Welcome – before we begin…

Write one or two questions/issues you are hoping are addressed in this session.

You will be asked to “chat” about your issues in a few minutes.

BC Patient Safety & Quality Council

EFFECTIVE DATA DISPLAY

VIRTUAL LEARNING OPPORTUNITY

AUGUST 19, 2010

BRITISH COLUMBIA | BC Patient Safety & Quality Council

What do you need to know?

Question for today's participants:

Write one or two questions/issues you are hoping are addressed in this session?

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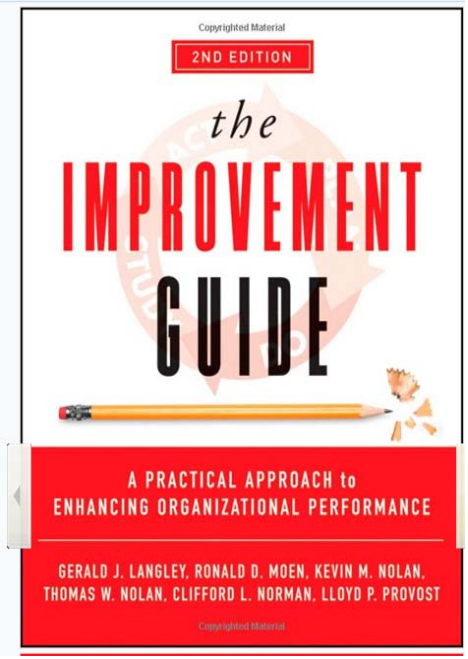
Plan for the session

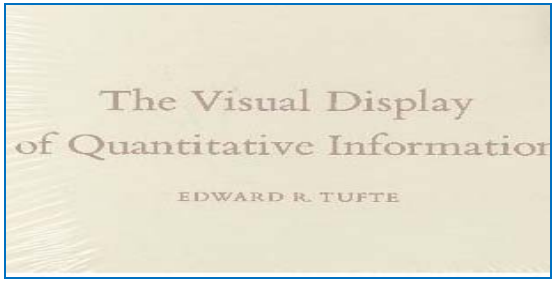
- Background: what is *Quality Measurement?*

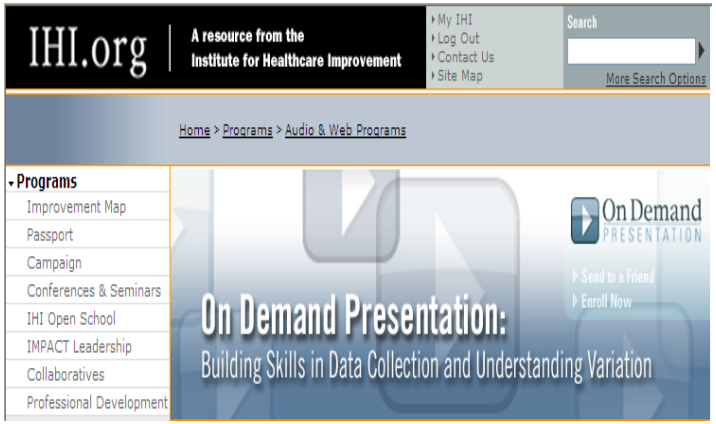
- How to display results?
  - Different purposes = different techniques
  - run chart, control chart, Pareto diagram
  - Advantages of displaying data over time
  - Different audiences

- Best practice tips on graphical display

Resources







Sandra Murray, MA, Principle, Corporate Transformation Concepts, is an independent consultant who concentrates her work in the area of effectively using process improvement methods to get strategically vital results. She has been an Improvement Advisor with the Institute for Healthcare Improvement (IHI) since 2002, working in the areas of patient safety, as faculty for IHI's Breakthrough Series College, and as past Director and current faculty for IHI's Improvement Advisor Professional Development Program.

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What is Quality Measurement?

Indicators

Tracking outcome/process measures

Balanced Scorecards

Public reporting

Identifying issues

Patient and staff surveys

Using data to understand performance of a system

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Key Aspects of Performance Measurement by Type

Aspect	Accountability	Research	Improvement
Measurement Aim	Comparison, choice, reassurance, spur for change	New knowledge	Improvement of care
Measurement Methods Test observability	No test, evaluate current performance	Test blinded or controlled	Test observable
Bias	Measure and adjust to reduce bias	Design to eliminate bias	Accept consistent bias
Sample size	Obtain 100% of available, relevant data	"Just in case" data	"Just enough" data, small sequential samples
Flexibility of hypothesis	No hypothesis	Fixed hypothesis	Hypothesis is flexible; it changes as learning takes place
Testing strategy	No tests	One large test	Sequential tests
Determining if a change is an improvement	No change focus	Hypothesis, statistical test (t-test, F-test, chi-square) with p-values	Run charts or Shewhart control charts (use statistical process control methods)
Confidentiality of the data	Data available for public consumption and review	Research subjects' identities protected	Data used only by those involved with improvement

Source: Institute for Healthcare Improvement

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Accountability: report cards, public reporting, accreditation

Improvement: testing results of improvement projects

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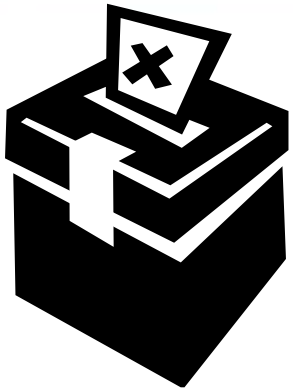
Dual purpose

accountability for improvement

Time for a poll:



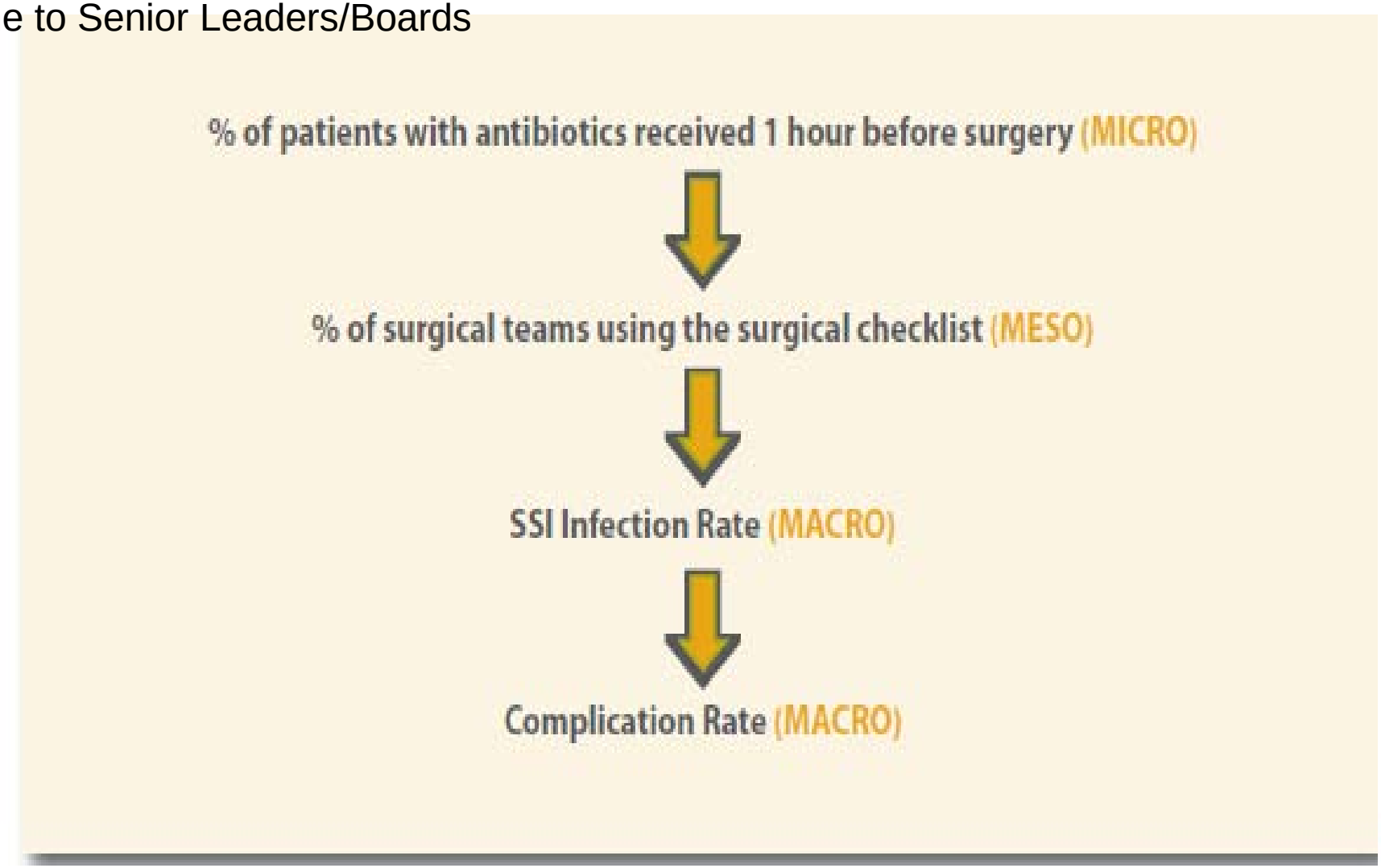
In your role, are you mainly involved with:

a. Measures to help clinicians/teams test improvement?

b. Measures to show to senior leaders/boards?

c. Both?

Cascade of Measures – from front line to Senior Leaders/Boards



Questions before we move onto:

-run charts

-control charts

-Pareto

Run Chart – key features

-Data displayed in time order

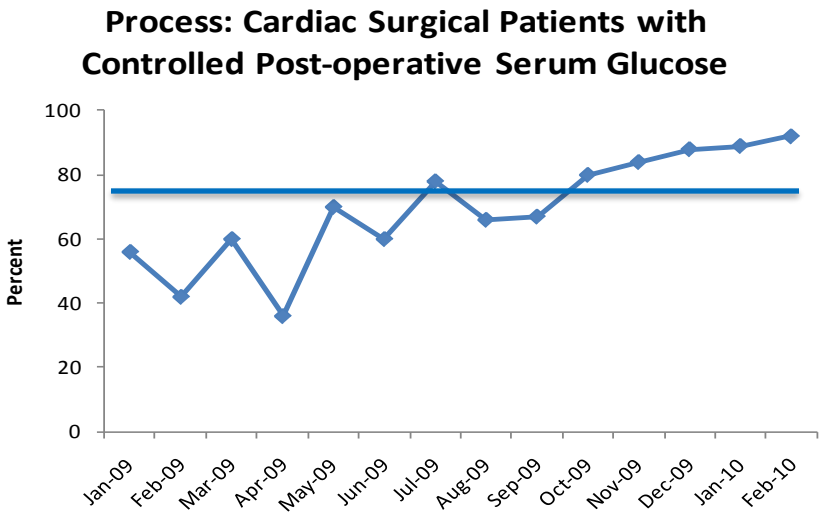
-Time is along X axis →

-Result along Y axis ↑

-Centre line = median

-One “dot” = one sample of data

-Sample size = each “dot” should have the same *n*



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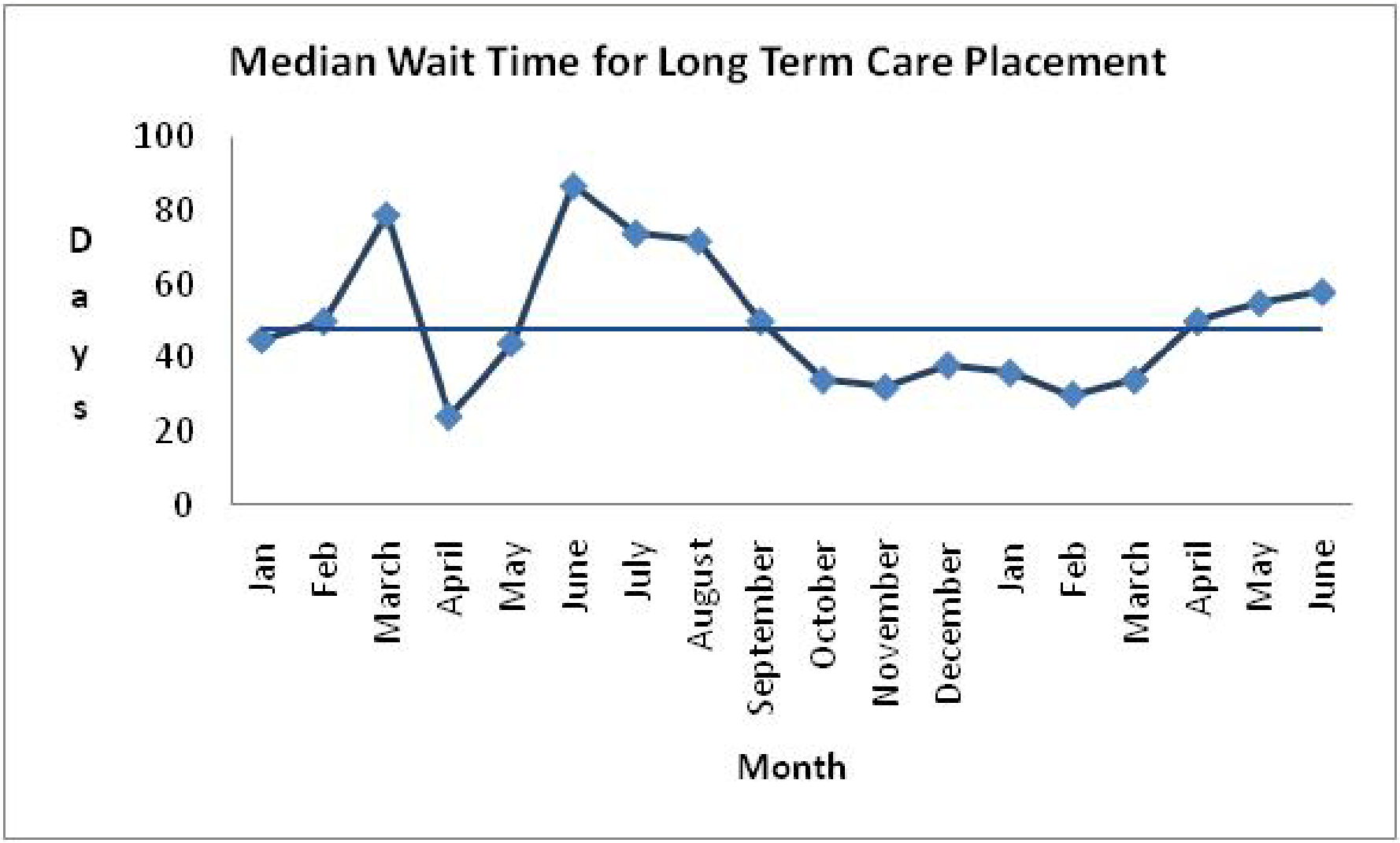
Run Charts – what they tell us



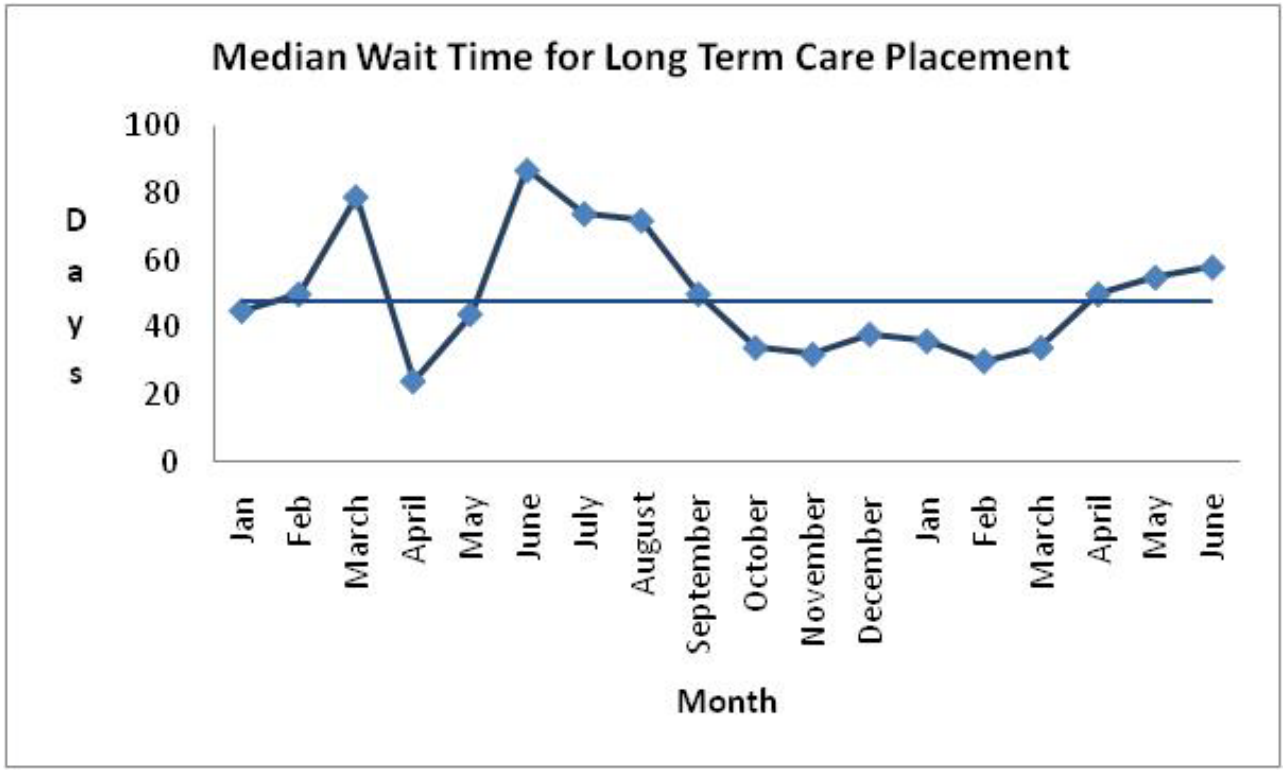
Run Charts – what they tell us

-How much variation is there? Is it stable?

-Is process changing significantly over time? >> probability based rules

-Is the improvement holding?

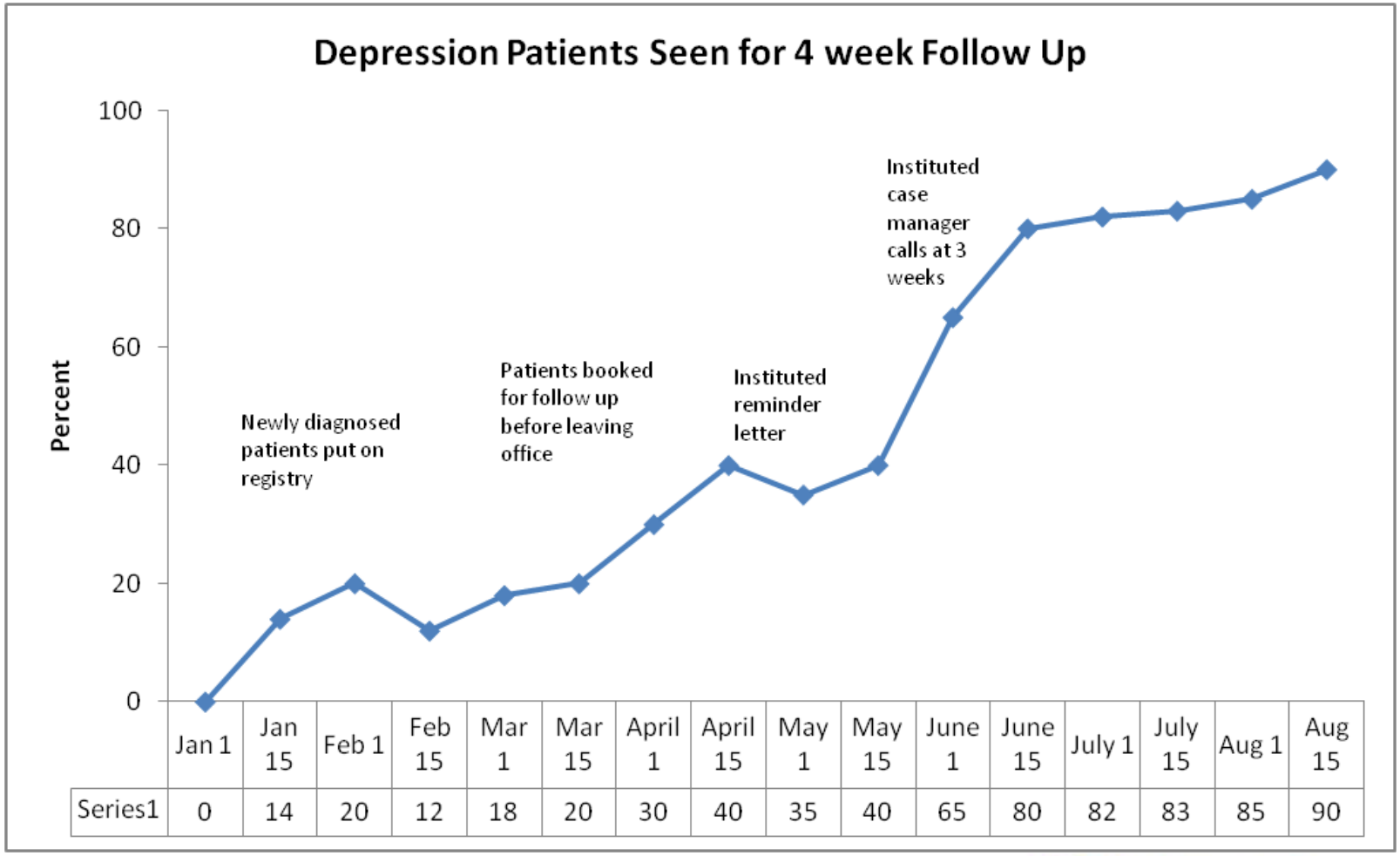
-Have our specific changes resulted in an improvement?



Annotated Run Chart

- Used in improvement work

- Think about it as a system of changes, *not direct cause and effect*



	Jan 1	Jan 15	Feb 1	Feb 15	Mar 1	Mar 15	April 1	April 15	May 1	May 15	June 1	June 15	July 1	July 15	Aug 1	Aug 15
Series1	0	14	20	12	18	20	30	40	35	40	65	80	82	83	85	90

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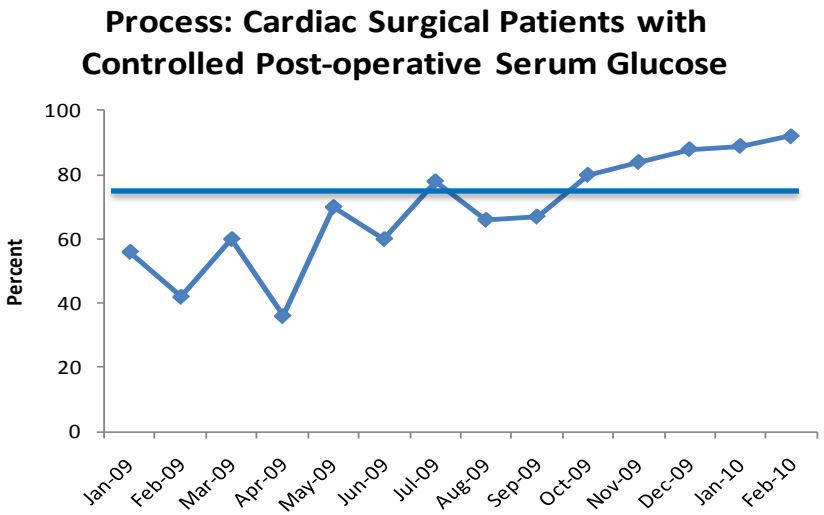
Run Chart – when to use

-Looking for evidence of improvement
  -Statistically significant evidence of change in the system

-Ensure improved performance is maintained
  -You can decrease frequency of measurement

-Performance measure:
  -Consistently hitting the target?
  -Is it stable?

- Gives Statistical Process Control information without need for statistical software



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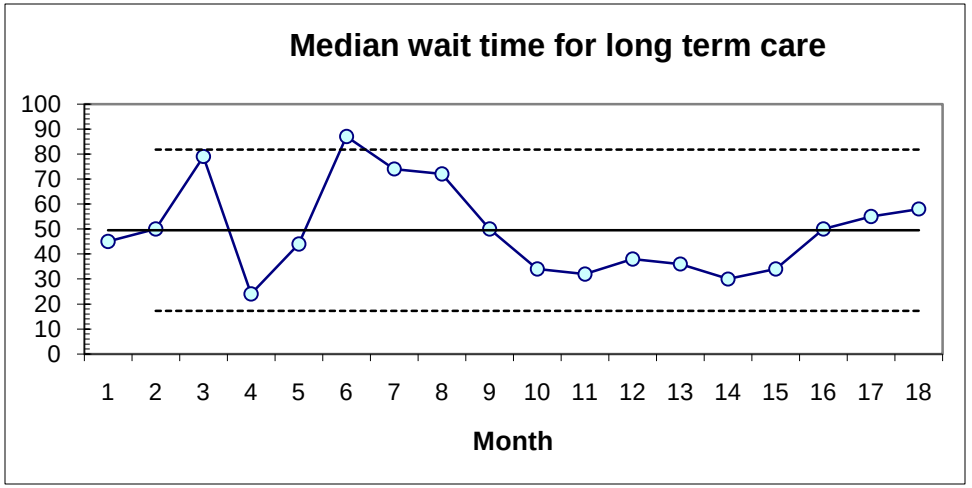
Control Chart

Key features

What does it tell us?

When to use?



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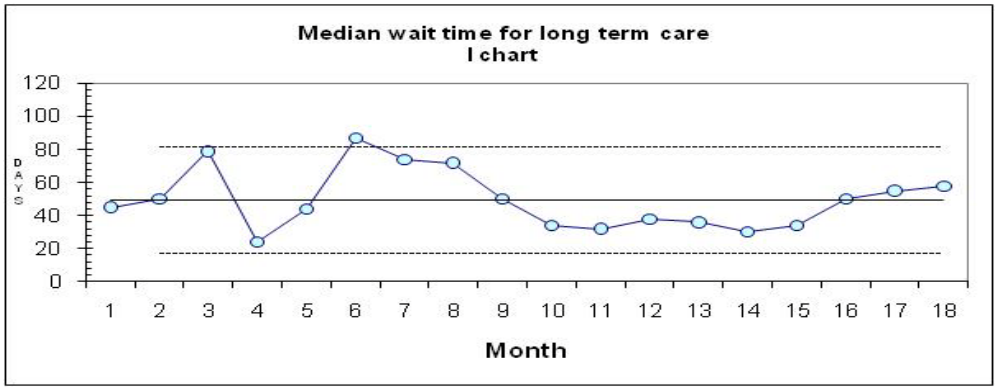
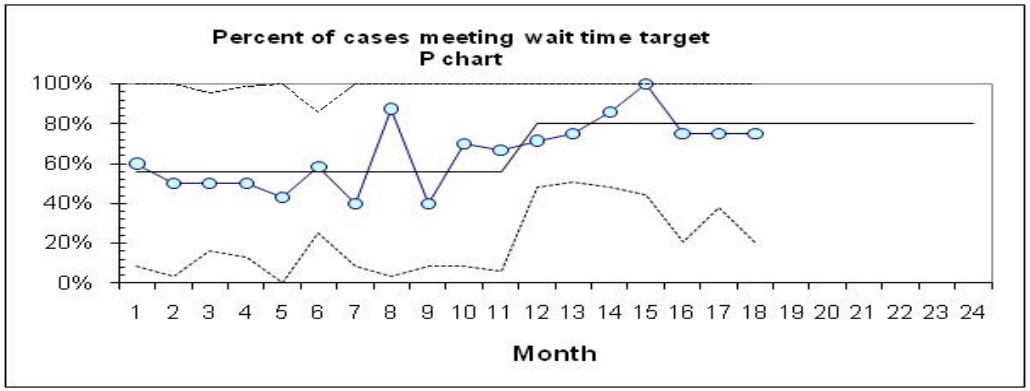
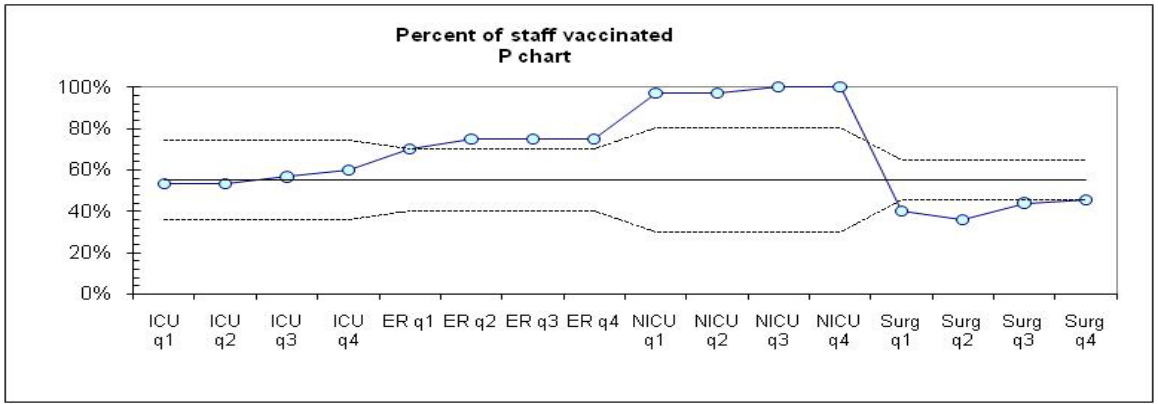
Control Chart

What features distinguish these control charts from the run charts?

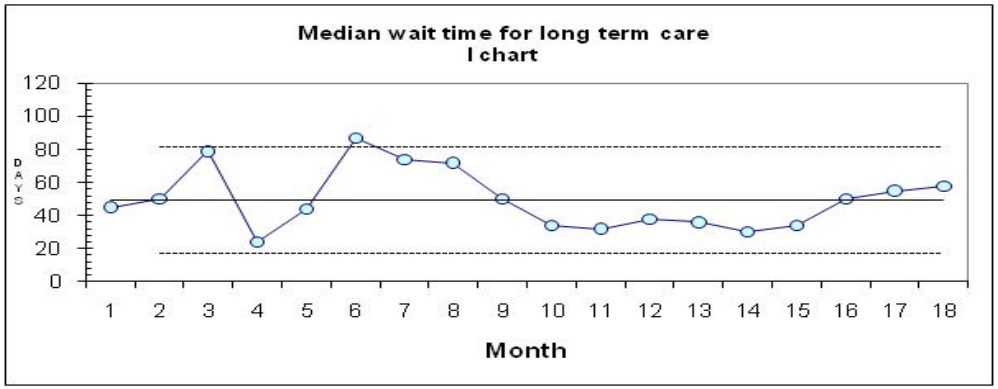


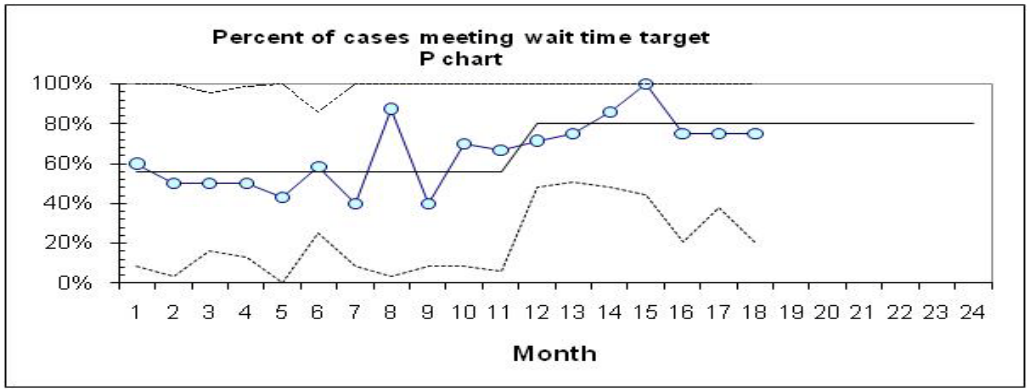


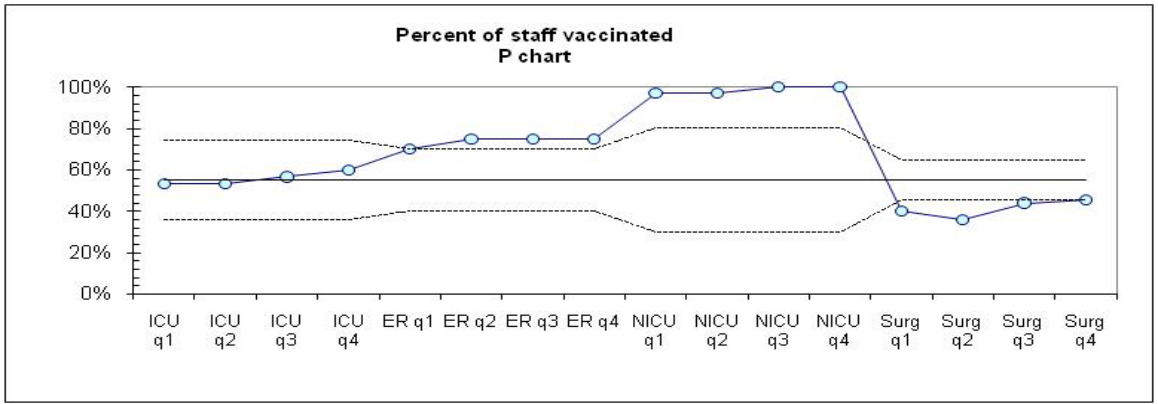


Control Chart - features

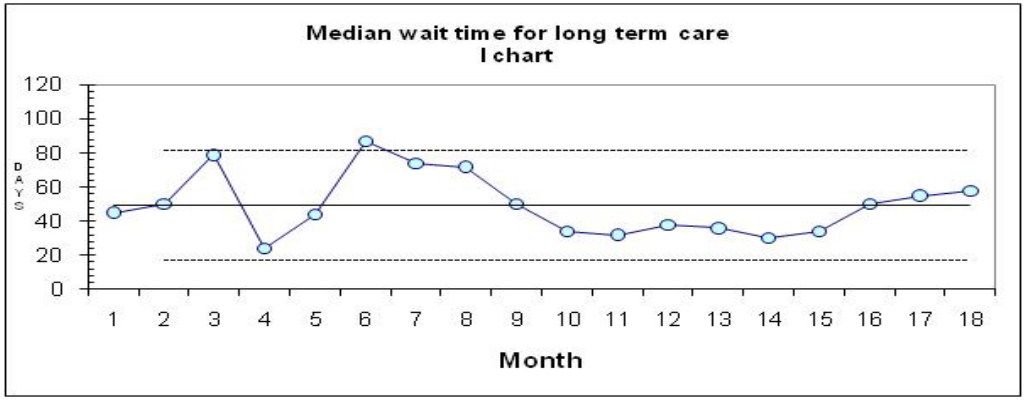
- centre line = mean
- upper and lower control limits
  - •to detect special cause variation
- control limits are not static
  - •based on sample size of each "dot"
- different types of charts
  - •data types: continuous, count, classification
- not necessarily ordered by time
  - •advanced application of SPC – is there something different about this system?







What is it telling us?

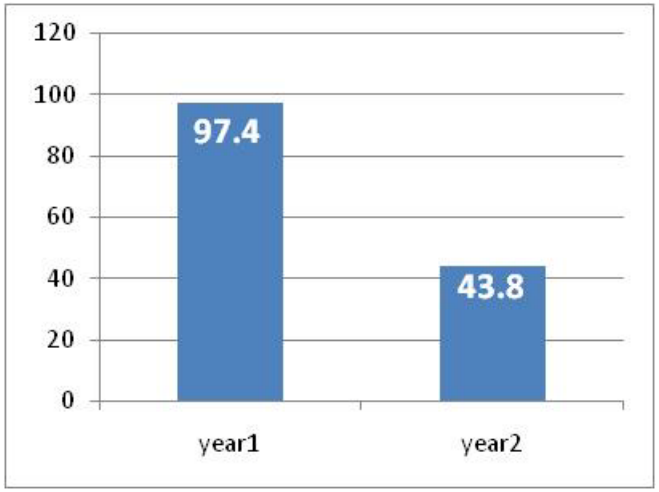


month	days
1	45
2	50
3	79
4	24
5	44
6	87
7	74
8	72
9	50
10	34
11	32
12	38
13	36
14	30
15	34
16	50
17	55
18	58

Not visually intuitive

No test of change in the system

No predictor of future performance



pre-post test, p<.01

Don't see times increasing in last months

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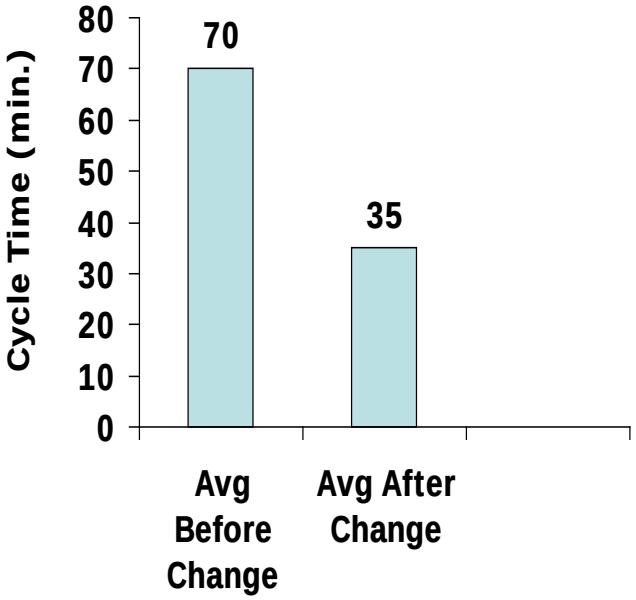
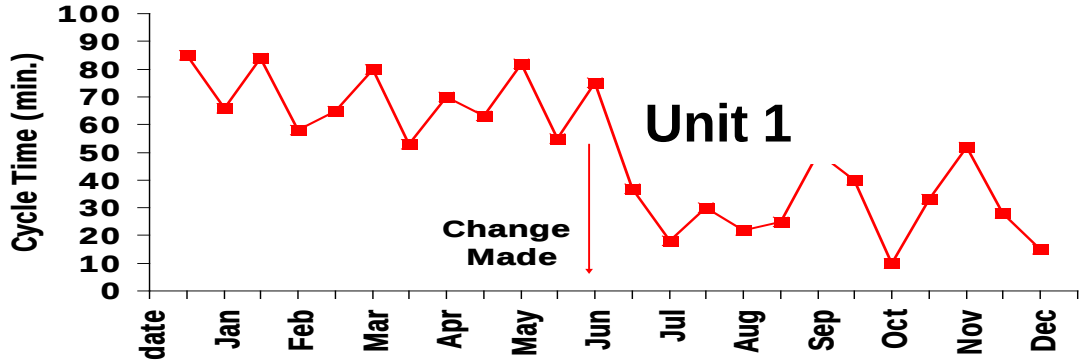
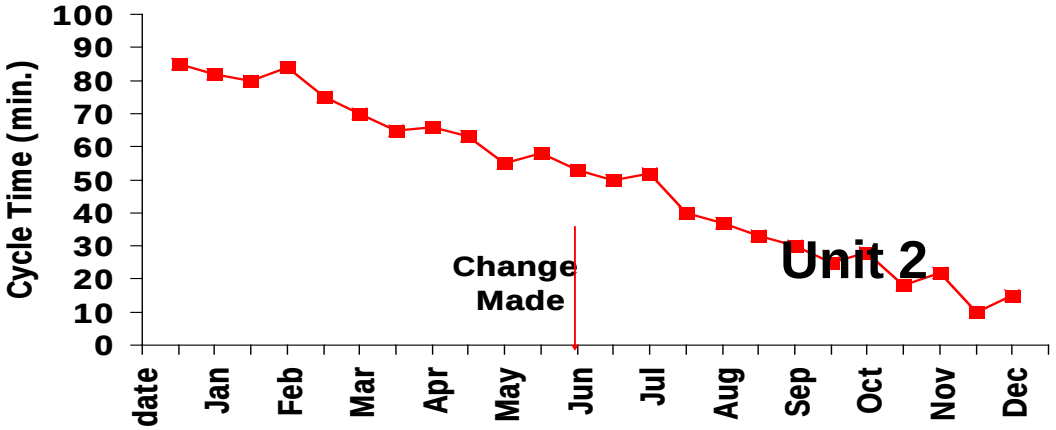
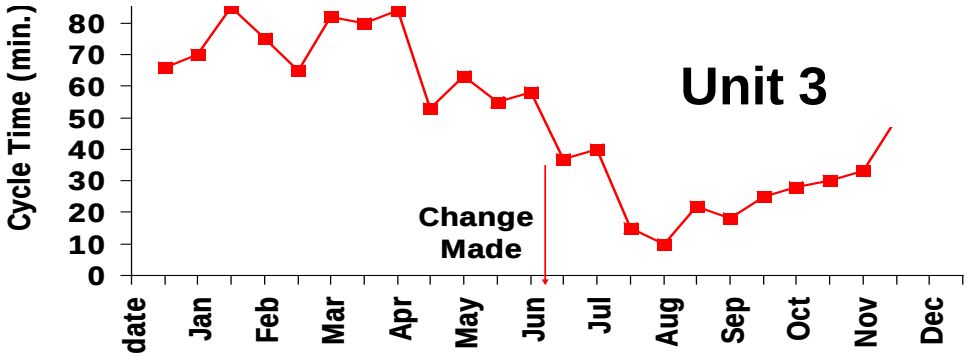
Cycle time results for units 1, 2 and 3









Control Chart – when to use?

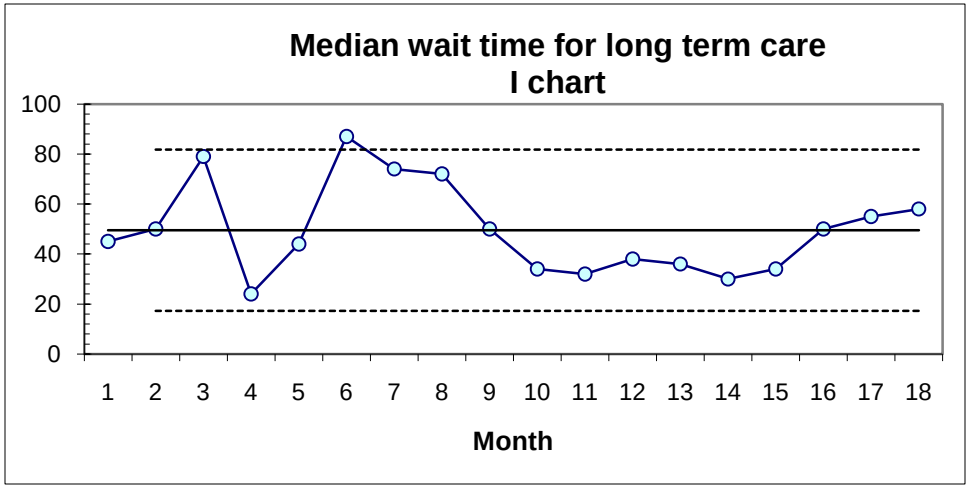
-Different sample size for each time period

-Determine improvement – evidence of special cause variation (more power than run charts)

-Is system stable – is it ready for improvement?

-Performance reporting to senior leaders: can predict future performance by extending control limits

-Investigate causes of variation
e.g. sub-group by Hospital Ward



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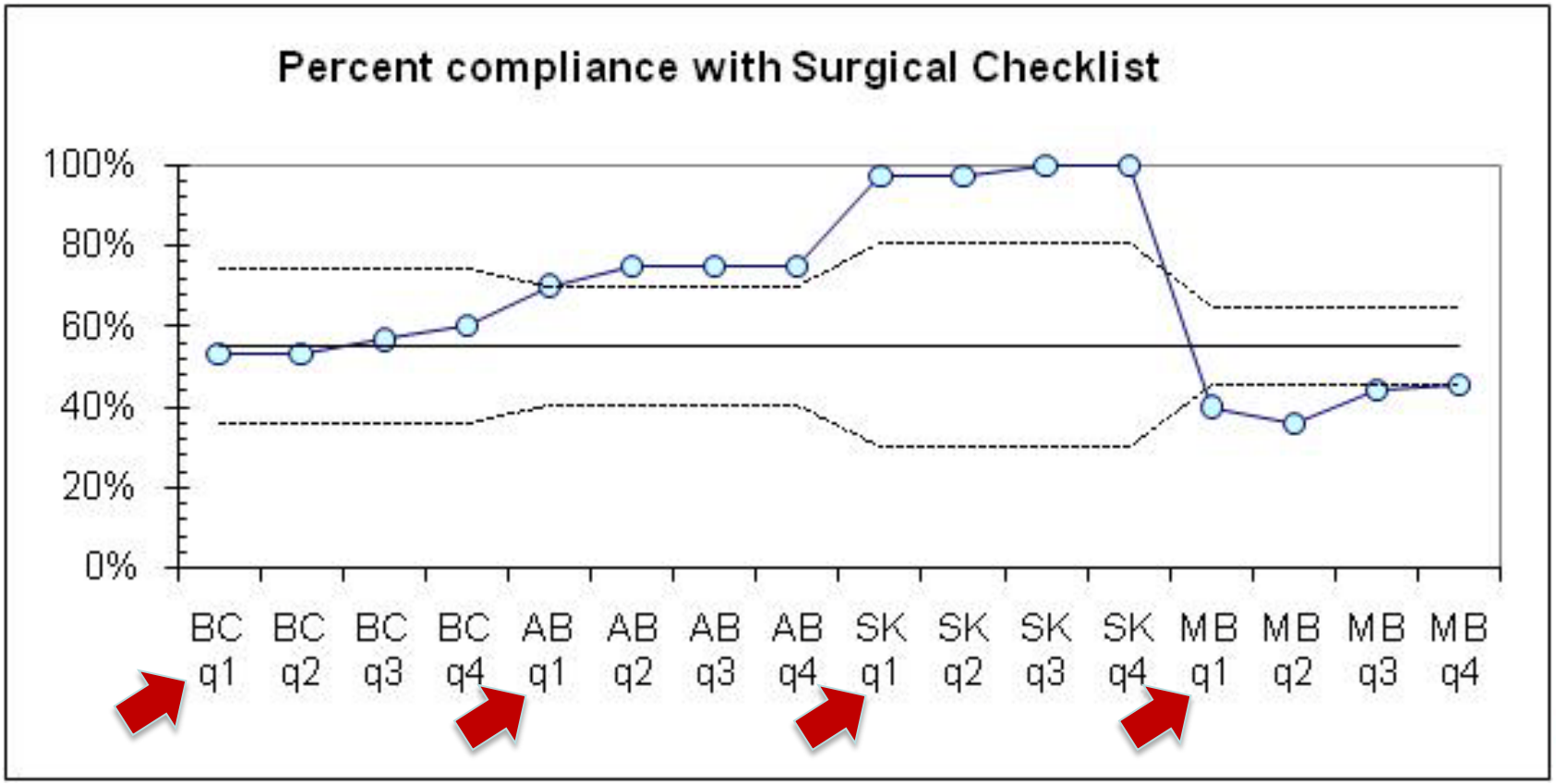
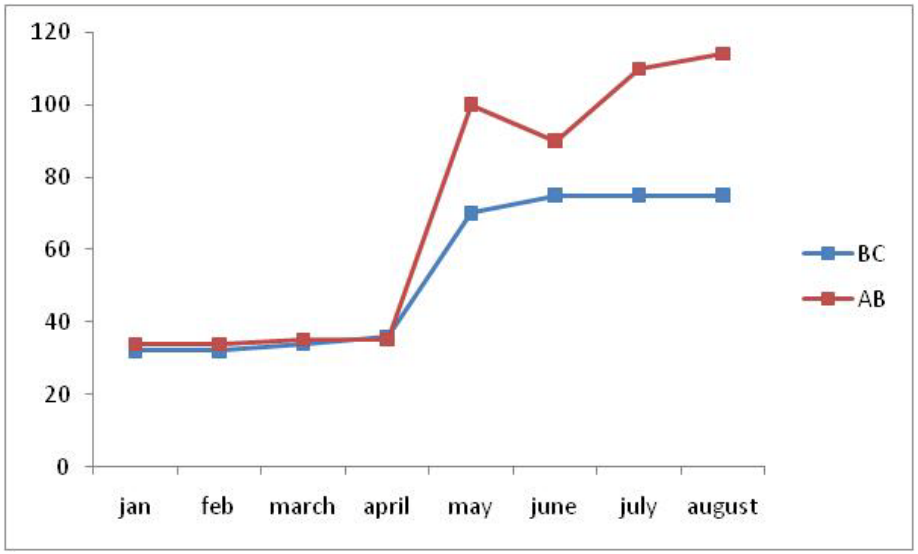
Display of more than one independent variable

- For example, more than one site, unit, city, health authority

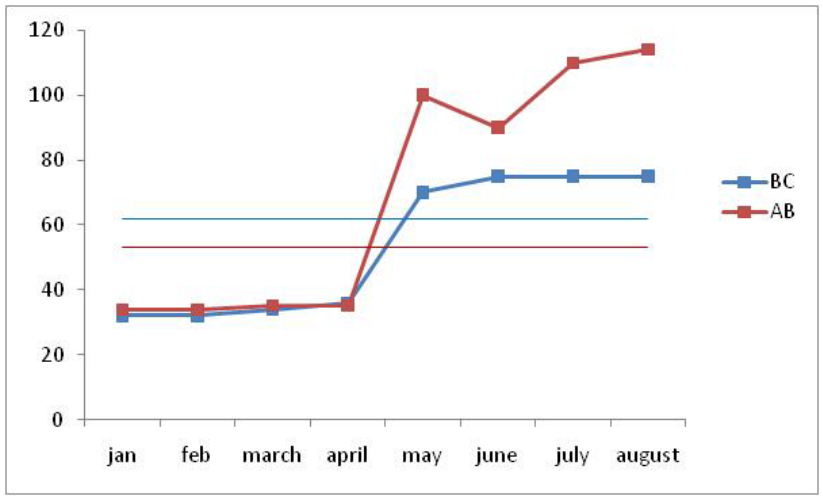


Display of more than one independent variable

Show 2 or 3 lines on a run chart for visual display



Gets messy for analysis



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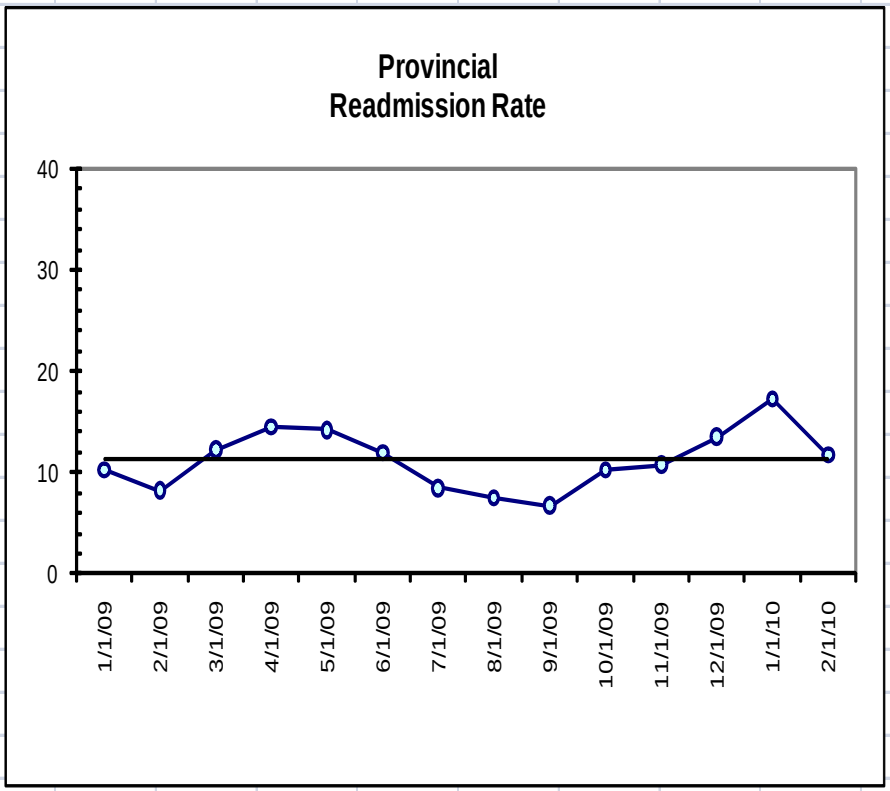
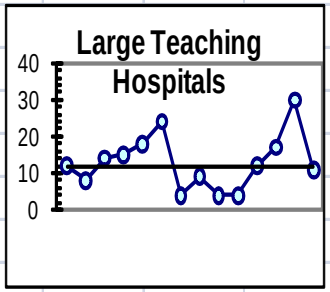
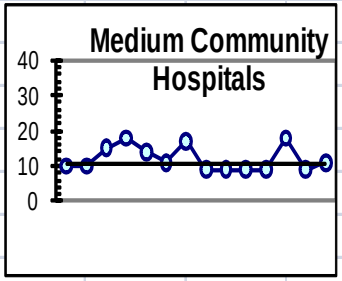
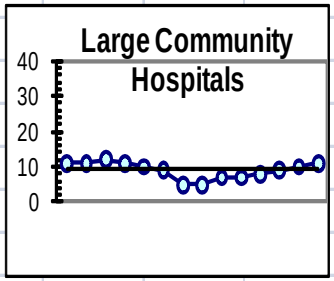
Display of more than one independent variable

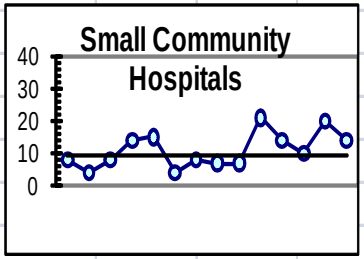
Small Multiples











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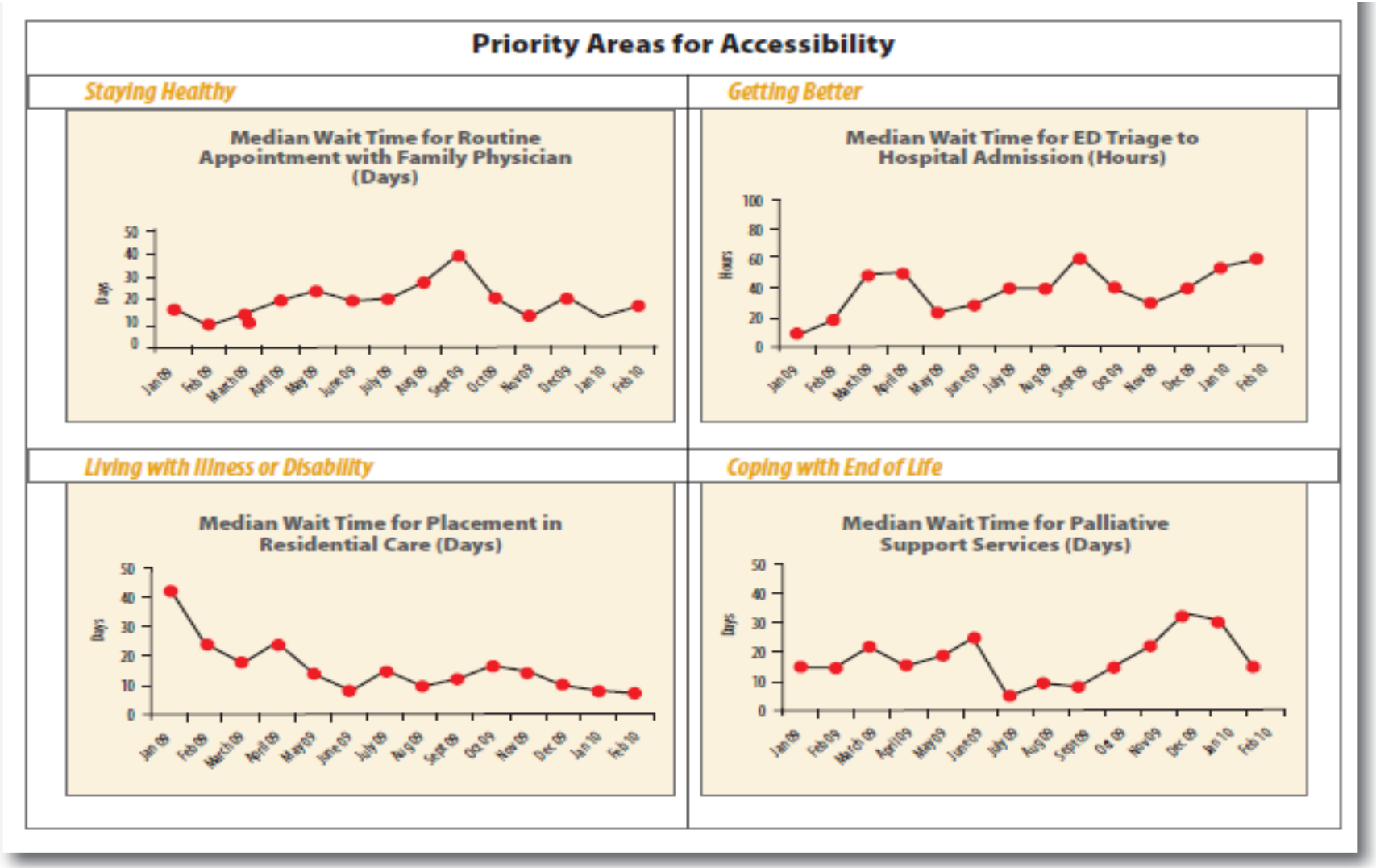
Small multiples - Dashboard Reports for Senior Leaders



Display of more than one independent variable

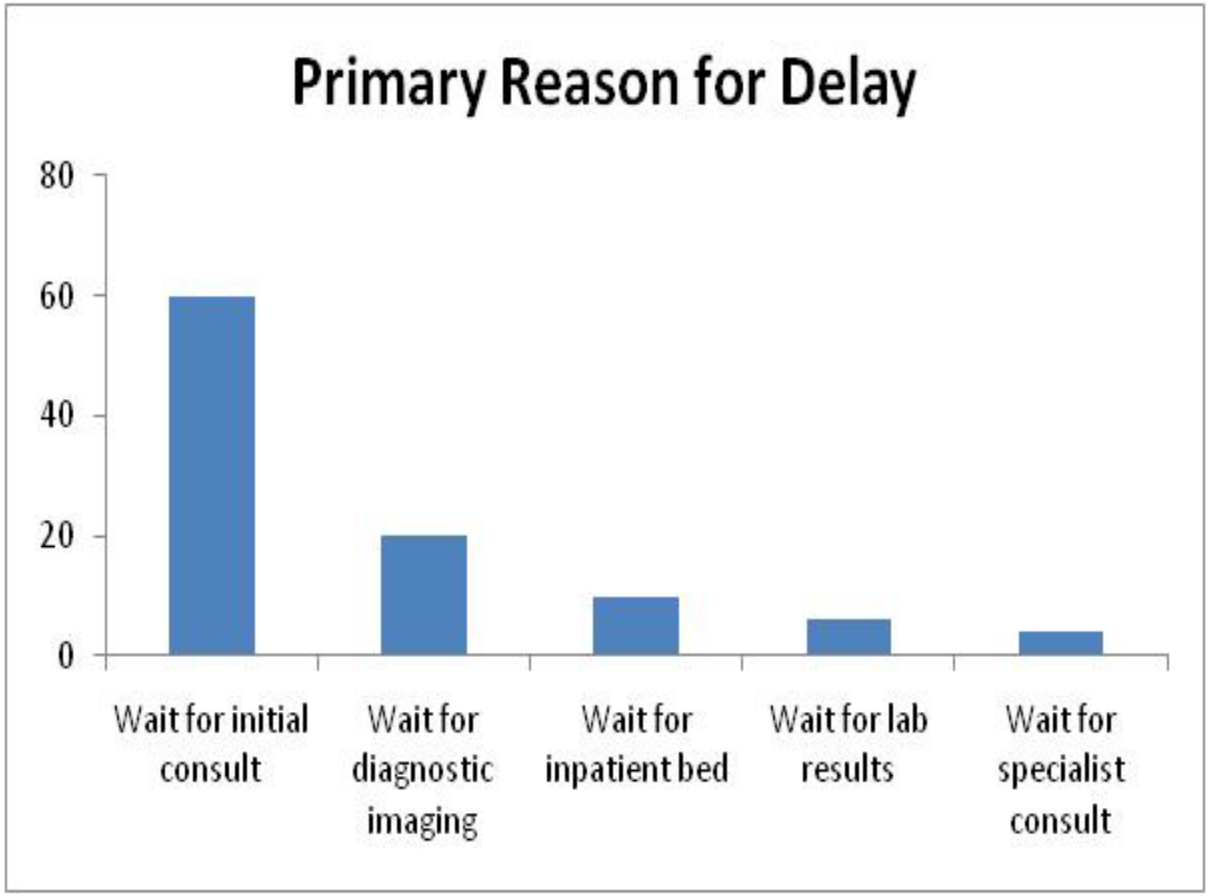
Drill down (e.g. web based selection)

Pareto Chart– key features

-Bar chart of “categories”

-Ordered from largest to smallest

-Used to verify ideas with data

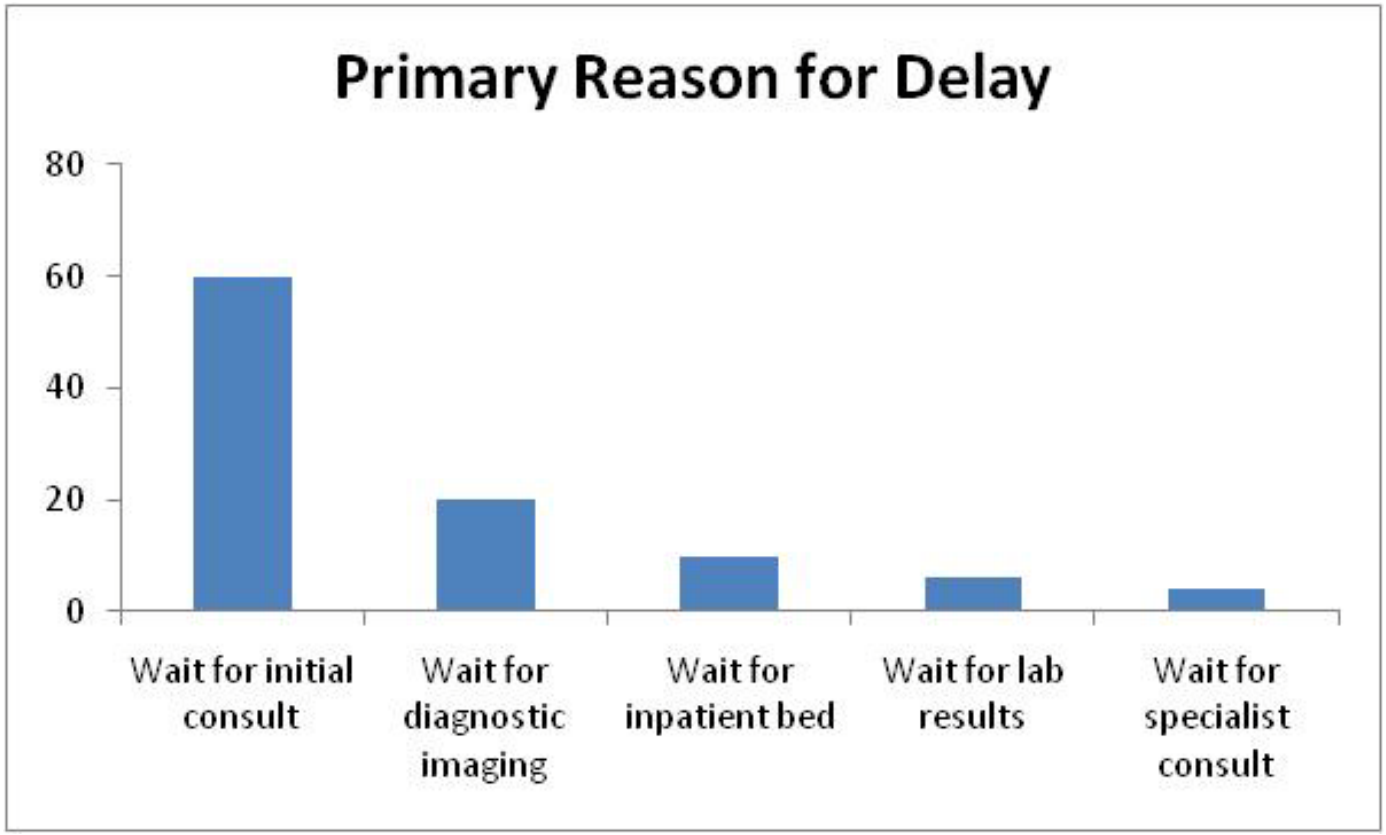


Pareto Chart– what they tell us

-What problems offer greatest potential for improvement

-Is at 80/20 rule at play?

-What problem/area to focus on?



Pareto Chart– when to use

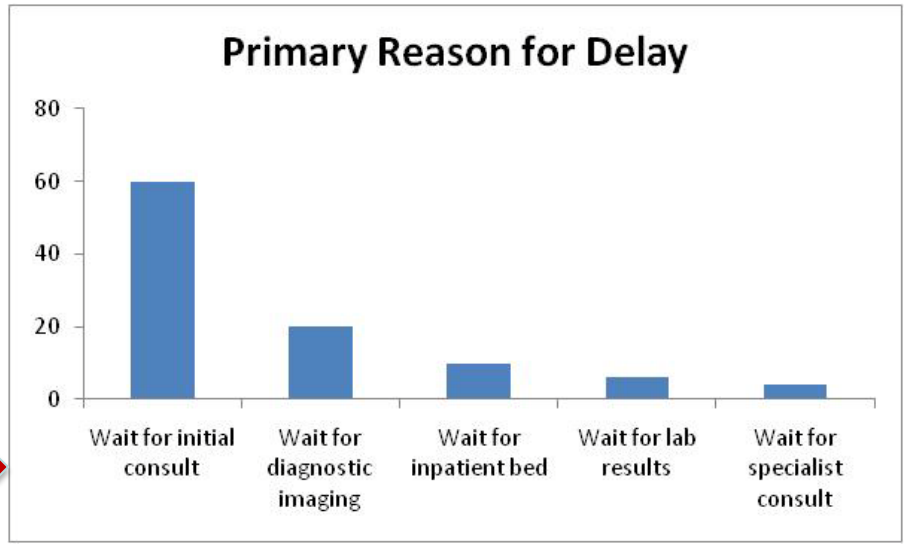
Key words:

reasons for ….?

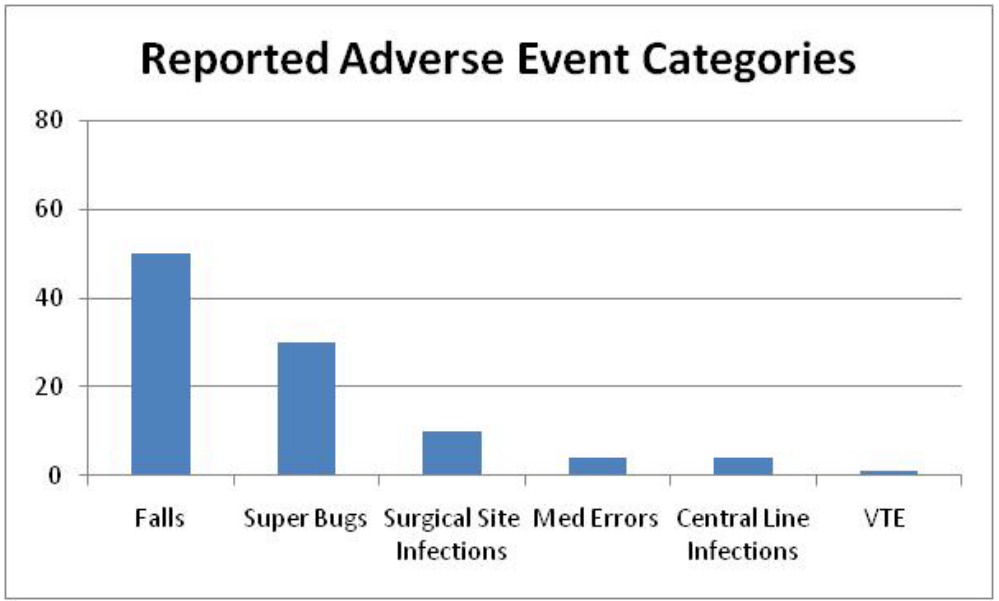
type of …..?

Improvement level: identify ideas for change

Collect data after brainstorming or problem solving (e.g. fishbone)



Leadership level: identify where to direct improvement resources



Your turn – real world examples

	Run Chart	Control Chart (same as run chart plus…)	Pareto Chart
What they tell us…	Improvement over time? Improvement sustained? Stable system?	Special cause variation? Is there a different system? Predict future performance	Reasons for… ? Types of …?
Examples….			

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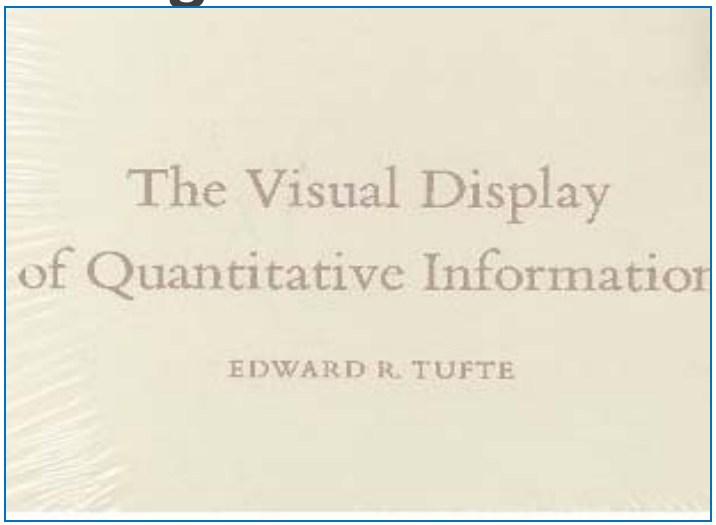
Some General Tips of Graphical Design



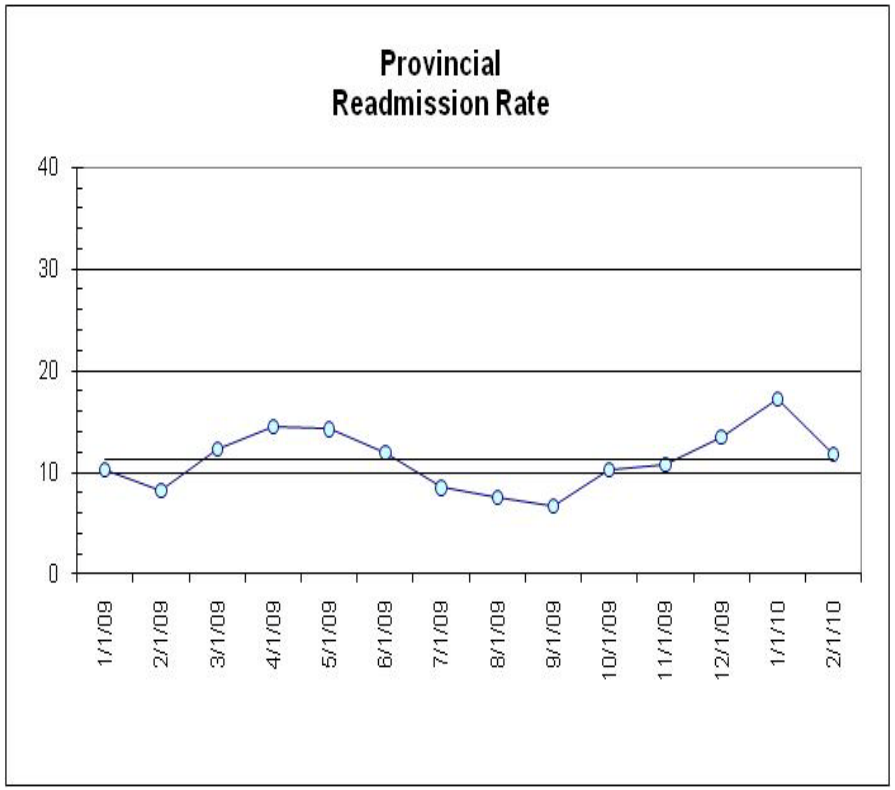
Graphical Excellence

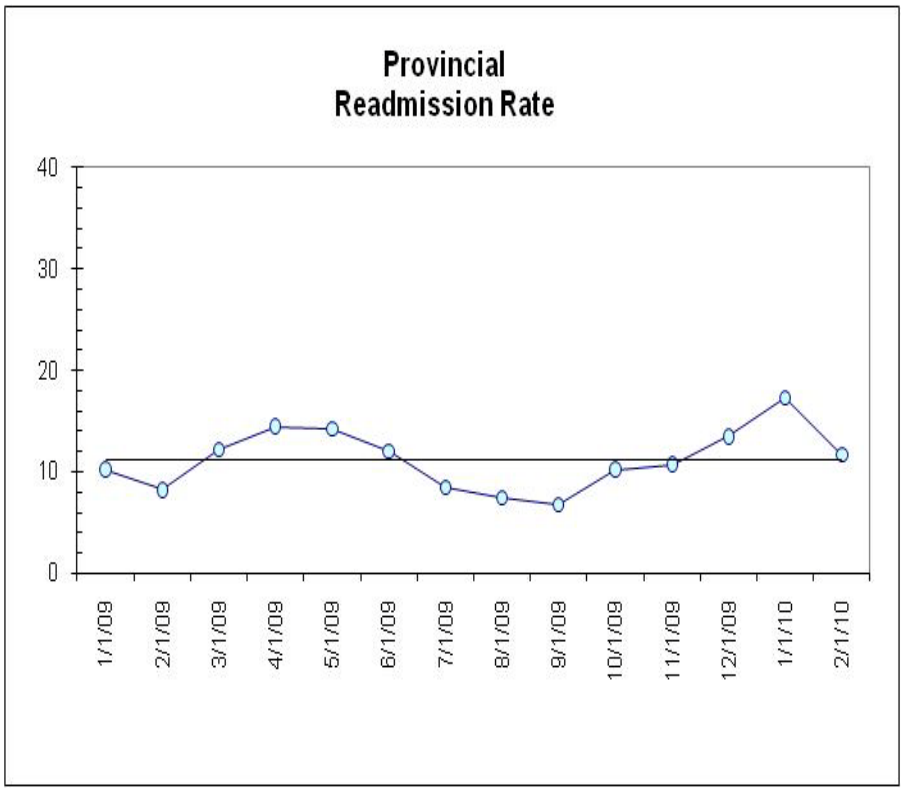
Convey the greatest number of ideas
in the shortest amount of time
using the least ink
and the smallest amount of space

… while maintaining the *truth*

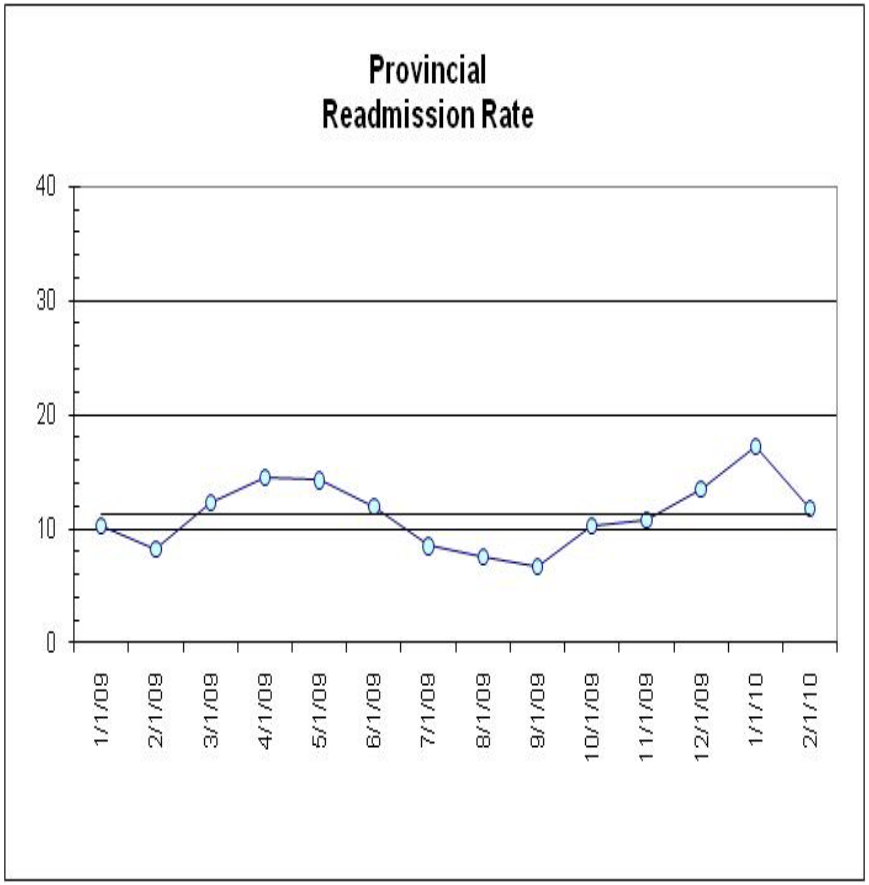
Some General Tips of Graphical Design

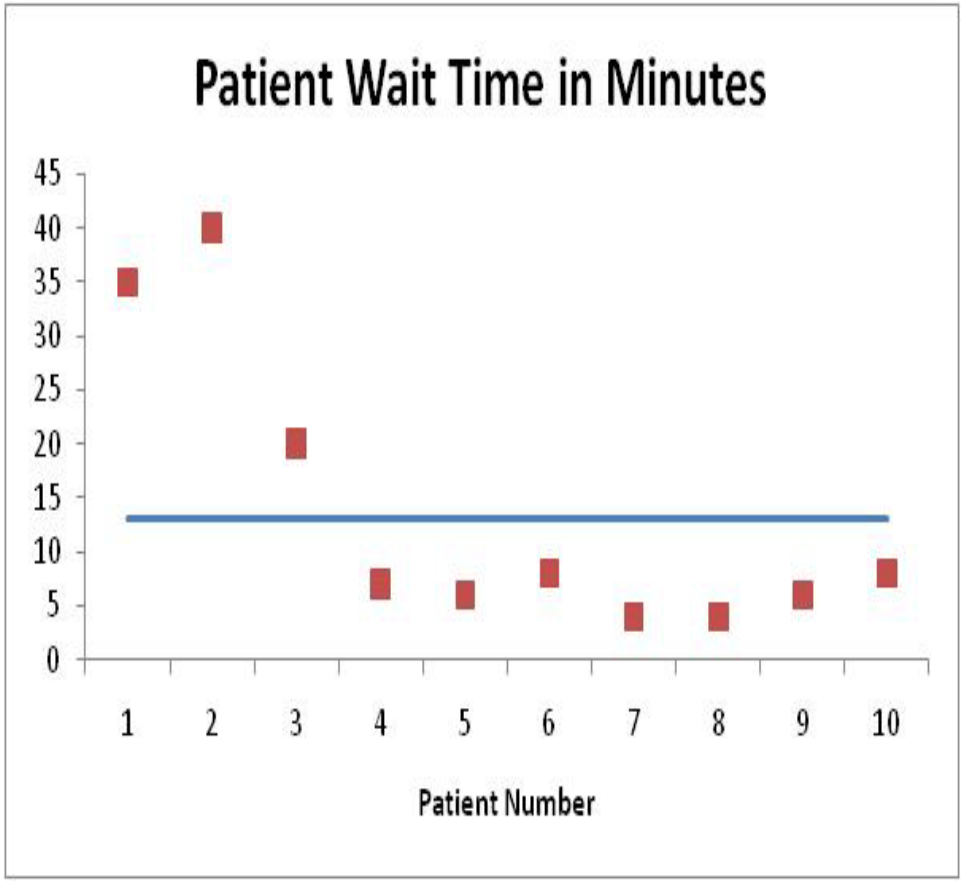
1. Grid-lines?



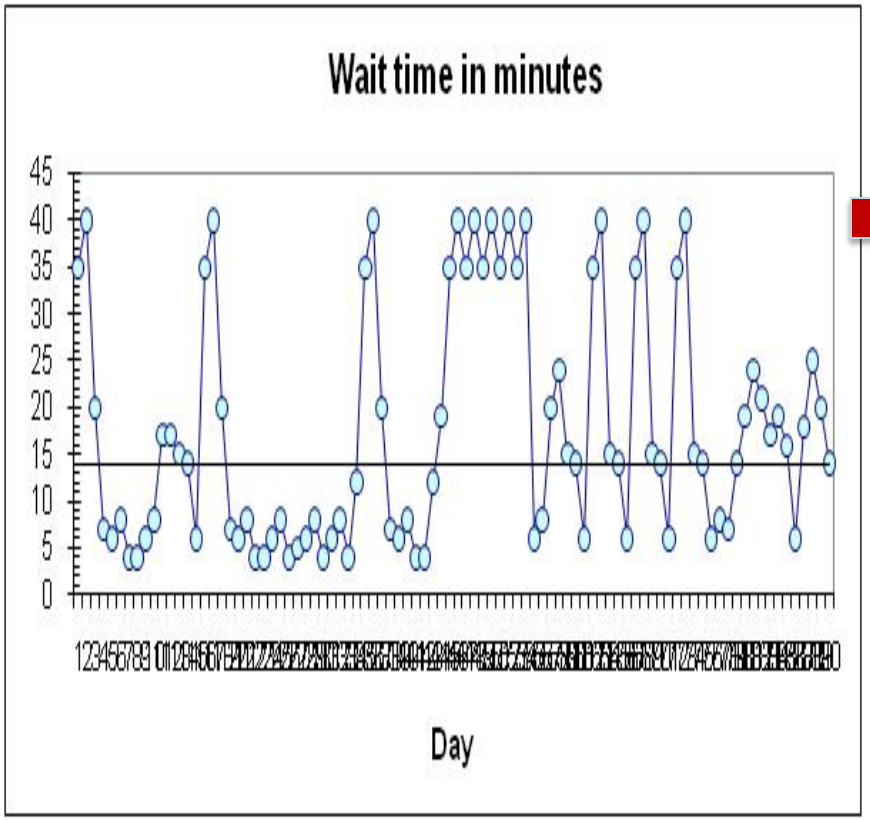


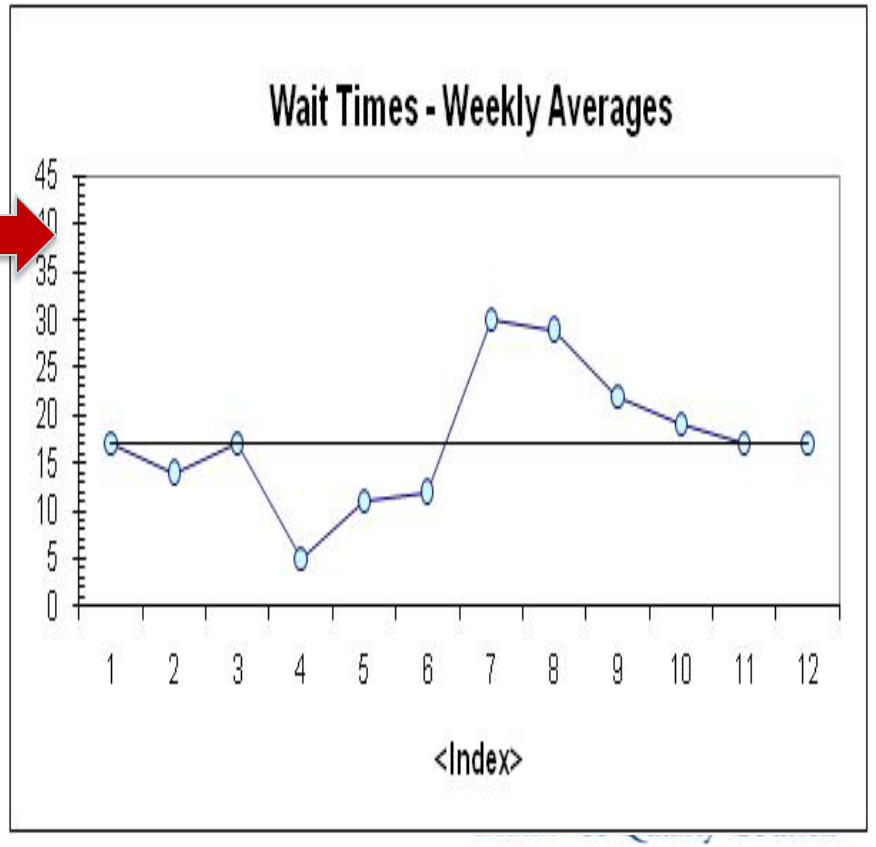
2. *Connect* with a *line,* ***but only*** if the order is *time*



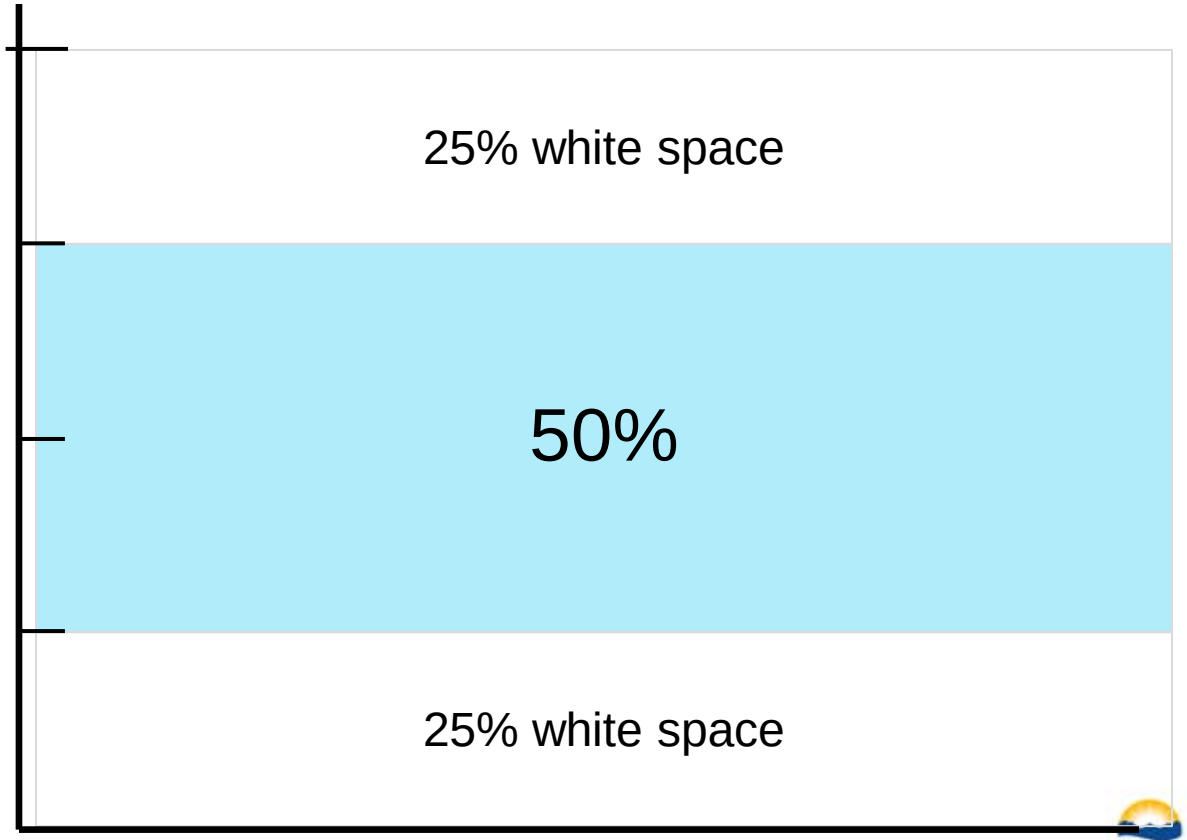


3. Keep to *80 points* or less

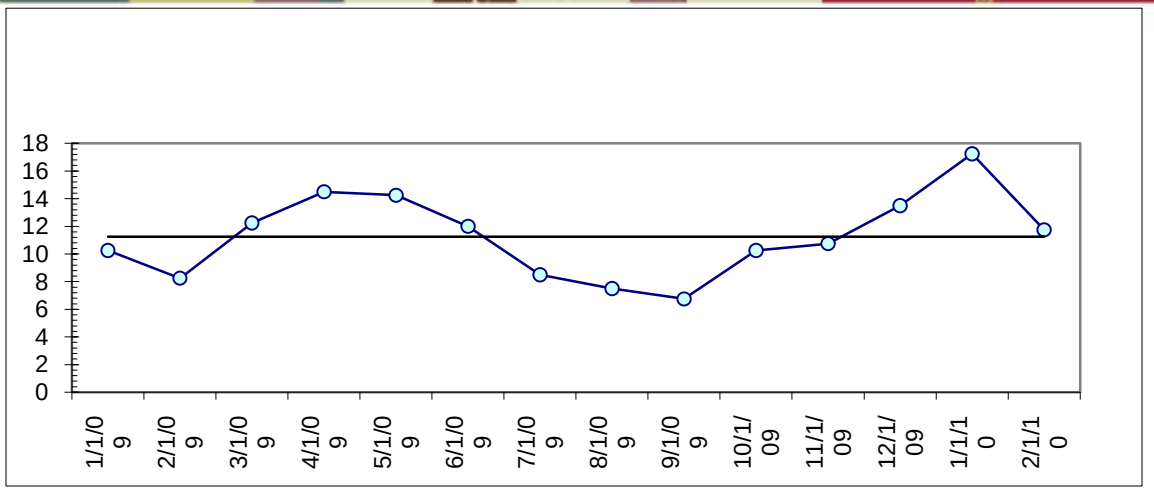




4. Scaling and White Space: ***50% white space: 50% data***



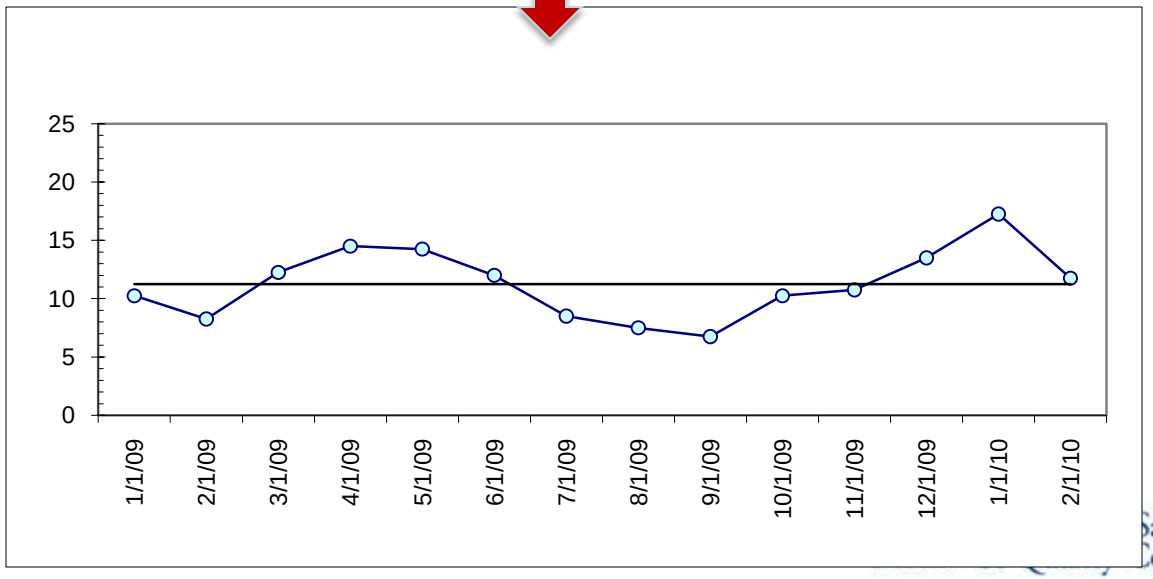
BC Patient Safety & Quality Council



50% white space

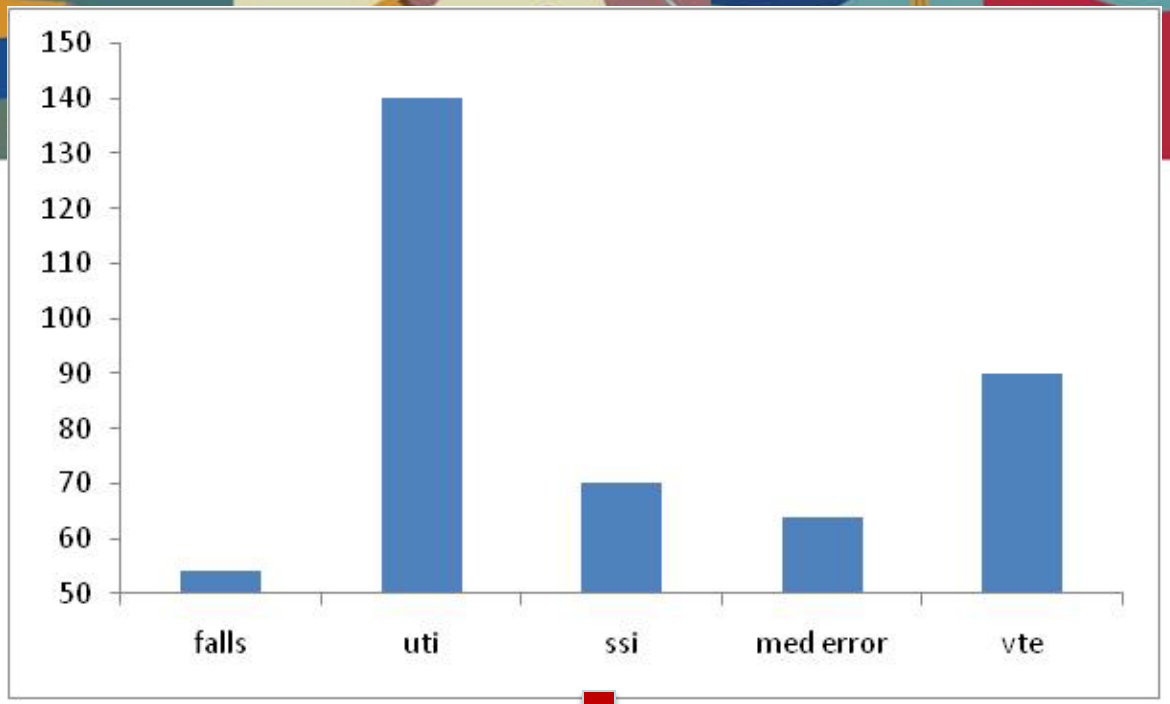
Also – don't go beyond absolutes:

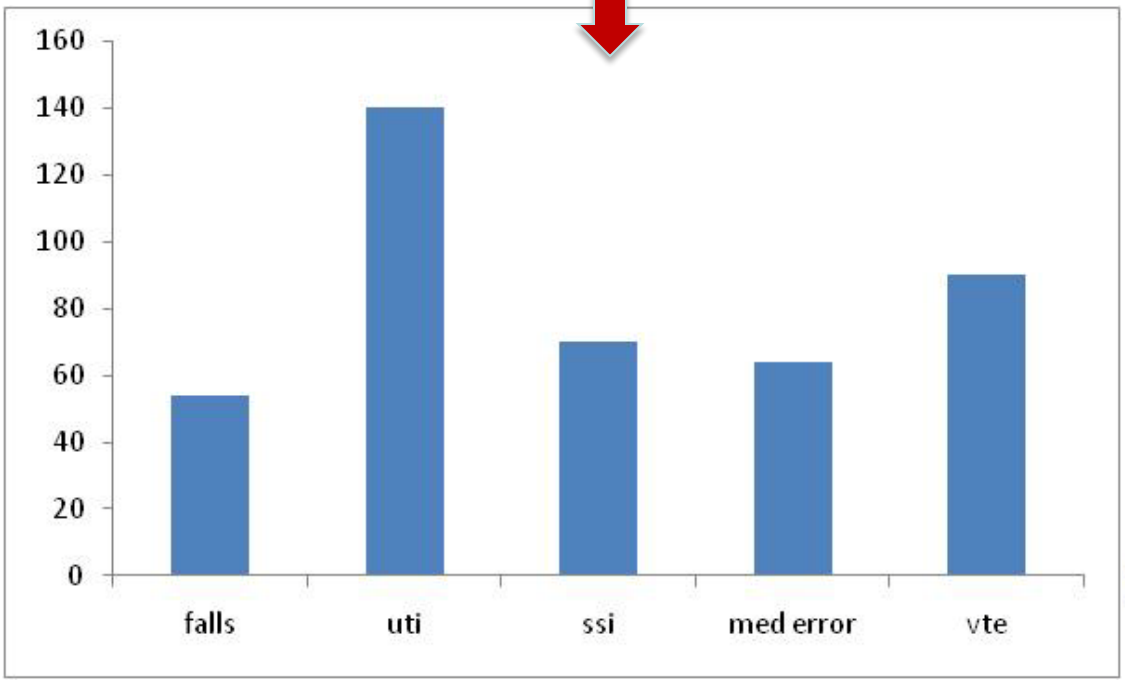
- zero
- 100%



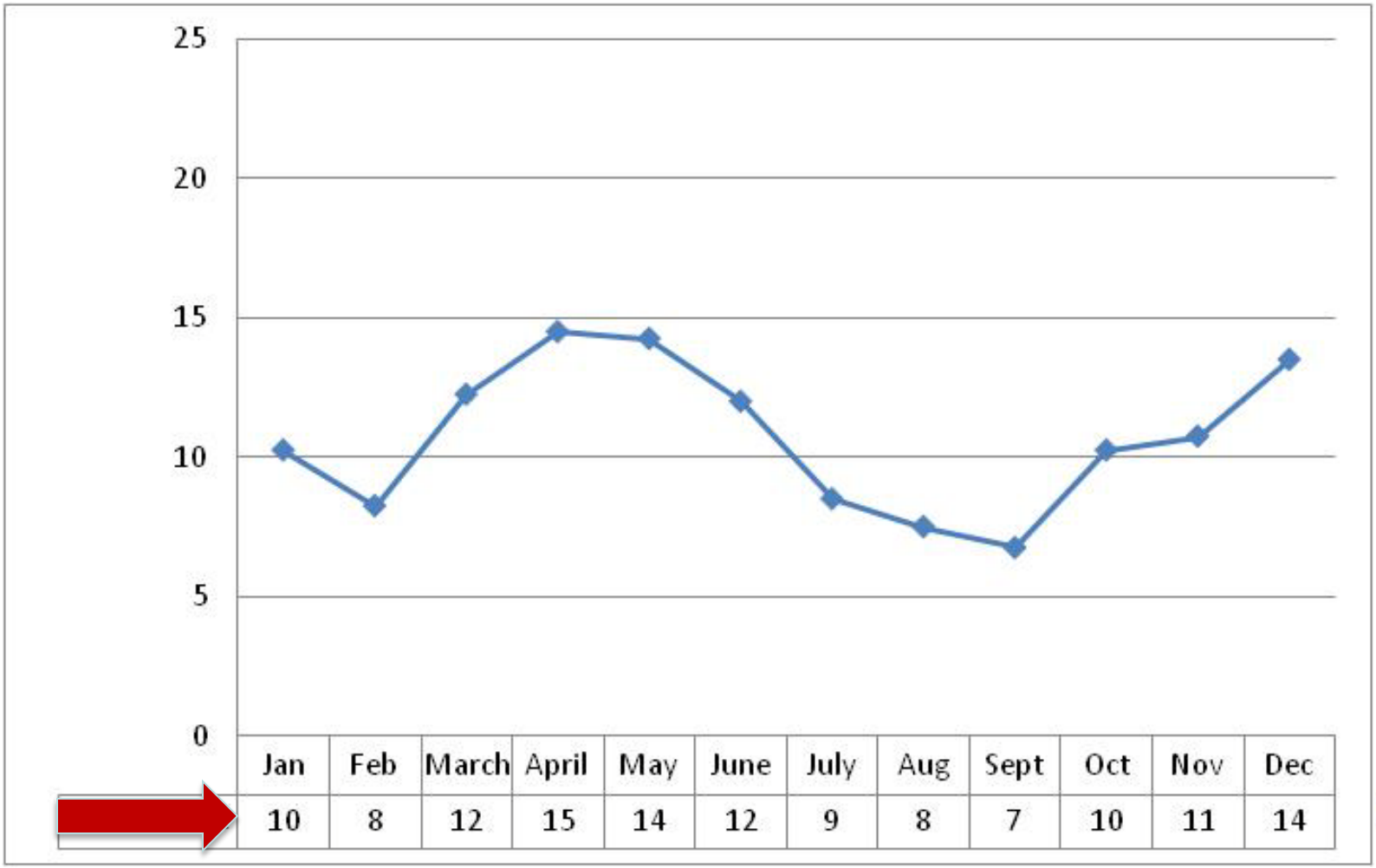
For Bar Charts/Pareto Charts

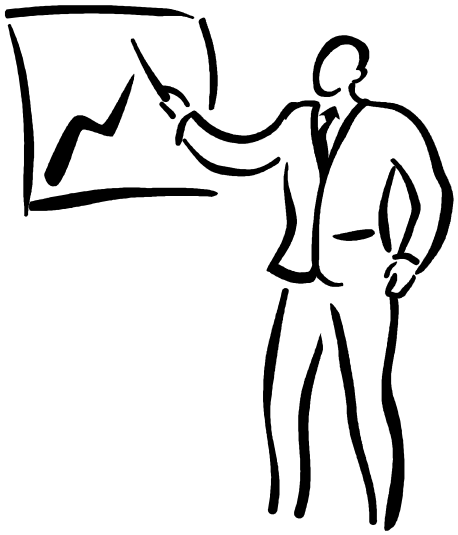
Always start at zero





5. Display *Data Table*





Questions?

Ideas for another session on Quality Measurement?

References

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  http://www.edwardtufte.com/tufte/books_vdqi
- The Data Guide, Associates for Process Improvement
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  - http://www.ihi.org/IHI/Programs/AudioAndWebPrograms/OnDemandPresentationMeasurement.htm