760 total patient records, 9 age groups, and 4 BMI groups. Patients in their 20s are the most distributed at 20.33% of the total, and the rest of the groups are generally distributed at 10%. In addition, checking the BMI ratio shows that "Obesity" patients are the most distributed with 49.67% of the total, and "Underweight" patients are the least distributed with 8.27%.

**차트이(가) 표시된 사진

자동 생성된 설명**

Through the left pie chart, the gender ratio of all patients is 49.91% for males and 50.09% for females, at a similar level.

**차트이(가) 표시된 사진

자동 생성된 설명**

Based on the line charts above, the average weight by age is 158.75 lb., indicating that the average weight of 26, 51, 57, 64, and 67 years old are heavier than the other ages, and the average weight of 50, and 60 years old are lighter than the other ages. It can also be seen that the weight of 50 and 51 years old is clearly different by one year.

**차트이(가) 표시된 사진

자동 생성된 설명**

Based on the line chart above, the average height by age is 62.5 kg, indicating that the average height of 29, 57, and 64 years old are taller than the other ages, and the average height of 56 old is the shortest. It can also be seen that the height of 56 and 57 years old is clearly different by one year.

Also, compared to the average weight chart, 57 and 64 ages are on average heavier and taller than other ages.

**차트이(가) 표시된 사진

자동 생성된 설명**

The above line chart shows the average diastolic blood pressure and average systolic blood pressure by age. It may be seen that the average diastolic blood pressure is 95.90 mm Hg, and the average systolic blood pressure is 125.48 mm Hg. Normally, normal blood pressure levels should be below 80 mm Hg of diastolic blood pressure and below 120 mm Hg of system blood pressure, but it can be confirmed that blood pressure levels at most ages are not in the normal range.

**차트이(가) 표시된 사진

자동 생성된 설명**

The "Average of DiaBP and Average of SysBP by age" line chart above shows that there are problems with the patient's diastolic blood pressure and systolic blood pressure, so the above chart shows the distribution by 4 levels of blood pressure. As a result, only a few patients have normal blood pressure, and most patients have hypertension stage 2 and hypertension stage 1.

If you look at the left stacked chart, you can check the blood pressure distribution by BMI group. On average, all BMI groups have many distributions of stage 2 hypertension and stage 1 hypertension, while normal blood pressure and elevated blood pressure levels are very less.

**차트이(가) 표시된 사진

자동 생성된 설명**

In addition, the table on the right shows that on average, half (50%) of all age groups have two stages of hypertension and only 3% have normal blood pressure. However, the results may be inaccurate because this is a blood pressure written based on the results of the peak heart rate after the treadmill stress test.

**테이블이(가) 표시된 사진

자동 생성된 설명**

Finally, check the results (3 heart health levels) of the treadmill stress test by BMI group and age group.

차트이(가) 표시된 사진

자동 생성된 설명The stacked chart on the left shows that patients who are "Obesity" at all heart health levels account for the largest percentage and those who are "Underweight" account for the lowest percentage. In addition, it can be confirmed that 40% of all patients are at risk, and less than 30% of extremely healthy patients.

**차트이(가) 표시된 사진

자동 생성된 설명**

Based on the stacked chart above, checked the heart health status by age, and found that the group in their 20s had much more patients with very healthy or healthy hearts than those at risk. Conversely, there are more patients at risk for groups in their 60s and older.

It can also be seen that as the age group increases, the number of patients at risk gradually increases and the number of patients with healthy hearts decreases.

**Conclusion**

As a result of analyzing the relationship between the health record variables of each patient through the treadmill stress test, it was found that almost all age groups are obese, and the higher the age group, the higher the risk of potential coronary artery disease. The additional data we would like to propose for more insight are health record data of more people and data from the regions where they live (ex: Country, City, State). If such additional data is provided, I think that a deeper analysis can be performed. And in the case of the "BMI" column, it was thought that the effectiveness of the results could be threatened while analyzing. This is because the results of 'BMI' may not be the original figures for each patient because the data set was recorded at the maximum heart rate after performing a treadmill stress test. While conducting this analysis, I wanted to create a level metric that subdivided the treadmill stress test level divided by age group once more, but it was impossible with the SQL knowledge that I knew so far.

**Appendix**

USE [Featherman\_Analytics];

SELECT \*

, CASE -- results of treadmill test

WHEN [HRTreadmillTest] >= [AvgMaxHeartRate] THEN 'At risk'

WHEN [HRTreadmillTest] < [AvgMaxHeartRate] AND

[HRTreadmillTest] > [HR Zone 60]

THEN 'Healthy'

WHEN [HRTreadmillTest] <= [HR Zone 50] OR [HRTreadmillTest] <= [HR Zone 60]

THEN 'Extremely Healthy'

END AS [Heart Health]

, CASE -- Blood Pressure

WHEN [SysBP] < 120 AND [DiaBP] < 80 THEN 'Normal'

WHEN ([SysBP] BETWEEN 120 AND 129) AND [DiaBP] < 80 THEN 'Elevated'

WHEN ([SysBP] BETWEEN 130 AND 139) OR ([DiaBP]BETWEEN 80 AND 89) THEN 'Stage 1 Hypertension'

WHEN ([SysBP] >= 140 AND [SysBP] < 180) OR ([DiaBP] >= 90 AND [DiaBP] < 120) THEN 'Stage 2 Hypertension'

WHEN [SysBP] >= 180 OR [DiaBP] >= 120 THEN 'Hypertensive crisis'

END AS [Blood Pressure]

, CASE -- Gender

WHEN sex = 1 THEN 'Male'

ELSE 'Female'

END AS [Gender]

FROM

(SELECT \*

, CASE -- BMI groups

WHEN [BMI] < 18.5 THEN 'Underweight'

WHEN [BMI] BETWEEN 18.5 AND 24.9 THEN 'Healthy Weight'

WHEN [BMI] BETWEEN 25.0 AND 29.9 THEN 'Overweight'

WHEN [BMI] >= 30.0 THEN 'Obesity'

END AS [BMI Group]

, CASE -- Avg Max Heart Rate (85%)

WHEN [Age Group] = '20 years' THEN 170

WHEN [Age Group] = '30 years' THEN 162

WHEN [Age Group] = '35 years' THEN 157

WHEN [Age Group] = '40 years' THEN 153

WHEN [Age Group] = '45 years' THEN 149

WHEN [Age Group] = '50 years' THEN 145

WHEN [Age Group] = '55 years' THEN 140

WHEN [Age Group] = '60 years' THEN 136

WHEN [Age Group] = '65 years' THEN 132

WHEN [Age Group] = '70 years' THEN 128

END AS [AvgMaxHeartRate]

, CASE -- HR Zone 50%

WHEN [Age Group] = '20 years' THEN 100

WHEN [Age Group] = '30 years' THEN 95

WHEN [Age Group] = '35 years' THEN 93

WHEN [Age Group] = '40 years' THEN 90

WHEN [Age Group] = '45 years' THEN 88

WHEN [Age Group] = '50 years' THEN 85

WHEN [Age Group] = '55 years' THEN 83

WHEN [Age Group] = '60 years' THEN 80

WHEN [Age Group] = '65 years' THEN 78

WHEN [Age Group] = '70 years' THEN 75

END AS [HR Zone 50]

, CASE -- HR Zone 60%

WHEN [Age Group] = '20 years' THEN 120

WHEN [Age Group] = '30 years' THEN 114

WHEN [Age Group] = '35 years' THEN 111

WHEN [Age Group] = '40 years' THEN 108

WHEN [Age Group] = '45 years' THEN 105

WHEN [Age Group] = '50 years' THEN 102

WHEN [Age Group] = '55 years' THEN 99

WHEN [Age Group] = '60 years' THEN 96

WHEN [Age Group] = '65 years' THEN 93

WHEN [Age Group] = '70 years' THEN 90

END AS [HR Zone 60]

FROM

(SELECT [ID],[age],[sex],[SysBP],[DiaBP],[HRTreadmillTest],[weightLbs]

,[heightInches],[BMI]

, CASE -- age groups

WHEN age BETWEEN 20 AND 29 THEN '20 years'

WHEN age BETWEEN 30 AND 34 THEN '30 years'

WHEN age BETWEEN 35 AND 39 THEN '35 years'

WHEN age BETWEEN 40 AND 44 THEN '40 years'

WHEN age BETWEEN 45 AND 49 THEN '45 years'

WHEN age BETWEEN 50 AND 54 THEN '50 years'

WHEN age BETWEEN 55 AND 59 THEN '55 years'

WHEN age BETWEEN 60 AND 64 THEN '60 years'

WHEN age BETWEEN 65 AND 69 THEN '65 years'

WHEN age BETWEEN 70 AND 79 THEN '70 years'

END AS [Age Group]

FROM [featherman].[Health\_heart\_experimental]

) AS data

) AS data2