Overview

This project addresses a fundamental challenge in hospital operations: identifying which departments and processes are most likely to compromise patient quality, not during rare disasters, but during **routine operational stress** (staff absence, capacity strain, and morale fluctuation).

By analyzing weekly service data (bed capacity, refusal rates, patient satisfaction, and staff morale), the project established **quantifiable, data-driven links** between internal staff metrics and external patient outcomes (quality and risk exposure).

Strategic Questions & Technical Solutions

The analysis was structured around three high-impact strategic questions, designed to identify root causes of quality failure and risk exposure.

Question 1: The Hidden Cost of Refusal

(Where is capacity strain actively damaging patient satisfaction for admitted patients, and where is the service resilient?)

Technical Tool	Metric Defined	Insight
Window Functions (NTILE)	**Refusal Quartile:** Segments weeks into high vs. low refusal periods.	We found that **General Medicine and Surgery** suffered a satisfaction drop of **-5.46 points** during high-refusal weeks, while other services (Emergency, ICU) showed resilience.
Data Aggregation	**Average Length of Stay (ALOS)**	Surgery's ALOS of **7.87 days** was identified as the primary operational bottleneck, driving capacity strain across the facility.

Question 2: Staff Morale and Patient Age Risk

(Are vulnerable patients being exposed to high-risk environments where admission volume and staff stress align poorly?)

Technical Tool	Metric Defined	Insight
Complex Joins / Conditional Logic	**Vulnerability Risk Score:** Combines weekly staff absence, vulnerable patient count (age < 10 or > 75), and patient volume into a single weighted metric.	The highest risk score (97.47) was recorded in Emergency during a week with only **5.13% staff absence**, showing the triage protocol is dangerously fragile to routine strain.

Question 3: Morale-Driven Quality Collapse

(Which service is most vulnerable to a **patient satisfaction crash** *when staff morale drops below a critical threshold (*$\text{morale} < 70$*)?)*

Technical Tool	Metric Defined	Insight
Conditional Aggregation (SUM CASE WHEN)	**Quality Collapse Delta:** Calculated as Avg(High Morale)-Avg(Low Morale)	**ICU** showed the highest positive delta of **+3.42 points**, proving that staff morale intervention in the ICU is the most direct way to protect patient quality.
Interpretive Analysis	**Compensatory Behavior**	**Surgery** and **General Medicine** showed a *negative* delta (satisfaction *increased* during low morale), indicating highly dedicated staff are compensating for systemic failures.

Strategic Action Plan

The following recommendations are derived directly from the analysis and target the root cause of operational fragility.

Failure Area	Recommendation
ICU Morale	**Implement a Morale-Linked Workload Cap.** Immediately tie ICU staff workload metrics to the Morale KPI.
Surgery Bottleneck	**Mandate Targeted ALOS Reduction.** Focus process improvement efforts to reduce Surgery's 7.87-day ALOS.
Emergency Risk	**Develop an Adaptive Triage Protocol.** Implement an automated alert that flags all vulnerable patient admissions when staff absence exceeds a limit..