Historical Complication Rate

The **historical complication rate** is the average rate of adverse outcomes observed in a specific procedure over a defined period. It serves as the foundation for setting the **reference value (k)** and the **CUSUM threshold** in surgical performance monitoring.

Purpose

In CUSUM analysis, this historical rate provides a **realistic performance benchmark**, allowing current outcomes to be compared meaningfully with past institutional or published data.

How It's Calculated

To determine the historical complication rate for intracranial pressure (ICP) monitor placement:

- Review all relevant cases over the past 1–3 years.
- Count the total number of complications (e.g., infection, hemorrhage, malposition).
- Divide by the total number of procedures performed.

Example:

- 12 complications over 120 ICP placements
- Historical complication rate = 12 / 120 = **10%** → `k = 0.1`

Why It Matters

- Establishes the **target** used in the CUSUM equation (reference value k).
- Serves as a baseline to detect improvements or deteriorations in current performance.
- Helps differentiate between **expected risk** and **performance-related issues**.

Sources of Historical Data

- Institutional surgical audit records
- National registries or multicenter studies
- Peer-reviewed literature (e.g., complication rates from similar patient populations)

Best Practices

- Use **local data** when available for the most accurate benchmark.
- Update the historical rate **periodically** to reflect improvements in technique or changes in patient population.
- Stratify data by factors like **procedure type**, **surgeon experience**, or **patient complexity** when possible.

By grounding your CUSUM analysis in real-world historical data, you ensure that the performance

thresholds are both **clinically meaningful** and **fairly applied**.