Healthcare Analysis using SQL

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Project Summary:

This project focuses on analysing data to address the hospital's concerns regarding resource allocation and the effectiveness of patient care across various departments. The goal is to uncover actionable insights into patient demographics, diagnostic trends, and visit patterns to optimize service delivery.

Objective:

1) What is the demographic profile of the patient population, including age and gender distribution?

Pediatric: less than 18 years old

Adult: Between 18 to 64 years old

Senior: Over 65 years old

2) Which diagnoses are most prevalent among patients and how do they vary across the different demographic groups, including gender and age?

3) What are the most common appointment times throughout the day, and how does the distribution of appointment times vary across different hours?

4) What are the most ordered lab tests?

5) Typically, fasting blood sugar levels fall between 70-100 mg/dL. Identify patients whose lab results are outside this normal range to implement early intervention.

6) Assess how many patients are considered High, Medium, and Low Risk. High Risk: patients who are smokers and have been diagnosed with either hypertension or diabetes.

7) Find out information about patients who had multiple visits within 30 days of their previous medical.

Dataset:

Below are details of the datasets:

- Patients: patient id, patient name, date of birth, gender, address
- Outpatient Visits: visit id, patient id, visit date, name of doctor, reason for visit, diagnosis prescribed medication, smoking status
- Lab Results: result id, visit id, test name, test date, result value
- Hospital Records: patient id, patient name, BMI, family history, days in hospital
- Appointment: visit id, patient id, department name, patient name, appointment time, arrival time, appointment date, admission time

Query Analysis and Insights:

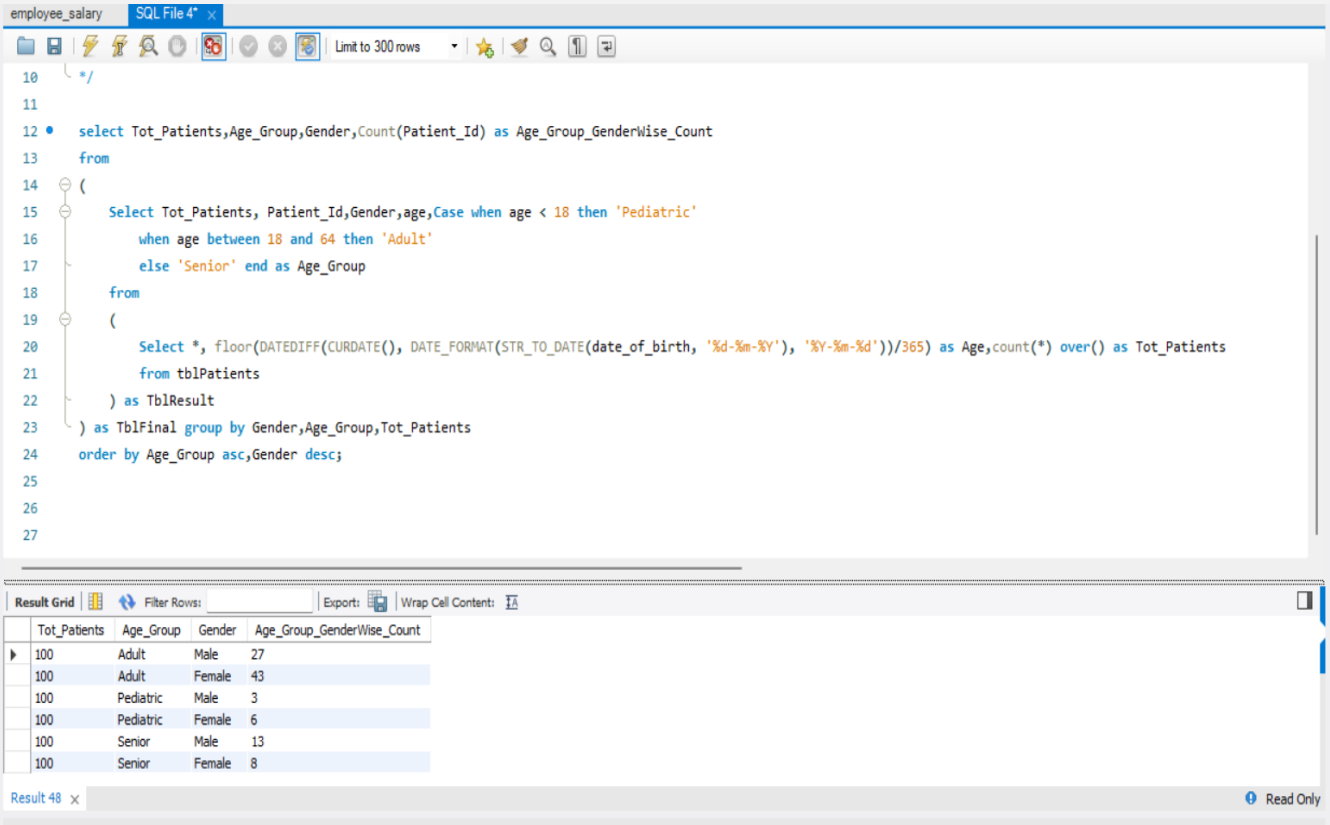
DEMOGRAPHICS

1) What is the demographic profile of the patient population, including age and gender distribution?

- Pediatric: less than 18 years old
- Adult: Between 18 to 64 years old
- Senior: Over 65 years old

I grouped the records by Age group and Gender and observed that Adult Females represent the largest segment in the patient dataset, followed by Adult Males.

QUERY & OUTPUT

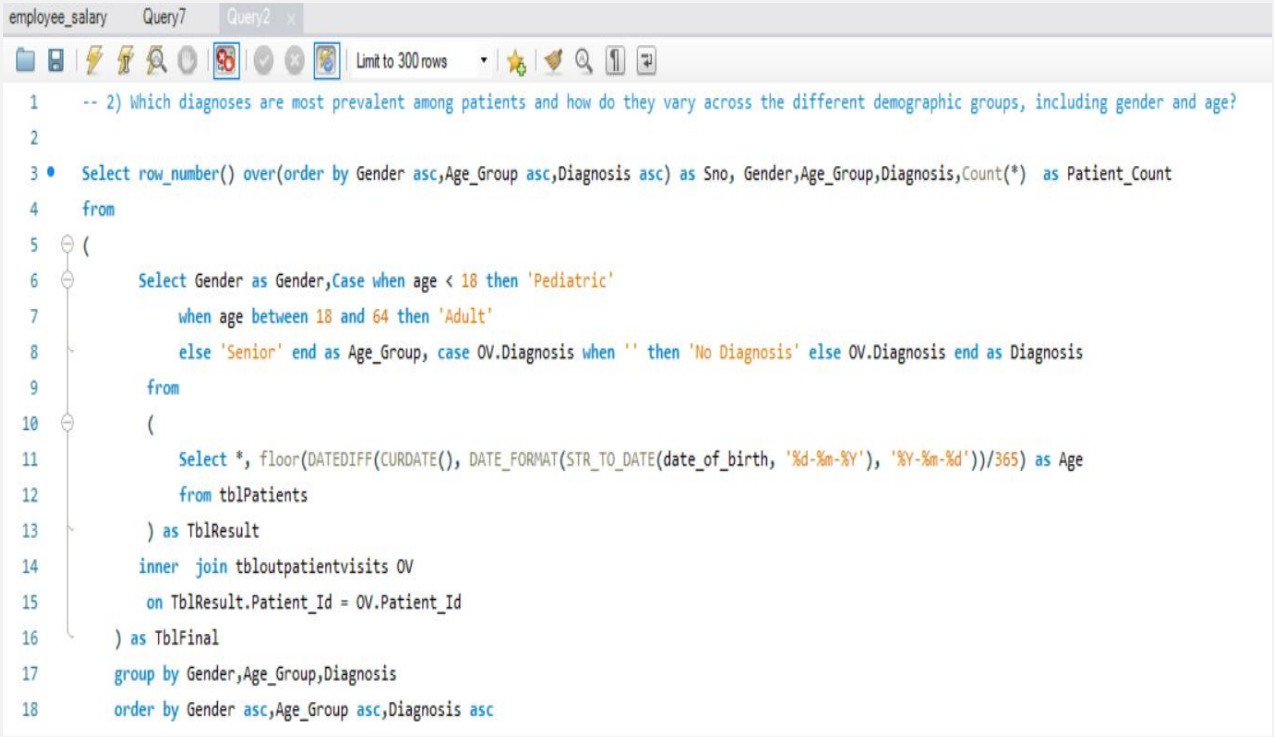


DIAGNOSIS

2) Which diagnoses are most prevalent among patients and how do they vary across the different demographic groups, including gender and age?

109 adult females and 25 senior females were left without a diagnosis, while 68 adult males and 51 senior males also had no recorded diagnosis. In addition, the most common diagnosis among adult males and females is diabetes, while respiratory illness is prevalent among seniors.

QUERY

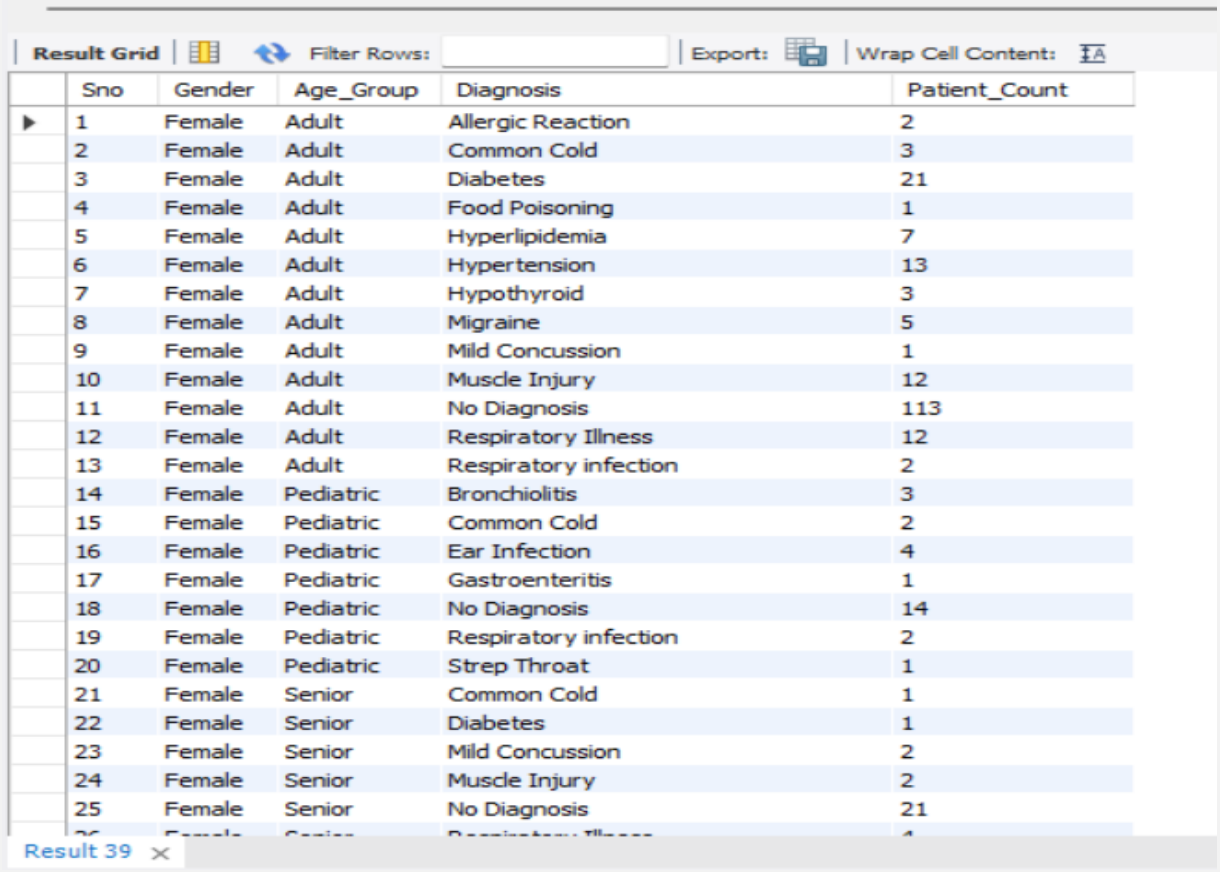


```
-- 2) Which diagnoses are most prevalent among patients and how do they vary across the different demographic groups, including gender and age?

Select row_number() over(order by Gender asc,Age_Group asc,Diagnosis asc) as Sno, Gender,Age_Group,Diagnosis,Count(*)  as Patient_Count
from
(
      Select Gender as Gender,Case when age < 18 then 'Pediatric'
          when age between 18 and 64 then 'Adult'
          else 'Senior' end as Age_Group, case OV.Diagnosis when '' then 'No Diagnosis' else OV.Diagnosis end as Diagnosis
       from
       (
          Select *, floor(DATEDIFF(CURDATE(), DATE_FORMAT(STR_TO_DATE(date_of_birth, '%d-%m-%Y'), '%Y-%m-%d'))/365) as Age
          from tblPatients
       ) as TblResult
      inner  join tbloutpatientvisits OV
       on TblResult.Patient_Id = OV.Patient_Id
  ) as TblFinal
  group by Gender,Age_Group,Diagnosis
  order by Gender asc,Age_Group asc,Diagnosis asc
```

OUTPUT

FEMALE DISTRIBUTION

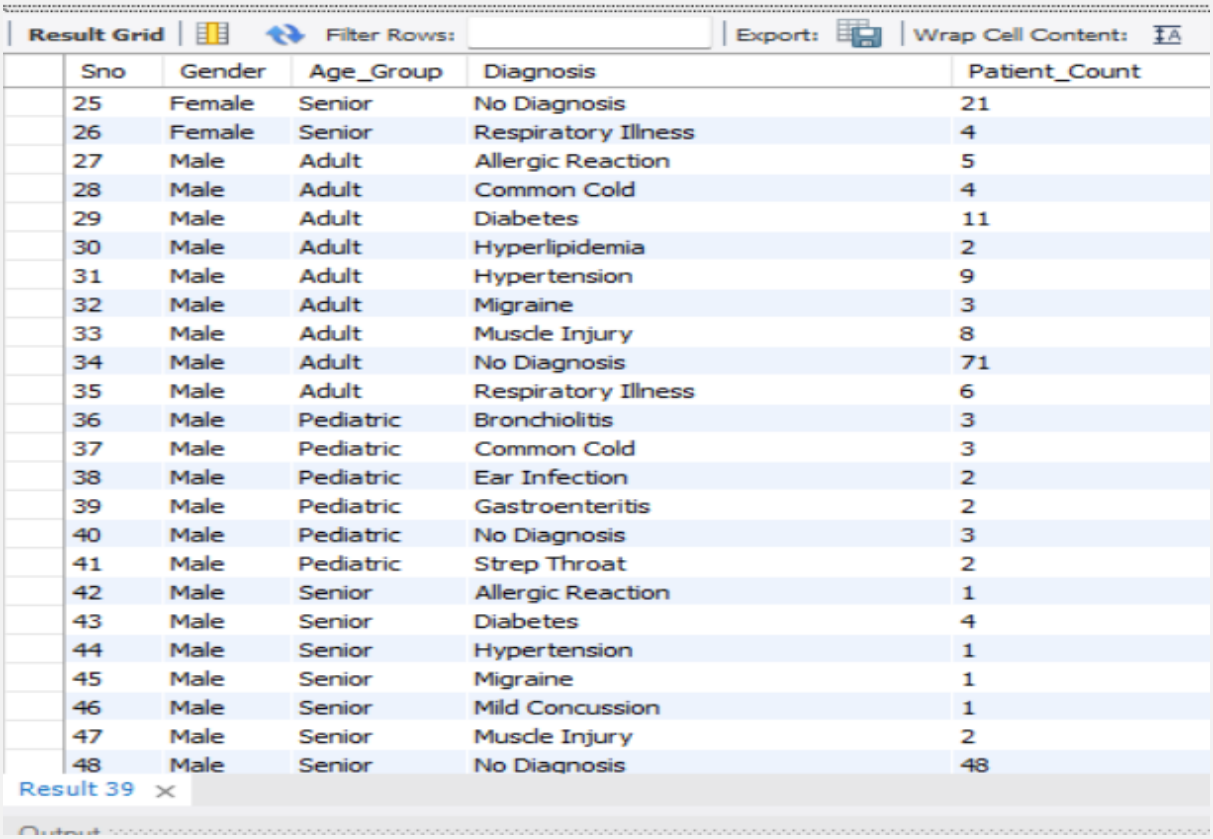


Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Sno	Gender	Age_Group	Diagnosis	Patient_Count
1	Female	Adult	Allergic Reaction	2
2	Female	Adult	Common Cold	3
3	Female	Adult	Diabetes	21
4	Female	Adult	Food Poisoning	1
5	Female	Adult	Hyperlipidemia	7
6	Female	Adult	Hypertension	13
7	Female	Adult	Hypothyroid	3
8	Female	Adult	Migraine	5
9	Female	Adult	Mild Concussion	1
10	Female	Adult	Muscle Injury	12
11	Female	Adult	No Diagnosis	113
12	Female	Adult	Respiratory Illness	12
13	Female	Adult	Respiratory infection	2
14	Female	Pediatric	Bronchiolitis	3
15	Female	Pediatric	Common Cold	2
16	Female	Pediatric	Ear Infection	4
17	Female	Pediatric	Gastroenteritis	1
18	Female	Pediatric	No Diagnosis	14
19	Female	Pediatric	Respiratory infection	2
20	Female	Pediatric	Strep Throat	1
21	Female	Senior	Common Cold	1
22	Female	Senior	Diabetes	1
23	Female	Senior	Mild Concussion	2
24	Female	Senior	Muscle Injury	2
25	Female	Senior	No Diagnosis	21

Result 39

MALE DISTRIBUTION



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Sno	Gender	Age_Group	Diagnosis	Patient_Count
25	Female	Senior	No Diagnosis	21
26	Female	Senior	Respiratory Illness	4
27	Male	Adult	Allergic Reaction	5
28	Male	Adult	Common Cold	4
29	Male	Adult	Diabetes	11
30	Male	Adult	Hyperlipidemia	2
31	Male	Adult	Hypertension	9
32	Male	Adult	Migraine	3
33	Male	Adult	Muscle Injury	8
34	Male	Adult	No Diagnosis	71
35	Male	Adult	Respiratory Illness	6
36	Male	Pediatric	Bronchiolitis	3
37	Male	Pediatric	Common Cold	3
38	Male	Pediatric	Ear Infection	2
39	Male	Pediatric	Gastroenteritis	2
40	Male	Pediatric	No Diagnosis	3
41	Male	Pediatric	Strep Throat	2
42	Male	Senior	Allergic Reaction	1
43	Male	Senior	Diabetes	4
44	Male	Senior	Hypertension	1
45	Male	Senior	Migraine	1
46	Male	Senior	Mild Concussion	1
47	Male	Senior	Muscle Injury	2
48	Male	Senior	No Diagnosis	48

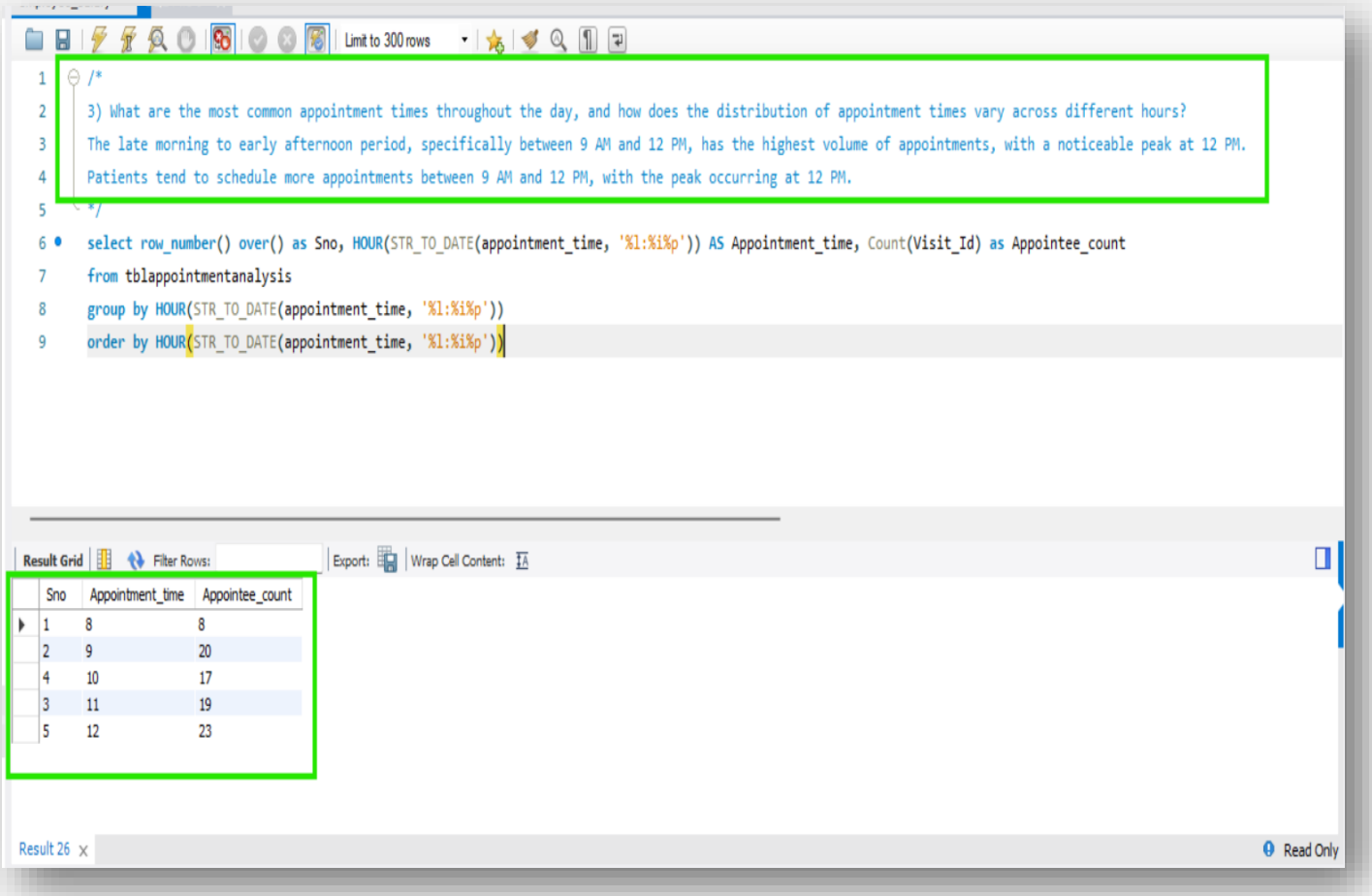
Result 39

APPOINTMENT TIME DISTRIBUTION

3) What are the most common appointment times throughout the day, and how does the distribution of appointment times vary across different hours?

The late morning to early afternoon period, specifically between 9 AM and 12 PM, has the highest volume of appointments, with a noticeable peak at 12 PM. Patients tend to schedule more appointments between 9 AM and 12 PM, with the peak occurring at 12 PM.

QUERY & OUTPUT



```
/*
3) What are the most common appointment times throughout the day, and how does the distribution of appointment times vary across different hours?
The late morning to early afternoon period, specifically between 9 AM and 12 PM, has the highest volume of appointments, with a noticeable peak at 12 PM.
Patients tend to schedule more appointments between 9 AM and 12 PM, with the peak occurring at 12 PM.
*/
select row_number() over() as Sno, HOUR(STR_TO_DATE(appointment_time, '%l:%i%p')) AS Appointment_time, Count(Visit_Id) as Appointee_count
from tblappointmentanalysis
group by HOUR(STR_TO_DATE(appointment_time, '%l:%i%p'))
order by HOUR(STR_TO_DATE(appointment_time, '%l:%i%p'))
```

Result Grid

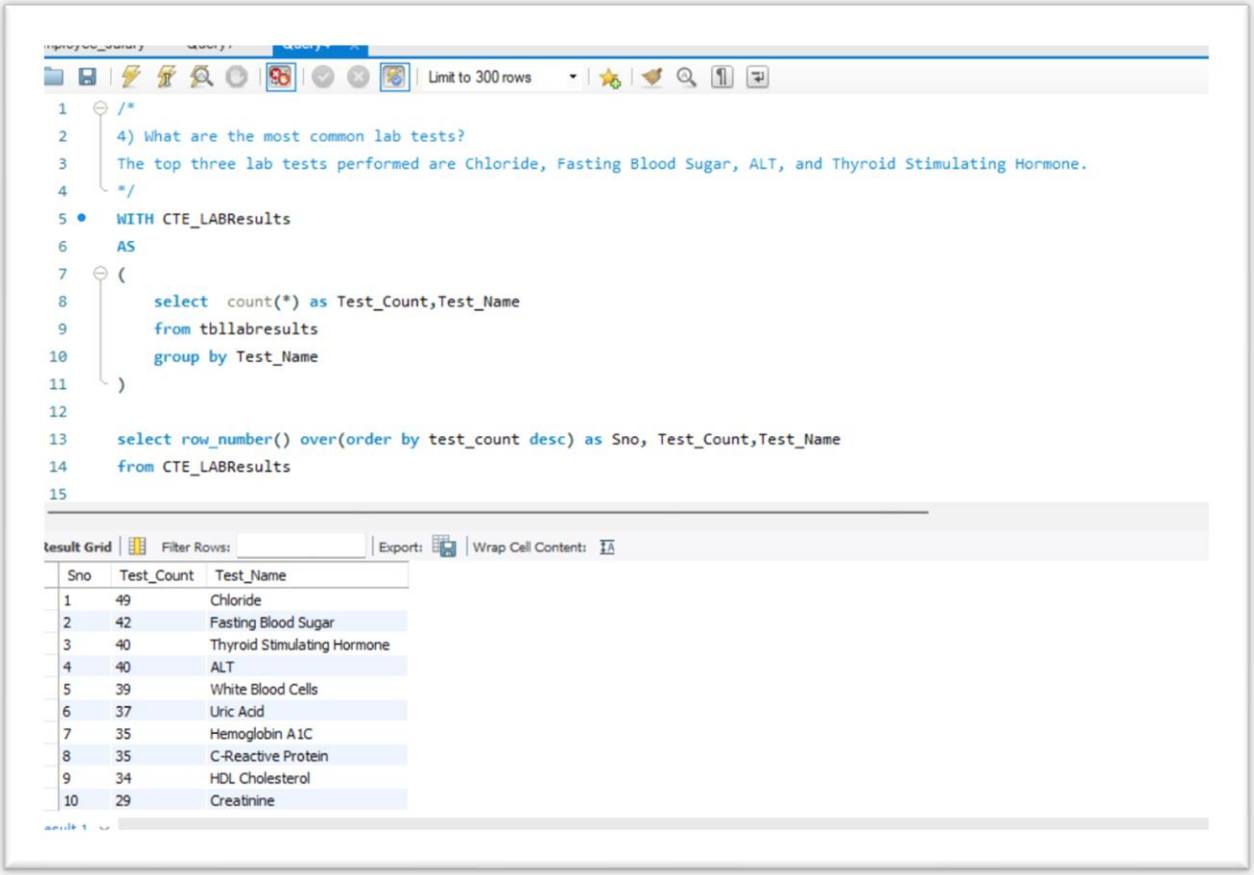
Sno	Appointment_time	Appointee_count
1	8	8
2	9	20
4	10	17
3	11	19
5	12	23

COMMON LAB TEST

4) What are the most common lab tests?

The top three lab tests performed are Chloride, Fasting Blood Sugar, ALT, and Thyroid Stimulating Hormone.

QUERY & OUTPUT



```
/*
4) What are the most common lab tests?
The top three lab tests performed are Chloride, Fasting Blood Sugar, ALT, and Thyroid Stimulating Hormone.
*/
WITH CTE_LABResults
AS
(
    select  count(*) as Test_Count,Test_Name
    from tbllabresults
    group by Test_Name
)

select row_number() over(order by test_count desc) as Sno, Test_Count,Test_Name
from CTE_LABResults
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Sno	Test_Count	Test_Name
1	49	Chloride
2	42	Fasting Blood Sugar
3	40	Thyroid Stimulating Hormone
4	40	ALT
5	39	White Blood Cells
6	37	Uric Acid
7	35	Hemoglobin A1C
8	35	C-Reactive Protein
9	34	HDL Cholesterol
10	29	Creatinine

LAB RESULT ANALYSIS

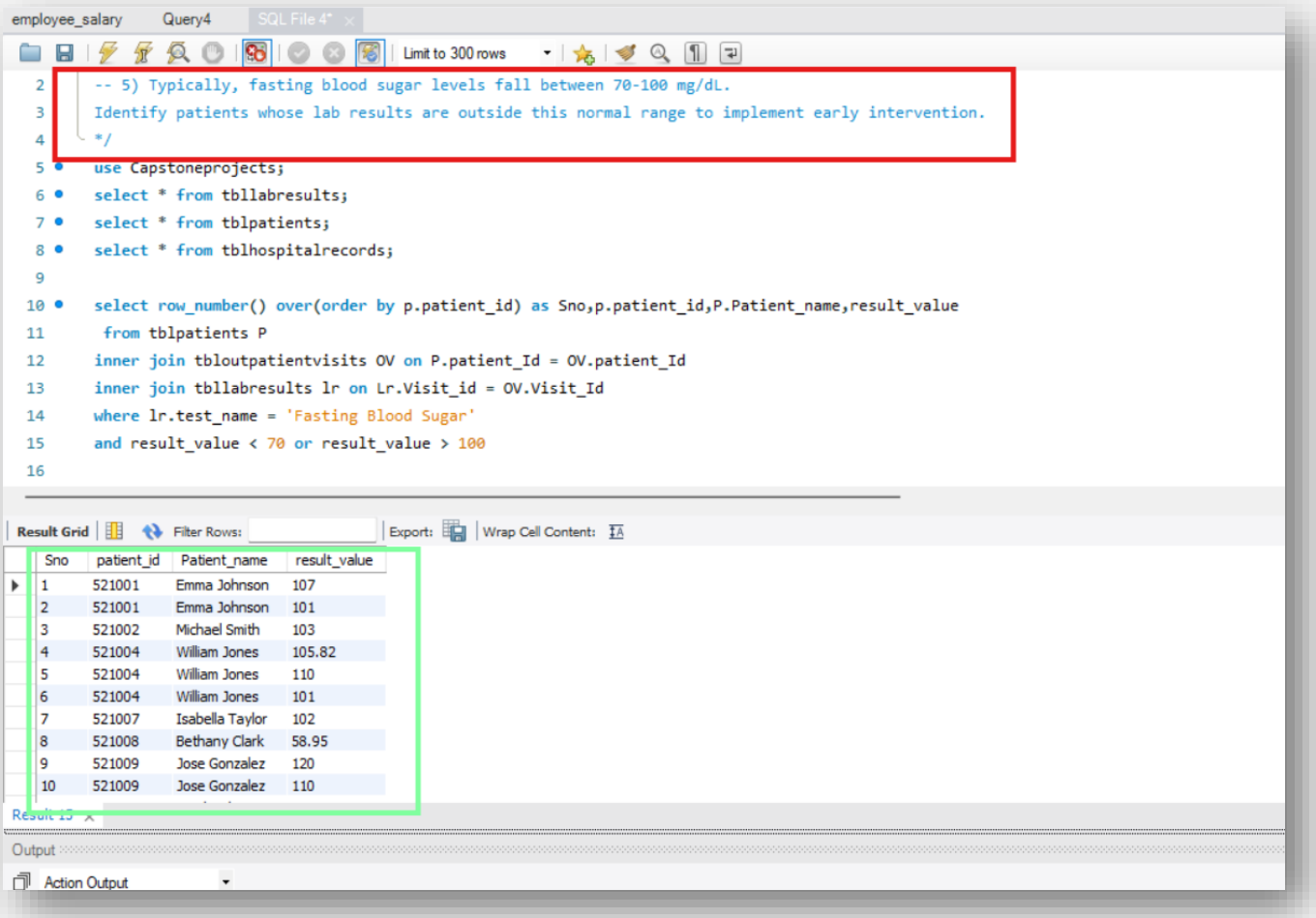
5) Typically, fasting blood sugar levels fall between 70-100 mg/dL. Identify patients whose lab results are outside this normal range to implement early intervention.

These patients have fasting blood sugar levels outside the normal range and may benefit from further evaluation and early intervention to manage their blood sugar levels.

High Risk: patients who are smokers and have been diagnosed with either hypertension or diabetes.

Medium Risk: patients who are non-smokers and have been diagnosed with either hypertension or diabetes.

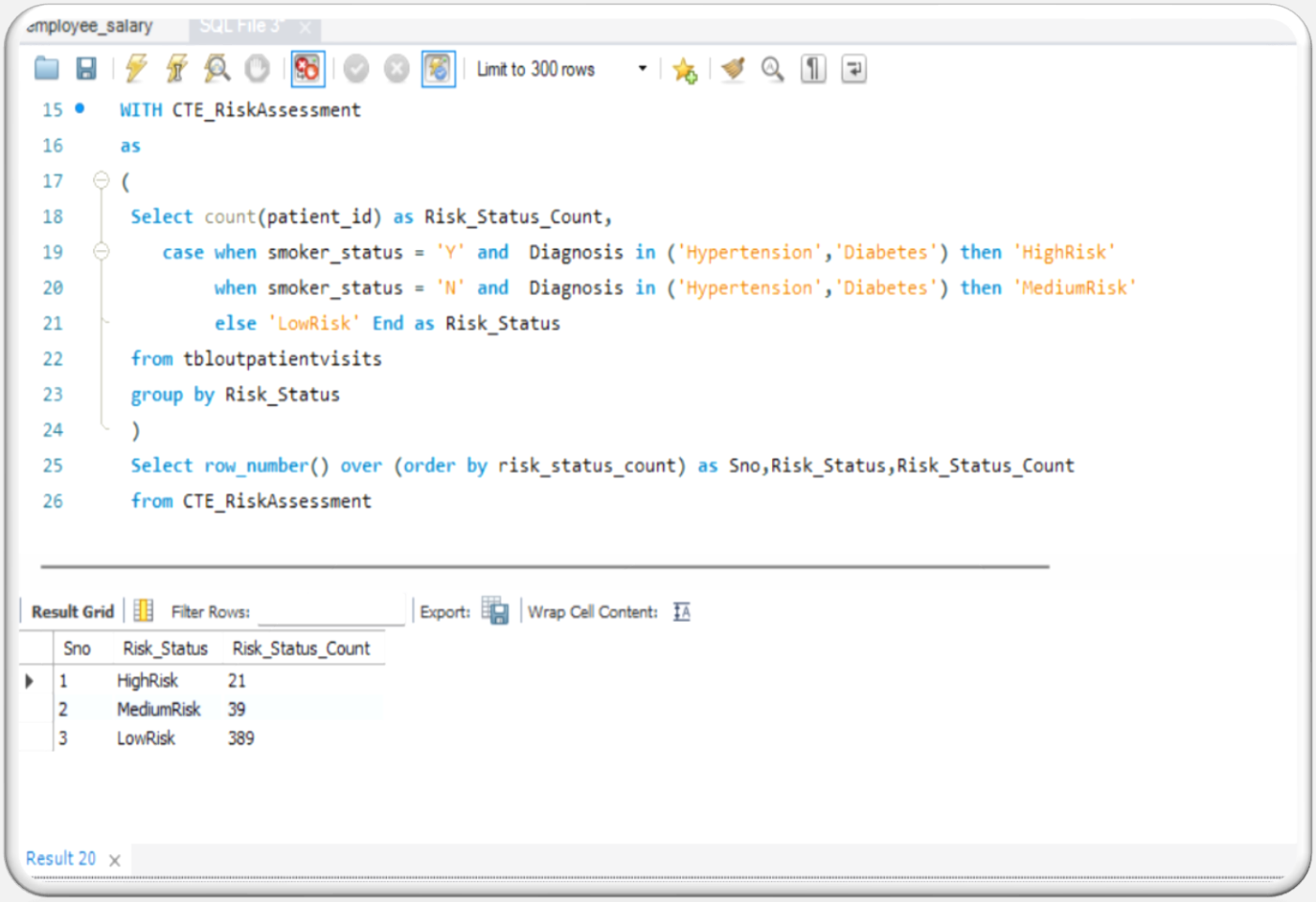
Low Risk: patients who do not fall into the High or Medium Risk categories. This includes patients who are not smokers and do not have a diagnosis of hypertension or diabetes.



PATIENT RISK CATEGORY

6) Assess how many patients are considered High, Medium, and Low Risk.

There are 21 high-risk patients who are smokers and have been diagnosed with either Hypertension or Diabetes. Identifying these patients is crucial to provide them with appropriate treatment.



PATIENT VISIT HISTORY

7) Find out information about patients who had multiple visits within 30 days of their previous medical visit

- Identify those patients
- Date of initial visit
- Reason for the initial visit
- Readmission date
- Reason for readmission
- Number of days between the initial visit and readmission
- Readmission visit recorded must have happened after the initial visit

This analysis enables hospitals to pinpoint patients at risk for readmission, helping them enhance post-discharge care, minimize avoidable readmissions, and refine clinical protocols. Additionally, it highlights instances where the diagnosis from the initial visit may have had an adverse effect, leading to the need for readmission.

```
1
2 •  SELECT row_number() over() as Sno, Ov1.patient_id,
3           Ov1.visit_date AS Initial_Visit_Date, Ov1.reason_for_visit AS Initial_Visit_Reason,
4           Ov2.visit_date AS ReVisit_Date, Ov2.reason_for_visit AS ReVisit_Reason,
5           timestampdiff(day,STR_TO_DATE(Ov1.Visit_Date, '%d-%m-%Y'),STR_TO_DATE(Ov2.Visit_Date, '%d-%m-%Y')) AS Days_Between_Initial_and_Revisit
6    FROM tbloutpatientvisits Ov1
7    INNER JOIN tbloutpatientvisits Ov2
8    ON Ov1.patient_id = Ov2.patient_id
9    WHERE timestampdiff(day,STR_TO_DATE(Ov1.Visit_Date, '%d-%m-%Y'),STR_TO_DATE(Ov2.Visit_Date, '%d-%m-%Y')) <= 30
10   and STR_TO_DATE(Ov2.Visit_Date, '%d-%m-%Y') > STR_TO_DATE(Ov1.Visit_Date, '%d-%m-%Y')
11
```

Sno	patient_id	Initial_Visit_Date	Initial_Visit_Reason	ReVisit_Date	ReVisit_Reason	Days_Between_Initial_and_Revisit
1	521025	07-12-2024	Checkup	31-12-2024	Checkup	24
2	521026	31-05-2024	Knee pain	10-06-2024	Checkup	10
3	521027	10-10-2024	Diabetes check	08-11-2024	Annual physical	29
4	521027	08-11-2024	Annual physical	10-11-2024	Diet and Exercise Counseling	2
5	521028	29-05-2023	Fever	15-06-2023	Annual physical	17
6	521029	19-01-2024	Annual physical	30-01-2024	Diet and Exercise Counseling	11
7	521029	30-01-2024	Diet and Exercise Counseling	01-02-2024	Diabetes check	2
8	521029	19-01-2024	Annual physical	01-02-2024	Diabetes check	13

Conclusion:

This analysis provides a comprehensive understanding of the patient population by demographic factors such as age and gender, offering insights into the prevalence of various diagnoses across different groups. It also identifies common appointment times, helping optimize scheduling, and highlights the most ordered lab tests, aiding in resource allocation. Additionally, by assessing fasting blood sugar levels, the hospital can take early intervention measures for patients outside the normal range. The risk categorization (High, Medium, and Low) allows for targeted healthcare strategies, while tracking patients with multiple visits within 30 days can help improve post-discharge care and reduce readmission rates.

By:

Manikantan
Database - MySql