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Well, hello again folks. This is the last of my four mini lessons, and I'm going to pull a lot of the concepts together. And you see the title of this is, "Common cause? You do NOT (necessarily) need to redesign!" It's a very common misconception that if your run chart or control chart shows just common cause, that you're stuck with the performance, and there's nothing you can do about it, and the only option is to redesign. That is not true. As I will show you, common cause can sometimes hide very serious special causes and the problem is, they're aggregating predictively to make it look like common cause. That will become much more apparent to you when I give you my example. So really the whole goal here is to take common cause and expose, if possible, the hidden special causes underneath it.

And I'm going to show you the importance to respect this wisdom that I got from the first edition of the Keen Handbook back in the late 80's, that things are the way they are because they got that way. And unless you understand how they got that way, they're perfectly vested in staying that way. So you've got to be very careful about imposing a brand new solution from the outside until you know how the situation got where it is. People resist change, and they do not like a disturbance in their daily work routine.

So, and I will also show you the need that when possible, you need to get – to exhaust your in-house data and whenever possible get a baseline. Some wisdom from the 'Juran Institute' has shown that many projects fail because of lack of a good baseline estimate of a problem. And as I've already eluded to, common cause variation could be hiding special causes. And I've already introduced you to the concept of stratification, how we need to focus a vague situation. And I'm going to delve much deeper into that, and give you a very, very powerful tool, which happens to be, yes, the Pareto Matrix. And then there are two other special cause strategies. And our tendency is to jump to these first. So, I will show you that there are common cause strategies and they must be followed in a particular sequence.

So what I'm hoping, you'll be better prepared to resist the initial temptation to jump right to a solution on a situation that needs improvement. You'll once again, see the need to focus a vague situation before brainstorming possible causes of your problem. And then use your in-house data to get a project baseline, and to assess the effects of your interventions, and use the powerful Pareto Matrix technique whenever possible to expose three common types of variation. And then yes, use three common cause strategies in a specified order.

Now you've all seen this, and a lot of times, people think the plan is, come up with a great idea and test it. Well, if the world were this simple, that would be easy to do. Unfortunately, what tends to happen is, you have this nice – you have this nice, theoretically simple model that interacts with your work culture, or the culture of the problem you are trying to solve. And when this meets that, you get this. That it is not so pretty. And it goes back to a saying I've been using all of these lessons that vague solutions to a vague problem get you vague results. Hence the

need for understanding this part as I said before, things are the way they are because they got that way. And that plan is not come up with a good idea.

Now I got this, a lot of this wisdom for this lesson from an old Juran video series that was made in the '70s called, 'Juran, on Quality Improvement.' And I wore a copy of those out when I worked for 3M. There was so much wisdom in there. And I think this was one of his more powerful ones. So number one, he says, "Always exhaust your in-house data. You're going through the trouble of collecting it, well let's assess the value of that collection, and can we leverage it, its value, as much as we can for the purposes of our project?" And a very famous statistician one time said, "The more you know what's wrong with your data, the more useful it becomes." So it's always another way to make sure you have good data as you proceed with your project.

And if you'll remember, I gave you a Berwick quote in one of the earlier videos where he asked some questions, where he talked about plotting data over time. And later on in his statement, he gets to things like, "Well, what do we plot? Where are the data? What do they mean, to whom? Are they defined in a way that makes them useful for this project? Who should see them and why?" These get good conversations going around your project and will hopefully insure that you have better data as you go forward.

And as I've already said, many projects fail because of no measurement of the extent of the problem, which means you have a vague problem and you're going to try some vague things, and how will you know if they made a difference? And you get vague results. So by taking in-house data, if you plot the dots, you can get a baseline and see, are there common causes or special causes present? And then one thing I like to say is, what is the most recent stable history and we can use that as the baseline. And also use that for some of the common cause strategies. And then we can use it to determine whether our interventions are successful or not.

So once again, plot the dots. You start off with a Run Chart of the indicator that's important for your project.

So after you've exhausted your in-house data, found out what's wrong with it, hopefully you can salvage enough to get a good baseline for your – the extent of your problem. So, the first, and I've already alluded to this, and I'm going to dig deeper into it, is stratification. How do you go from a vague situation to expose the twenty percent of your process causing eighty percent of your problem, which allows the focus? And once you've focused that, how do you then drill further down on this twenty percent? And then once you get more insight, can you come up with some theories, which you now test with a design test or intervention?

Now as I like to say, each one of these gets progressively more difficult in terms of how it disturbs your work cultures. And a lot of us have made the mistake, me, plenty of times, where you immediately go in and start collecting everything you can about a situation hoping for some

insight. And then, or, we tend to jump right to, well we all know what the answer is, we have to implement this. So, remember things are the way they are because they got that way.

So common cause strategy number one, is stratification. And I'm going to iterate once again, common cause does not mean, necessarily mean you have to redesign your process entirely. Preferably, you'd like to go in and find some things that will result in, less disturbance to the work culture than a whole new redesign. As you will see, hidden special causes can be aggregating very predictably. All common cause means is that you can't look at data points individually and you can't look at incidents individually if you're plotting things like falls, med errors, you can't treat everyone as a special cause. You have to now somehow group the data to see if there are any underlying patterns underneath.

So what is the twenty percent of our process causing eighty percent of our problem? So stratification allows you to focus, focus your efforts. And, as I hope I've made you aware in the last video on control charts, that stability, sometimes you don't like the level at which your stability, or the level of variation that you have to live with. Well, that's the bad news. But the good news is, it's stable. The amount of variation doesn't matter. It means, all these data points came from the process and you can aggregate them together to get better information. In other words, as in the case of the bacteraemias, you'd much rather look at all 150 to brainstorm reasons of slice and dice than four this quarter, three last quarter, and treat every one as a special cause. So the power is, you can aggregate any stable period.

This was an example once, that was presented at a meeting and they had their monthly net error meeting. And they listed this month, last month, twelve months ago in terms of errors, and then started explaining every error of the month. Well just before I went into this meeting, somebody said, "Davis, I thought you might like the last two years of minutes for this meeting." Well the good news was, in the top, right-hand corner of every month's result there was data that said, 'This month, last month, twelve months ago.' So I took those twenty-four sheets and walked off to the Milky Way, discussing every errors of special cause. I plotted the thirty-six dots. And here's what I got. And if you apply your test, that's common cause. But now, that doesn't mean I have to accept it. That doesn't mean there aren't special causes because one thing that is sometimes very helpful in terms of a data plot is, it just means I can't treat points individually. So a question might become, is there a pattern to all the high points, or is there a pattern to all the low points? In other words, every time it's high, is it for the same reason? Every time it's low, is it for the same reason? So, I'm starting to cluster things. And in this case you might notice all of the high points are from July. So I innocently raised my hand and said, "Well, what's the – what happens in July?" And you could just hear the collective slap on the forehead that said, "New residents."

There you go, it's July every time. So now, the interesting thing becomes, there's July and there's the rest of the year. And this also brings up a point, wouldn't you like to prevent that spike every year? Though it, one other thing that the special cause tells you is, I have to look at the July errors separately from the others to get insight into what happens in July and what do we

have to be better prepared for in terms of education for July. With no doubt, you educate them on every kind of medication error they can make, but here are the twenty percent of the errors that cause eighty percent of the problem. You better make darn sure they know those. So you don't mix up those errors with other months. So you could improve the occurrence of the spike and at the same time, you can aggregate med errors from the other eleven months and slice and dice in one way as I will show you very shortly.

Now this was a case of the A&E performance of one of those that I showed you from last time. And as you see, everything is between the limit, it's all common cause. Well, if possible the first thing you like to say is, when it's low, is it for the same reason or when it's high, is it always for the same reason? Well in this case, this was very interesting. This facility did have a policy on the books that no more than two doctors should ever be on leave. Well, guess what we found out, that one was low because there were more than two doctors on leave. That one was low because there were more than two doctors on leave, and that one was low because there were more than two doctors on leave. In other words, every time it was low, it was for the same reason. And they did have the policy on the books that no more than two doctors should be on leave. And this shows the policy has good theory behind it, but it wasn't being enforced. So sometimes that can be very helpful. So once again, you would consider these differently from the other weeks.

And if you remember, my very first example in the Run Chart lesson where we had an intervention and our goal was to get to seventy-five percent, but after the intervention, it went from being perfectly designed to get fifty to being perfectly designed to get sixty-eight, it leveled off. So now, if I want to get seventy-five, I need to make another intervention. So as you see right here, we could aggregate all the breaches of the target here, and look for the reasons, and find the twenty percent of the reasons that caused eighty percent of the breaches. So that's what I mean now by most stable history. If you'll remember, I think I told you where this was, they stopped getting the feedback and I told her to show them visually, this run chart. And when everybody saw this, the next month it went back up. So, here was your last stable period so I want to look at as many breaches from that as possible to see the underlying pattern.

Here's a trap you don't want to fall into, and it's very tempting. It is very tempting. You say, well we're stuck at sixty-eight, it's common cause, we've got to do something. We're still not at our target. Well, let's do a cause and effect diagram. Why don't people comply with the bundle? And you come up with all kinds of reasons. Now think about how you would collect data to get insight on this. And Brian Joiner would say, "Is there some way rather than collect specific information on every breach, to find out where the interesting part of the process is, and then collect detailed data there?" Once again, when you go to dissection, you're really over collecting data. So, is there some way you can focus? Yes. And the data collection is much more simple for doing that and doesn't cause as much disturbance on the frontline with people collecting very detailed data. You want them to collect detailed data only where you need the details.

So I will irritate one more time, first try to find the twenty percent of your process causing eighty percent of the problem, which allows you to focus. Now I'm going to teach you one of the most

powerful tools for stratification and I learned this one from this Juran tape and many people have told me this is by far one of the most helpful things they have ever gotten from my lectures. So, I'm going to show you how to create a two dimensional Pareto Matrix.

So for example, let me take some data from here, aggregate a bunch of the non-compliances, and let's say, I've got six facilities and this is a seven element bundle, so what I do is grab the last twenty to thirty, say, non-compliances from each facility to put it on an even keel. And then you look at each non-compliance and say, which element, or elements of the bundle weren't followed? Because there could be more than one thing that wasn't followed. And all you do is say, okay, here's the facility, here's the bundle element. And we first, look at the totals. And we look in the columns for the big numbers. This is the only time I'll let you draw a little circle around something big. Because at this point, you are looking for something to scream at you. And as you see here, we've got four big numbers here. This forty-one, this seventy, and then this forty-one, and this fifty. But now, let's go further, let's see – and you'll see the power now of this matrix presentation. Let's look at the forty-one a little further.

Well, if we do that, you'll notice that there is a further special cause here, and it's with Clinic B with the third element of the bundle. Now I want you to notice, the rest of Clinic B's work is very, very good. And no one else is having trouble with this. So I think you would agree with me that the odds for fixing this are pretty high and it will be pretty immediate. There's something glaring at us, or what it might say too, is, they have an – all this says is it has a different process and we automatically assume method. They might have an input to their process in terms of the type of patient, etc., that makes this element of the bundle a little more vague about needing to be enforced. We don't know, we're going to find out awfully quickly.

So here is another thing because remember I said, you don't want to treat one kind of variation as the other. If all we did was look at this total, we'd say, well we have to give everybody an in-service on element three of the bundle. In which case, I think you'll agree with me too, it would be a waste of time. It would even be a waste of time for Clinic B because they're doing good work and some quick discussion with the other clinics would expose the problem very quickly. Okay, and yeah, the odds of fixing this are very easy.

So now, as I've already said, we could have a system-wide webinar on bundle element three. That's treating special cause as if it were common cause. So the fact that System B is doing good work and you have the knowledge in the system from the other clinics, we're going to have a quick success here.

Okay, let's look at Clinic E. That was another big number here. Now if you notice, there really isn't any further big number screaming at you like it did in the case of Clinic B. So what this would tell you is, they're having trouble with the total guidelines. Their guideline implementation process is a problem. Now notice it's not as cut and dry as zeroing in and getting a quick answer. You're going to have to study what they're doing because we have evidence that the other clinics aren't having as much of a problem, so there is some knowledge to be shared

with Clinic E. And here's my point, yes, you're going to have to dissect things a little further here, but notice you're dissecting them for one clinic, and not all six.

Clinic E is having a problem with guideline implementation in general. We can focus the effort. We need to dissect Clinic E's data. We need more specific data on their non-compliance. Now if you look at element five of the element, that was another big number. And you look across and you don't see any screaming special cause, as you can see here, element five of the bundle is a problem for this clinic, for this health system. So once again, the answer isn't clear, but it also is very clear that you don't say, cut it out, we're having trouble with it, cut it out. We're going to make you more accountable. The system is perfectly designed to have trouble with bundle element five. So it's going to take systemic intervention to fix this. Now once again, it's not clear, but we've been able to focus.

Now here is my point, if we hadn't stratified and just continued to look at the aggregate performance, and Deming has a wonderful saying, "Statistics on performance don't help you improve performance." So just knowing the guideline compliance and saying, I don't like that number, isn't a very big help. We had to go in there and pull it apart. Because if we hadn't, Hospital B would have unknowingly continued to have a problem with bundle element three. Hospital E would have unknowingly continued its poor guideline process, and everyone would have unknowingly continued to have problems with bundle element five. Nothing would change, it would still aggregate very predictably. So, yes, statistics on performance by themselves do not help you improve performance. Are there some markers by which you can dissect the data or stratify it?

So just by doing this, there would be a potential for fifty percent reduction in non-compliance meaning, you could get it up to eighty-five percent compliance. So you could plot a control chart to see, intervene on those three big sources of variation and see where does it level off? By fixing these, what is the process perfectly designed to get, given these new inputs? And now, where you have all those hidden special causes out, now you can decide whether you need to redesign or not. So you would have to do some stratification on which you would do some dissection, see what happens and then do I need to intervene further with a redesign? And here's my point, did you notice the goal didn't enter into either the analysis or the solution? You found what was there in your process. Your process doesn't understand the goal. The goal has no part to play in coming up with a solution.

If I wanted to, I could take that data and do a control chart to say, all right here is what we were perfectly designed to get at fifty percent. Here was the stable baseline we got, and we needed feedback given. And then we could say, well we did the stratification matrix and the next five months, look at that, it went outside the limit and it's still kind of trending up, it hasn't leveled off yet. So this shows you the power of plotting the dots, applying common cause strategies, having a baseline, and looking at the effects of your interventions.

Now here is something else because people are increasingly saying this, if you have an intervention – so we have an intervention right there, you can – and you’re doing an intervention to drive it specifically in a desired direction. So in other words, I want the compliance to go up. So if you have a known intervention, and it’s going in the desired direction, you can relax the six successive increases that declare a trend down to four and you can relax the eight in a row above the median in this case to five because you’re not on a fishing expedition on data you’ve never seen before. In which case, you need to be conservative. But if you have a known intervention at a known point and you wanted to go in a desired direction, you can relax the six in a row of the trend rules of four, and the eight in a row of the shift rule to five. I’m telling you this because I know some people are starting to count these criteria instead and it can be very confusing. So once again, it’s when you have a known intervention to drive it in a desired direction. The others are when you’re looking at data for the first time, data you’ve never looked at before, you’re plotting it, you have to be conservative.

Now remember the fall scenario that I did the control chart of last time, that they had the nine – this month nine, last month zero, twelve months ago they were up twenty-five percent, and we did the control chart to show that they were perfectly designed to get the results they had been getting all along. And one point I forgot to make in that lesson was, that in any one month they can have between zero to fifteen falls just due to random variations. So when they bought everybody pizza for this zero, they could have been treating common cause as special. And then he didn’t like the nine, he was treating that, which we showed to be common cause, he was treating that as special. But the point I want to make is, if all they do is continue to do what they are doing, you see this upper limit, well tick, tick, tick, tick. There is a fifteen in their future. Once again, if all they do is continue to do what they are currently doing. And tick, tick, tick, there will be another zero sometime in their future. So as you see, they are treating everything as special cause. Well this would say, it’s common cause. Now let’s say, I think over this time I counted all the falls, let’s say we have, I think it was 191 falls, let’s use the common cause strategy.

I’m sure quite a few of you have done this. Falls seem to be a big problem for your crowd. And you want to, you to prevent them, so you might do some brainstorming and say, what causes falls?

Well, I give a lot of talks to long-term care facilities, and does this pattern look familiar? Some information I got from people in the long-term care industry was, a patient when, even when they’re in their room, there are three places people can fall. So they can fall off the bed, they can fall off the chair in the room, or they can fall in the bathroom. So already, I’m hearing some ways we can categorize falls in terms of where they happen. Oh did they happen in the hall, or were they on a certain kind of med? But once again – and we could make the horizontal element say, the time of day. So in this case, you would see that – you know, I made this data up, that the chair at let’s say, that’s ten o’clock, or eleven o’clock, is a problem, or then that if it was the bed, the bed, regardless of the time of day is a problem, or this time of day is a problem. So once again, just using the simple concept of the Pareto Matrix, it’s do we have a very focused special

cause? Do we have a special cause that needs more focusing through dissection? Well, so there's the specific special cause. Here is one that needs more dissection. And this one as well, needs more dissection.

So I showed you this the last lesson, that someone had set herself a tough goal of ten percent, and happened to have a red in the month that she was doing the review. And by plotting a data, I said she was already meeting her goal of ten percent. But why be satisfied with ten percent? You could take all these cancellation or no-shows and put them together and find further opportunity to get your rate even lower.

So once again, we want to avoid, why do people cancel or don't show up? Well, I'm sure you can think of some high-level reasons here and probably do a Pareto Matrix like this.

So you could have several locations, and you could look – you might have seven kinds of reasons say, but once again, does one location have problem with a specific type of reason? Does one location have a problem with cancellations in general, or do all locations have a problem with one particular reason? I think you're seeing the wisdom of plotting data in two dimensions whenever possible.

Now this is a good one. There was one facility where the person who handled complaints was told he had to resolve complaints within twenty days, arbitrary goal. If he didn't, he had to write a special report as to why. He gave me his data and someone was concerned, they said, "Well wait a minute, see he did a hundred percent here, why can't he do it every month? Well maybe we should kind of take it easy on him and set a tough goal of ninety percent for this and that will motivate him to do better."

Well, I'll do one better than that, let's plot the dots. You'll see that when I do that as I show you in the control chart video, this is a stable process. You don't see any trends up, trends down, no clumps of data above or below the median, and they're all above the lower limit. As a matter of fact, you will see, that the upper limit is higher than a hundred percent, which means having a hundred percent isn't unusual. So he got a hundred percent this month due to sheer, dumb luck. And the problem is, you can say, well you did it that month, why didn't you just do it again? And then, they haven't gotten there yet, but if all he does is continue to do what he's doing, there is a forty-five percent sometime in his future. But right now, all we can say is, he is perfectly designed for seventy-six percent of the time resolving complaints within twenty days. So, let's find the reason that I think there were 85 complaints here. Let's put all those 85 complaints together and see if there is a pattern to complaints that take longer than twenty days to resolve.

The other thing, you could do also would be, to take each complaint in its time order and plot how long did it take to resolve it, to find out whether twenty days was a common cause or a special cause. So once again, we could brainstorm, what causes long complaint resolution times? Well, why don't we use data to focus the situation?

And once again, we can do the same thing, so I could have type of complaint and say, department within a hospital, and you find that one department has a problem with one specific complaint, one department has a problem with complaints in general, and that one complaint is common across every department in the hospital. And I smile, as I think of one time. I think at one hospital it was parking, but there could be other ones that are designed in your system to make patients uncomfortable and complain. So once again, you see the logic of taking some data, aggregating a stable period, and slicing and dicing it, hoping to find things you can really focus on. I'd much rather do twenty percent of the work than a hundred percent – work on twenty percent of the process than all one hundred percent of it.

And I have to tell you this one story where a friend of mine had data like this once, and his boss saw that he got a hundred percent and said, “Well, why, why can't you do that every month?” And my friend said, “Well you have to understand, that could have been a fluke and it's very difficult to do.” And but the boss said, “But I need a goal to motivate you. I want a hundred percent.” And he said, “Okay, I'll tell you what, it only has to average a hundred percent.” And I just want to emphasize again, setting a ninety percent goal, he just would have continued to chase his tail. And let me ask you, if you deal with complaints, how is each complaint treated? You have someone hired specifically to deal with each complaint treating it as a special cause. Can you do the work to say, I want to reduce the number of complaints? Otherwise, all you're doing is scraping the toast after it's burnt.

So, let me review. Always exhaust your in-house data because the more you know what's wrong with your data, the more useful it becomes. Hopefully you can get a nice baseline to say, are we dealing with common cause, special cause? And what is the most recent stable history that give you a baseline of the extent of the problem? And that, there are three common cause strategies which you should take in a specific order. First of all, can we use stratification? And I think as you saw, it was very high level data collections, like looking at each incident and just going – very easy to classify. And once you find out where the twenty percent is, now you drill down. You may have to, for example, if a certain waiting time is long and it involves different departments, that you've got to break the time up into its pieces, and that can be a real pain in the butt. But, at least you're doing it where you know you'll get a payback.

Think about it, if you did it on every single – say in the case of lab turnaround time, every single lab test, you put the time it came in, the time it went to the testing station, the time at the testing station, the time to get the results, the time to get the results back to people. That's a lot of pieces. Why don't we find the twenty percent of the test, or the twenty percent of times of day that account for eighty percent of the problem times and then zero in on those and get all the information on those?

So once you've focused and have gotten rid of most of the aggregated special causes, now you are ready for a design test – and check your level, and if it's not acceptable, now you have to start thinking about a design intervention into it further.

So you've seen this equation several times, if you have a vague problem, and a plot of your data over time, and a data sanity ah-ha, you are going to solve the right problem. So no more vague solutions to vague problems that get you vague results.

So my summary, as has been the theme of all four of my lessons, plot the dots. And from this lesson, common cause variation can hide ongoing special causes that are aggregating predictably because people aren't aware of them, so they keep doing what they've always done.

When possible, always try to focus a vague situation with Pareto Analysis, preferably the Pareto Matrix if you can get the data in two dimensions.

Jumping right to a solution, is not advisable until you know how things got that way. Remember, things are the way they are because they got that way? And all this stratification will give you very valuable insight into that.

And be careful, the plan of rapid cycle PDSA does not mean come up with a good idea.

So, this concludes the video series. I hope they have been helpful. I am always just an email away if you'd like to contact me, and there's my phone number, and there's my website. It would be my pleasure to help each of you.

And as I said before, my promise remains. I will help you plot your first dot. Thank you very much.