M5: Handout for Davis Balestracci’s “Data Sanity” Minicourse

In a nutshell, these three articles frame the minicourse (important):


Rationale for Minicourse and for Best Learning Experience

There is “method to Balestracci’s madness” of not letting you follow along with a slide pack (at least for Part 1). My experience has shown that a stack of PowerPoint slides are very difficult to learn from when one is being initially exposed to very crucial concepts designed to change a mindset. One can get overly-absorbed in the slides and miss key points that require focused attention on the lecture to truly comprehend – and a sense of discomfort for motivation! [to be explained in the minicourse when I talk about adult learning] For those of you who will insist on having the slides, I’ll happily supply you with an edited version after the Forum.

[For people reading this who are not taking or did not take this minicourse and are intrigued by the approach: I recommend the Joiner or Balestracci references given on page 16 of this document – this is a totally different mindset from what many of you are used to, and it’s necessary for seeing beyond this material’s elegant – and deceptive – simplicity]

Participants: Take notes and ask me questions any time and at the break. We can continue the dialogue via e-mail or an occasional phone call. I won’t disappear after the Forum!

There will also be extensive dialogue during the minicourse that I will facilitate within the changed mindset.

I feel that follow-up reading using these BRIEF explanations of key concepts – written in the conversational style in which I teach – will be more valuable. And I’m absolutely delighted to follow-up on any questions with you via e-mail (davis@davisdatasanity.com).

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Post-seminar highly recommended readings, references and “nuggets” pp. 16-18 [including live links to BRIEF articles]

Another example: How to calculate common cause limits pp. 19-20
Root cause analysis? Be careful! pp. 21-22
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Post-seminar clarification reading p. 25
Helpful Quality Digest articles by Davis Balestracci that cover key concepts from this minicourse

Davis’s framing the history of the IHI Annual Forum as his minicourse rationale:


1-2 page “Statistical Corner” articles by Davis for Quality Digest covering main topics of today:

TQM, Six Sigma, Lean and...Data?  [Trust me:  they’re all the SAME!]
http://www.qualitydigest.com/july06/departments/spc_guide.shtml

Dialogue between Davis and World Quality Leader [Why leaders must understand variation!]
- People LOVE Rankings -- http://www.qualitydigest.com/sept06/departments/spc_guide.shtml

Why avoid commonly used bar graphs? – easy: most of them are worthless!
http://www.qualitydigest.com/june06/departments/spc_guide.shtml

Sick of Boring Meetings that Waste Your Time? [Beware of trend lines and direct two-point comparisons]
http://www.qualitydigest.com/sept05/departments/spc_guide.shtml

A Common Cause Strategy for Count Data [Pareto matrix concept: uses data from article directly above]
http://www.qualitydigest.com/oct05/departments/spc_guide.shtml

The Wisdom of David Kerridge:  Statistics and reality--Part 1 [dealing with “clinical trial” mindset of physicians, which is NOT RELEVANT to real, everyday world]

The Wisdom of David Kerridge:  Statistics and reality--Part 2

**Outstanding** article on “count” data by Donald Wheeler to show motivation for very specific definitions of what you’re counting and the need to consider the “implicit denominator.” The subsequent two articles are by Davis on statistical stratification:  http://www.qualitydigest.com/nov97/html/spctool.html

Taking Count Data a Step Further (Statistical Stratification)—Parts 1 & 2
- http://www.qualitydigest.com/nov05/departments/spc_guide.shtml
  [u-chart: not covered in seminar, but very similar to p-chart directly below]
- http://www.qualitydigest.com/dec05/departments/spc_guide.shtml [how to stratify percentages with a p-chart]

It’s Time to Ignore the Traffic Lights (Example shown in minicourse – see also pp. 19-20 of this handout)
http://www.qualitydigest.com/july05/departments/spc_guide.shtml

The first two common cause strategies:

Are You Using SWAGs?  [Important article: shows a common WRONG analysis that I suspect will be very common to determine “pay for performance”]
http://www.qualitydigest.com/jan06/departments/spc_guide.shtml

Think you Know Balance Scorecards?  Think again… [your “Homework” scenario]

=====================================
Part 4 – Transitioning your role to get the respect you *deserve*

[See Balestracci M5 Part4 Summary document]

Cultural resistance / psychology – a practical, realistic approach:

**The BASIC behavior model (human and organizational) introduced in the minicourse:**


A universal statement from good improvement practitioners: *A transforming organization is going to need a culture of feedback and coaching – and LOTS of it.*

The **absolute best** resource for the type of coaching needed is *The Heart of Coaching* by Thomas Crane.

- Download the first three chapters FREE at: [www.craneconsulting.com](http://www.craneconsulting.com)
Today: Skills and Needed Mindset to “Build-in” Improvement into Organizational DNA

Short-term Roadmap
1. Top management awareness and deep knowledge of what I teach you today
   - Learn and apply in everyday work:
     - Process thinking
     - Eradicate blame
     - Problem-solving tools
     - Statistical thinking & “plotting the dots”
2. Post IHI. Build a critical mass: 25-30% of executives / management demonstrating their commitment to improvement [Focus post-Forum efforts here to create this critical mass]
   - Beware one time “spray-and-pray” events to culture at large motivated by the logic that knowledge = changed behavior. [Stop ALL “spray-and-pray” type education.]
     - (Only) 20-30% of organization needs to be educated in improvement theory
     - (Only) 10-20% of organization needs to be trained in basic tools for improvement
     - (Only) 1-2% of organization needs to be trained in advanced tools (“belts?”)
   - Promotions based on demonstrating changed behaviors regarding improvement

Ultimate goal: ‘Improvement’ as a way of life [4-6 year journey?] – Routinely observe:
- Customer orientation
- Continuous improvement
- Elimination of waste
- Prevention, not detection
- Reduction of variation
- Statistical thinking and use of data
- Adherence to best-known methods
- Use of best available tools
- Respect for people and their knowledge
- Results-based feedback: emotionally intelligent culture
Five KEY Concepts of the day

1. Improvement “Pyramid”

Most organizations are stuck here because they think “logic” will be enough: Engines need Fuel

2. Key Model for Human (AND Organizational) Behavior

Burn this into your brains

A1 TRAP: “Describing R2 and C2” is not enough!

1 = Present
2 = Future (Desired)

Organizational AND Human behavior

New results require new “beliefs”

What A2 would motivate a B2?

Quality of FUEL = “Quality” of:

Personal feedback

Relationships through which information flows

Perceptions and Feelings influencing relationships: CULTURE

(And STILL one more layer to go…)

BASE of the Pyramid

7. Quality of individuals’ mind-sets
   ◦ Unique personal values and “baggage”
     every individual brings to work
   ◦ Interacts with Level 6 [Culture]

Individual Mindsets
3. EVERYTHING is a process

Unless your improvement process is consciously based on this framework, you will not be solving the “deeper” problems of which no one is aware.

4. Why “traditional” statistics courses don’t work in the real world

A visual of why the statistics you are taught in a “basic” academic course are many times NOT APPLICABLE in the real world – NO concept of “process” and HUMAN variation.

Unfortunately, the computer will do anything you want.

The more you know what is wrong with your data (“human variation”) the more useful it becomes.

This brief newsletter explains things further and shows the example I did during the seminar comparing three hospitals:


5. Brian Joiner’s “Levels of Fix” [from Fourth Generation Management]

Push for “deep level” fixes
Elegantly Simple Example: “After that downward trend, why did we go back up?”

MRSA Bacteraemia 2001-02 to 2005-06

<table>
<thead>
<tr>
<th>Bacteraemias [TIME order]</th>
<th>Sorted Order</th>
<th>Moving Range</th>
<th>Sorted Moving Range</th>
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<td>7</td>
<td>8</td>
<td>1</td>
<td>4</td>
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<td>13</td>
<td>9 [9 smaller, 9 larger]</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
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<td>5</td>
<td>13</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

**MR_{med}: Avg. of 9^{th} and 10^{th} = 4**

[KEY to process variation]

**MR_{med} = 4**

**MR_{max} = 4 \times 3.865^* \sim 15**

**Process common cause:**

8 \pm (4 \times 3.14^*) \sim [0–20]

* From theory:

Always used with MR_{med}

“Perfectly designed”
Déjà vu? Seven Everyday Scenarios (Real situations and data)

Scenario #1: Mid-Year Progress Reports [Part of an assignment to my MBA students]

You have your shiny new MBA degree and it’s your first week of work at a new job – an obvious upgrade from your old one. The chief exec knows that you had a course somewhat related to “quality improvement” (he also knows it was taught by “that crackpot Balestracci”), so he wants you to give you a baptism of fire by evaluating and making recommendations on a few of his pet projects.

**Complaints [Total number and % resolution <20 days]**

“Over the last three years or so, we’re averaging about 25 complaints a month and some months we even get twice that many. I don’t like these numbers, and we’ve committed to a very expensive ‘total patient satisfaction’ program. The graph below on the left was done by my analyst and it compares January through June 2011 versus January through June 2012.

“The other graph, on the right, shows our complaint resolution performance. The three-person department responsible for complaint resolution is supposed to get them resolved within 20 days – if they don’t, I expect a special report telling me why it wasn’t. They were obviously able to do it at one-hundred percent once, so I don’t understand why they can’t do it again!

“That said, as you can see, there are more complaints this year, and they’re resolving them at a lower rate! Given the higher number of complaints, I probably shouldn’t demand 100% all the time. So, what do you think of giving them a ‘stretch’ goal that ‘90% of complaints should be resolved within 20 days?’

“In addition to the goal, what else do you think we should do?”

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Complaints</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>2012</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>2012</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>2012</td>
<td>4</td>
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<td>4</td>
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<td>5</td>
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<td>6</td>
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<td>3</td>
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<tr>
<td>1</td>
<td>2011</td>
<td>2</td>
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<tr>
<td>2</td>
<td>2011</td>
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<td>4</td>
<td>2011</td>
<td>2</td>
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<tr>
<td>5</td>
<td>2011</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>2011</td>
<td>3</td>
</tr>
</tbody>
</table>

YTD: 187 (2012) vs. 123 (same period 2011: + 50%)  
YTD: 73.8% (2012) vs. 75.5 (down slightly from 2011)

In your initial investigations, you overhear some front line people talking about how they’re so glad the recent construction project is over – patients were really cranky and always asking staff for directions. The signage was downright awful. Not only that, a lot of them took it out on staff about that closed parking lot!

You ask a colleague about it and they tell you that the construction took place the first four months of this year…
Scenario #2: “Never events” – Pressure sores

“And then there’s those blasted insurance companies breathing down my neck about ‘never events’ for which they’re going to stop reimbursing our treatments because they claim it’s our own fault! I heard about this quality guru Crosby who made employees sign a pledge to ‘do it right the first time.’ Bringing his program in is expensive though. So, I was thinking about buying everyone a key chain with a giant ‘Q’ for ‘quality’ and the phrase ‘No pressure (sores)...it’s just up to ME!’ written around the circumference.

“I do have a very, very sharp nurse who is passionate about quality improvement. I put her in charge of reducing pressure sores, and she did a major intervention in January 2011. She’s been able to cut them in about half, but progress had been sporadic. The graph on the right shows the results since her intervention. As you can see, they went back up a bit May through August last year, and I got tough again. You can see the good September’s result. I then got distracted by end of year issues, and someone on the board noticed a major trend upward during that time. After three months of going back to the old rate, I had to get tough again. Good thing: you can see the trend downward. I don’t have time for this kind of babysitting! Can you find out what happened and figure out a way to get it even lower...and stay there? If you can get them to zero, I’ll spring for a pizza party.”

YTD: 31 vs. 27 (same period 2011: +15%)

You talk to the nurse involved and she is indeed sharp...and will no doubt be a powerful partner and ally for you. She’s used to the CEO’s tantrums and swears that she did nothing during this time – as far as she’s concerned, nothing changed, the new processes have “stuck,” and it’s all common cause. You ask her whether she’s ever head of common cause strategies and she answers “No.”

So, what’s the story? Is it common cause? Might there be further opportunity?
Scenario #3

You’re at a year-end performance review...

<table>
<thead>
<tr>
<th>DATE</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-12</td>
<td>9.2%</td>
</tr>
<tr>
<td>Feb-12</td>
<td>11.8%</td>
</tr>
<tr>
<td>Mar-12</td>
<td>8.5%</td>
</tr>
<tr>
<td>Apr-12</td>
<td>8.5%</td>
</tr>
<tr>
<td>May-12</td>
<td>10.1%</td>
</tr>
<tr>
<td>Jun-12</td>
<td>9.4%</td>
</tr>
<tr>
<td>Jul-12</td>
<td>13.0%</td>
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<td>Aug-12</td>
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<td>Sep-12</td>
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<td>7.9%</td>
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<td>Nov-12</td>
<td>9.1%</td>
</tr>
<tr>
<td>Dec-12</td>
<td>12.10%</td>
</tr>
</tbody>
</table>

Sketch data and...????
Scenario # 4: The “All-too-familiar” Budget Meeting [Another MBA assignment]

The dreaded bi-weekly discussion of the budget is the next meeting in your busy day. Times are “tight” and “accountability” is in the air. Once again, conversational snippets of “It’s not my fault!”, “You have to understand that something happened that we didn’t plan for,” etc. (ad nauseum) permeate the air as well as the predictable promises to “get right on it” (Yawn!).

A manager previously on the “hot seat” for budget performance regarding her paid FTE time (See the recent string of 10 out of 11 periods being above budget?) showed how the last three two-week periods have been below budget. Cries of “Well done” fill the room, so she is asked to share how she did it.

This particular manager is progressive and a good friend of yours. She has always been one of the best at utilizing resources. After giving her helpful “suggestions” to the room, she sits down and you catch her eye. You give her that “ ‘Whom do you think you are kidding?’ look,” and she smiles and discreetly slides you the a sheet containing the data on the following page.

This meeting is so “typical” and dreadfully boring, so you take her data and sketch individual run charts of both total FTE and the variance from budget.

Why is she smiling?

1) Is the “every two week meeting” a common cause or special cause strategy?

2) Do you see any potential special causes in these run charts? If so, do you have any possible theories for what caused them?

3) Regardless, how does she seem to be doing relative to budget?

4) To complete the picture and analysis, get the two control charts.
   a. Interpret each of them: What further insights have you gained?
   b. Given the current budget, if nothing changes, what is the expected range for any random two-week interval?
   c. If nothing changes, what do you predict her end-of-year budget performance will be?
   d. Do you have any recommended actions?

5) Should the “every two week meeting” continue to be routinely scheduled? Can you suggest a better alternative?
<table>
<thead>
<tr>
<th>Period</th>
<th>FTE</th>
<th>Variance from Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/18/98</td>
<td>107.35</td>
<td>-2.320</td>
</tr>
<tr>
<td>2/1/98</td>
<td>110.95</td>
<td>0.386</td>
</tr>
<tr>
<td>2/15/98</td>
<td>106.97</td>
<td>-3.682</td>
</tr>
<tr>
<td>3/1/98</td>
<td>105.98</td>
<td>-3.269</td>
</tr>
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<td>3/15/98</td>
<td>107.49</td>
<td>-2.612</td>
</tr>
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<td>3/29/98</td>
<td>106.37</td>
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<td>4/26/98</td>
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<td>5/1/98</td>
<td>105.44</td>
<td>-3.702</td>
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<tr>
<td>5/24/98</td>
<td>106.81</td>
<td>-2.375</td>
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<tr>
<td>6/7/98</td>
<td>106.10</td>
<td>-0.666</td>
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<tr>
<td>6/21/98</td>
<td>111.87</td>
<td>5.207</td>
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<td>7/5/98</td>
<td>112.38</td>
<td>5.730</td>
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<td>7/19/98</td>
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<td>0.389</td>
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<td>109.66</td>
<td>2.000</td>
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<td>10/11/98</td>
<td>103.31</td>
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<td></td>
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<tr>
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<td>106.43</td>
<td></td>
</tr>
<tr>
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<tr>
<td>2/28/99</td>
<td>106.15</td>
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</tr>
</tbody>
</table>

[Median = -0.666] [Median = 106.695]
Scenario #5: The Overtime Data
The same VP who held the every-two-week budget meetings was hammering a friend of mine (a wonderful nurse and great supervisor) about “too much overtime” and was threatening to cut her budget. She said, “It’s driving me crazy. Can you please take a look at it?”

She had delivered to my office a pile of 42 operational reports that needed to be transported by a dolly because they were so thick (“60% of published operational data is waste”). The number I needed was on the next-to-last page of each report – FTE of overtime per pay period (2-week period). So, I reconstructed her overtime utilization history:
Scenario #6: “We need to improve our patient satisfaction scores!”

I was invited to speak about data sanity at an organization. The executives were nowhere to be seen during any of my multiple presentations. The plethora of traffic light reports were driving the culture nuts and they told me so during my presentations – and were relieved when I showed them the futility of “red…yellow…green” and the data sane alternative of run and control charts. In fact, each group spontaneously broke into laughter! Of course word got back to the execs – who promptly told the person who invited me to never have me back.

Here is some (disguised) data from their Press-Ganey surveys. Each month, the execs got the results and marched around as a group planting a red, yellow, or green flag on each unit.

Now THAT’S “leadership”…

My recent experience has shown me that cultures are getting very obsessed over their percentile ranks and using them as arbitrary goals.

Let’s talk our way through their data and what it means – as does the whole “customer satisfaction” survey process.

<table>
<thead>
<tr>
<th>Period</th>
<th>Dept. 1 Percentile Rank</th>
<th>Dept. 2 Percentile Rank</th>
<th>Dept. 3 Percentile Rank</th>
<th>Dept. 4 Percentile Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-11</td>
<td>61</td>
<td>44</td>
<td>70</td>
<td>51</td>
</tr>
<tr>
<td>Feb-11</td>
<td>72</td>
<td>15</td>
<td>65</td>
<td>68</td>
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<td>Mar-11</td>
<td>77</td>
<td>8</td>
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<td>17</td>
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<tr>
<td>Apr-11</td>
<td>68</td>
<td>6</td>
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<tr>
<td>May-11</td>
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<td>12</td>
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<td>Jun-11</td>
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<td>Sep-11</td>
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<td>Oct-11</td>
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<td>Dec-11</td>
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<td>64</td>
<td>54</td>
<td>78</td>
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<tr>
<td>Jan-12</td>
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<tr>
<td>Oct-12</td>
<td>99</td>
<td>32</td>
<td>72</td>
<td>71</td>
</tr>
</tbody>
</table>
Scenario #7: The “Would You Recommend?” Survey

The following data display was in a newspaper article rating 20 health systems in a metropolitan community on the question: "Would you recommend your clinic to adult friends or family members?" At the time, I happened to work at Clinic 19 (maybe not the best service, but excellent care). We came in the (allegedly) lowest quartile.

The public wants data to make a decision:

So, what would you decide?

It's a classic customer satisfaction survey 1 to 4 Lichert scale:

1=Definitely No, 2=Probably No, 3=Probably Yes, 4=Definitely Yes. Note that the table combines the Definitely No and Probably No responses.

I had no idea how the sample was chosen, guessing that they kept sending surveys out (randomly) until 250 responses were received (not so random).

<table>
<thead>
<tr>
<th>Def</th>
<th>%Def</th>
<th>Prob</th>
<th>%Prob</th>
<th>Pr/Def</th>
<th>%P/D</th>
<th>Total</th>
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<td>Yes</td>
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<td>30.8%</td>
<td>15</td>
<td>5.3%</td>
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<td>20</td>
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<td>56.9</td>
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<td>37.4</td>
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<td>5.7</td>
</tr>
<tr>
<td>Total/</td>
<td>2820</td>
<td>57.4%</td>
<td>1727</td>
<td>35.2%</td>
<td>359</td>
<td>7.3%</td>
</tr>
</tbody>
</table>

Ranking the 20 systems via quartiles in both best and worst possible responses:

**Definitely Yes:**
- Quartile 1 (alleged best): 1, 11, 12, 16, 18
- Quartile 2 (allegedly pretty good -- still above average): 4, 5, 13, 17, 20
- Quartile 3 (Uh-oh -- below average): 3, 6, 8, 9, 14
- Quartile 4 (alleged absolute worst): 2, 7, 10, 15, 19

**Probably/Definitely Not:**
- Quartile 1 (allegedly absolute worst): 3, 7, 8, 15, 19
- Quartile 2 (Uh-oh -- below average): 2, 5, 6, 9, 14.
- Quartile 3 (Whew! -- better than average): 4, 10, 11, 16, 18
- Quartile 4 (alleged best): 1, 12, 13, 17, 20
Seven Everyday Statistical Traps

1. Treating all observed variation in a time series data sequence as special cause
2. Treating things that “shouldn’t” happen as special cause
3. Fitting inappropriate “trend” lines to a time series data sequence.
   - What part of “NEVER!” don’t you understand?
4. Unnecessary obsession with and incorrect application of the Normal distribution
   - How often did I mention it?
5. Choosing arbitrary cutoffs for “above” average and “below” average
   - The process WILL tell you
6. Improving processes through the use of arbitrary numerical goals and standards
   - Goal = “Fact of life”
     - Is it a “would be nice to achieve” target (arbitrary) or a “We don’t attain this, we don’t survive” target (fact-of-life)?
   - “Is the ‘gap’ from the goal common or special cause?”
7. Using “rolling” or “moving” average
   - Rolling invalidates many commonly used statistical techniques and displays
   - Fitting inappropriate “trend” lines to a time series data sequence.

Highly Recommended Useful References

Good basic material [Start here! – note that two outstanding articles are free (**)]

http://www.amazon.com/Data-Sanity-Quantum-Unprecedented-Results/dp/1568292953/ref=pd_sim_b_3
If you liked my lecture, you will like this. I “write like I talk.” I also address the “cultural” issues you will face as you try to implement changes. [e-mail me for Chapter summaries – davis@davisdatasanity.com ]

Outstanding overview of a sound everyday quality perspective with which to approach all work.

This article was seminal in my understanding of process thinking and common vs. special cause

Another brilliant introduction to understanding variation in an analytic context

Back surgery experience insightfully observed through the lens of quality improvement theory. Ask yourself, “Could this happen today at my facility?” – (Yes). Addressing the issues in this article is true improvement!
Two excellent supplemental books:

http://www.amazon.com/Understanding-Variation-The-Managing-Chaos/dp/0945320531/ref=pd_sim_b_1

A relatively easy read. Every page contains a control chart of management-type data.

Davis’s most recent Quality Digest articles – cover all aspects of improvement, including culture. These are more like “2-pagers.”

- Link to the archive (many articles listed, with live links):
  http://www.qualitydigest.com/read/content_by_author/11300

- Dean Spitzer’s outstanding measurement assessment:

- Maybe you need to think about a better method for educating your culture?
  http://archive.aweber.com/davis_book/5PKtM/h/From_Davis_Balestracci_When.htm

Topics not necessarily covered, but highly recommended follow-up reading:

- The remaining two common cause strategies:

- Articles on good data collection, including the eight questions you need to ask:

- Davis Balestracci’s Quality Digest Statistics Columns Relevant to Healthcare

Many of these topics will be touched upon in the minicourse. These represent a “handbook” of BASIC statistical concepts that will solve 80-90% of most everyday problems. They contain very few advanced tools and are BRIEF.

Asking the Right Questions [C-section example in seminar – RUN CHART]
http://www.qualitydigest.com/jan05/departments/spc_guide.shtml

SPC in the Boardroom? [“Trends” – what they are NOT]
http://www.qualitydigest.com/feb05/departments/spc_guide.shtml

Real Common Cause [color-coding as a common cause strategy]
http://www.qualitydigest.com/aug05/departments/spc_guide.shtml

I HATE Bar Graphs!
- http://www.qualitydigest.com/may06/departments/spc_guide.shtml [advanced]
An Alternative to the Red Bead Experiment [an earlier incarnation of my “coin flip” scenario]  
http://www.qualitydigest.com/aug06/departments/spc_guide.shtml

Two More Basic Lessons [another possible analysis of the ranking data – not covered in minicourse]  
http://www.qualitydigest.com/dec06/departments/spc_guide.shtml

Every Wednesday We Scramble for Beds! [Something that could be useful for you – not covered in minicourse]  

Some Thoughts on Benchmarking (Parts 1 & 2)  
http://www.qualitydigest.com/may07/departments/spc_guide.shtml

Ten Fundamentals of Variation [Foundation for proper use of “tools” and “data” in this philosophy]  

A Blinding Flash of the Obvious [Red…yellow…green…AGAIN! And a simple way to compare performances]  

A Graphical Approach to ANOM [deeper insight into previous column]  

Running Circles Around Control Charts [What part of “no more trend lines” don’t you understand?]  

Statistics Don’t “Prove” Anything... but PARC analysis generally does [Why what you’re taught in school isn’t necessarily applicable in the real world]  
http://www.qualitydigest.com/nov07/departments/spc_guide.shtml

**The Wisdom of David Kerridge: Statistics and reality--Part 1 [Some good concepts when you deal with physicians]  


Time to Declare War On Surveys--Parts 1 & 2 [Most surveys, as currently designed, are a waste of time and money!]  
http://www.qualitydigest.com/april08/departments/spc_guide.shtml

Degrees of Freedom [Why you don’t need to know this!]  
http://www.qualitydigest.com/may08/departments/spc_guide.shtml

Excerpt from above article: “I get this question all the time (ANOVA tables in particular seem to terrorize people)... but I wish people were asking better questions about the problem they’re trying to understand/solve, the quality of the data they’re collecting/crunching, and what on earth they’re actually going to do with the results and their conclusions. In a well-meaning attempt not to turn away any statistical questions, my own painful attempts to explain degrees of freedom have only served to distract the people who are asking from what they really should be thinking about.”  
– Davis’s respected colleague

Percentage Deceptiveness [Title speaks for itself]  

An Underrated Test for Run Charts [Handy to have in your back pocket – doesn’t happen often, but often enough]  
“Red…Yellow…Green…” RUBBISH! [Adapted from: “It’s Time to Ignore the Traffic Lights” (Example used in minicourse) http://www.qualitydigest.com/july05/departments/spc_guide.shtml]

In the UK, a crucial target is % Patients waiting < 4 hours in an Accident & Emergency Department. The 2003 goal was > 90%. Here is data for one region where the number is “coded” in green for > 90%, yellow for 85% < 90, and red for < 85%. The data are shown in the table below. Is reacting to the “color of the week” a common cause or special cause strategy?

The run chart is shown below (Median = 90.75). Are there any trends? Runs of length > 8? Do we have the “privilege” of calculating the average?

<table>
<thead>
<tr>
<th>Sorted Data</th>
<th>Region 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Mar-03</td>
<td>93.6%</td>
</tr>
<tr>
<td>6-Apr-03</td>
<td>90.8%</td>
</tr>
<tr>
<td>13-Apr-03</td>
<td>90.2%</td>
</tr>
<tr>
<td>20-Apr-03</td>
<td>90.1%</td>
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<tr>
<td>27-Apr-03</td>
<td>91.8%</td>
</tr>
<tr>
<td>4-May-03</td>
<td>90.7%</td>
</tr>
<tr>
<td>11-May-03</td>
<td>90.1%</td>
</tr>
<tr>
<td>18-May-03</td>
<td>91.7%</td>
</tr>
<tr>
<td>25-May-03</td>
<td>89.7%</td>
</tr>
<tr>
<td>1-Jun-03</td>
<td>89.8%</td>
</tr>
<tr>
<td>8-Jun-03</td>
<td>88.5%</td>
</tr>
<tr>
<td>15-Jun-03</td>
<td>91.0%</td>
</tr>
<tr>
<td>22-Jun-03</td>
<td>89.7%</td>
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<tr>
<td>29-Jun-03</td>
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<tr>
<td>6-Jul-03</td>
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<td>91.1%</td>
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<tr>
<td>27-Jul-03</td>
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</tr>
<tr>
<td>3-Aug-03</td>
<td>91.4%</td>
</tr>
<tr>
<td>10-Aug-03</td>
<td>91.9%</td>
</tr>
</tbody>
</table>

How is the process doing relative to the 90% goal? Are the yellow weeks truly special causes? The runs analysis shows this process to be stable—exhibiting common cause. What strategy have they been using over the last 20 weeks (A meeting discussing that specific week’s data)? Do you have a suggested alternative?

There are some additional questions that, if answered, could provide valuable information:

1) If nothing else changes, what is the typical range in the weekly performance so as to avoid overreaction? Have any of the past 20 weeks been outside of that range either high or low?

2) How much of a difference between two consecutive weeks is “too much”?

3) When the occasional “week from hell” occurs where “everything that can possibly go wrong” does go wrong (and it will!)—through NO fault of the workers—what is the worst performance one could expect under normal circumstances?

⇒ A control chart is a time plot of the data with common cause limits added.

--Like the coin flip, what is the range of performance I typically expect if nothing in the process has changed? In other words, what range are you “perfectly designed” to get?

These represent a range ("dead band") around the average of a stable process where individual data points may be expected to fall if the underlying process does not change.

The process for doing this is shown in the following table. The difference between two consecutive weeks’ results in the sequence, known as the moving range, becomes a key component in estimating this process’s natural, common cause, variation.

Note that the Moving Range is formed by taking the absolute value of the difference of two consecutive numbers in the natural sequence.
--The first value, 2.8, is obtained by taking the absolute value of the difference between the second data point and the first data point: (90.8 – 93.6). (Variation is variation regardless of whether it’s positive or negative.)

--The next value, 0.6, is obtained similarly by taking the difference between the third data point and the second data point: (90.2 – 90.8).

--This continues until the last moving range, 0.5, is obtained by taking the absolute value of the difference between the twentieth observation and the nineteenth observation: (91.9 – 91.4).

--“N” data points yield (“N” - 1) moving ranges because the first data point has no predecessor (In this case, our 20 data points produce 19 moving ranges).

As shown in the next column, these moving ranges are then sorted in ascending order and the median of these, the Median Moving Range (MR\text{Med}), is found. This is the key number for understanding the common cause variation in a given situation. All subsequent calculations will involve it.

To determine the median, \([\frac{N+1}{2}] = \frac{(19 + 1) / 2} = 10\), meaning that the 10th sorted moving range is the vital number. In this case, 1.0.

If, from a time order sequence of data of any length, the moving ranges are calculated and the MR\text{Med} found, then multiplying MR\text{Med} by 3.865 will yield the maximum difference between two consecutive data points that could be attributable to common cause.

The 3.865 is derived from statistical theory and is valid for any time sequence where the median (not average! – see note below) moving range is calculated. This is true regardless of how many numbers were in the sequence.

So...given this process, one month can differ from its immediately preceding month by as much as:

\[3.865 \times 1.0 \sim 3.9\] [Did any week have a significant shift from its previous week?]

If the MR\text{Med} is multiplied by 3.14 (another constant derived from statistical theory, and, once again, valid only for calculations involving the median moving range), this represents the common cause “dead band” on either side of the average: 90.7 + [3.14 x 1.0] = [87.6 – 93.8]

[Note: One can indeed use the average moving range (more cumbersome by hand). If so, substitute 3.268 for 3.865 and 2.66 for 3.14. These multiply the AVERAGE moving range. The limits will be close to those using the median moving range. If there are serious outliers, these limits based on the MR\text{average} will be inflated. Statistically, the average is makes “better use” of the data – IF there are no special causes!]

Davis Balestracci

www.davisdatasanity.com
“Root Cause Analysis?” – Be careful!

Jim Clemmer: If we are unhappy with the behavior of people on our team or in our organization, we need to take a closer look at the system and structure they're working in. If they behave like bureaucrats, they're likely working in a bureaucracy. If they're not customer focused, they're probably using systems and working in structure that wasn't designed to serve the servers and/or customers. If they're not innovative, they're likely working in a controlled and inflexible organization. If they resist change, they're probably not working in a learning organization that values growth and development. If they're not good team players, they're likely working in an organization designed for individual performance. Good performers, in a poorly designed structure, will take on the shape of the structure.

My experience has been that people in quality improvement are working very hard with a lot on their plates. "Tenacious" doesn't even begin to describe the passionate commitment I see. Especially now with "never events" becoming part of the process, many of you have taken on an additional role of being responsible for "root cause analyses."

Let's get back to two very basic, and probably the most important, fundamentals of quality improvement:

1. Your current processes are perfectly designed to get the results they are already getting.

2. Any experienced variation is one of two types, and treating one as the other adds additional complexity with no value...and could even make things worse.

Most of you already know that the two types of variation are "common" (systemic) and "special" (unique) cause. And the human tendency is to treat all variation as "special." And since "never events" aren't "supposed" to happen, the well-meaning approach is to do a root cause analysis on every incident, i.e., treat each as a special cause.

Have any of you wondered whether you are "perfectly designed" to have "never events"...and that they could be waiting to happen, i.e., common cause?

[Incident: a hazardous situation that was unsuccessfully avoided]  

Redefining Root Cause

I am a member of the American Society for Quality (ASQ), and in this month's Quality Progress there was a very insightful letter shedding light on what "root cause" should mean [Thank you, Meredith Brown]. I've extracted the key points and will let her do the talking:

“To be of value, root cause analysis should focus primarily on identifying solutions to system design flaws, thereby preventing accidents and failures. It shouldn't focus on identifying causes, root or otherwise. All too often, however, the causes are based on biases and a lack of critical thinking. In addition, human performance and error factors are frequently overlooked or treated superficially in causal analysis.

“Questions such as, "How could he not have seen that was going to happen?" or "How could they have been so irresponsible and unprofessional?" are retrospective. The only reason they can be answered is because the outcome is already known. They are the result of hindsight bias, which includes a tendency to oversimplify the complexity and ignore the uncertainties of the circumstances people faced when the problem occurred.

“When failure occurs, reactions tend to focus on the people proximal to the accident -- those closest in time and space to the mishap. This is also called focusing on the sharp end. By doing so, you miss underlying contributors to the event.

“More than likely, you'll be able to describe in detail what could have been done to prevent the mishap. But this is a counterfactual representation of the past. Instead of focusing on what actually happened and seeking to understand why it made sense for people to do what they did, all you're doing is proving that another course was open to them.

“All of these common approaches to causal analysis allow you to judge the actions of those involved, to point out what they should have done and to condemn them for what they failed to do to prevent the mishap. It's only a small leap to judge not only the actions, but also the very character of those involved. This is an example of something called the fundamental attribution error.
“A related tendency is the illusion of common sense -- the sense that everyone (or at least everyone who is reasonable, intelligent and informed) shares your understanding and perspective. When you approach event analysis with the belief that what is common sense to you is the right way to see the world, you may fail to understand why people's actions made sense to them at the time. You will likely be judgmental in your approach and will not uncover important and actionable causes of the event.

“When it comes to causal analysis, organizations tend to be satisfied with a simplified, linear and proximal set of causes. However, studies of accidents in complex socio-technical systems show that they are begging to be looked at more broadly and deeply for causes.

“The human tendency is an expectation of quickly getting to the bottom of things, get the forms filled out, fix the problem identified and get back to work. Invariably, this leads to solutions aimed at the people involved on the front line -- retrain them, supervise them better or just fire them -- rather than at the conditions that led to the event.”

**My Challenge to You**

Some food for thought: What if you plotted a run chart of the number of occurrences of events (weekly, monthly, or quarterly) that resulted in a root cause analysis? If that plot is stable (and I'm willing to bet that most of them will be), what if you aggregated ALL of your root cause analysis results from these and did a root cause analysis of your root cause analyses [common cause strategy]?

Would "lack of empowerment," "communication disconnect" and/or "lack of information" possibly pop out? Revisit Jim Clemmer's opening quote and ask the probing question, "Why did it make sense at the time for people to do what they did?"

These are deeper system issues that could mean you have other potential "never events" (seemingly unrelated) lurking in other parts of your organization -- Tick...tick...tick...

And, once again, like a lot of what I teach, this goes against most conventional wisdom. I understand that the pressure is intense for results when these "never events" occur, but there could be some wisdom in considering the strategy, "Don't just do something, stand there!"
Quotes from this morning:

*When we are dealing with people, let us remember we are not dealing with creatures of logic. We are dealing with creatures of emotion, creatures bustling with prejudices and motivated by pride and vanity.*

— Dale Carnegie, personal effectiveness pioneer and author

**Laminate the following and hand it out liberally: ZERO tolerance for blame!**

| Only about 15 percent of [problems] can be traced to someone who didn’t care or wasn’t conscientious enough. But the last person to touch the process, pass the product, or deliver the service may have been burned out by ceaseless [problem-solving]; overwhelmed with the volume of work or problems; turned off by a “snoopervising” manager; out of touch with who his or her team’s customers are and what they value; unrewarded and unrecognized for efforts to improve things; poorly trained; given shoddy material, tools, or information to work with; not given feedback on when and how products or services went wrong; measured (and rewarded or punished) by management for results conflicting with his or her immediate customer’s needs; unsure of how to resolve issues and jointly fix a process with other functions; trying to protect himself or herself or the team from searches for the guilty; unaware of where to go for help. All this lies within the system, processes, structure, or practices of the organization… |

--- Jim Clemmer *Firing on All Cylinders*

**Barriers: “Lack of...”**

- ...top management support
- ...workers wanting to be empowered
- ...end to ‘command and control’
- ...leaders providing a good role model
- ...people being held accountable
- ...people being on board and aligned
- ...organizational patient focus
- ...a sense of urgency
- ...clear and common vision
- ...clear, enforced ground-rules for dialogue, consensus, teamwork, decisions and feedback

**Peter Block:**

All of these points are true. It is just that they have become useless to talk about. They have become habitual language and we have become anesthetized to their meaning and depth. These words, because of their popularity, now belong to someone else, not to us. The phrases get used for persuasion and political advantage, not for their capacity for human connection. They have become the party line and evoke unconsciousness and keep us frozen in the comfort of routine.
Any good quality management system is the sum of the decisions made within it…Each time we choose to sacrifice the good of the system for one person, or allow an ineffective, outdated legacy practice to continue, we take small steps toward lower and lower standards.

When we have a culture that puts quality and environmental attainment at a lower priority than feelings and keeping the status quo, slowly we make the hundreds of decisions that eat away at total performance.

Over time, harmless little decisions can derail a quality management system. -- Jim Verzino

My challenge to you for today: Are you ready to say “ENOUGH!”?

Enough of attending meetings that lead to building a bridge to nowhere, enough of asking what I’m supposed to ask rather than what needs to be asked, enough of praising people who are undeserving of praise, enough of valuing form over substance, enough of accepting good when what is needed is outstanding, enough of enabling people to act as victims when they need to take personal responsibility.

Inevitably, this kind of shift doesn't happen unless a substantial number of leaders put their collective foot down and say “Enough!” in unison. - - Mariela Dabbah

A HUGE Caution: “The modern world’s tech-giddy control and facilitation makes us stupid. Awareness atrophies. Dumb gets dumber. Lists are everywhere — the five things you need to know about so-and-so; the eight essential qualities of such-and-such; the 11 delights of somewhere or other. We demand shortcuts, as if there are shortcuts to genuine experience. These lists are meaningless…When you are not told what to do you begin to think what to do. You begin to see without distraction.” – Roger Cohen [NY Times 10/10/2013]

Jim Clemmer: Why most training fails

“Too often, companies rely on lectures (‘spray and pray’), inspirational speeches or videos, discussion groups and simulation exercises. While these methods may get high marks from participants, research (ignored by many training professionals) shows they rarely change behavior on the job. Knowing isn't the same as doing; good intentions are too easily crushed by old habits. Theoretical or inspirational training approaches are where the rubber meets the sky.” -- Jim Clemmer

Jim Clemmer: The Behavior-shaping role of structures and systems

“It’s like the strange pumpkin I once saw at a county fair. It had been grown in a four-cornered Mason jar. The jar had since been broken and removed. The remaining pumpkin was shaped exactly like a small Mason jar. Beside it was a pumpkin from the same batch of seeds that was allowed to grow without constraints. It was about five times bigger. Organization structures and systems have the same affect on the people in them. They either limit or liberate their performance potential.” -- Jim Clemmer [www.jimclemmer.com]
To be explained during seminar: Post seminar clarification reading

Series 1
- http://archive.aweber.com/davis_book/7wqRw/h/From_Davis_Balestracci_The.htm
- Beware of a Common Financial Trap [Why “rolling averages” are WRONG!]
  http://www.qualitydigest.com/mar05/departments/spc_guide.shtml

Series 2
How do you Treat Special-Cause Signals? [Don’t treat every special cause signal as a special cause!]

Series 3

Series 4

Series 5