**Harmonie Medical Center – Operational Efficiency Analysis  
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**Executive Overview**

Harmonie Medical Center embarked on a data-driven review of its operations in response to rising patient readmission rates, uneven staff responsiveness, and limited insight into departmental performance. With a structured approach to healthcare data analysis, the goal was not just to identify inefficiencies, but to uncover actionable insights that tell a story about how care is delivered and where it can be improved.

Using structured datasets encompassing patient demographics, vitals, admissions, and doctor visits, this report brings together multiple threads of clinical operations to provide a holistic assessment of performance and propose forward-looking strategies.

This report directly addresses a set of critical operational questions raised by the hospital's leadership and aligns with the broader project objective: to build a SQL-based, on-demand reporting solution that improves patient outcomes, optimizes staff workflows, and enhances departmental accountability.

**1. Identifying High-Risk Patients: A Window into Urgency**

Healthcare, at its core, is about early recognition and timely intervention. At Harmonie, vital sign abnormalities serve as a digital early-warning system. With over 3,000 patient records analyzed, each individual showed at least one vital reading outside the clinical norms. However, more telling is the concentration of these abnormalities within a short window: in the last 48 hours, 1,466 patients (73.71%) had abnormal vital signs.

This pattern tells us two things: the hospital is seeing a high acuity patient population, and many patients are either not stabilizing as quickly as expected or are deteriorating while admitted. Both scenarios highlight the need for rapid response protocols, real-time monitoring, and possibly a dedicated escalation team.

The data also revealed 10 patients with repeated abnormal readings in a single month, including individuals like Massimo Jäkel and Sophie Griffiths who each had 14 instances. These are the patients who might fall through the cracks in a busy ward but who data brings sharply into focus.

**Recommendation:** Introduce an automated vital sign alert system and flag high-frequency abnormal cases for nurse manager review each morning.

**2. Readmission Rates: The Second Visit That Shouldn’t Happen**

Readmissions often carry an unspoken narrative: something in the care continuum failed. Whether it's premature discharge, insufficient follow-up, or missed complications, the numbers offer more than just a metric.

At Harmonie, 18.03% of patients return within 30 days. That’s nearly 1 in 5. When broken down by department, Cardiology leads with a 24.49% rate, closely followed by Internal Medicine (23.32%) and Pulmonology (21.61%). These are not minor deviations; they indicate systemic gaps.

A deeper look suggests that while acute conditions may be managed effectively during the initial admission, the handoff to outpatient care may be lacking. Especially in Cardiology, where complex medication regimens and post-op recovery demand precision and support, the readmission rate is a red flag.

**Recommendation:** Launch a pilot transitional care program for Cardiology and Internal Medicine that includes a post-discharge call within 48 hours and a follow-up appointment within 7 days.

**3. Doctor Responsiveness: Consistency or Constraint?**

A uniform doctor response time of 25 minutes across all departments seems almost too perfect. It suggests efficient scheduling and prioritization but also invites the question: is this level of responsiveness optimal?

Over the past 14 days, individual doctor data showed response times clustering between 21 to 26 minutes. This narrow range suggests a standardized workflow, yet it may also mask underlying variability in urgency levels or patient acuity. For example, a 25-minute wait may be reasonable for a routine visit, but critical cases need attention in minutes, not quarters of an hour.

**Recommendation:** Conduct a focused time-and-motion study to assess if current workflows allow sufficient triage differentiation between urgent and non-urgent cases.

**4. Admission Trends: When the Doors Open Less**

From March to May, a steady drop in admissions was observed across all departments, with Emergency Medicine experiencing the most significant decline (391 in March to 230 in May). While seasonal variation is a possibility, such a dramatic shift warrants investigation.

This decline could hint at external factors—perhaps improved primary care or telemedicine alternatives—or internal ones like capacity caps or policy changes. If sustained, this trend could affect resource allocation, staffing, and even budgeting.

**Recommendation:** Analyze parallel trends in outpatient referrals and regional health patterns. Consider deploying community health outreach to assess barriers to access.

**5. Hourly Doctor Visits: The Pulse of the Hospital**

Hospital activity doesn’t sleep, and Harmonie's visit patterns reflect that. Peak hours were not just during the day, but also in the early morning (06:00 and 07:00) and late evening (21:00). With consistently high activity between 06:00 and 23:00, the message is clear: care is a 24/7 endeavor.

This constancy places pressure on staff to be optimally distributed, especially during early and late shifts when fatigue or understaffing might compromise care.

**Recommendation:** Recalibrate staffing schedules to match hourly peaks. Empower shift leads to request floating staff during peak periods.

**6. Patient Outcomes: More Than a Statistic**

The final chapter in a patient’s story is recovery, readmission, or loss. Internal Medicine had the lowest recovery count and highest readmission rate, while Cardiology recorded the most deaths (56). Pulmonology, despite having the highest ICU admissions, had the fewest deaths—possibly a testament to effective critical care.

Moreover, two patients transitioned from ICU to death within a short time frame. While the sample is small, it underscores the need for high-alert monitoring for post-ICU discharges.

**Recommendation:** Implement mandatory care coordination for ICU discharges, including risk scoring for mortality within 30 days.

**7. Technical Implementation and Tool Design**

This report forms the foundation for an on-demand, SQL-powered analytics dashboard designed for Harmonie's operations and clinical leadership. Queries are structured around the hospital's key operational questions:

* Patient Risk & Vitals: Identify patients with recent abnormal vitals and frequent alerts.
* Admissions & Readmissions: Track 30-day readmissions by department.
* Doctor Responsiveness: Calculate average response time by doctor and department.
* Workload & Capacity: View admission volumes by month and department.
* Patient Outcomes: Summarize outcome distribution and post-ICU follow-up.

The backend SQL queries join EHR tables including Patients, Vitals, Admissions, Doctor\_Visits, and Outcomes. These queries can power a user-facing dashboard (e.g., Power BI or Tableau), allowing leadership to filter by time period, department, or patient cohort.

Sample SQL Query Snippet ***Patients with abnormal vitals in the last 48 hours:***

**SELECT p.patient\_id, p.full\_name, v.recorded\_time, v.vital\_type, v.vital\_value**

**FROM Vitals v**

**JOIN Patients p ON p.patient\_id = v.patient\_id**

**WHERE v.recorded\_time >= CURRENT\_DATE - INTERVAL '48 HOURS'**

**AND (**

**(v.vital\_type = 'Heart Rate' AND (v.vital\_value < 60 OR v.vital\_value > 100))**

**OR (v.vital\_type = 'Temperature' AND (v.vital\_value < 36 OR v.vital\_value > 38))**

**OR (v.vital\_type = 'Systolic BP' AND (v.vital\_value < 90 OR v.vital\_value > 140))**

**OR (v.vital\_type = 'Diastolic BP' AND (v.vital\_value < 60 OR v.vital\_value > 90))**

**);**

**Next Steps:**

* **Integrate this logic into an automated dashboard for real-time decision support.**
* **Create interactive reports for clinical leads to drill into specific metrics.**
* **Schedule weekly refreshes to keep the data actionable and current.**

**Conclusion: Turning Insight into Action**

This analysis is more than a collection of metrics; it's a blueprint for clinical and operational transformation. Harmonie Medical Center has the data, the demand, and the drive. What follows now must be execution. By acting on these insights—from real-time vital monitoring to smarter post-discharge care and dynamic staff allocation—the hospital can elevate both patient outcomes and staff performance.

This is not just a report. It’s a call to move from awareness to accountability, from analysis to action.