



Illinois Health and Hospital Association

Quality Essential Skills Training (QuEST) Session 2: An Introduction to Measurement for Improvement

Support

This program is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) as part of an award totaling \$824,375 with 0% financed with non-governmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS, or the U.S. Government. For more information, please visit [HRSA.gov](https://www.hrsa.gov).

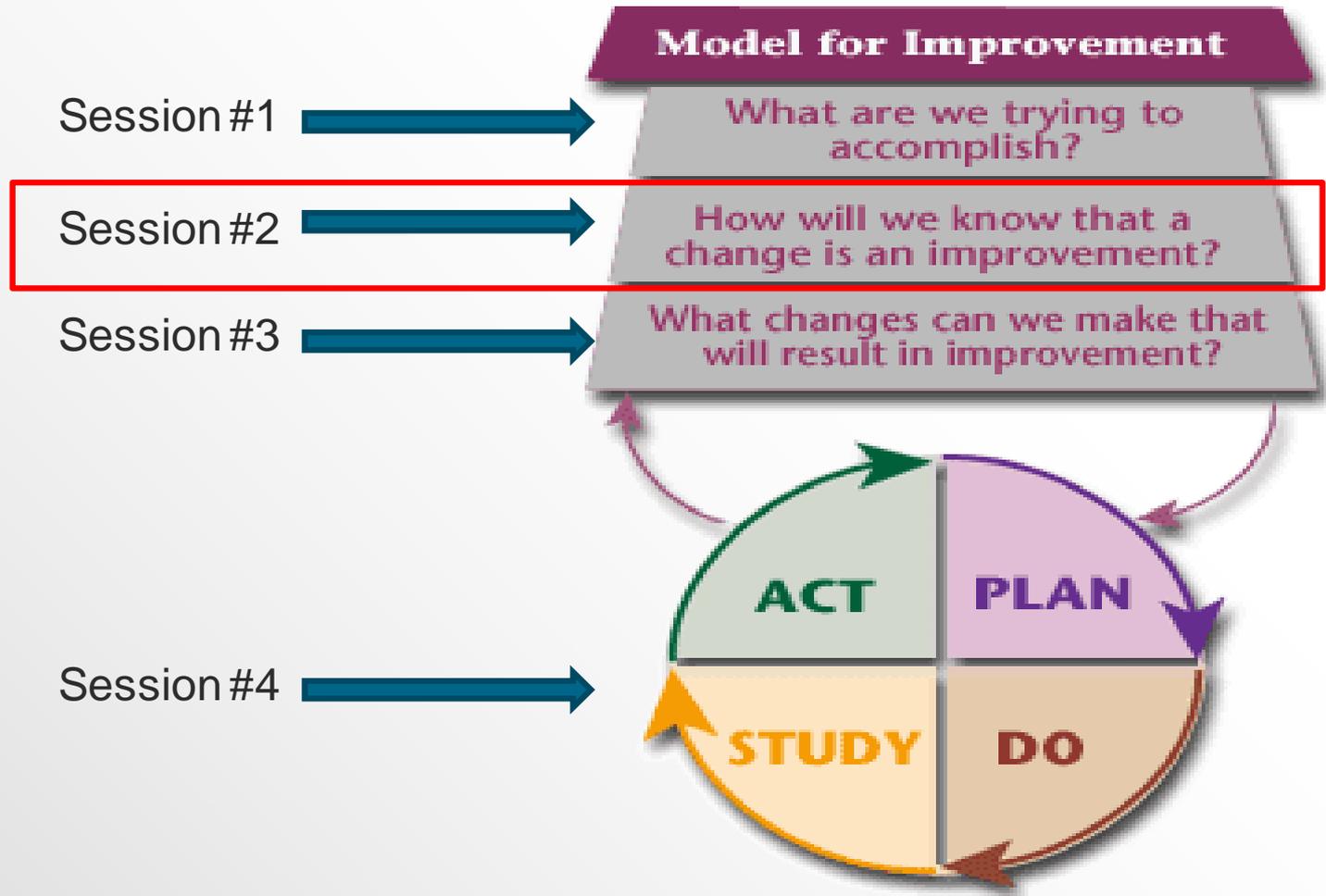
Agenda

1. Session 1 Review
2. Question 2 of The Model for Improvement (MFI)
3. Organizing your Measures
4. Operational Definitions
5. Variation and Run Charts
6. Next steps

Our Goal by the End of Session 4

1. Have a full understanding of the Model for Improvement (MFI)
2. Be equipped with the knowledge to use the MFI, and the tools provided, to guide your quality improvement projects moving forward
3. Have a completed Project Charter form

The Model for Improvement



Our Toolbox

1. The Project Charter
2. The Run Chart Template
3. The Model for Improvement Form

The Project Charter

- A great method to run a project by and a great way to START a project!
- A “Charter” is a statement of work (SOW) that defines the “what” and “why”
- A Charter is a short document we use to build support for and scope out a project that supports the purpose of the project
- It is the first 3 questions of The Model along with a short narrative building a case for support
- Should be shared, built as a team

 GREAT LAKES PARTNERS FOR PATIENTS		
Model for Improvement Project Charter This project charter clarifies expectations among the team and establishes the project's aim, measures, scope, timeline and team members.		
QUESTION 1: WHAT ARE WE TRYING TO ACCOMPLISH?		
Aim Statement:		
QUESTION 2: HOW WILL WE KNOW THAT A CHANGE IS AN IMPROVEMENT?		
Outcome Measures	Current	Target
Process Measures	Current	Target
SCOPE		
In Scope:	Out of Scope:	
QUESTION 3: WHAT CHANGES CAN WE MAKE THAT WILL RESULT IN IMPROVEMENT		
Small Tests of Change	Date	
Project End Date:		
TEAM		
Executive Sponsors:		
Dyad Champions:		
Team Members		

Next Steps from Session 1

1. Identify a quality improvement project for your organization
2. Using the Project Charter Document:
 - ❖ Develop the aim statement for your project
 - ❖ Complete the Team section of the document
3. Review the aim statement with team members to reach consensus
4. Bring your Project Charter to Session 2



Model for Improvement Project Charter

This project charter clarifies expectations among the team and establishes the project's aim, measures, scope, timeline and team members.

QUESTION 1: WHAT ARE WE TRYING TO ACCOMPLISH?		
Aim Statement:		
QUESTION 2: HOW WILL WE KNOW THAT A CHANGE IS AN IMPROVEMENT?		
Outcome Measures	Current	Target
Process Measures	Current	Target
SCOPE		
In Scope:	Out of Scope:	
QUESTION 3: WHAT CHANGES CAN WE MAKE THAT WILL RESULT IN IMPROVEMENT		
Small Tests of Change		Date
Project End Date:		
TEAM		
Executive Sponsors:		
Team Members		

Question TWO of the Model for Improvement



The most basic understanding of the 2nd question is this:
MEASUREMENT

“Concept” vs “Measure”

These are *NOT* measures!

Reduce wait times

Improve patient satisfaction

Expand market share

Be more efficient

Increase health and well-being

Reduce waste

Improve our financial situation

Reduce inpatient discharge delays

Enhance Patient education

Deliver safe services

Every Concept Can Have Multiple Measures

Concept

Potential Measures

Patient Falls

Percent of patients who fell once or more
Falls rate (# falls per 1000 patient days)
Number of falls

Patient harm

Percent compliance with central line bundle
Medication error rate
Days since the last C. diff episode

Employee Evaluations

Percent of evaluations completed on time
Number of evaluations completed
Variance from due date

Three Types of Measures

Outcome Measures:

Voice of the customer or patient. How is the system performing?
What is the result?

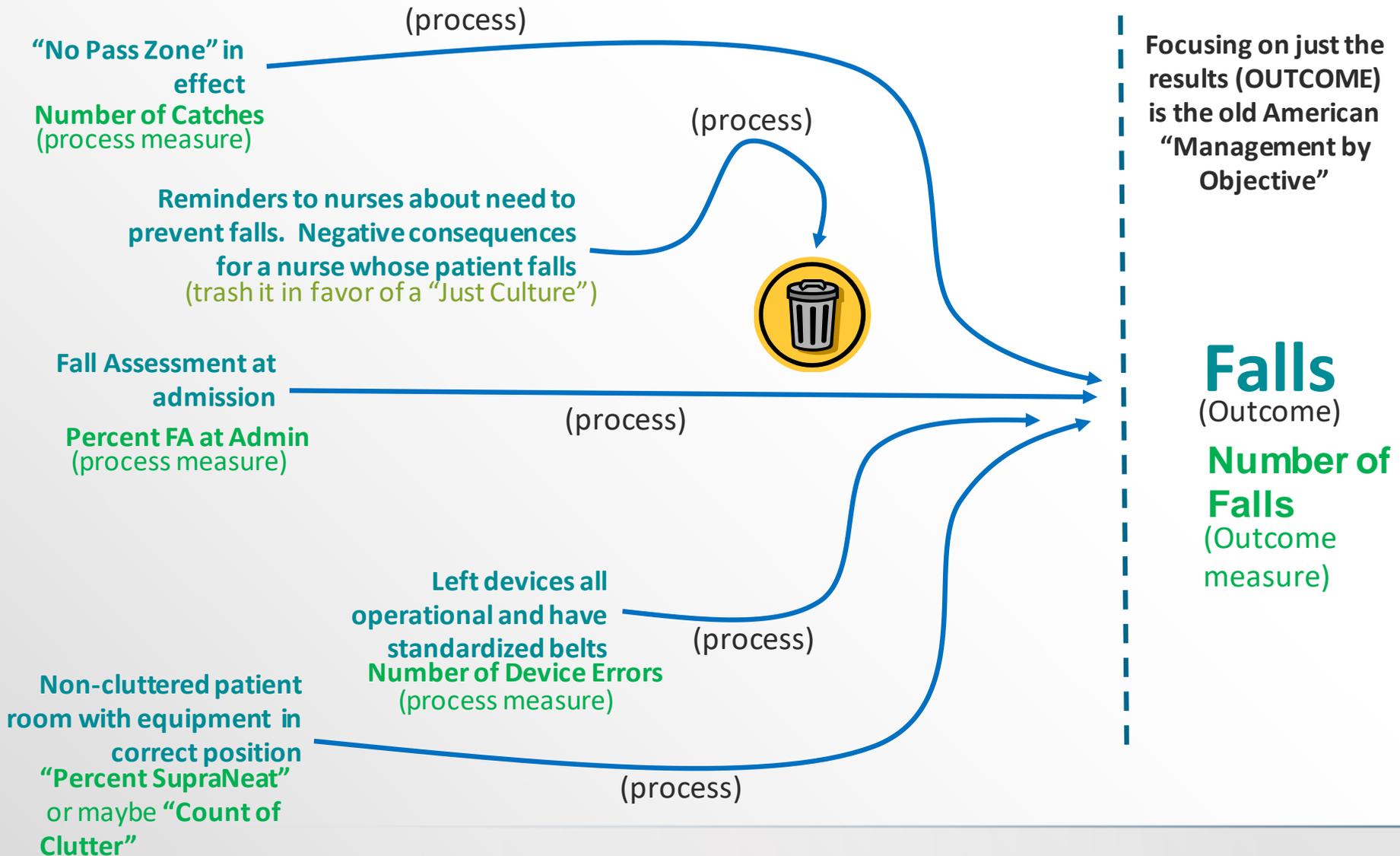
Process Measures:

Voice of the workings of the processes in the system. Are the parts/steps in the system performing as planned?

Balancing Measures:

Looking at a system from different directions/dimensions. What happened to the system as we improved the outcome and process measures (e.g. unanticipated consequences, other factors influencing outcome)?

Relationship Between Process and Outcome Measures



Balancing Measures: A trick to finding them ...

A great question to use to uncover balancing measures is to ask a SME(s):

“If this goes well, if we meet our aim, what could go wrong as a result of our success? Could we hurt some other area or outcome measure if we hit our goal?”

***Balancing Measures help
you capture
unintended consequences,
or “sub-optimization”***

Potential Set of Measures for Improvement in a Family Practice Clinic

Topic (concept)	Outcome Measures	Process Measures	Balancing Measures
<p>Improve waiting time and patient satisfaction in the family practice clinic</p>	<p>Total Length of Stay (in minutes) for a scheduled appointment at the clinic</p> <p>% of patients marking Strongly Agree to the question: "Would you recommend our clinic to family and friends?"</p>	<p>Time from check-in till seeing the doctor</p> <p>Patient /staff comments on flow</p> <p>% of patient receiving discharge materials</p> <p>Wait time for ancillary services (lab, x-ray, ultra-sound) during a visit</p>	<p>Volume of patients</p> <p>% of patients leaving without being seen by the doctor</p> <p>Staff satisfaction</p> <p>Financials</p>

Organizing Your Measures Worksheet©

Improvement Team Name:

Concept	Potential Measure(s)	Outcome	Process	Balancing

Source: R. Lloyd. *Quality Health Care: A Guide to Developing and Using Indicators*. Jones and Bartlett, 2004.

Organizing Your Measures Worksheet[©]

Improvement Team Name:

Concept	Potential Measure(s)	Outcome	Process	Balancing
Patient Harm	Inpatient falls rate	✓		
Patient Harm	Number of falls	✓		
Compliance	Percent of inpatients assessed for falls		✓	
Staff Education	Percent of staff fully trained in falls assessment protocol		✓	
Assessment Time	The additional time it takes to conduct a proper falls assessment			✓

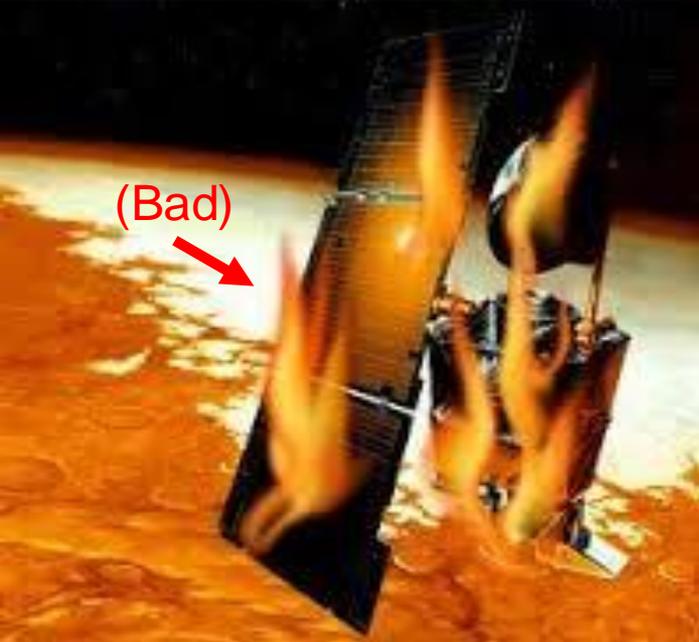
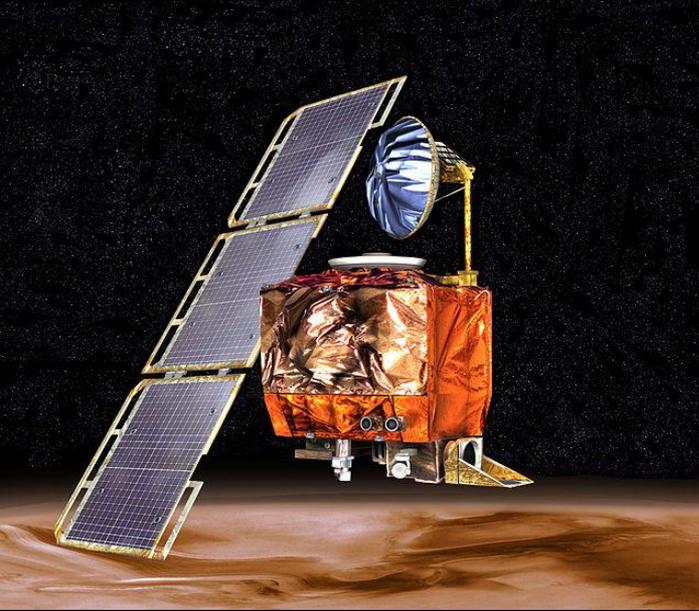
Source: R. Lloyd. *Quality Health Care: A Guide to Developing and Using Indicators*. Jones and Bartlett, 2004.

An Operational Definition...

... is a description, in quantifiable terms, of what to measure and the steps to follow to measure it consistently.

- It gives communicable meaning to a concept
- Is clear and unambiguous
- Specifies measurement methods and equipment
- Identifies criteria

Source: R. Lloyd. *Quality Health Care: A Guide to Developing and Using Indicators*. Jones and Bartlett, 2004.



September 23, 1999

An expensive lesson in lack of an operational definition!

NASA lost a \$125 million Mars orbiter because **one engineering team used metric units** (newton-seconds) to guide the spacecraft while **the builder (Lockheed Martin) used pounds-second** to calibrate the maneuvering operations of the craft.

Information failed to transfer between the *Mars Climate Orbiter* spacecraft team at Lockheed Martin in Colorado and the mission navigation team in California. The confusion caused the orbiter to encounter Mars on a trajectory that brought it too close to the planet, causing it to pass through the upper atmosphere and disintegrate.

Does every measure need an operational definition?

- **Simplest answer:** YES! Have to be explicit.
- The more detail the better. Document all inclusions and exclusions. Being teased?
- ALWAYS include along with run or control chart

Example of a good “Op-Def”:

Medication Error Measure Operational Definition

Measure Name: Percent of medication errors

Numerator: Number of outpatient medication orders with one or more errors. An error is defined as: wrong med, wrong dose, wrong route, wrong time or wrong patient.

Denominator: Number of outpatient medication orders received by the family practice clinic pharmacy.

Operational Definition:

This measure applies to all patients seen at the clinic. Shawn Mulder from DDS will pull the medication error data and the number of OP medication orders from the family practice clinic from the pharmacy computer system every Monday morning before 10 A.M., stratify it by type of order (new versus refill), group it by week and email data to William Peters to create two run charts (one for new order and one for the refills). William Peters will email the charts to the project team and to John Smith. John Smith will work with project team to annotate the chart and then give to Marcia Wals to be placed in the organizational dashboard.

How often and for how long do you need to collect data?

Frequency – the period of time in which you collect data

- Moment by moment (continuous monitoring, every case)?
- Every hour?
- Every day? Once a week? Once a month?

A KEY QUESTION: We can learn faster if we measure in **smaller time increments** OR **larger time increments**?

Duration – how long you need to continue collecting data

- Do you collect data on an on-going basis and not end until the measure is always at the specified target or goal?
- Do you conduct periodic audits?
- Do you just collect data at a single point in time to “check the pulse of the process”
- **OUTCOME vs PROCESS** measures ...

Do you need to pull a sample or do you take every occurrence of the data (i.e., collect data for the total population).

Operational Definition Worksheet

Measure Name: _____

(Remember this should be specific and quantifiable, e.g., the time it takes to..., the number of..., the percent of... or the rate of... it should be “dry and scientific” sounding)

Measure Type: _____

(Outcome. Process or Balancing measure?)

Operational Definition

Define the specific components of this measure. Specify the numerator and denominator if it is a percent or a rate. If it is an average, identify the calculation for deriving the average. Include any special equipment needed to capture the data. If it is a score (such as a patient satisfaction score) describe how the score is derived. When a measure reflects concepts such as accuracy, complete, timely, or an error, describe the criteria to be used to determine “accuracy.” Name the person responsible for collecting and entering data. The more detail, the better!

How will we know that a change is an improvement?

Appreciating Random Variation and the Run Chart



Illinois Health
and Hospital
Association

Question TWO of the Model for Improvement



Source: Associates for Process Improvement

We just learned:

- The second question of the Model for Improvement
- The “Three Faces of Measurement”
- The relationship between data and knowledge
- The “measurement journey”, the steps to create a measure and the three kinds of measures
- The importance of “operationally defining” measures
- The different types of measures we create when using “data for improvement”

Learn how to use the power of the run chart to interpret data for improvement

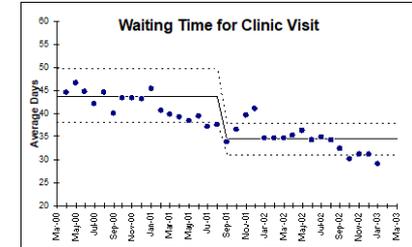
There are many tools in the improvers belt to make sense of variation, the run chart is the “HAMMER”

There are several tools we use in improvement to make sense of the variation that is inherent in EVERY measure.

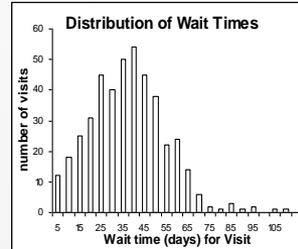
Run Chart



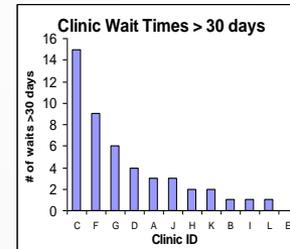
Shewhart Chart



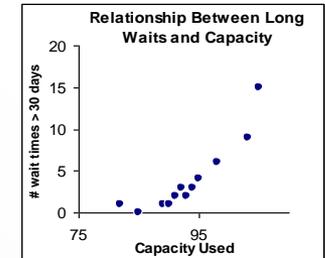
Frequency Plot



Pareto Chart



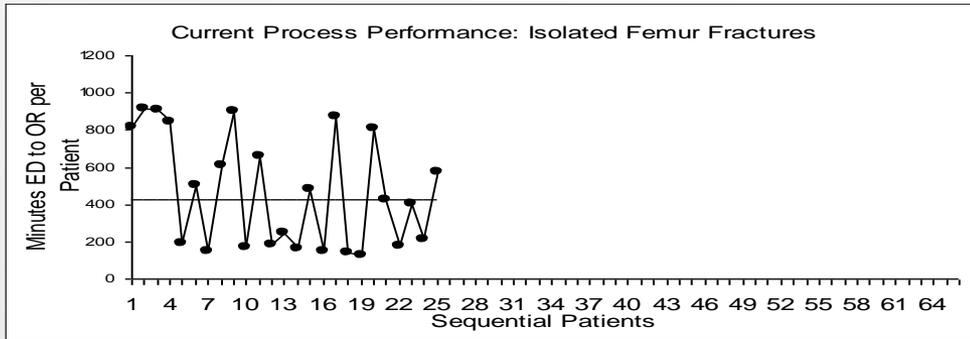
Scatterplot



HP 8-34

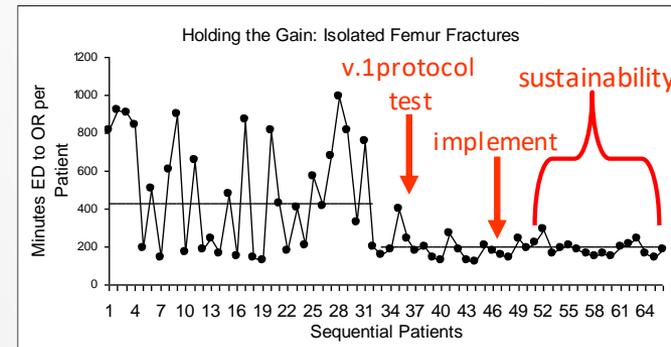
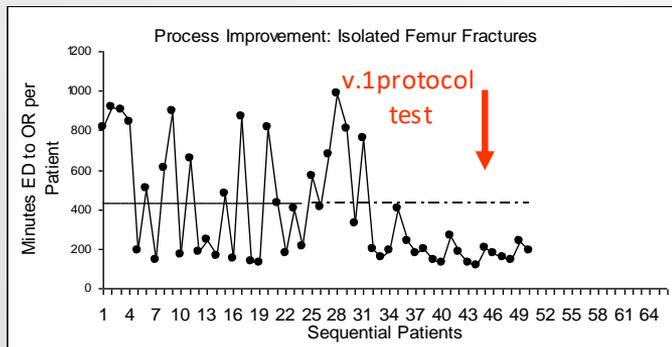
Run Chart: the tool we use to make sense of variation

Make process performance visible



- Make process performance visible to all, to appreciate
- Determine if a change is an improvement
- Determine if we are holding the gains (sustainability)

Determine if change is an improvement



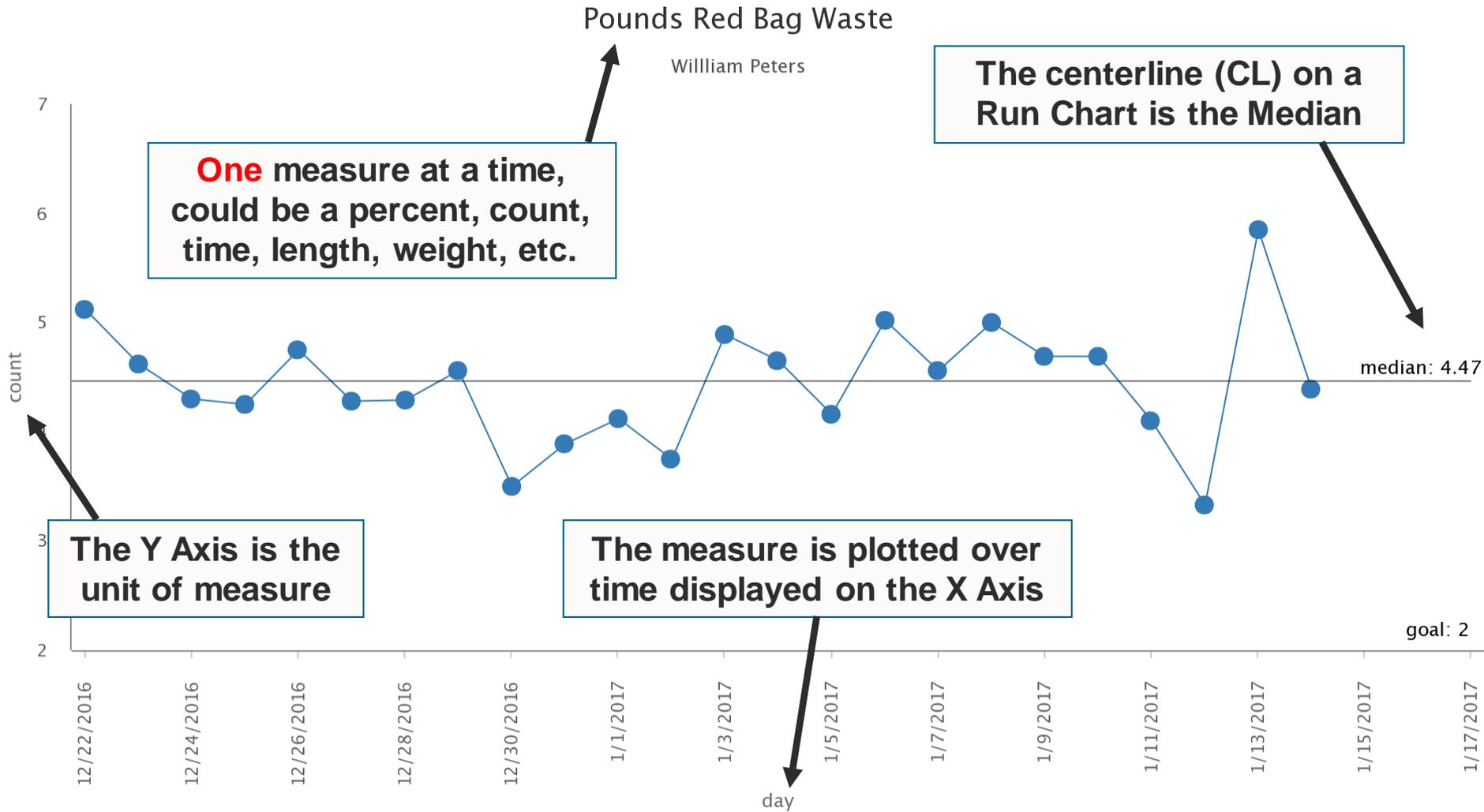
Determine if we are holding the gains

Run Chart: the tool we use to make sense of variation, how we PROVE IMPROVEMENT!

Benefits

- EVERYONE PLAYS BY THE SAME RULES! (STANDARDIZE!)
- Get those closet to the process to measure it in real time, to take ownership of the data
- Used to prove improvement, to prove success, to strengthen theory
- There is an easy web based template to use which is easy & saves time
- <https://qilothian.scot.nhs.uk/run-chart-tool>
- <http://www.ihl.org/resources/Pages/Tools/RunChart.aspx>

Anatomy of a Run Chart



generated from ihi.org

Four Rules to Apply to a Run Chart

Four rules that indicate
non-random patterns
in a run chart, indicate
SIGNAL!
(in no particular order)

1. Shift
2. Trend
3. Too many or too few runs
4. Astronomical data point

Murray and Provost, 3 (11-15)

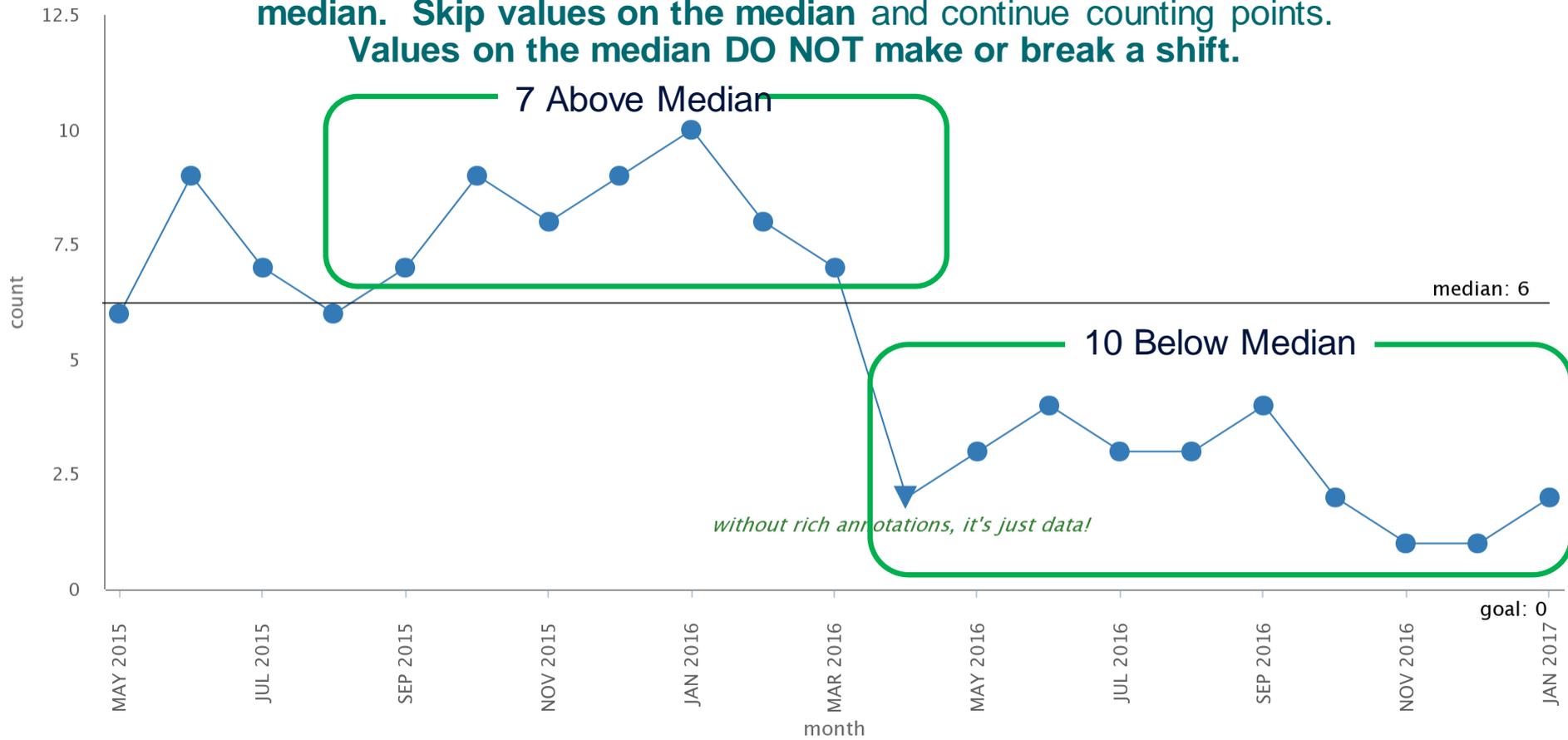
All of these rules are calculated by the NHS run chart excel template

<https://qilothian.scot.nhs.uk/run-chart-tool>

Rule one: the shift

Number of Falls

Six or more consecutive POINTS either all above or all below the median. Skip values on the median and continue counting points. Values on the median DO NOT make or break a shift.

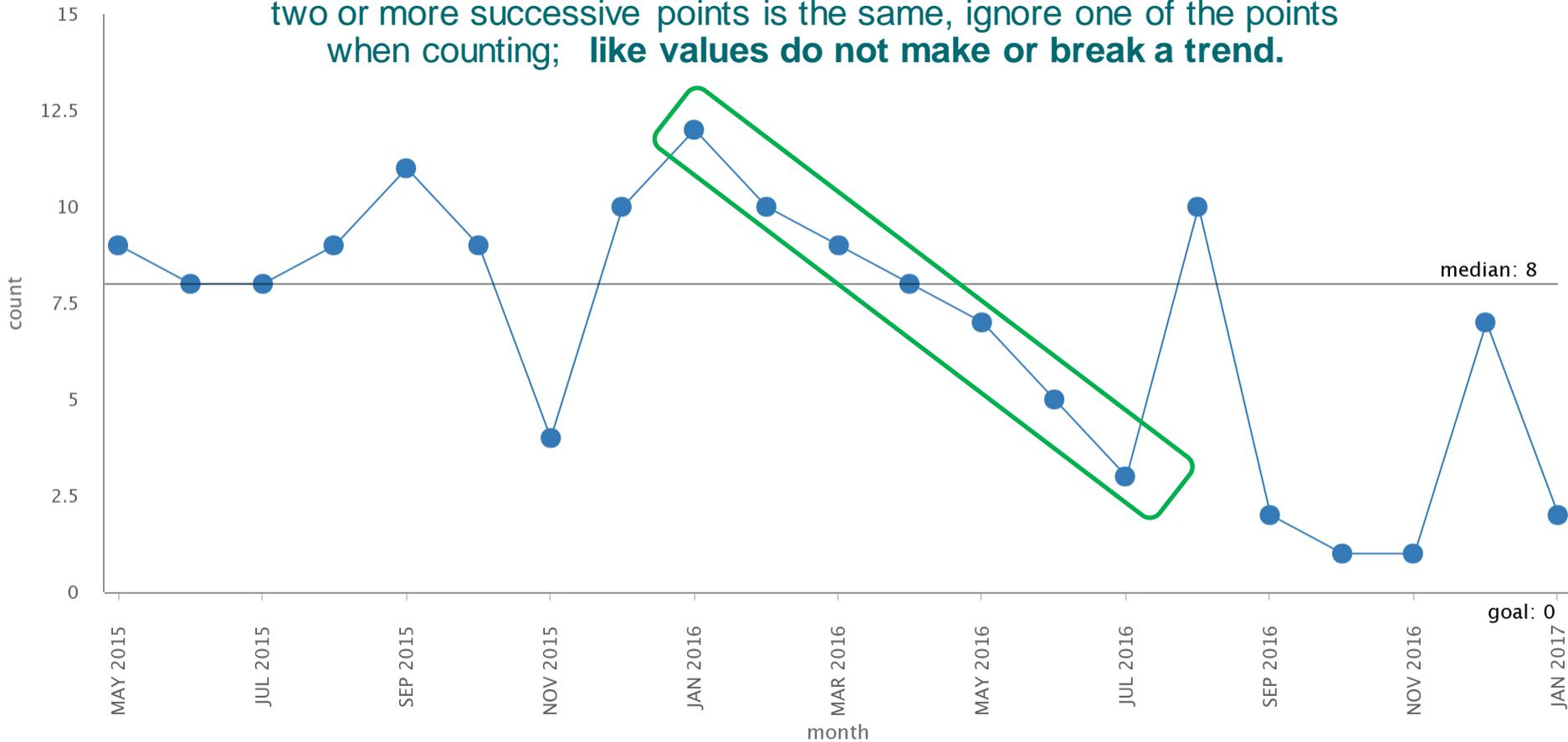


generated from ihi.org

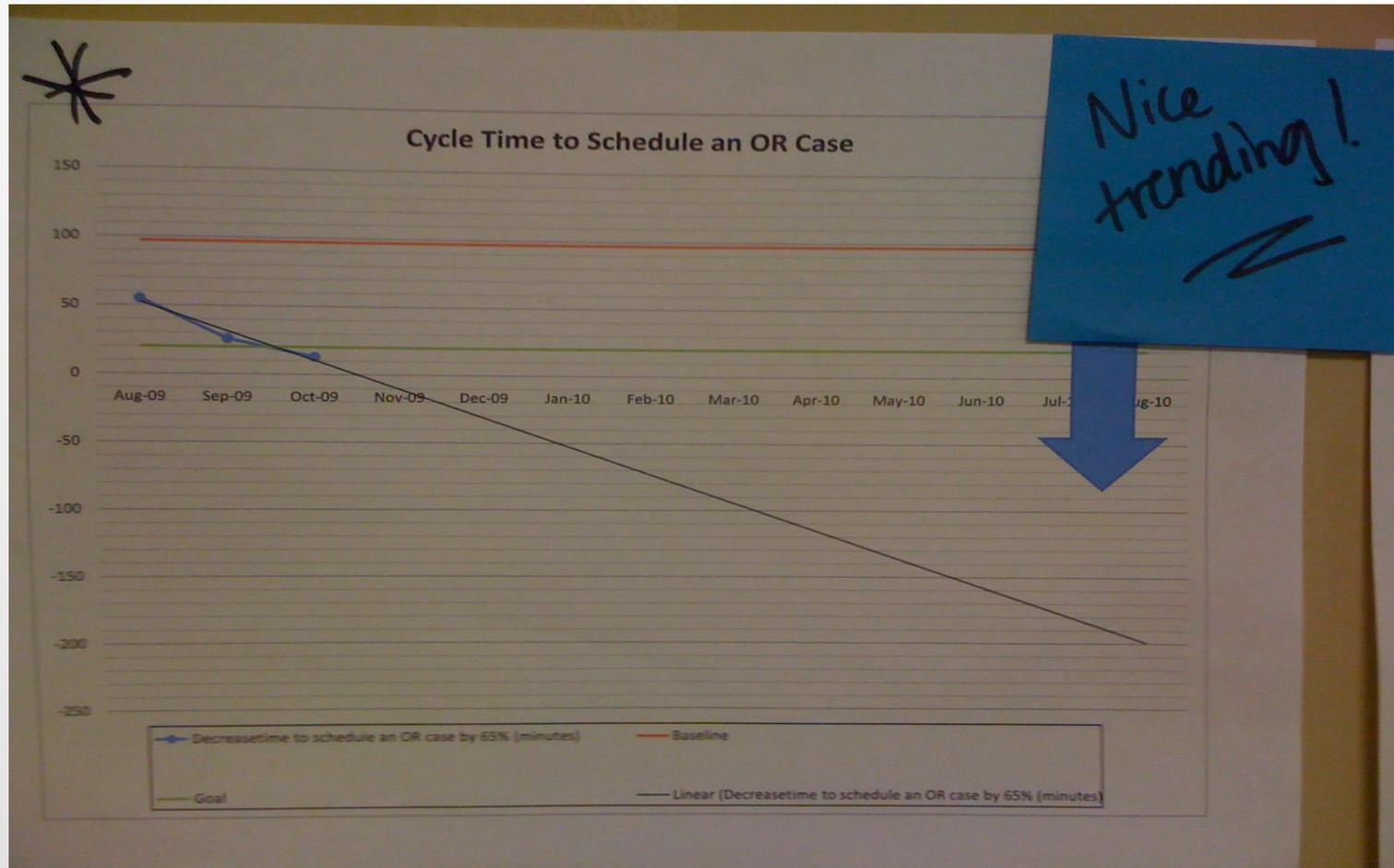
Rule two: the trend

Number of Restraints

5 - 6 (6 if >N20) points all going up or all going down. If the value of two or more successive points is the same, ignore one of the points when counting; **like values do not make or break a trend.**



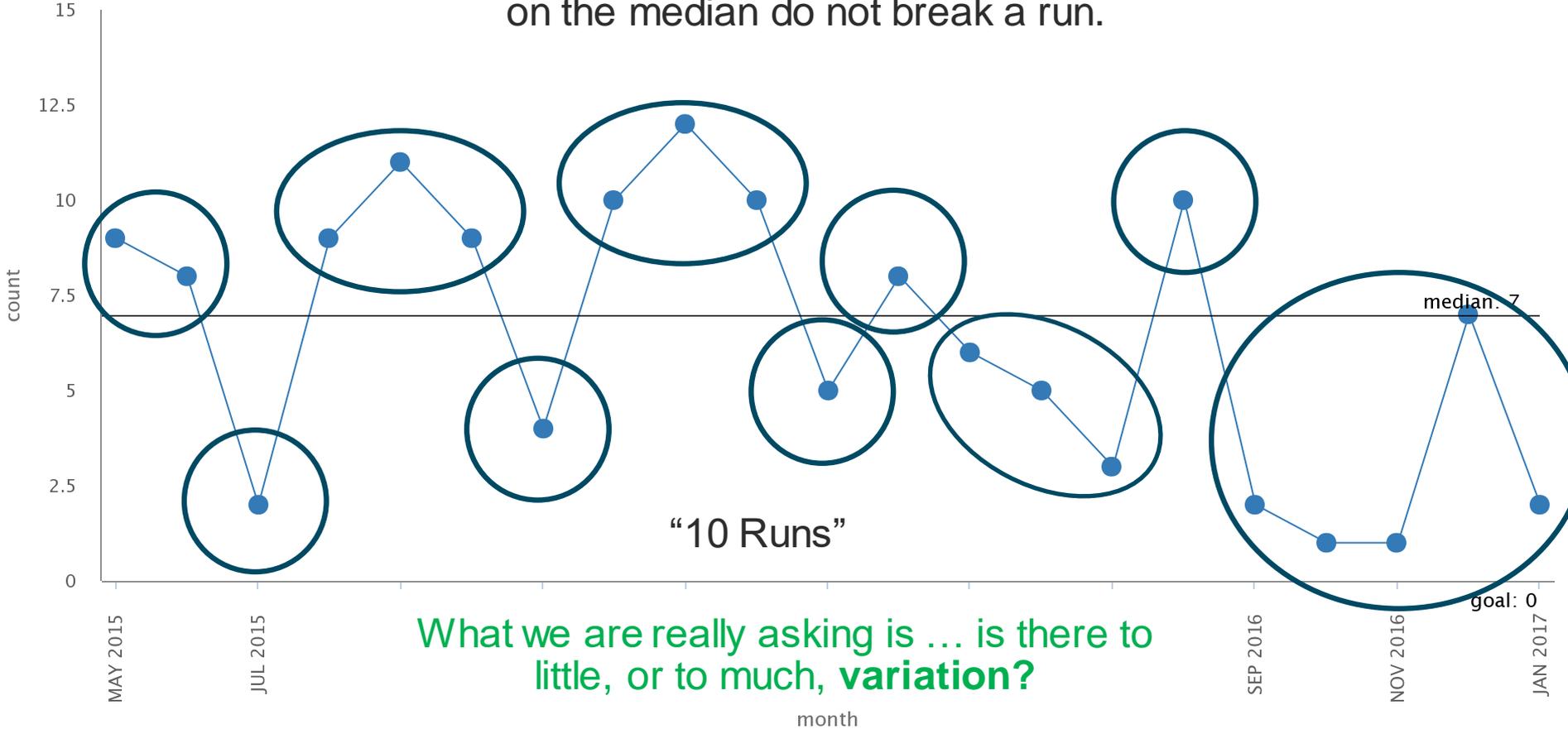
This is NOT a trend!



Rule three: to many or to few runs

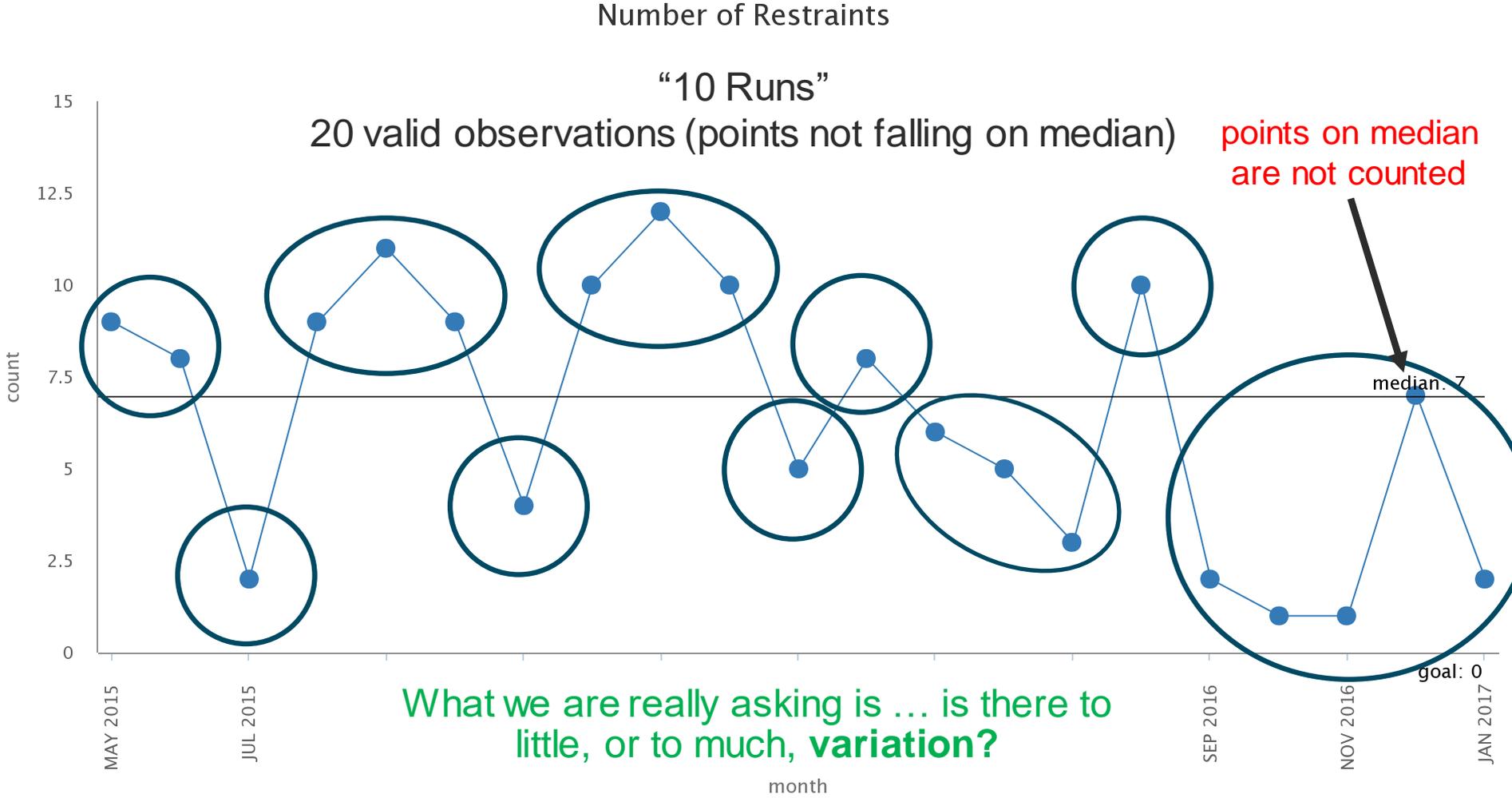
Number of Restraints

A run is a series of points in a row on one side of the median. Points falling on the median do not break a run.



generated from ihi.org

Rule three: to many or to few runs



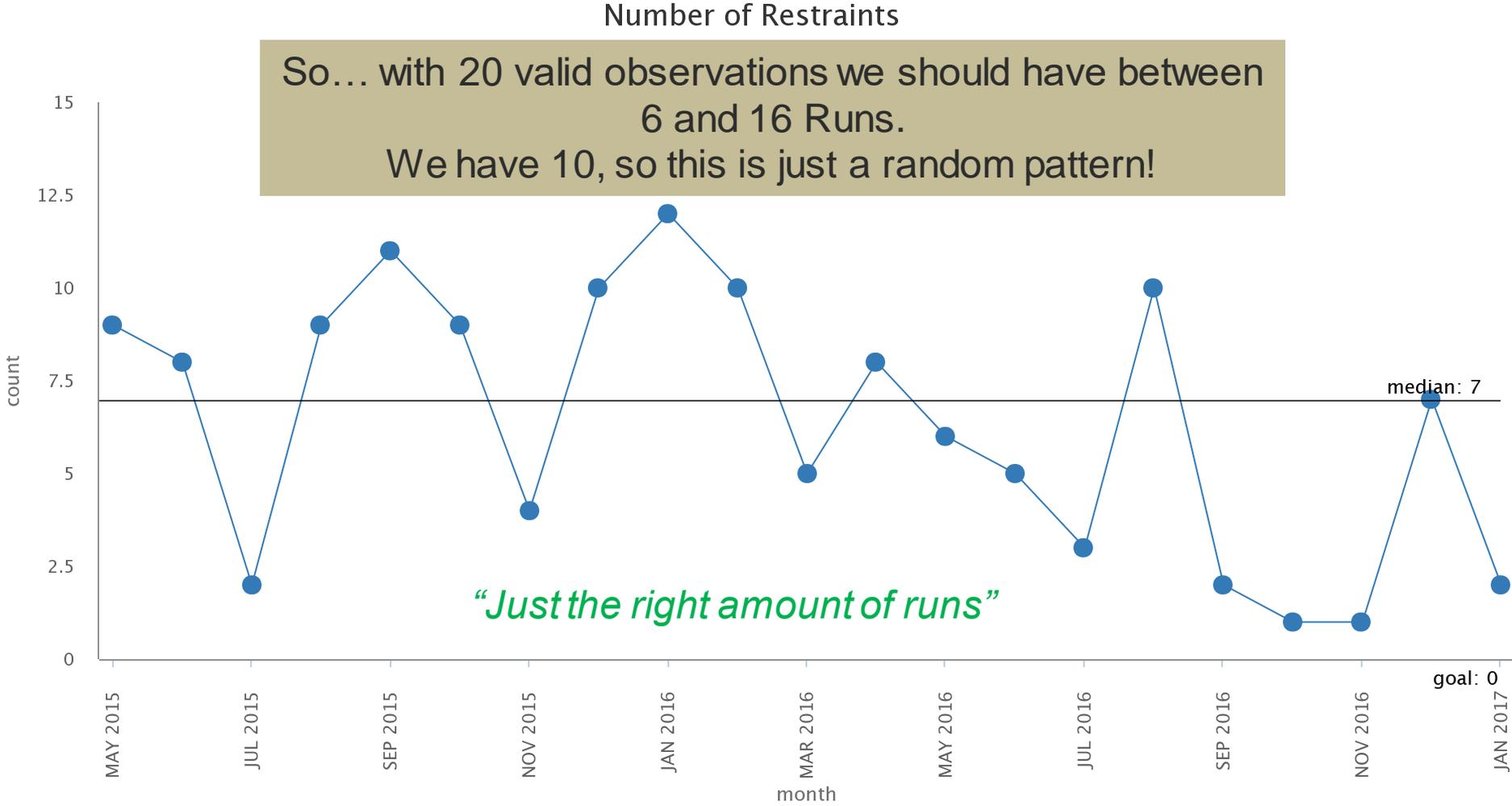
Rule three: to many or to few runs

The NHS Run Chart tool will determine this rule for you, but if you are using Excel, or paper/pencil, use the lookup table provided in the run chart template

Total number of data points on the run chart <i>that do not fall on the median</i>	Lower limit for the number of runs (<i>< than this number of runs is "too few"</i>)	Upper limit for the number of runs (<i>> than this number of runs is "too many"</i>)
10	3	9
11	3	10
12	3	11
<p>So... with 20 valid observations we should have between 6 and 16 Runs. We have 10, so this is just a random pattern!</p>		
17	5	13
18	6	14
19	6	15
20	6	16
21	7	16
22	7	17
23	7	17
24	8	18
25	8	18

Table is based on about a 5% risk of failing the run test for random patterns of data.
Adapted from Swed, Feda S. and Eisenhart, C. (1943). "Tables for Testing Randomness of Grouping in a Sequence of Alternatives. Annals of Mathematical Statistics. Vol. XIV, pp.66 and 87, Tables II and III.

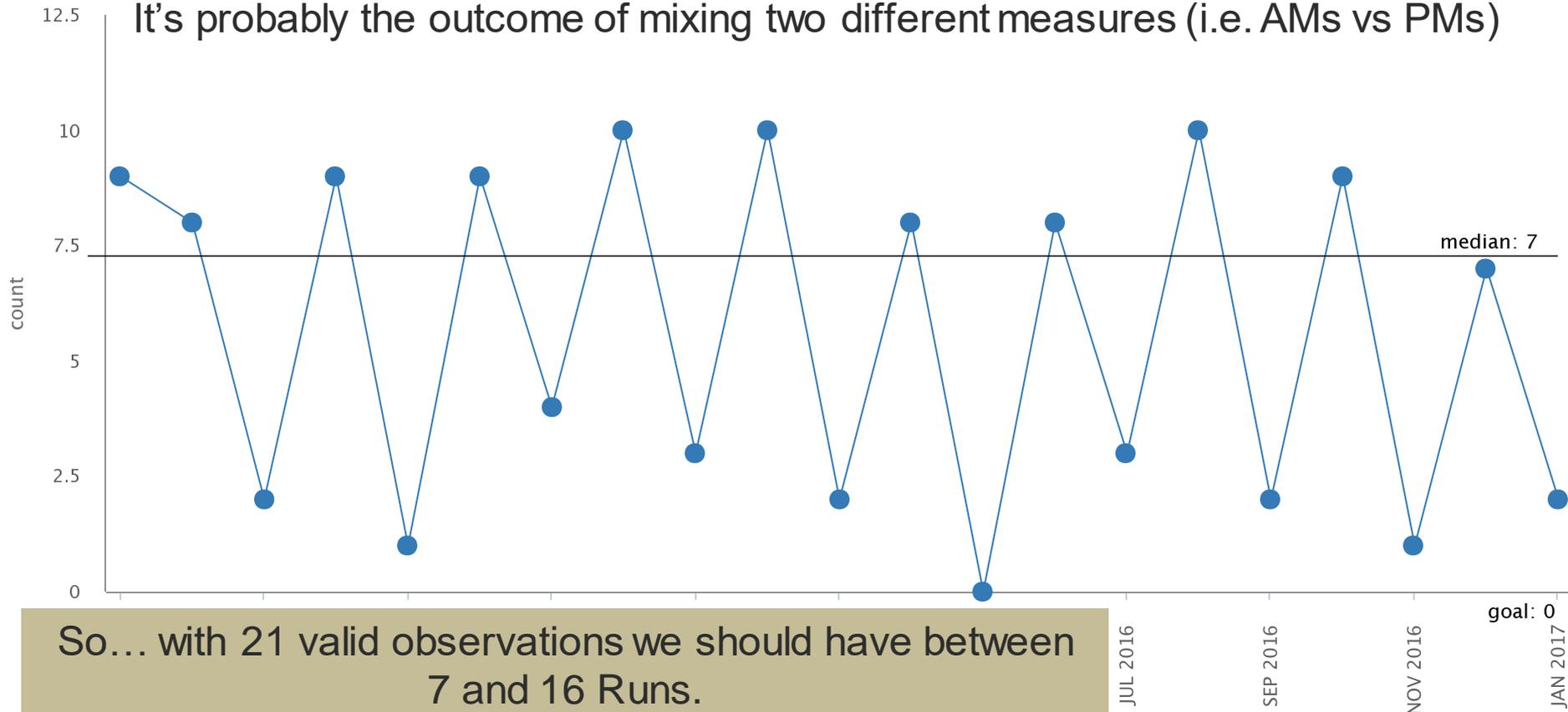
Rule three: to many or to few runs



Rule three: to many or to few runs

Number of Restraints

Here is one with too many runs! This is called a “saw tooth pattern”
It’s probably the outcome of mixing two different measures (i.e. AMs vs PMs)



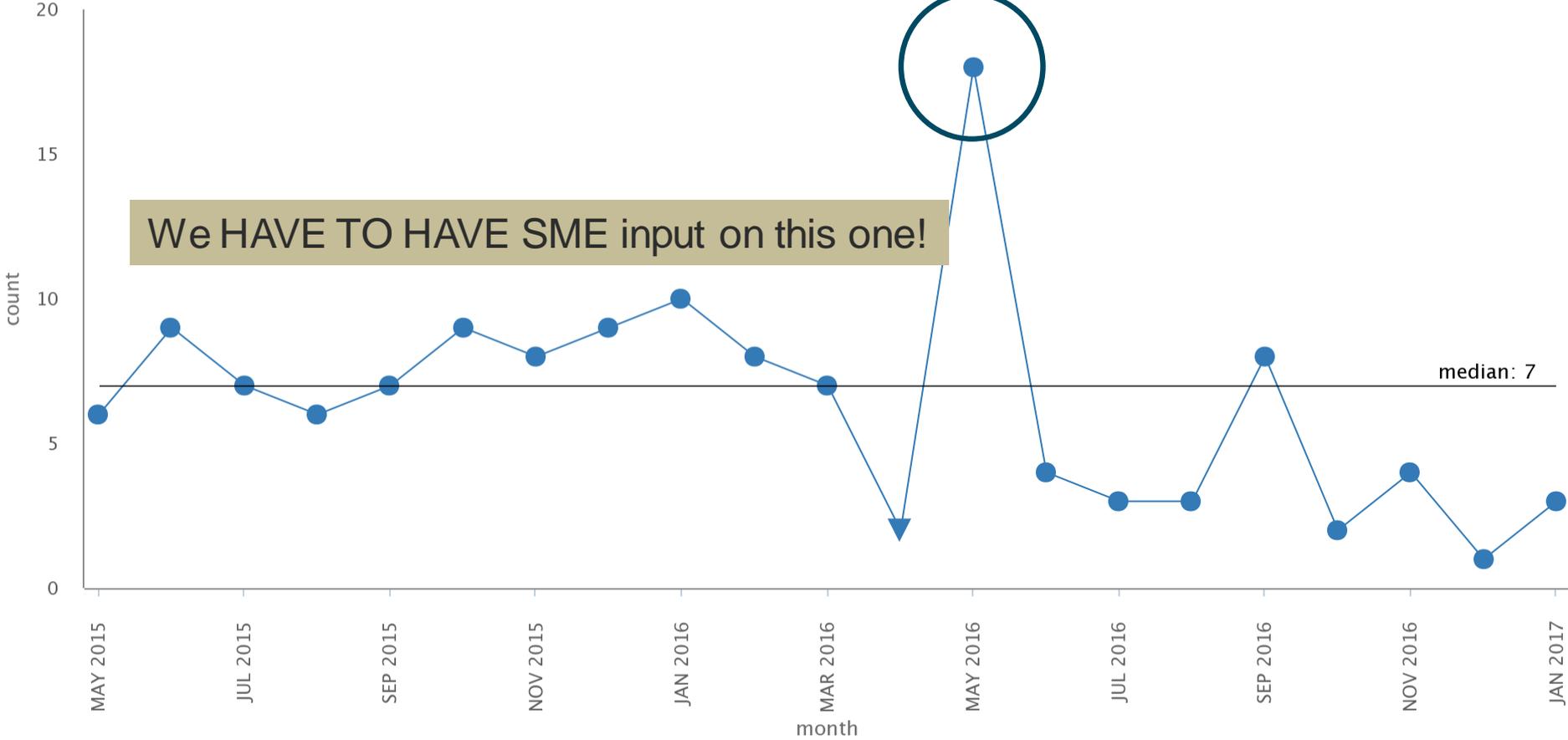
So... with 21 valid observations we should have between 7 and 16 Runs.

We have 18, so this is a NON-RANDOM pattern!

Rule four: Astronomical data point

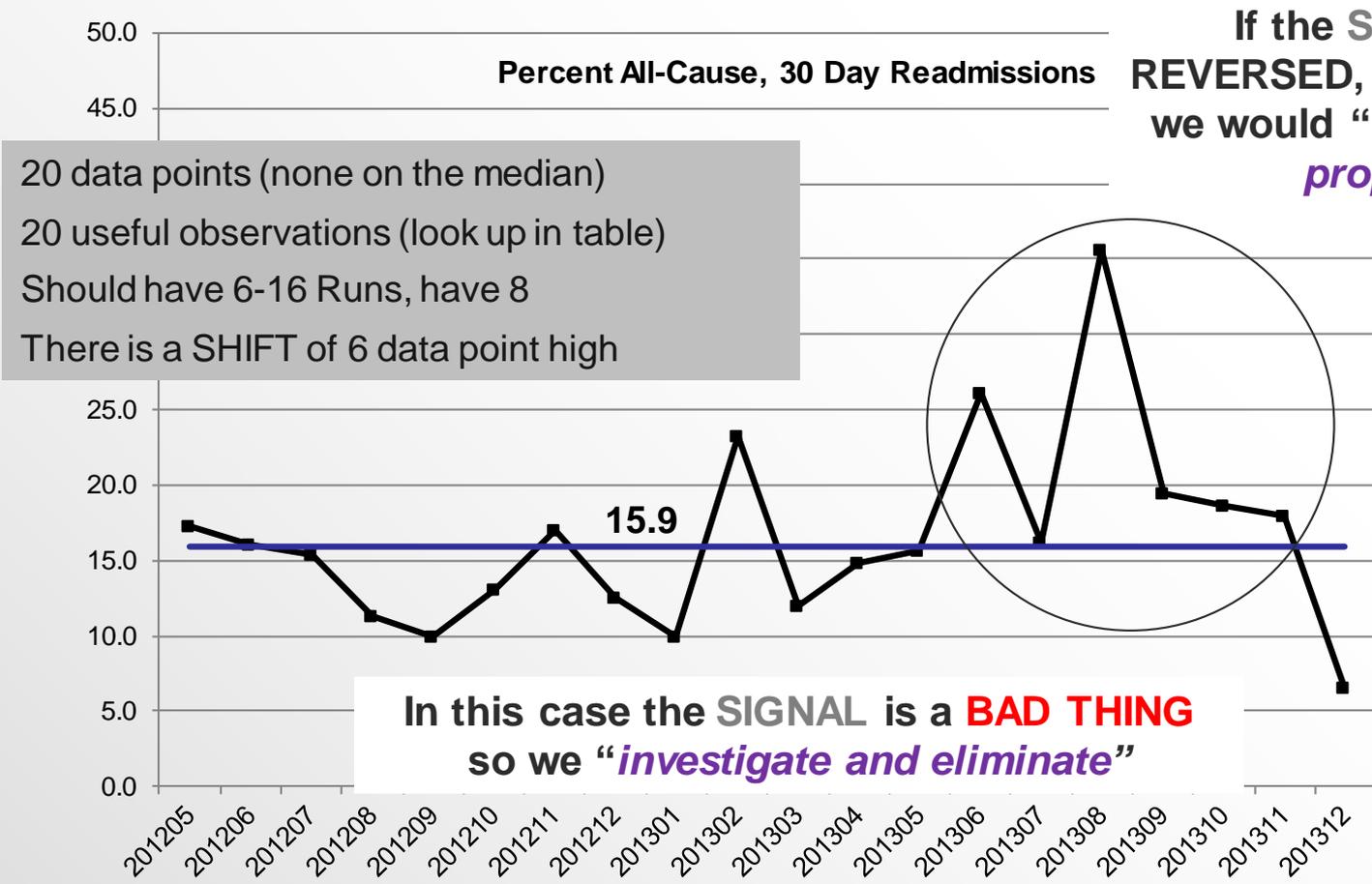
Number of Falls

William Peters



generated from ihi.org

A Random Example...



If the SIGNAL was REVERSED, a **GOOD THING**, we would *investigate and propagate*



I&P
 or
I&E
 &
LEARN & TAKE ACTION!

So far, so good, so what ...

So we have a signal of non-random variation ...

... or ...

**We have a run chart with no signal, just noise,
just random variation ...**

Are these **good/**bad** things?**

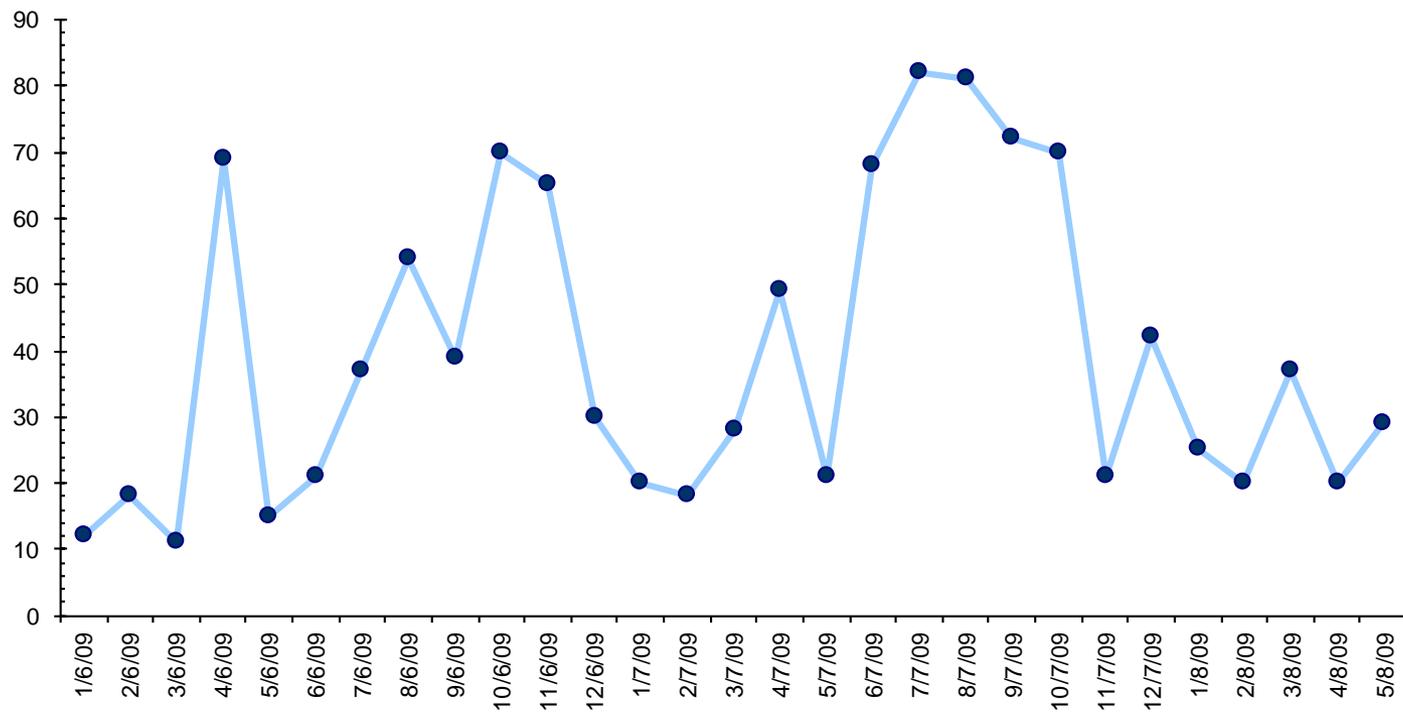
“Practice isn’t the thing you do once you’re good. It’s the thing you do that makes you good.” - Malcolm Gladwell

So, let’s practice...

Number of Clinic Visits (M-F)

Is this a Run Chart? If not, what is it?

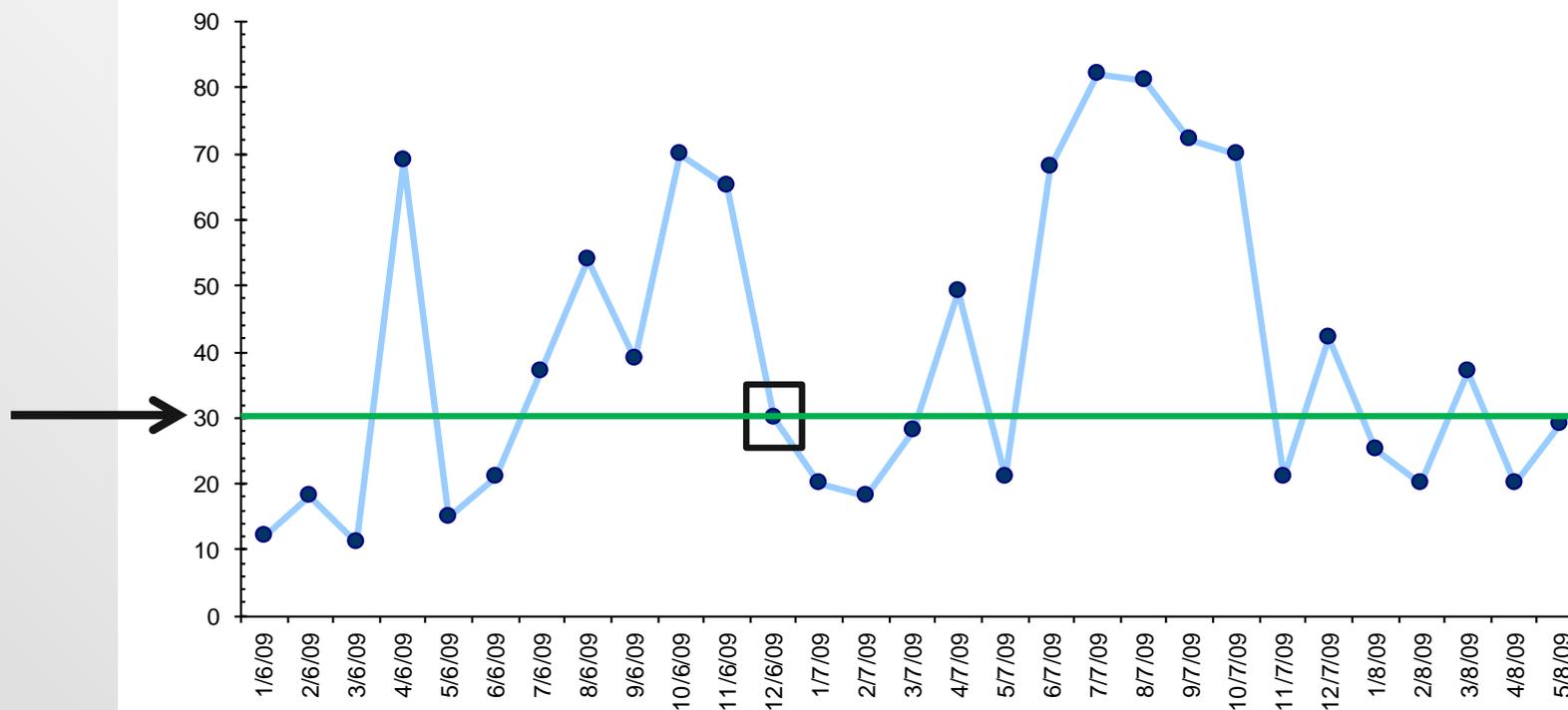
Visits



Source: Dr. Robert Lloyd IHI

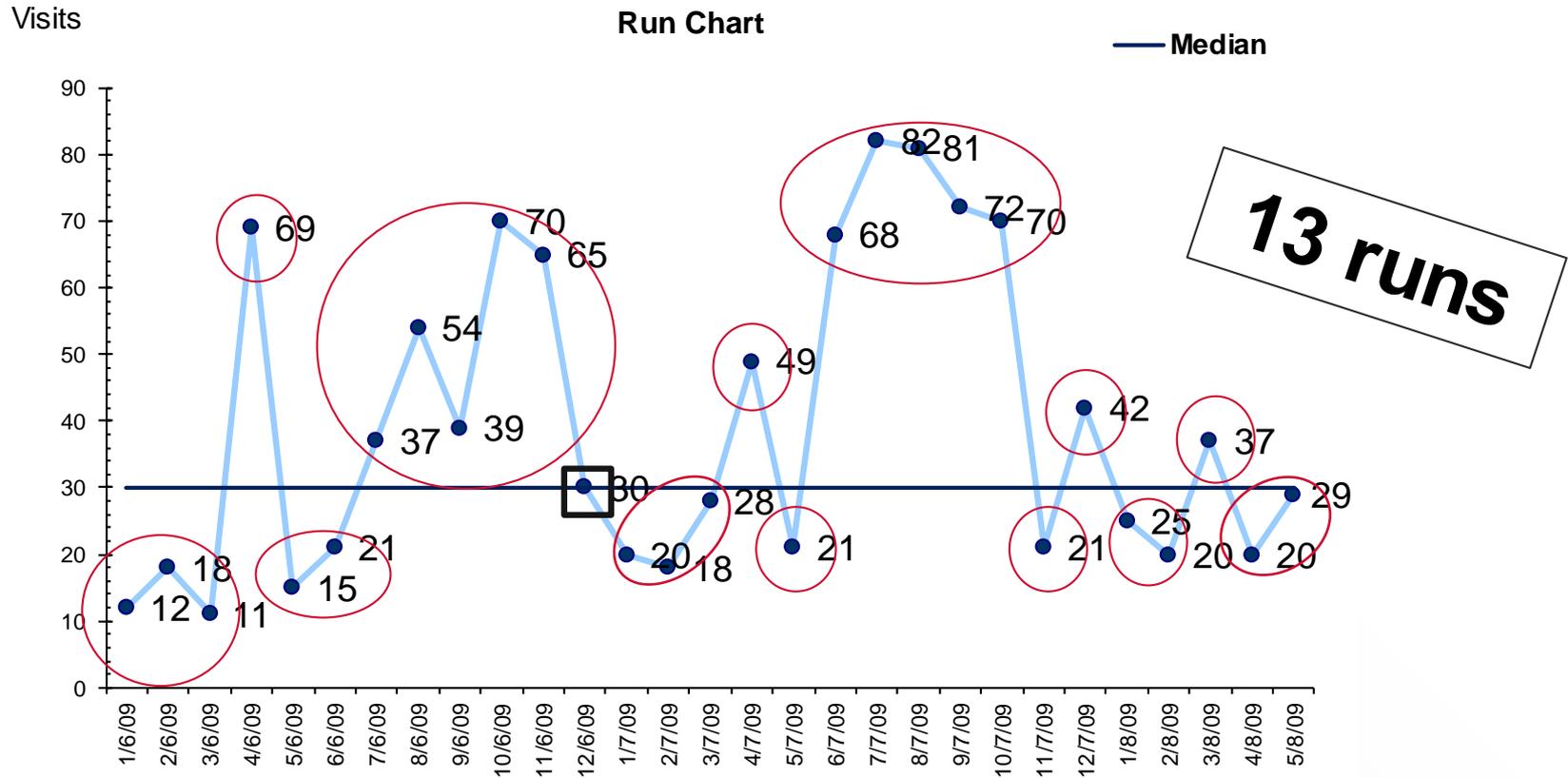
Number of Clinic Visits (M-F)

1. The median value is 30.
2. It is useful to mark the data points that fall on the median so you do not count them when determining the number of runs.
3. “useful observations” are the count of data points NOT on (=) median
4. 29 data points with 1 on the median for 28 useful observations (table says 10-20 runs)
5. Now count the number of runs.



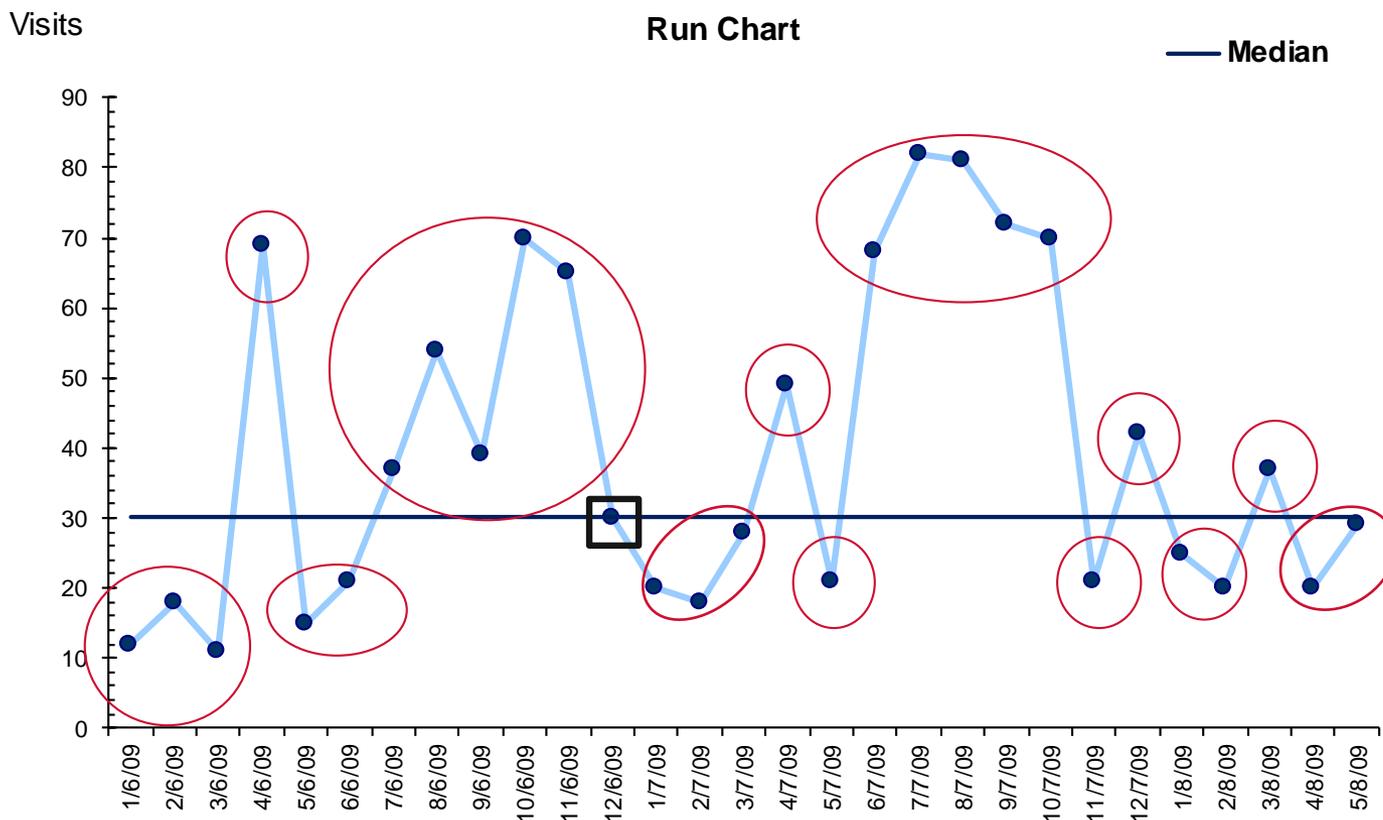
Source: Dr. Robert Lloyd IHI

Now we apply the 4 run chart rules and determine if there are any non-random patterns in the data.



Source: Dr. Robert Lloyd IHI

- 1) 13 runs w/28 points (lookup table states there should be between 10 - 20 runs) **random pattern**
- 2) Are there more than 6 points in a run above or below the median? Shift? **nope, random pattern**
- 3) Are there 6 or more data points constantly increasing or decreasing? Trend? **nope, random pattern**
- 4) Are there any astronomical data points? **nope, random pattern**



a completely random pattern

In Conclusion...

- All measures have random variation
- We are forced to interpret this variation
- Incorrectly interpreting this variation has dire consequences
- The run chart is the tool we use to determine signal/noise
- We use the four rules to interpret the run chart
- Using the run chart as THE standard against which improvement (WORK) is judge is fair and reduces anxiety!

Next Steps

- ❖ Session 1: Focus on the MFI & Question 1 of the MFI - *Complete*
- ❑ **Before beginning Session 2: Complete the aim statement and team section of the Project Charter**
- ❖ Session #2: Focus on Data/Measurement & Question 2 of the MFI - *Complete*
- ❑ **Before beginning Session 3: Complete the metrics and scope sections of the Project Charter**
- ❖ Session 3: Focus on Tests of Change & Question 3 of the MFI
- ❖ Session 4: Bringing it all together & Implementation

Next Steps

1. Using the Project Charter Document:
 - ❖ Complete the Measures section - Utilize the *Organizing Your Measures* and *Operational Definition* worksheets to help develop measures
 - ❖ Complete the Scope section of the document
2. Review the measures with team members to reach consensus
3. Bring your Project Charter to Session 3



Model for Improvement Project Charter

This project charter clarifies expectations among the team and establishes the project's aim, measures, scope, timeline and team members.

QUESTION 1: WHAT ARE WE TRYING TO ACCOMPLISH?		
Aim Statement:		
QUESTION 2: HOW WILL WE KNOW THAT A CHANGE IS AN IMPROVEMENT?		
Outcome Measures	Current	Target
Process Measures	Current	Target
SCOPE		
In Scope:		Out of Scope:
QUESTION 3: WHAT CHANGES CAN WE MAKE THAT WILL RESULT IN IMPROVEMENT		
Small Tests of Change	Date	
Project End Date:		
TEAM		
Executive Sponsors:		
Dyad Champions:		
Team Members		

Next Steps

If you have questions or would like feedback on what was covered during this session please email our IHA Team at:

IHAFlex@team-iha.org

Thank you!



Illinois Health and Hospital Association

Your trusted voice and resource

team-iha.org