Patient Mortality Forecasting Framework

Objectives

- Measure total in-hospital mortality burden.

- Calculate overall mortality rate percentage.

- Compare mortality outcomes across demographics (age, gender).

- Analyze mortality relationships with comorbidities.

- Evaluate ICU-related factors linked to mortality (admit source, ICU type, ICU stay).

SQL SCRIPT

```
SELECT * FROM public.patient_data
ORDER BY patient_id ASC


-- 1. How many total deaths occured in the hospital
select sum(case when hospital_death = 1 then 1 else 0 end) as total_hospital_death
from patient_data;

        --/OR/--
select count(*) from patient_data where hospital_death = 1;


-- 2. what was the percentage of the mortality rate?
select round(avg(case when hospital_death = 1 then 1 else 0 end)*100,2) as mortality_rate
```

```sql
from patient_data;


-- 3. What was the death count of each gender?

select gender, count(hospital_death) as total_hospital_death

from patient_data where hospital_death = 1 and gender is not null

group by gender;


--

alter table patient_data

alter column age type integer

using age::integer;


-- 4. Age-based comparison of average and maximum  values for patient who died vs survived

select round(avg(age),2) as avg_age,

max(age) as max_age, hospital_death from patient_data

where hospital_death = 1

group by hospital_death

union

select round(avg(age),2) as avg_age,

max(age) as max_age, hospital_death from patient_data

where hospital_death = 0

group by hospital_death;


-- 5. Age-based comparison of patient outcomes(death vc survival)
```

```sql
select age,

  count(case when hospital_death = 1 then 1 else 0 end) as died_patient,

  count(case when hospital_death = 0 then 1 else 0 end) as survived_patient

 from patient_data

 where age is not null

 group by age

 order by age asc;


-- 6. Patient age profile by decade

select concat(ceil(age/10)*10, '_' ,ceil(age/10)*10+9) as age_bracket,

    count(*) as patient_count

from patient_data

where age is not null

group by age_bracket;

              --/OR/--

select concat(floor(age/10)*10, '_' ,floor(age/10)*10+9) as age_bracket,

    count(*) as patient_count

from patient_data

where age is not null

group by age_bracket;


-- 7. Analyzing mortality counts: senior patients (65+) vs middle-aged patients (50–65)

select sum(case when age>65 and hospital_death = '0' then 1 else 0 end) as
healthy_senior_patients,
```

```sql
    sum(case when age between 50 and 65 and hospital_death = '0' then 1 else 0 end)

        as healthy_middle-aged_patients,

        sum(case when age>65 and hospital_death = '1' then 1 else 0 end) as
dead_senior_patients,

        sum(case when age between 50 and 65 and hospital_death = '1' then 1 else 0 end) as

        dead_middle-aged_patients

from patient_data;


--

alter table patient_data

alter column hospital_death_prob type numeric

using hospital_death_prob::numeric;


-- 8. Measuring the average likelihood of hospital death across different age groups
select
    case when age<40 then '1-40'

            when age >= 40 and age < 60 then '40-59'

                when age >= 60 and age < 80 then '60-79'

                else '80 and above'

                end as age_group ,

round(avg(hospital_death_prob),3) as avg_death_prob

from patient_data

group by age_group

order by age_group asc;
```

```sql
-- 9. ICU admit source with the largest share of admissions and deaths
select distinct icu_admit_source,

        sum(case when hospital_death = 1 then 1 end) as patient_died,

        sum(case when hospital_death = 0 then 1 end) as patient_survived

from patient_data

where icu_admit_source is not null

group by icu_admit_source;



-- 10. Average age of people in each ICU admit source and patient's death status
select distinct icu_admit_source,

        count(hospital_death) as patients_died,

        round(avg(age),2) as avg_age

from patient_data

where hospital_death = '1'

group by icu_admit_source;



-- 11. Average age of people in each type of ICU and amount that died
select distinct icu_type,

        count(hospital_death) as patients_died,

        round(avg(age),2) as avg_age

from patient_data

where hospital_death = 1

group by icu_type;
```

```sql
--

alter table patient_data

alter column bmi type numeric

using bmi::numeric;


-- 12. Average bmi of people who died

select

        round(avg(bmi),2) as avg_bmi

from patient_data

where hospital_death = 1;


-- 13. Patients are suffering from each comorbidity

select

    sum(aids) as patients_with_aids,

    sum(cirrhosis) as patients_with_cirrhosis,

    sum(diabetes_mellitus) as patients_with_diabetes,

    sum(hepatic_failure) as patients_with_hepatic_failure,

    sum(immunosuppression) as patients_with_immunosuppression,

    sum(leukemia) as patients_with_leukemia,

    sum(lymphoma) as patients_with_lymphoma

from patient_data;


-- 14. Percentage of patients with each comorbidity among patients who died?
```

```sql
select

    round(sum(case when aids = 1 then 1 else 0 end) * 100 / count(*),2) as aids_percentage,

    round(sum(case when cirrhosis = 1 then 1 else 0 end) * 100 / count(*),2) as cirrhosis_percentage,

    round(sum(case when diabetes_mellitus = 1 then 1 else 0 end) * 100 / count(*),2) as
diabetes_percentage,

    round(sum(case when hepatic_failure = 1 then 1 else 0 end) * 100 / count(*),2) as
hepatic_failure_percentage,

    round(sum(case when immunosuppression = 1 then 1 else 0 end) * 100 / count(*),2) as
immunosuppression_percentage,

    round(sum(case when leukemia = 1 then 1 else 0 end) * 100 / count(*),2) as
leukemia_percentage,

    round(sum(case when lymphoma = 1 then 1 else 0 end) * 100 / count(*),2) as
lymphoma_percentage

from patient_data

where hospital_death = 1;


-- 15. Mortality rate in percentage

select

    count(case when hospital_death = 1 then 1 end)*100/ count(*) as mortality_rate

from patient_data;


-- 16. Percentage of patients who underwent elective surgery

select

    count(case when elective_surgery = 1 then 1 end)*100/ count(*) as elective_surgery_percentage

from patient_data;
```

```sql
-- 17. Average bmi for male & female patients who underwent elective surgery

select

    round(avg(case when gender = 'M' then bmi end),2) as avg_bmi_male,

    round(avg(case when gender = 'F' then bmi end),2) as avg_bmi_female

from patient_data

where elective_surgery = 1;



-- 18.  Top 10 ICUs with the highest hospital death probability

select icu_type, icu_death_prob

from patient_data

order by icu_death_prob

limit 10;



-- 19. Average length of stay at each ICU for patients who survived and those who didn't

select

    icu_type,

    round(avg(case when hospital_death = 1 then pre_icu_los_days end), 2) as avg_icu_stay_death,

    round(avg(case when hospital_death = 0 then pre_icu_los_days end), 2) as avg_icu_stay_survived

from patient_data

group by icu_type

order by icu_type;
```