YOUR 35-36 WKS DATA
What are we going to do with all of it?

We’ve discussed our AIM...

- To improve the care and outcomes for infants born between 35 0/7 to 36 6/7 weeks by systematically implementing evidence-based practices to achieve a 10% reduction in readmission rates (within one week of discharge) by March 2019.

  – IMMEDIATE AIM: To improve practice reliability of 35-36 week newborns by 15% by March 2019, by systematically developing and implementing evidence-based practices focused on delivery room care, transition, infection, nutrition, parent education, and discharge readiness.

We’ve discussed the data we are asking you to collect...

<table>
<thead>
<tr>
<th>INFANT CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation</td>
</tr>
<tr>
<td>Birthsite</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POST-Discharge FOLLOWUP PHONE Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>(NOTE: The following fields can be checked off in the “Post-Discharge Follow-up Phone Call” form)</td>
</tr>
<tr>
<td>Need to have a post-discharge follow-up phone call with the caregiver of this infant?</td>
</tr>
<tr>
<td>Follow-up was completed for the infant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROCESS MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge readiness checklist completed for the infant</td>
</tr>
<tr>
<td>Parent education regarding discharge plan (specific to the infant), including the nutritional plan, was documented in the infant's medical record</td>
</tr>
<tr>
<td>Follow-up provider was identified and an appointment was made prior to discharge</td>
</tr>
</tbody>
</table>
But remind me again, why do we need data?

The Model for Improvement
- Primary tool of quality improvement.
- Provides a framework for developing, testing, and implementing changes that lead to improvement.

More specifically...

- Measures = Data
- Provides us feedback we need to know if our changes are resulting in improvement.
  - Answers
  - REMEMBER: "All improvement is change, but not all change is improvement."
- Plays important supportive roles:
  - Using key measures to assess progress toward the project’s aim ("What are we trying to accomplish?").
  - Using specific measures for learning during PDSA cycles.
  - Using balancing measures to assess whether the system as a whole is being improved.
  - Using data from the system to focus improvement and refine changes.

Ok, but “how” will our data provide us feedback?

- The answer: run charts
What is a run chart?

- Graphical display of data plotted in some type of order.
- Horizontal axis is most often a time scale (e.g., months) but can also be sequential patients, visits, or procedures.
- The vertical axis represents the quality indicator being studied (e.g., infection rate).
- Goal lines and annotations of changes and other events can be added.

![Run Chart of Measure](chart)

Why use a run chart?

- In general,
  - Easy to construct and simple to interpret.
  - Encourages us to ask good questions based on the data you are viewing and thus learn about the process or system that the measure represents.
  - Allow us to learn about a great deal about the data with minimal mathematical complexity.
  - Allow us to communicate the effects of improvement work to others.

- Important uses:
  - Displays data to make process performance visible (i.e., depict how well (or poorly) a process is performing).
  - Determines if changes tested results in improvement.
  - Determines if we are holding the gain made by our improvement.
  - Allows for a temporal (analytic) view of our data versus a static (enumerative) view.

Use Of A Run Chart: Example 1

- Data on number of readmissions (within 1 week).
- 24 months of data looking at the number of readmissions each month as well as the number of 35-36 week infants.
  - Unit wide practice education and auditing was implemented (i.e., the change) at the beginning of the 2nd year.

- Based on the provided representation of the data, can we answer the following questions?
  - Did things improve?
  - What will happen next?
  - Should we do something?
  - Do we need more data?
Use Of A Run Chart: Example 1, cont'd

• Helpful to calculate monthly percent.
• Common practice to help interpret data: “break it down”.
  – Look before the change: Moths 1-12
    • Average = 40%
    • Max = 47%
    • Min = 34%
  – Look after the change: Month 13-24
    • Average = 37%
    • Max = 42%
    • Min = 33%
• Now can we answer the following questions?
  – Did things improve?
  – What will happen next?
  – Should we do something?
  – Do we need more data?

Use Of A Run Chart: Example 1, cont’d

• Better practice: a run chart.
• Now you’re able to answer the questions and make some strong conclusions...
• Not only can you tell that before the change that there was a lot more variability in the results, but can also see that after the change there was a straight downward trajectory – a direction of goodness (desired direction), that is very, very consistent and reliable.

TAKE HOME: Graphically displaying data over time enables you to be able to interpret the behavior of the data.

Use Of A Run Chart: Example 2

• Imaginary improvement project:
  – Aim: Decrease the “delay time” (in hours).
  – Data collected for 14 weeks.
  – The change was made after week 7.
  – Question: Did the change lead to improvement?
• Common test of change: “before & after test”:
  – “Before”: delay time measured at week 4.
  – “After”: delay time measured on week 11.
  – Often show data as a bar chart.
• Bigger questions:
  – Does this test provide an adequate degree of belief that the change, when implemented, will lead to an improvement?
  – Are there other feasible explanations of the reduction in delay time after the change was introduced?
Did the change result in the improvement that you see or don’t see on the run chart?

**CASE 1:**
- No obvious improvement after the change is made.
- Measures made during the test are typical from a process that has a lot of week-to-week variation.
- **Conclusion:** the change did not have obvious impact on the delay time.

**CASE 2:**
- Appears that the process has been steadily improving over the 14-week period.
- Rate of improvement did not change when the change was introduced; the improvement started before our change.
- **Conclusion:** there is no evidence to show that the change made any contribution to the improvement.

**CASE 3:**
- Initial improvement is observed after the change is made, but the process seems to return to its pre-change level in the last 3 weeks.
- Results may be due to the “Hawthorne effect”:
  - Whenever changes are made, initial improvements are observed.
  - But performance quickly returns to normal after workers become accustomed to the change (fOCUS on the change decreases).
- **Conclusion:** temporary change because you haven’t actually changed the process.

**CASE 4:**
- An improvement in the process has occurred, but it appears that the improvement occurred in week 5 – before the change in week 7.
- **Conclusion:** the improvement in delay time should be attributed to some other phenomenon, not the change of interest.
Use Of A Run Chart: Example 2, cont’d

Did the change result in the improvement that you see or don’t see on the run chart?

CASE 5:
• Process appears to be consistent, except for an unusual result that occurred in week 4.
  – Makes it appear that the more typical result on week 11 was an improvement.
• Conclusion: no evidence that the change contributed to any improvement.

CASE 6:
• Appears that the process is operating around the same level of performance in week 1 to 7.
• Appear to have a consistent new process at a much better level of performance starting in week 8.
• Conclusion: the change did result in a meaningful improvement.

Can we do more with a run chart?

• Usually, the median is calculated and used as the chart’s centreline.
  – The median is the point at which half the observations are expected above and below it.
  – The median is not influenced by extreme values in the data.
  – The median is required when applying the Run Chart Rules, which allows us to determine objectively when these data signal a process improvement.

Rules to help interpret a run chart

*Source of example and images: With permission. TIPQC Practical Improvement Curriculum, Project 8, 2014. Used with permission from Massachusetts General Hospital.*
Run Chart Rules, cont’d

- **Rule 1 – Shift**
  - 6 or more consecutive points either all above or all below the median.
  - Values that fall on the median do not add to nor break a shift. Skip all values that fall on the median and continue counting.

- **Rule 2 – Trend**
  - 5 or more consecutive points all going up or all going down.
  - If the value of 2 or more consecutive points is the same, only count the first point and ignore the repeating values; like values do not make or break a trend.

- **Rule 3 – Runs**
  - A run is a series of points in a row on one side of the median.
  - Non-random pattern is signalled by too few or too many runs, or crossings of the median line.
  - If only chance is influencing the process being measured with a run chart, then there should be a regularity at which data points go above and below the median to satisfy this condition.
  - Tables exist listing the numbers that are “too few” or “too many”.

- **Rule 4 – Astronomical point**
  - Used in detecting unusually large or small numbers – one that is obviously, even blatantly, different from the rest of the points.
  - Should not be confused with the highest or lowest data points, which will occur on any run chart.

Rules: Good “technique”

- **DON’T**
  - Over- or under-react to a single or most recent data point
  - Use the terms “shift” and “trend” indiscriminately/incorrectly
  - Use a run chart to determine if a process is stable
    - Properly done using Shewhart (control) charts

- **DO**
  - Create an initial median using baseline data
    - Should come from a process exhibiting no signals (shift, trend, runs, astronomical data point).
    - Frozen and extended into future – new data are not allowed to influence it
    - Changes in the new data will stand out more clearly
  - Make sure you a minimal amount of data
    - (if possible) Shift and run rules require more than 10 points before they are applicable

Learning more

- “The run chart: a simple analytical tool for learning from variation in healthcare processes”
  - Citation: Perla RJ, Provost LP, Murray SK - BMJ Quality & Safety 2011;20:46-51.