What is quality improvement (QI)?
QI is a systematic, formal approach to analyze and improve performance.

How is quality improvement different from research?
QI projects address a stated problem by implementing multiple interventions in a real-world situation, continuously monitoring change, and adjusting interventions to optimize results. On the other hand, research focuses on the effect of a specific intervention on a system, often utilizing randomized control trials. Within QI, controlled studies are rare, as context is an important factor in real-world situations.

How do I design a QI project?
1. After identifying a problem to be addressed or a scenario to be optimized, create a SMART Aim Statement: Specific, Measurable, Achievable, Relevant, and Timely. For example: I will reduce my 5k time by one minute within 6 months.
2. After crafting an Aim Statement, identify how change will be measured
   • Outcome measure(s): direct measurement of the process your Aim Statement attempts to improve
   • Process measure(s): measurement of steps within the process to be improved or of outcomes of specific interventions
   • Balancing measure(s): monitoring for unintended consequences or outside influences that may be affecting data
3. Run at least two (preferably more) PDSA cycles
   Plan: Plan an intervention that is hypothesized to result in improvement.
   Do: Implement the intervention within the system, starting small and scaling up if it results in improvement
   Study: Analyze the effects of the intervention
   Act: Determine whether the intervention was valuable: should that intervention be adapted, adopted, or discarded?
How do I track change over time in the system?

A run chart is a line chart that tracks data over time. It allows visualization of trends and patterns. Typically, a run chart contains:

- A measure (often an outcome measure) graphed over time
- A line indicating the median prior to implementation of any interventions
- If relevant, a line indicating the goal (as stated in the Aim Statement)
- Annotations of any noteworthy events, including intervention roll-out.

So I have a run chart, now what?

Once you have at least 12 data points, you can analyze for common cause variation vs special cause variation. Common cause variation is the stable, predictable variation within the system. Special cause variation is unstable variation that is the result of external factors acting on the system; this may indicate that your improvement process is affecting the system.

Signs of special cause variation include:

- Too many/too few runs. A run is the number of consecutive data points that lie on the same side of the median. For example, if there are 12 data points, fewer than 3 runs or greater than 10 runs indicate special cause variation.
- Shifts: A shift is a run consisting of 6 or more data points
- Trends: A trend contains 5 or more consecutive points that are all increasing or all decreasing
- Astronomical data point: A data point that lies far outside of the mean