Analysis of Risk Factors for ICU Mortality in Female Patients

Assignment 3

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Query:

Home | PRESCRIPTIONS ⊗ | ADMISSIONS ⊗

```
SELECT p.gender, p.dob, a.admittime, a.dischtime, a.hospital_expire_flag
FROM patients p
INNER JOIN admissions a ON p.subject_id = a.subject_id;
```

SELECT statement helps retrieve the attributes from the table
FROM is used to identify the table
INNER JOIN combines rows from ‘patients’ and ‘admissions’ tables based on condition that satifies subject id in both tables. The result of an INNER JOIN contains only the rows that have matching values in both tables.

Query Results:

Execute Query | Export Results

gender	dob	admittime	dischtime	hospital_expire_flag
F	2131-05-07 00:00:00	2196-04-09 12:26:00	2196-04-10 15:54:00	0
M	2082-07-17 00:00:00	2153-09-03 07:15:00	2153-09-08 19:10:00	0
M	2082-07-17 00:00:00	2157-10-18 19:34:00	2157-10-25 14:00:00	0
M	2100-05-31 00:00:00	2139-06-06 16:14:00	2139-06-09 12:48:00	0
M	2101-11-21 00:00:00	2160-11-02 02:06:00	2160-11-05 14:55:00	0
M	2054-05-04 00:00:00	2126-05-06 15:16:00	2126-05-13 15:00:00	0
F	2191-11-30 00:00:00	2191-11-30 22:16:00	2191-12-03 14:45:00	0

This query retrieves the gender, date of birth, admission time, discharge time, and hospital expiration flag for each patient in the MIMIC III dataset

Total Number of Patients by Gender

Query:

```
SELECT p.gender, COUNT(*) AS num_patients
FROM patients p
INNER JOIN admissions a ON p.subject_id = a.subject_id
GROUP BY p.gender
ORDER BY num_patients DESC;
```

This query groups the data by gender and calculates the number of patients for each gender, sorted in descending order.

Execute Query

Query Results:

gender	num_patients
M	32950
F	26026
gender	**num_patients**

As given above , the query retrieved the number of patients with respect to the gender. There are **32950** male patients and **26026** female patients

Mortality status of female patients in ICU

```
SELECT a.subject_id, a.hadm_id, a.admittime, i.icustay_id, i.intime, i.outtime,

  CASE WHEN a.hospital_expire_flag = 1 AND i.intime IS NOT NULL THEN 1 ELSE 0 END AS mortality

FROM patients p

INNER JOIN admissions a ON p.subject_id = a.subject_id

INNER JOIN icustays i ON a.hadm_id = i.hadm_id

WHERE p.gender = 'F';
```

```
SELECT a.subject_id,
    a.hadm_id,
    a.admittime,
    i.icustay_id,
    i.intime,
    i.outtime,
    CASE
      WHEN a.hospital_expire_flag = 1 AND i.intime IS NOT NULL THEN 1
      ELSE 0
    END AS mortality
```

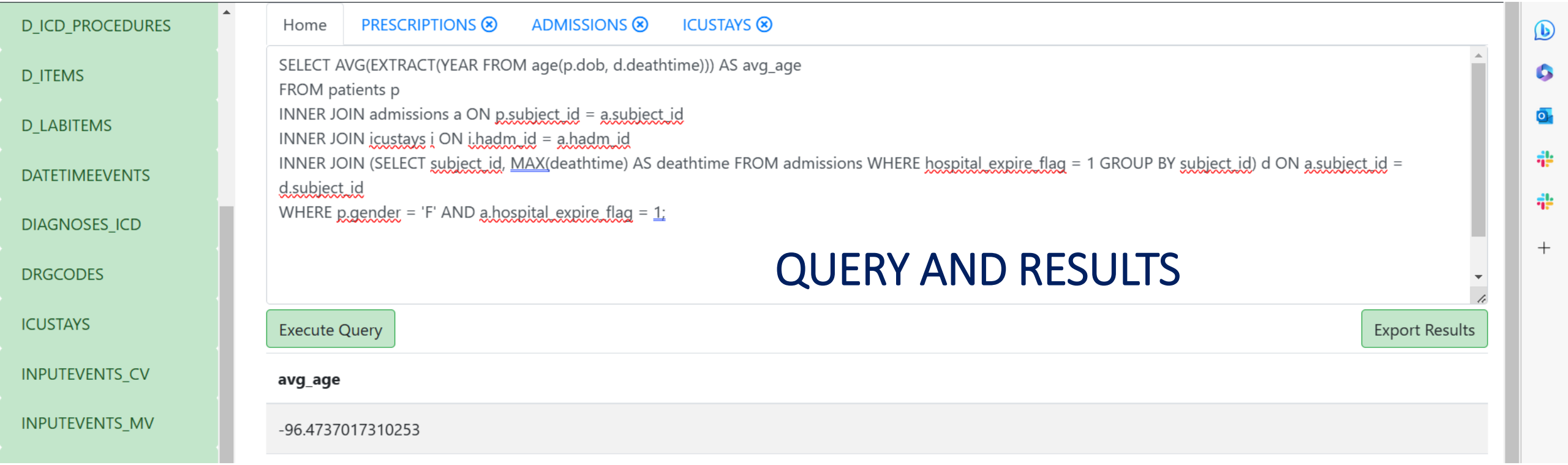
Execute Query

Export Results

subject_id	hadm_id	admittime	icustay_id	intime	outtime	mortality
268	110404	2198-02-11 13:40:00	280836	2198-02-14 23:27:38	2198-02-18 05:26:11	1
271	173727	2120-08-07 18:56:00	249196	2120-08-07 23:12:42	2120-08-10 00:39:04	0
281	111199	2101-10-18 04:42:00	257572	2101-10-18 04:45:22	2101-10-25 22:29:25	1
282	119013	2175-02-01 17:47:00	293262	2175-02-02 17:01:10	2175-02-03 13:27:58	0
284	112354	2149-11-29 15:37:00	223593	2149-11-29 15:39:34	2149-11-30 17:18:14	0
286	106909	2175-12-31 22:56:00	260225	2175-12-31 22:57:27	2176-02-24 19:16:58	0

This query selects specific columns from the **patients**, **admissions**, and **icustays** tables and calculates the mortality status of female ICU patients

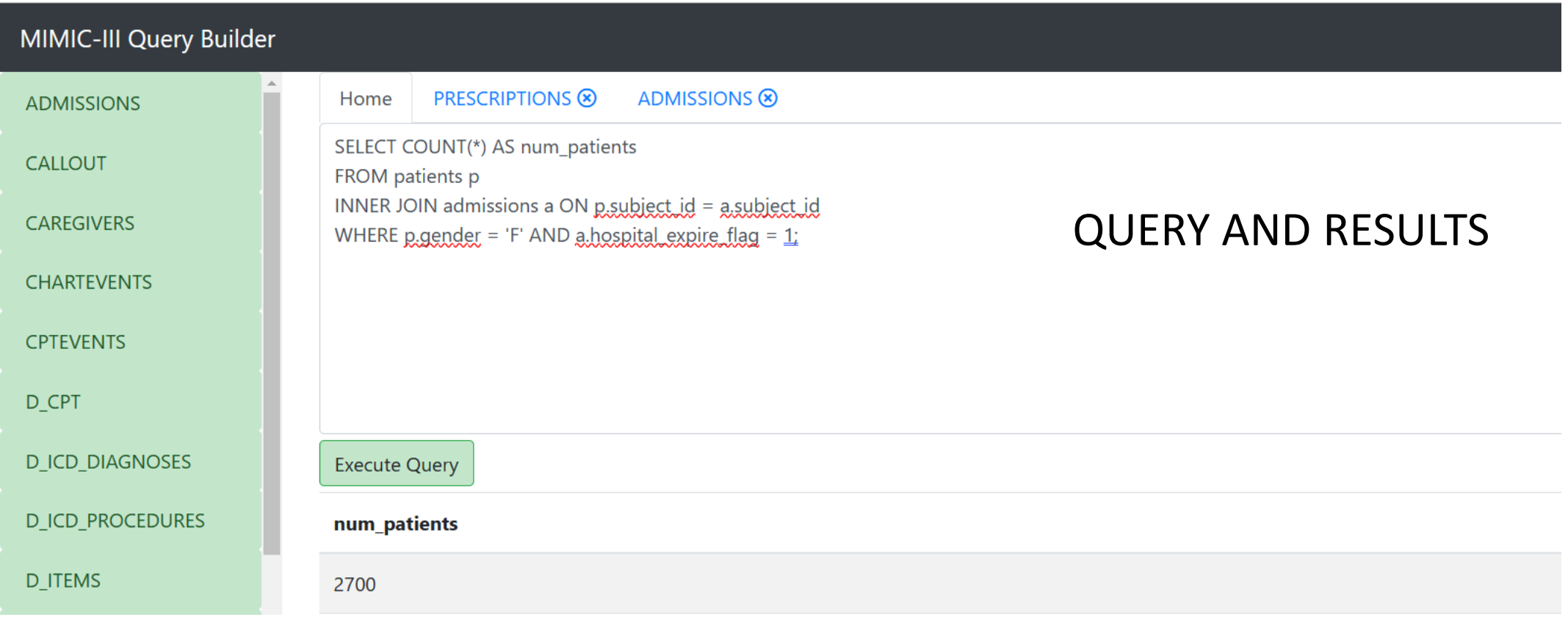
Average age of female patients during death



Now let's find out the average age of female patients when they died in the Hospital ICU.

This query calculates the age of each female patient at the time of their death. To do this, I have joined the **admissions** table with the **icustays** table to get the ICU stays for each patient and to get the admission and discharge times for each ICU stay. I am also joining with a subquery that selects the maximum **deathtime** for each patient who died in the hospital(Using MAX because there could be multiple patient admissions). This allows us to calculate the average age of female patients at the time of death, using the **dob** column in the **patients** table and the **deathtime** column from the subquery.

Total Number of Female Patients who died in ICU



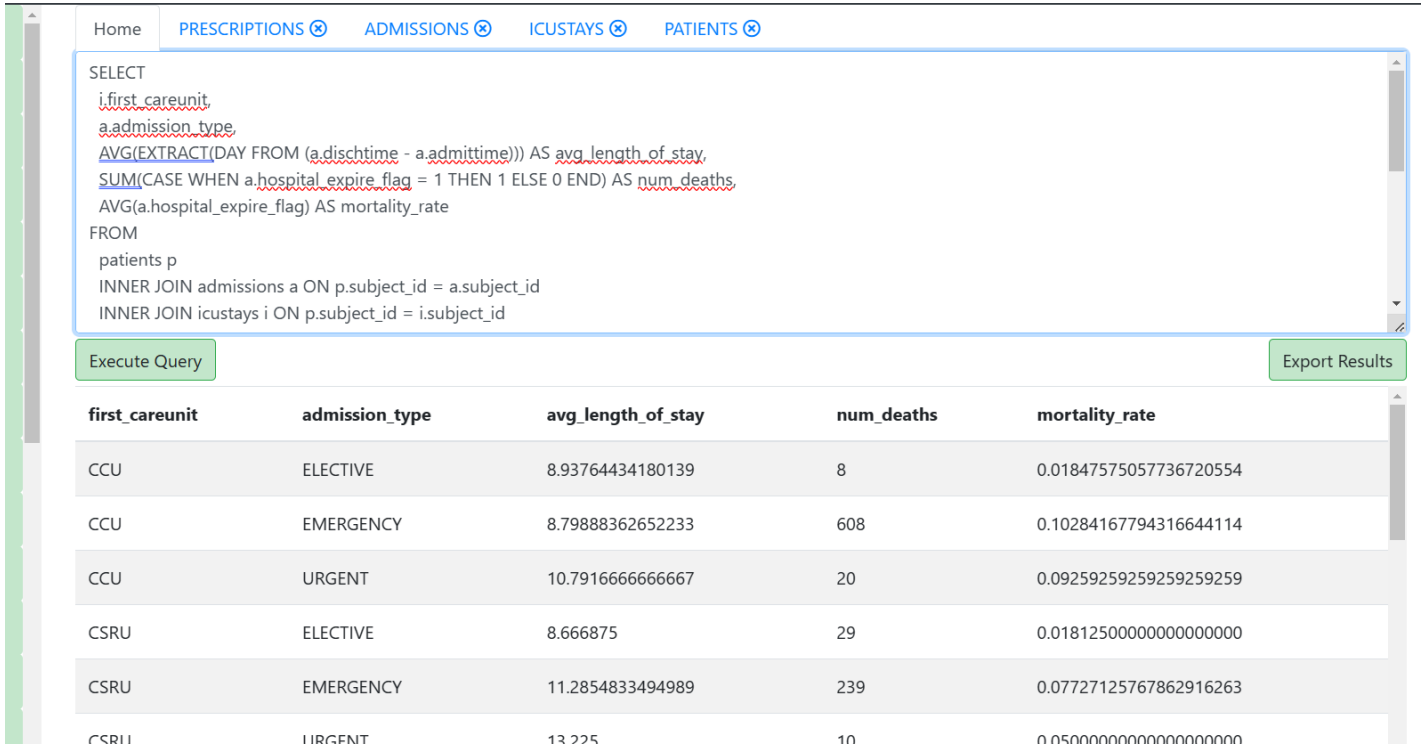
This query will give you the total number of female patients who died during their hospital stay.

COUNT() is used to find the total number of patients. AS is used to store the result in a variable. WHERE clause is used to specify a condition for filtering with a specific criteria that only female patients who died were considered. AND is used to specify more than one condition.

The number of female patients who died in the hospital ICU were **2700.**

Average length of stay and mortality rate as per diagnosis

```
SELECT  i.first_careunit, a.admission_type,
AVG(EXTRACT(DAY FROM (a.dischtime - a.admittime))) AS avg_length_of_stay,
SUM(CASE WHEN a.hospital_expire_flag = 1 THEN 1 ELSE 0 END) AS num_deaths,
AVG(a.hospital_expire_flag) AS mortality_rate
FROM  patients p
INNER JOIN admissions a ON p.subject_id = a.subject_id
INNER JOIN icustays i ON p.subject_id = i.subject_id
WHERE  p.gender = 'F'
GROUP BY  i.first_careunit,  a.admission_type
ORDER BY  i.first_careunit, a.admission_type;
```



first_careunit	admission_type	avg_length_of_stay	num_deaths	mortality_rate
CCU	ELECTIVE	8.93764434180139	8	0.01847575057736720554
CCU	EMERGENCY	8.79888362652233	608	0.10284167794316644114
CCU	URGENT	10.7916666666667	20	0.09259259259259259259
CSRU	ELECTIVE	8.666875	29	0.01812500000000000000
CSRU	EMERGENCY	11.2854833494989	239	0.07727125767862916263
CSRU	URGENT	13.225	10	0.05000000000000000000

This query calculates the average length of stay and mortality rate for female ICU patients based on the diagnosis during their admission and the type of ICU unit they were admitted to. The query groups the results by ICU unit and admission diagnosis and sorts them by ICU unit and admission type.

There were **608** deaths for Emergency Cases whose avg stay was 8.7 days and there were admitted in CCU unit

Top 5 diagnoses for female ICU patients

Home | PRESCRIPTIONS ⊗ | ADMISSIONS ⊗ | ICUSTAYS ⊗ | PATIENTS ⊗ | D_ICD_DIAGNOSES ⊗ | DIAGNOSES_ICD ⊗

```
SELECT a.diagnosis AS diagnosis, COUNT(*) AS num_patients
FROM patients p
INNER JOIN admissions a ON p.subject_id = a.subject_id
WHERE p.gender = 'F' AND a.hospital_expire_flag = 1
GROUP BY a.diagnosis
ORDER BY num_patients DESC
LIMIT 5;
```

Execute Query

diagnosis	num_patients
INTRACRANIAL HEMORRHAGE	120
PNEUMONIA	116
SEPSIS	114
CONGESTIVE HEART FAILURE	56
SUBARACHNOID HEMORRHAGE	47

INTRACRANIAL HEMORRHAGE has the highest number of deaths in females

This query will retrieve the top 5 diagnoses for female ICU patients who did not survive, based on the “diagnosis” field in the admissions table. GROUP BY is done for diagnosis so all patients under each category will be grouped and ORDER BY patients DESC will arrange the diagnosis according to the descending order of deaths

Proportion of female ICU patients who were intubated and did not survive

```
SELECT
    COUNT(*) AS total_female_icu_patients,
    SUM(CASE WHEN a.hospital_expire_flag = 1 AND i.intime IS NOT NULL THEN 1 ELSE 0 END) AS intubated_female_icu_patients_not_survived,
    ROUND(CAST(SUM(CASE WHEN a.hospital_expire_flag = 1 AND i.intime IS NOT NULL THEN 1 ELSE 0 END) AS NUMERIC) / COUNT(*) * 100, 2) AS
proportion_intubated_female_icu_patients_not_survived
FROM patients p
INNER JOIN admissions a ON p.subject_id = a.subject_id
INNER JOIN icustays i ON a.hadm_id = i.hadm_id
WHERE p.gender = 'F';
```

Execute Query | Export Results

total_female_icu_patients	intubated_female_icu_patients_not_survived	proportion_intubated_female_icu_patients_not_survived
27063	3004	11.10

| total_female_icu_patients | intubated_female_icu_patients_not_survived | proportion_intubated_female_icu_patients_not_survived |

The **CASE** statements are used to filter the data based on the conditions, and the **SUM** function is used to calculate the number of patients that meet those conditions. Finally, the **ROUND** function is used to calculate the proportion of intubated female ICU patients who did not survive and round it to two decimal places. **The proportion was 11.10 which is relatively high, and it suggests that there may be some factors associated with a higher risk of mortality in female ICU patients who are intubated**

Finding correlation using corr() between age and length of stay

Home | PRESCRIPTIONS ⊗ | ADMISSIONS ⊗ | ICUSTAYS ⊗ | PATIENTS ⊗ | D_ICD_DIAGNOSES ⊗ | DIAGNOSES_ICD ⊗

```
SELECT corr(EXTRACT(YEAR FROM a.admittime)-EXTRACT(YEAR FROM p.dob), i.los) AS correlation_coefficient
FROM patients p
INNER JOIN admissions a ON p.subject_id = a.subject_id
INNER JOIN icustays i ON a.hadm_id = i.hadm_id
WHERE p.gender = 'F' AND a.hospital_expire_flag = 1;
```

Execute Query | Export Results

correlation_coefficient
-0.105838367739887

This query calculates the correlation coefficient between the age of female patients at the time of admission and their length of stay in the ICU. A positive correlation coefficient would suggest that as the age of female patients increases, their length of stay in the ICU also increases, which may be a risk factor for mortality. **The correlation coefficient of -0.105 indicates a negative correlation stating that age could not be a risk factor for increase in the number of days of ICU stay.**

Commonly consumed medications by female patients who died

Home | ADMISSIONS ⊗ | ICUSTAYS ⊗

```
SELECT drug, COUNT(*) AS num_prescriptions
FROM prescriptions
WHERE subject_id IN (
  SELECT p.subject_id
  FROM patients p
  INNER JOIN admissions a ON p.subject_id = a.subject_id
  INNER JOIN icustays i ON a.hadm_id = i.hadm_id
  WHERE p.gender = 'F')
GROUP BY drug ORDER BY num_prescriptions DESC LIMIT 10;
```

Execute Query

drug	num_prescriptions
Potassium Chloride	88079
Insulin	60531
Furosemide	60373
D5W	59264
NS	58412
0.9% Sodium Chloride	57139

This query starts by selecting the drug name and the number of times the drug was prescribed in the prescriptions table. Then it is joined to get the drug name associated with the ID. It also joins the admissions table on the hospital admission ID (hadm_id) to get the admission associated with the prescription. It further joins the patients table on the patient ID (subject_id) to get the gender of the patient. Only female patients are included in the query with the WHERE clause that specifies pt.gender = 'F'.

The results are then grouped by drug name using the GROUP BY clause and ordered in descending order based on the number of prescriptions using the ORDER BY clause. The LIMIT clause is used to return only the top 10 most common prescribed drugs.

This query retrieves information about drug use in female ICU patients, gives the most commonly prescribed drugs. **Patients who died in the ICU consumed Potassium Chloride, Insulin and Furosemide the most**