

















**Chi-Square Critical Value (χ2\chi^2χ2)**

The value **5.99** refers to the **critical value** for a chi-square test at:

* **Significance Level (α\alphaα) = 0.05**
* **Degrees of Freedom (df) = 2** (calculated based on the contingency table: (Rows−1)×(Columns−1)(\text{Rows} - 1) \times (\text{Columns} - 1)(Rows−1)×(Columns−1)).

This value comes from a **chi-square distribution table**. If your calculated chi-square statistic exceeds **5.99**, the result is **statistically significant**, meaning the observed differences are unlikely to be due to random chance.

**What Did We Calculate?**

**1. Observed and Expected Counts**

We created a **contingency table** based on:

* Committees (Orthopedic, Neurological, Cardiovascular).
* Cadaveric tissue use (Requires vs. Does Not Require).

For each cell, we calculated the **expected counts** using:

E=(Row Total) × (Column Total)Grand TotalE = \frac{\text{(Row Total) × (Column Total)}}{\text{Grand Total}}E=Grand Total(Row Total) × (Column Total)​

**2. Chi-Square Test Statistic**

We used the chi-square formula to calculate the **chi-square test statistic**:

χ2=∑(O−E)2E\chi^2 = \sum \frac{(O - E)^2}{E}χ2=∑E(O−E)2​

Where:

* OOO: Observed values from the contingency table.
* EEE: Expected values calculated based on row/column totals.

For each cell, we calculated (O−E)2E\frac{(O - E)^2}{E}E(O−E)2​ and summed these values to get the total χ2\chi^2χ2.

**Result**

In the previous analysis:

* **Calculated χ2\chi^2χ2 = 8.33.**
* **Critical χ2\chi^2χ2 = 5.99** (from the chi-square table for α=0.05\alpha = 0.05α=0.05, df = 2).

Since 8.33>5.998.33 > 5.998.33>5.99, the result is **statistically significant**. This means there’s a strong association between the advisory committee and cadaveric tissue use, and the differences in observed vs. expected counts are unlikely due to chance.

**Summary**

1. **Critical Value**: χ2\chi^2χ2 = 5.99 (df = 2, α=0.05\alpha = 0.05α=0.05).
2. **Calculated Chi-Square**: χ2\chi^2χ2 = 8.33.
3. **Conclusion**: Significant association between advisory committee and tissue requirements.

Let me know if you’d like to revisit the calculation or dive deeper!

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**You said:**

okay go through each step and provide a very breif recap of each one with a simple explanation and why it was meanintgful

**ChatGPT said:**

ChatGPT

Here’s a step-by-step recap of the **chi-square test process** with simple explanations and why each step is meaningful:

**Step 1: Define the Question**

* **What we asked:** Is there an association between advisory committees (e.g., Orthopedic, Neurological) and cadaveric tissue requirements?
* **Why it matters:** Understanding this helps prioritize resources and better predict tissue requirements for FDA 510(k) applicants.

**Step 2: Create a Contingency Table**

* **What we did:** Organized observed counts (OOO) of devices requiring vs. not requiring tissue across committees.
* **Why it matters:** This table shows how the data is distributed and provides the foundation for statistical testing.

**Step 3: Calculate Expected Values**

* **What we did:** Used the formula E=(Row Total) × (Column Total)Grand TotalE = \frac{\text{(Row Total) × (Column Total)}}{\text{Grand Total}}E=Grand Total(Row Total) × (Column Total)​ to calculate expected counts for each cell.
* **Why it matters:** Expected values represent what we’d see if there were no association (the null hypothesis). Comparing these to observed counts reveals whether differences are significant.

**Step 4: Compute Chi-Square Statistic**

* **What we did:** For each cell, calculated: (O−E)2E\frac{(O - E)^2}{E}E(O−E)2​ and summed all the results to get the chi-square value (χ2=8.33\chi^2 = 8.33χ2=8.33).
* **Why it matters:** This quantifies how much observed counts deviate from expected counts. Larger deviations indicate a stronger association.

**Step 5: Determine Degrees of Freedom (df)**

* **What we did:** Used df=(Rows−1)×(Columns−1)=2\text{df} = (\text{Rows} - 1) \times (\text{Columns} - 1) = 2df=(Rows−1)×(Columns−1)=2.
* **Why it matters:** Degrees of freedom define the shape of the chi-square distribution, which is critical for interpreting results.

**Step 6: Compare to Critical Value**

* **What we did:** Compared the calculated χ2=8.33\chi^2 = 8.33χ2=8.33 to the critical value χ2=5.99\chi^2 = 5.99χ2=5.99 (from the chi-square table for α=0.05\alpha = 0.05α=0.05, df = 2).
* **Why it matters:** Since 8.33>5.998.33 > 5.998.33>5.99, we concluded the result is statistically significant, meaning the association is unlikely due to chance.

**Step 7: Interpret Results**

* **What we found:** Advisory committees (e.g., Orthopedic, Neurological) are significantly associated with cadaveric tissue requirements.
* **Why it matters:** This validates your model, confirming these variables are important predictors for cadaveric tissue needs.