

# Measure and Improve Value-Based Outcomes: A Data Science Approach

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## 1 INTRODUCTION

There is a growing awareness of the need for our global healthcare system to transform to a value-based system. However, system structural changes based on the principles of data science have not yet been implemented. Rather than testing a hypothesis, data science is focused on measurement and improvement. Basic rules include the fact that data requires context to be meaningful. In healthcare, the context is any whole, definable patient care process. Another rule is that data should be decentralized and measured and analyzed in each local clinical environment.

## 2 METHODS AND PROCEDURES

The principles of data science were used to develop a novel, iterative process to measure and improve value-based outcomes.

- **This clinical quality improvement (CQI) method does not require submission to an Institutional Review Board (IRB) or a separate patient consent in the United States (US) because it is a quality improvement activity.**
- For one project at a US Academic Medical Center (AMC) in the Midwest, ventral hernia patients were identified through a surgical clinic administrative database. In addition to collecting patient clinical and outcomes data, these patients' specific hospital procedures were matched to the hospital financial database. Datasets were merged to allow for analysis of financial and clinical data.
- Two other projects included a Southeast US AMC evaluating the value-based outcomes for ventral hernia repair and a US Midwest Hernia Center evaluating the value of inguinal hernia repair, including long-term patient follow-up and clinic financial outcomes.

## 3 RESULTS

**At a Midwest hospital:** 512 patients (254 female and 258 male) underwent VHR from 1/2018 to 12/2023.

- Comparisons between financial outcomes, relative value units (RVUs), and length of stay (LOS) were completed.
- RVUs did not correlate with profitability.
- A coding change occurred in 2023 that led to a nearly \$100,000 decrease in hospital net margin.
- Using the robotic approach for only large hernias was found to improve patient outcomes and hospital net margin at the same time.

**At a Southeastern hospital:** 110 patients were evaluated.

- A long-acting local anesthetic was found to decrease length of stay and improve hospital net margin
- despite a \$300/dose increase in cost compared to shorter acting local anesthetic alternatives.

**At a Midwest Hernia Center:** 220 patients were followed with a follow-up rate of nearly 80% for over 12 months.

- It demonstrated good results with a novel hybrid hernia mesh.
- However, follow-up was significantly negatively impacted if a patient owed money to the clinic.

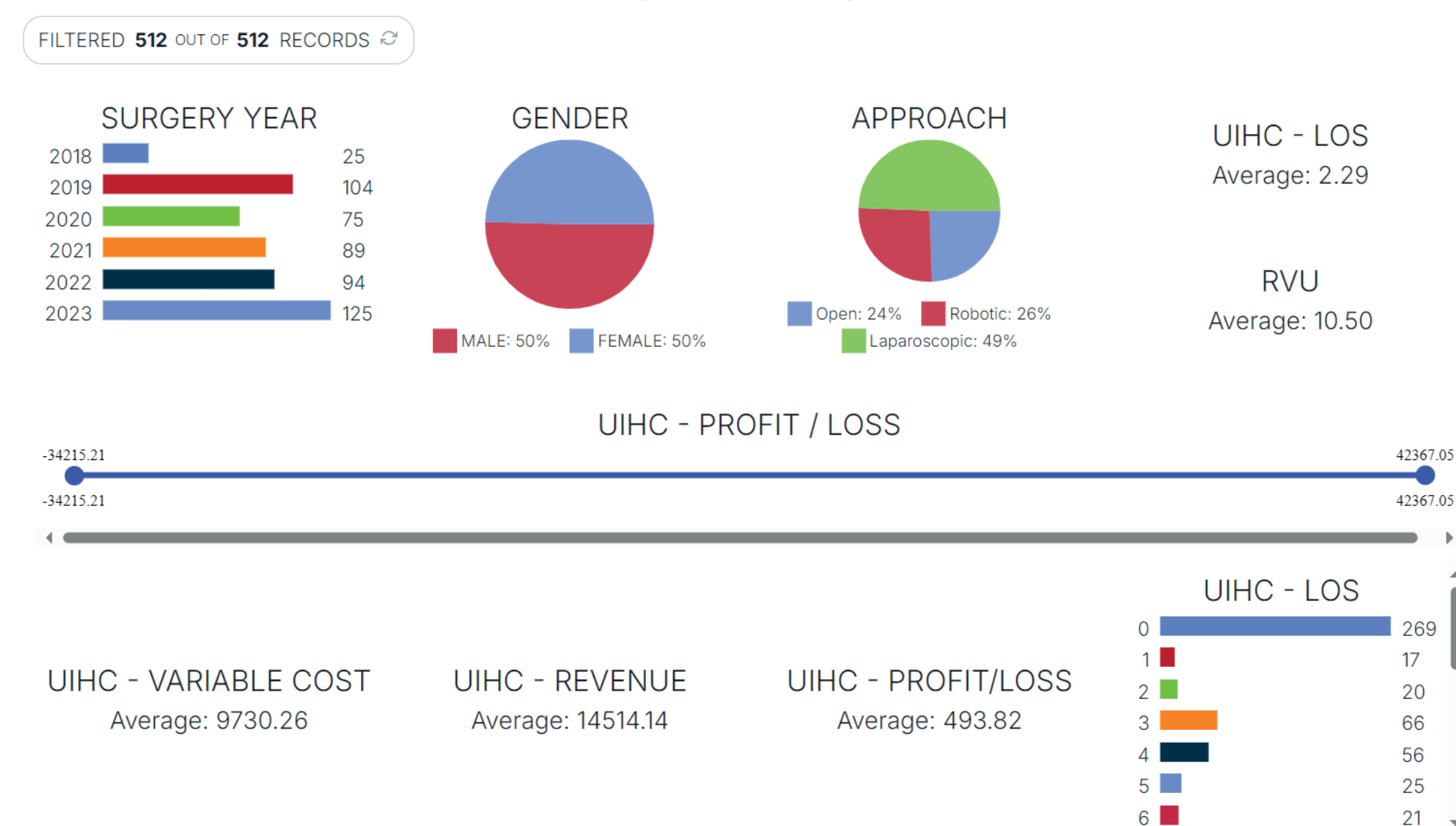
**These insights were obtained through non-linear analytical and interactive data visualization tools.**

## 4 CONCLUSIONS

- There is a need to transform our global healthcare system to a system based on the value of care.
- Using the principles of data science, we demonstrate how value of care can be measured in different ways depending on the context of each patient care process and in each local clinical environment.
- Using data science principles and tools, we can measure and improve the value of care for each definable, whole patient care process in each local clinical environment.

When we apply these principles at scale, we have the potential for a sustainable global healthcare system.

### Midwest AMC - Incisional Hernia (2018-2023)



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