Maximizing Tissue Donation Utilizing Observed to Expected Ratios

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Background: Observed to Expected (O:E) ratios are widely used in organ donation to evaluate transplantable organs by comparing the number of organs recovered with the number expected to be suitable for recovery. Recognizing the value in this metric, our organization sought to adapt the O:E framework for tissue donation. By establishing an O:E measure for tissue donors, we sought to quantify tissue recovery performance across varying donor characteristics and to identify opportunities for improvement.

Methods: We partnered with our Business Intelligence team to develop a supervised machine learning model that compares actual tissue recovery outcomes (observed) with outcomes expected under similar donor and operational circumstances. Historical recovery data was used to build tissue specific datasets containing recovery outcomes and key donor demographic, clinical, authorization, and operational variable including age, sex, race, body mass index (BMI), cause of death, and recovery opportunity factors. Data processing included variable categorization, handling of missing values, and data quality validation. A Random Forest classifier was trained using historical donor data to estimate the probability of recovery for each tissue type. Expected values were generated by applying the model to current donor cases and summing predicted probability across the population. Observed to Expected (O:E) ratios were calculated by dividing actual recoveries by the model generated expected values. The model is routinely recalibrated using recent recovery data to reflect changes in donor characteristics and recovery practices over time.

Results: We successfully developed an O:E ratio to evaluate tissue recovery performance. The overall tissue O:E metric is reviewed monthly by a team which includes tissue recovery, business intelligence and has become a key indicator of the program's overall health. At the close of 2025, the overall O:E was 1.00, indicating that recovery performance aligned closely with what would be expected for the donor population. The model also generates O:E values for individual tissue types, which revealed that vascular recoveries, particularly saphenous veins, consistently performed below 1.00 ending 2025 at 0.36. Following targeted improvement efforts, saphenous vein O:E improved to 0.46 during the first two months in 2026, demonstrating early positive impact. Scores below 1.00 continue to guide decisions about where additional training, operational adjustments, screening adjustments, or process refinements may be most beneficial. The model updates automatically as new data becomes available, ensuring that its predictions stay aligned with current recovery practices and processor requirements.

Conclusions: This metric is reviewed monthly and is included as part of the monthly scorecard for the work system and the tissue department. Integrating these measures into routine performance review has strengthened our ability to assess program health and focus improvement efforts where they are most needed. Early gains in vascular recovery performance after targeted interventions demonstrate the practical value of this approach. The O:E framework provides a sustainable, data-driven method for monitoring tissue recovery performance and supporting ongoing operational refinement.

Keywords: n/a

Clinical Trial Registry: n/a

Data Deposition: n/a

Completing Interests: The author declares no completing interests.

Ethical Approval: Study was conducted in accordance with relevant standards and regulations.

Funding: No specific funding for this work

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References: n/a

Tables and Figures:

Figure 1: 2025 Tissue O:E Ratio



Maximizing Tissue Donation Utilizing Observed to Expected Ratio

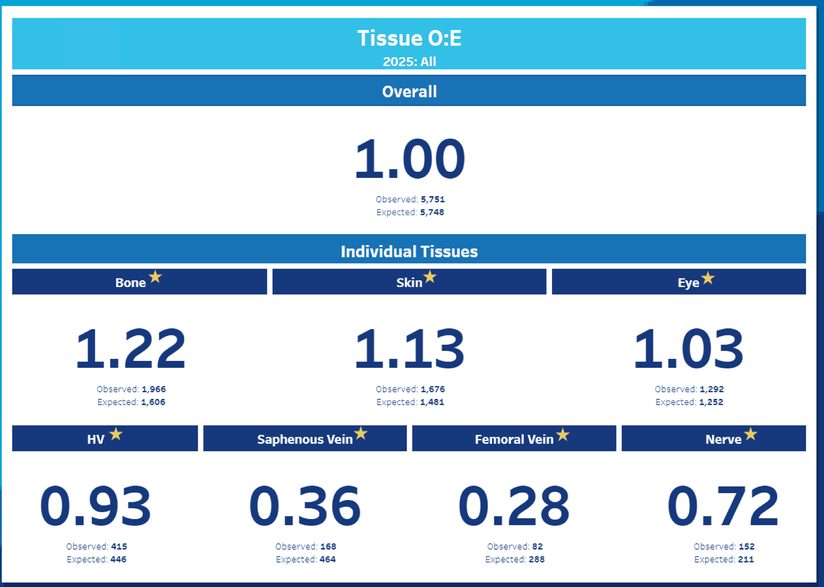
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Mid·America TRANSPLANT

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