Sensitivity to Change

One of the key strengths of CUSUM analysis is its high **sensitivity to change**—the ability to detect small, progressive shifts in performance that may not be obvious in traditional audits or aggregate statistics.

What It Means

Sensitivity to change refers to how quickly and accurately a monitoring tool can:

- Detect emerging trends (positive or negative)
- Reflect real-time variations in performance
- Alert clinicians to subtle but meaningful deviations from expected outcomes

CUSUM vs. Traditional Monitoring

Feature	CUSUM	Traditional Audit
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Tracks performance case-by-case	□ Yes	□ No (often monthly or quarterly)
Detects early drift	□ High sensitivity	□ Low sensitivity
Suitable for small sample sizes	□ Yes	□ Needs large numbers
Graphical representation	□ Intuitive curve	□ Summary statistics only

Why It Matters in Neurosurgery

In procedures like **ICP monitor placement**, even small changes in complication rate can have serious consequences. CUSUM allows for:

- Rapid feedback during early learning phases
- Early warnings before a statistically significant problem arises
- Detection of **both improvements** (learning curve) and **declines** (fatigue, system failure)

Clinical Application Example

- A shift from 10% to 15% complication rate over 10 cases may not be statistically significant.
- However, CUSUM would detect the **trend immediately**, showing an upward curve and potentially triggering a visual alert level.

Summary

High sensitivity to change makes CUSUM ideal for:

- **Trainee monitoring**
- **Procedure standardization**
- **Rapid quality assurance cycles**

This feature enables timely interventions, supports continuous improvement, and ultimately enhances patient safety.