In October 2011, CLSI published EP 23 Laboratory Quality Control Based on Risk Assessment. In the first five months **more than 400 copies** of this document were sold. CMS has stated that EP23 will be the approved guidance for developing CLIA acceptable Individualized QC Plans going forward. In this session we are going to discuss how EP23 came to be, briefly review the document, and discuss how it will impact our world.

Introduction

Key Learning Objectives

- Outline the reasons why EP23 was written
- Describe how risk management can be used to design a QC plan
- Describe the steps to develop an individualized QC plan
- Discuss the impact of EP23 on the clinical laboratory

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Agenda

- What is it?
- Why is it?
- How do we use it?
- What's the impact?

QC, EQC, EP23, IQCP … all of a sudden there seems to be a whole new set of acronyms and abbreviations in the world of POC QC It appears to be quite confusing. What is EP23, how did it happen and what does it mean to us and our customers? Let's find out

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What is EP23?

EP23-A Laboratory Quality Control Based on Risk Management

CLSI Guidance document providing a process to develop an overall Quality Control Plan (QCP) for the laboratory using risk management principles

It is …

- Flexible
  - Can design QCP to meet needs of any clinical laboratory situation
- Adaptable
  - New testing and QC technologies can readily be incorporated
- Meets Regulatory needs
  - Built on well established principles and accepted by CMS
- Leverages current QC practices
  - Incorporates and enhances current protocols

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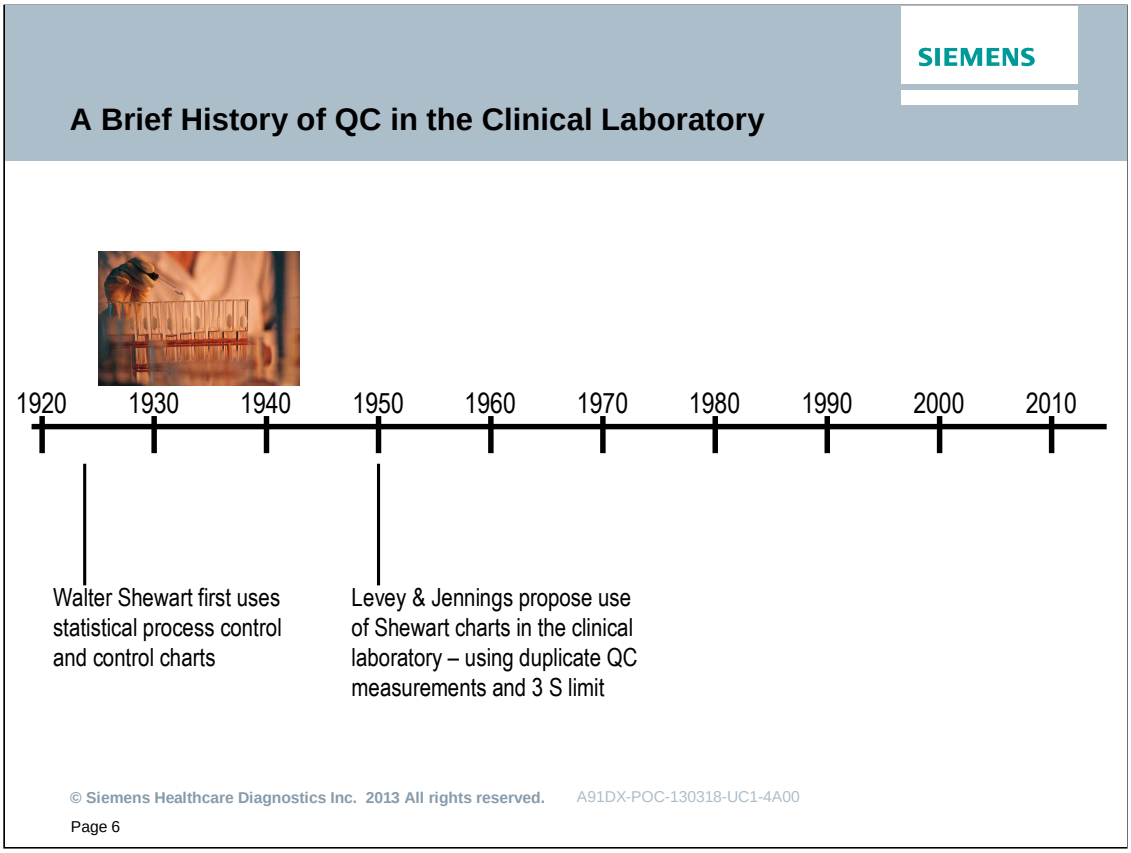
What is EP23? It is a guidance document published by CLSI that describes the process of creating an individualized Quality Control plan for any laboratory or diagnostic testing environment. It is flexible so it can be used in any laboratory or other diagnostic testing environment. It is adaptable, so it can help validate a QC plan that makes full use of any new technologies or built in monitoring. It is fully CLIA compliant. CMS has stated that EP23 is THE way to document an individualized QC plan going forward. And it leverages current QC practice. EP23 doesn't propose new QC practices, it provides a framework to validate that the QC practices used successfully manage the risks of reporting inaccurate lab results. EP23 doesn't preclude the use of any QC practice, it just provides a way to demonstrate that the proposed QC protocol will do the job.

Agenda

EP23

- What is it?
- Why is it?
- How do we use it?
- What's the impact?

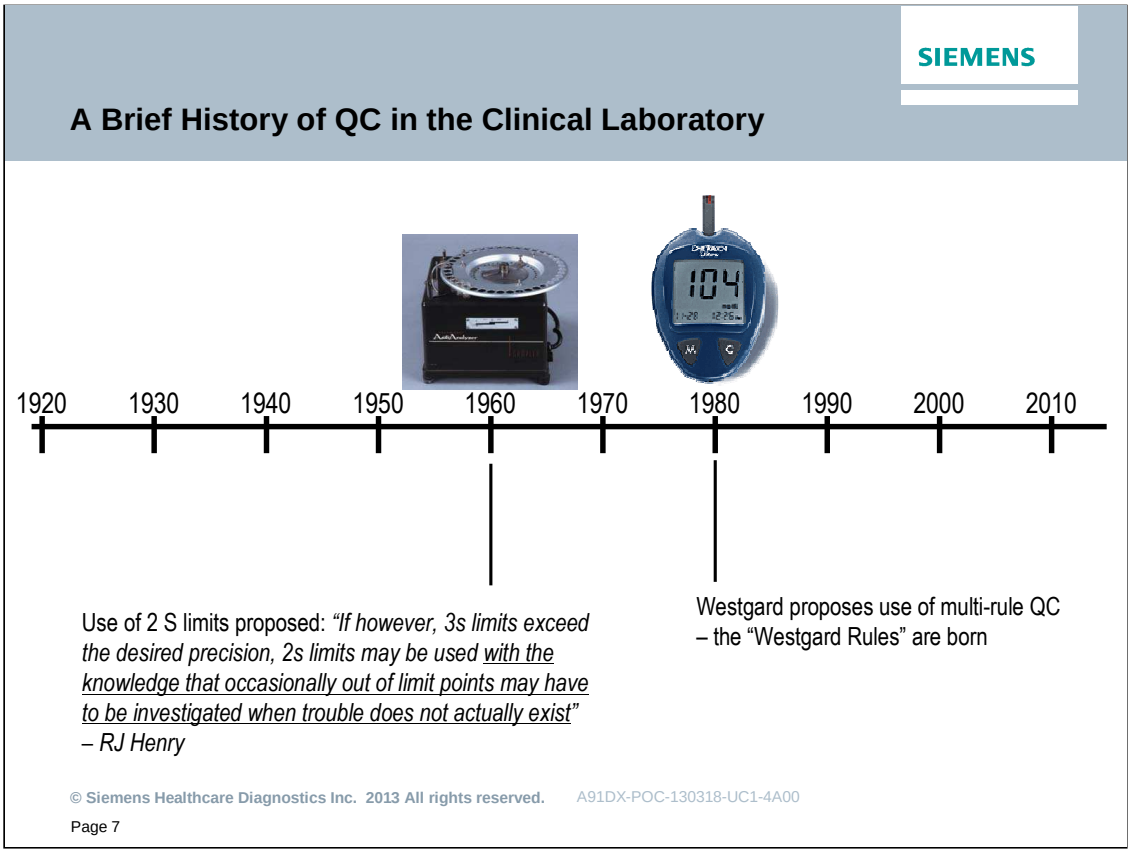
Why do we have EP23? To answer that we need to take a quick look at the history of QC in the clinical laboratory



Why was EP23 written? To understand that we have to review a little history.

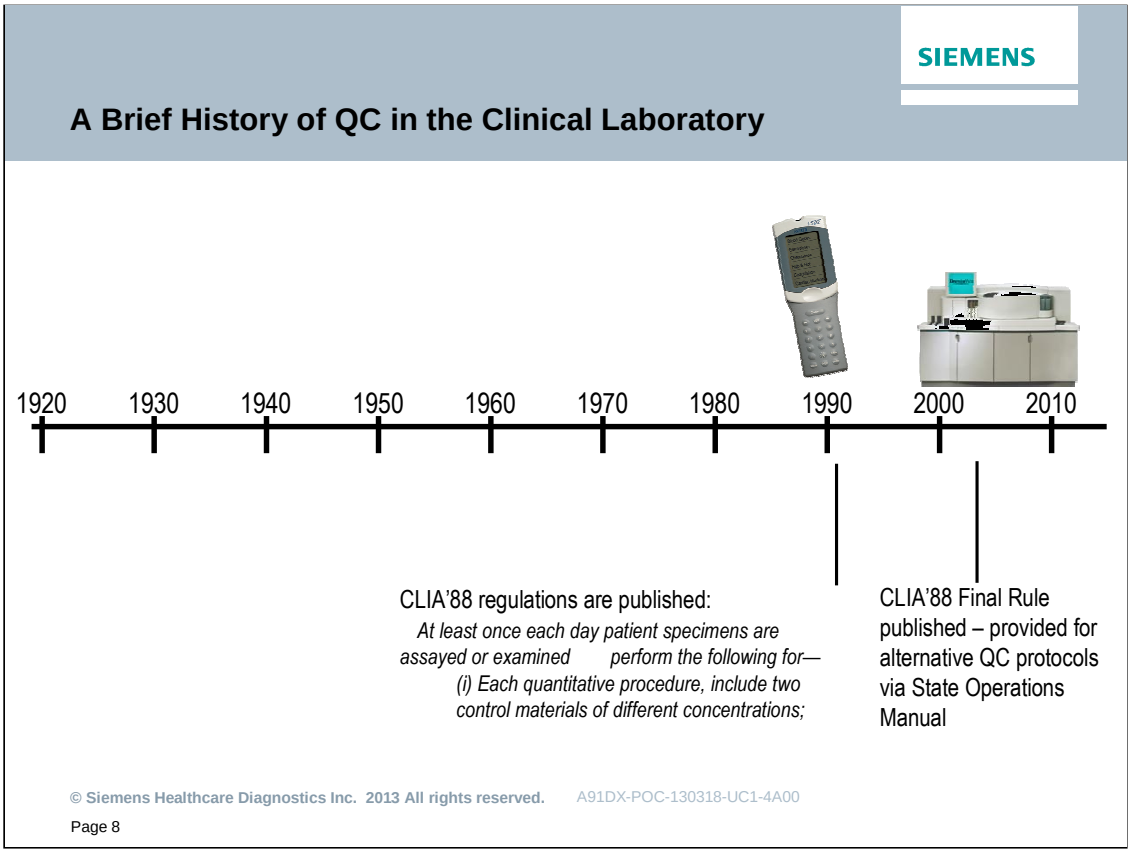
QC as we know it has it's roots in the 1920's when Walter Shewart first applied statistical techniques to monitoring a process. In his case, it was the manufacture of telephones. Shewart developed the control chart as we know it and implemented the first statistical QC rule. He used plus or minus 3 SD limits because in his words "we must use limits such that, through their use, we will not waste too much time looking unnecessarily for trouble"**.** At this time, in the clinical laboratory, quantitative analytical methods were performed on small batches of samples and the primary mechanism to assure quality relied on the fact that calibrators were run with every batch of samples and the folks performing the test knew the chemistry and were able to watch each step in the process develop so they could spot inconsistencies.

Then in 1950 two pathologists, Levey and Jennings discovered Shewart's work and applied it to the clinical laboratory. They published a paper that would forever associate their names with Shewart's control charts in the clinical laboratory. For their proposed QC protocol they tested QC samples in duplicate and used 3 SD limits. During this time, the way testing was performed in the clinical laboratory had not really changed, but now a QC sample was included in the batch.



Around 1960 the adoption of 2 SD limits for statistical QC was proposed based primarily on the use of a single QC sample and the feeling that this would not require testing QC in duplicate. However, things were starting to change in the clinical laboratory as the first automated testing systems were just becoming available. By 1970 testing volume had grown and random access testing of a much expanded menu of tests started to become common. Now QC was more often run at a specific time of the day rather than with each batch of patient samples. However, 2 SD limits were still the standard.

By 1980 testing volume had grown considerably. Labs were offering much larger menus and QC testing was typically done periodically at fixed time intervals. It was also becoming apparent that 2 SD limits were not optimal because of the high false positive rate. In 1981 Dr. Westgard proposed the use of a multi-rule approach to evaluating QC results in order to reduce the false positive rate and the "Westgard Rules" were born. Also in the early 1980's bedside or point of care testing began to explode as capillary glucose meters became commonplace in most healthcare institutions and testing began to move out of the laboratory creating new challenges for QC.



In 1992, the current CLIA regulations were first published and went into effect, establishing the regulatory requirement for two levels of QC once per day of testing as the **legal minimum for QC.** At the same time, point of care testing devices were becoming more and more sophisticated. They offered broader menus and increased internal monitoring that was claimed to replace the need for testing external QC samples. Legitimate questions were being raised about the best way to monitor devices using unit use testing cartridges rather than bulk reagent.

By 2000 the laboratory had become a highly automated place with integrated testing systems offering menus of over 100 analytes and round the clock testing. Traditional QC practices dating back to the 50's and 60's were becoming more and more out of step with the reality of the laboratory. In 2004 CMS published the CLIA QC final rule.

Jan. 2004 – Revised State Operations Manual Equivalent QC (EQC)

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Recognition that traditional QC practices that date back to batch testing are not ideal for newer technology

Recognition that no single QC protocol will be optimal for all devices or laboratories

3 EQC Options:

1. Test System internal controls monitor all phases of process – after validation, external QC once a month
2. Test System internal controls monitor some phases of process – after validation, external QC once a week
3. Test System without internal controls – after more extensive validation, external QC once a week

Widely criticized – Clinical laboratory QC community went crazy

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In early 2004 CMS published interpretive guidelines for the CLIA regulations as Appendix C of the State Operations Manual. In these guidelines CMS announced an alternative to the mandated default QC protocol called an Individualized QC plan. As an example of such a plan CMS presented Equivalent QC, or EQC. This was created in recognition that 2 levels of external QC once a day did not work for all diagnostic testing needs. CMS recognized that the vast majority of CLIA certificates went to physician office labs or other small testing environments that used waived devices or other point of care type testing systems. This also acknowledged that newer technologies with sophisticated internal monitoring processes may need alternate paths for quality control.

As originally proposed EQC offered three options based on the extent of internal monitoring built into the test system.

When EQC was announced it drew quite a response.; All those looking for a way to reduce, or virtually eliminate, testing of external QC samples cheered. While those folks who critically evaluated the protocol were appalled as there was little statistical or scientific basis for the three options.

In response, CMS said…. There need to be options for quality control that recognize the different settings where testing is performed and recognizes the evolution of testing technology, if this is unacceptable, propose something better.

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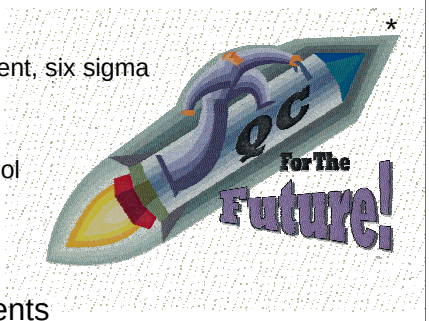
Mar. 2005 - CLSI Meeting - QC for the Future

Focused to address issues raised by EQC

- Reviewed history and current state of QC practice
- Overviews of possible approaches – risk management, six sigma

AdvaMed proposed an "Option 4"

- Manufacturer Validation of Alternative Quality Control
- Proposed CLSI document to support



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Outcome - proposals for two guideline documents

- EP22: Principles for Validation of Manufacturer's Quality Control Recommendations
- EP23: Laboratory QC Protocols Based on Manufacturer's Risk Mitigation Information and the Laboratory's Environment

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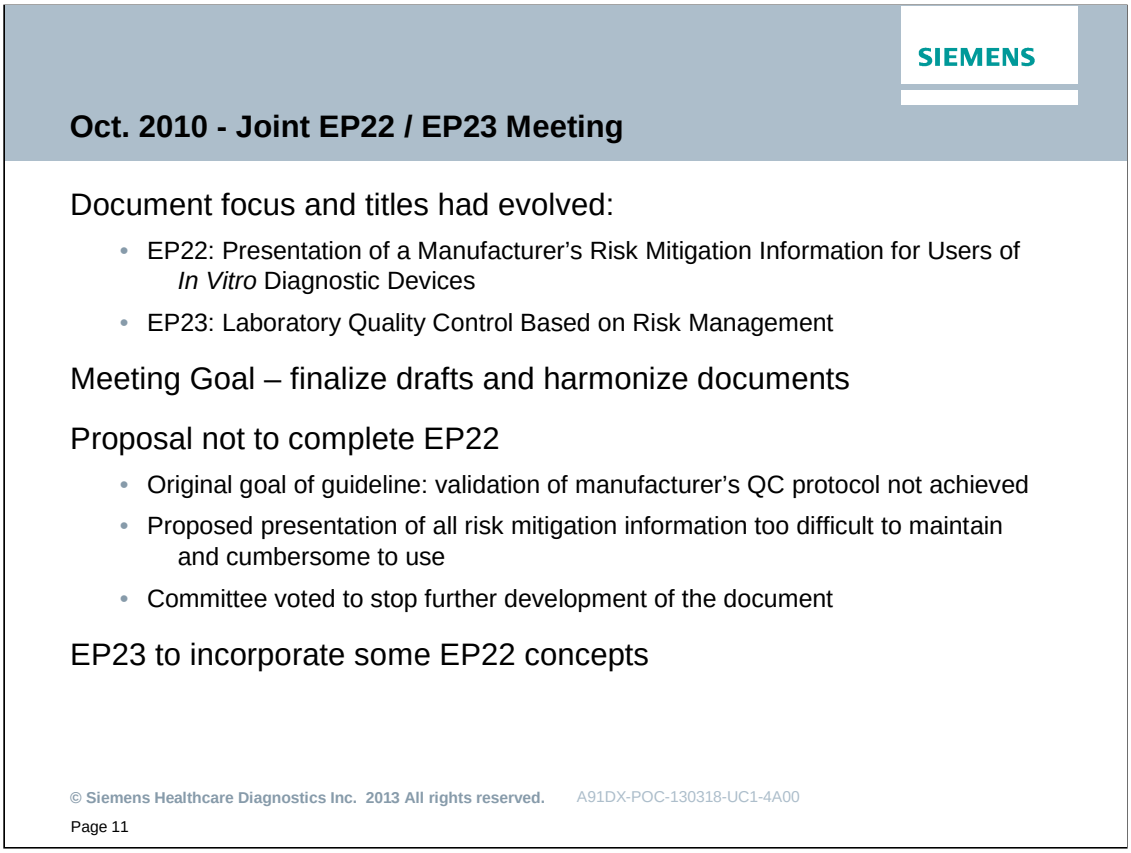
In March 2005, the Clinical and Laboratory Standards Institute (CLSI) held a conference called "QC for the Future". Over two days the conference focused on the history and current state of the laboratory and QC practices, the issues raised by equivalent QC and possible alternate approaches to developing QC protocols including risk management and the six sigma process.

Advamed, representing the IVD industry, proposed what they called Option 4 which would be a process whereby IVD manufacturers would provide detailed QC protocols with the IVD product. These protocols would be evaluated and approved by the FDA and, if followed by the laboratory, would be acceptable as fulfilling all regulatory requirements. Advamed proposed that CLSI create a document development committee to create the necessary guideline.

After much often heated discussion, the final proposal from the conference was for two related CLSI documents to be developed.EP22 and EP23. The respective development committees were formed and the process started.

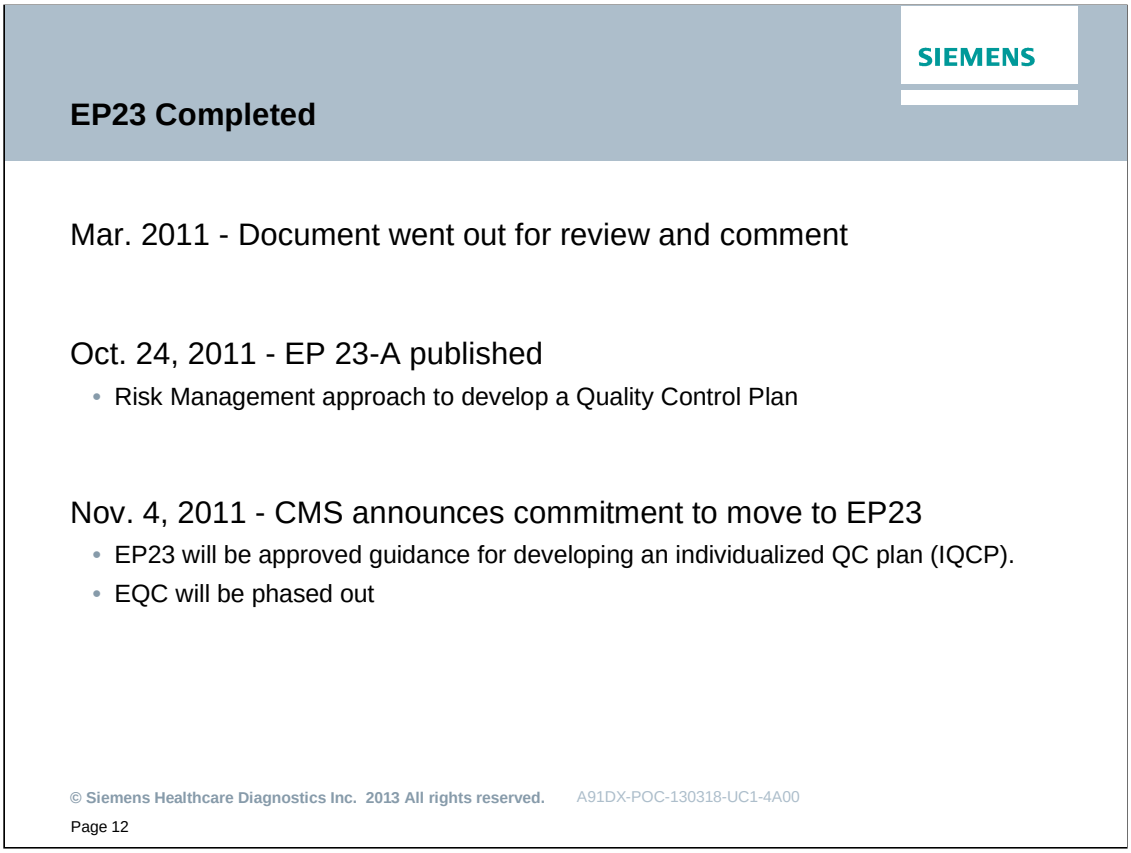
It was quite a process. Initially the three constituent groups on the committees – laboratory professionals, IVD manufacturers and the government were not aligned as to what these documents should be and what was even possible. Work went on for 5 years trying to fulfill the original mandates given for these documents. The next major milestone was a joint meeting of both committees in October 2010.



By October 2010 the process of developing the documents had lead to some changes in concept and direction. These changes were reflected in the revised titles. EP 22 became Presentation …. And EP23 became Laboratory Quality ….. The initial goal of the meeting was to harmonize the documents and finalize the drafts. However, things changed abruptly when the EP22 development committee proposed that further work on EP22 be stopped and the project dropped.

There were several reasons for this. First, the original goal did not work out. The idea of an IVD manufacturer proposing a specific QC protocol and supplying the FDA with data validating the protocol never got off the ground. The FDA was not able to take up the task of approving specific QC protocols, primarily because there was not a body of peer reviewed literature that outlined the accepted way to establish and validate all aspects of a QC protocol.

So the focus of the document shifted to presenting the risk assessment information compiled by the manufacturer as part of design and development in a way that the laboratory could use this information in the development of a QC plan. Unfortunately, this was not practical because of the amount and complexity of the information involved, the fact that some of the information was proprietary, and the fact that the information was continually changing during the life of the product. So the committee proposed EP 22 be terminated as a project and that EP23 pick up the slack by incorporating the use of manufacturer's information into the laboratory developed QC plan.



In March 2011, EP23 was complete and began the CLSI review and comment period. By October the comment period was over and all comments received (and there were hundreds) were addressed. EP23 was published on Oct. 24. Just **11 days** later CMS announced that EP23 would be the approved guidance for individualized QC plans going forward and that EQC would be phased out. That's pretty quick regulatory acceptance.

Given this history a few questions come to mind ….

What about recommendations for unit use and POC?

POC devices were principle drivers in starting the project

- Suggestion made that self contained unit use cartridges and internal monitoring virtually eliminates need for QC sample testing

Key concept:

- External QC samples provide evaluation of virtually the entire analytical process
- Do existing or proposed internal quality control mechanisms monitor the entire analytical process? (i.e. do they control all risks?)

Committee wanted guideline applicable to all devices

- Focused on identifying and managing risks

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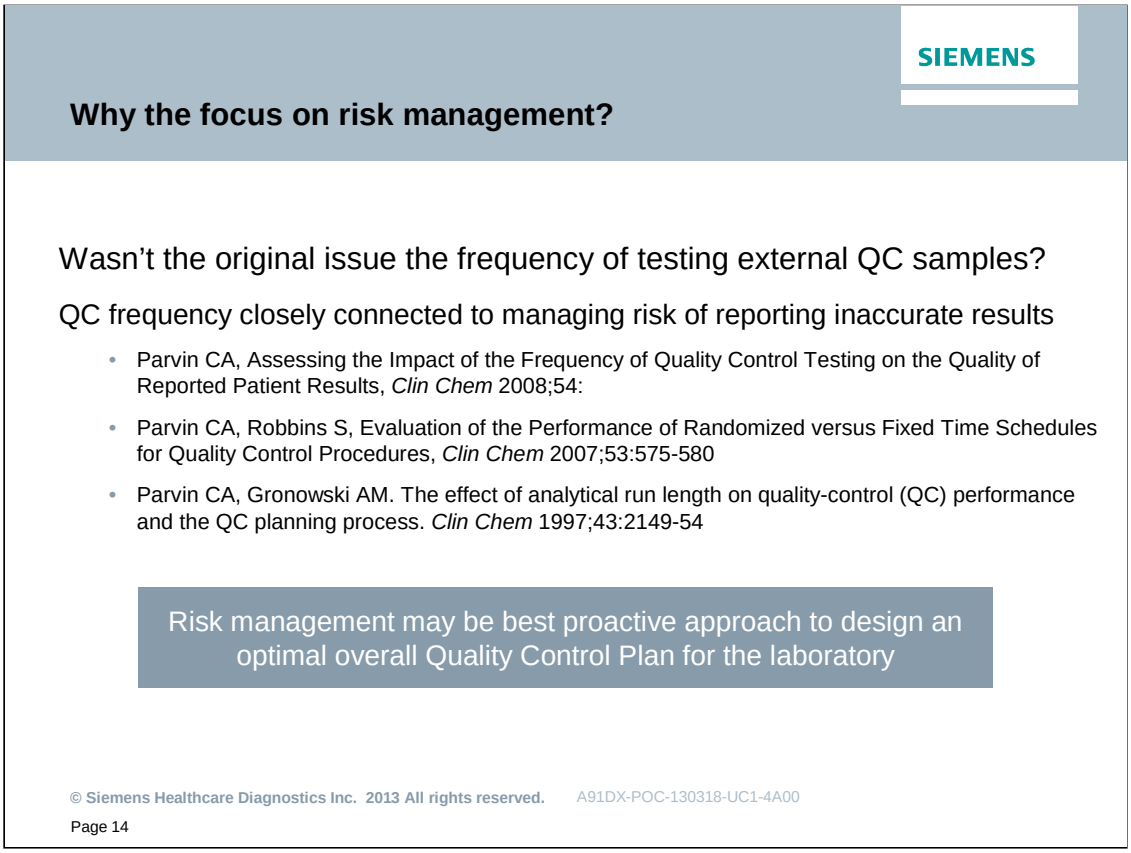
Wasn't the point of EQC the special needs of unit use and point of care devices? What happened with that in EP23?

Certainly point of care devices and testing environments were a principle driver in development of EP23. Especially because some felt that the current devices with built in internal checks obviated the need to test external QC samples. As EP23 was developed the committee looked at all the ways that testing devices are monitored for performance. They noted that one of the strengths of testing external QC samples was that the QC sample went through the entire testing process, and so detected problems throughout the process. Some of the internal checks did not encompass the entire testing process. However, the committee recognized that there is no one correct way to monitor the testing process so they focused on developing an approach that would support the use of all the available tools for monitoring. This is a key reason the focus became identifying where the risks were in the testing process and then making sure each risk was managed



So this brings us to risk management. It may seem odd that a discussion that began focused on how often to test QC samples turned into risk management. However, when you look more closely, you see that the frequency we should test QC samples is actually driven by managing the risk for reporting incorrect patient results. Even though QC has been discussed in the laboratory literature for decades, rarely is the frequency of testing QC samples discussed. Most of the literature deals with selecting rules and maintaining QC targets. Recently, however there have been a number of articles published that look at the optimal frequency to test QC samples. This work has been done primarily by Curtis Parvin, a biostatistician who currently works for BioRad. What these articles highlight is that one of the best criteria to use for deciding how often to test QC samples, or use any QC tool, is managing the risk of reporting inaccurate patient results. Basically, the only time you know that the test system is functioning correctly is at the moment when the internal check is performed or the QC sample is tested. Between those QC events the test system could fail at any time and you may not detect it until the next QC event. So, the frequency of how often to perform a QC event is best determined by how many inaccurate patient results may get reported before you detect the problem with the next QC event. Managing risk seems to be the best way to decide what QC tools are needed and how often they should be used. Please keep in mind that when I say "QC tools" I do not mean only testing external QC samples. Let's look at some of the QC tools available to us

QC Toolbox

"QC" is not only about testing external QC samples, it is all the tools we can use to monitor test system performance

From EP23: "Each QC tool has strengths and weaknesses. There is no perfect QC tool that consistently prevents or detects all failures. Understanding their strengths and weaknesses allows use of the tools to effectively reduce risk."

Analysis of Quality Control Samples

Controls Built Into the Measuring System

Control Techniques Using Patient Test Results

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The QC tools available include far more than just testing external QC samples. EP23 recognizes that a variety of QC tools exist and that no single QC tool is perfect. Instead the idea is to use whatever combination of QC tools that is most appropriate for the test system and the testing environment to assure that the risk of reporting inaccurate results is managed. Let's look at some of the QC tools identified in EP23

Analysis of QC samples is certainly a tool available to us and it a powerful and well established tool. It includes the traditional testing of QC samples by the lab, but it also includes testing samples across multiple laboratories like peer groups or proficiency testing. Key to effective use of QC samples is determining how often they need to be tested

Other tools in the QC tool box include controls built into the measuring system like integrated QC material, automatic system function checks, electronic checks and automatic calibration checks. These are also effective tools that should be part of the QC plan if they are available on the test system

Finally, there are control techniques that use the results from patient samples. This can be the repeat testing of patient samples to demonstrate consistent results or monitoring aggregated patient results like tracking the Average of Normals for a chemistry system or Bull's Algorithm in Hematology. This can also involve the review of patient results to detect results that are implausible and likely to be an error or using techniques like delta checks to make sure results are consistent for a given patient or comparing the results of related tests. For example reviewing results for several different thyroid tests on the same patient to make sure the results are consistent. While some of these tools may not be useful in a point of care testing environment, many of them are, and the goal of EP23 is to make optimal use whatever tools are practical for any given testing environment as part of the QC plan.

So how does this all come together within the EP23 process, let's take a look

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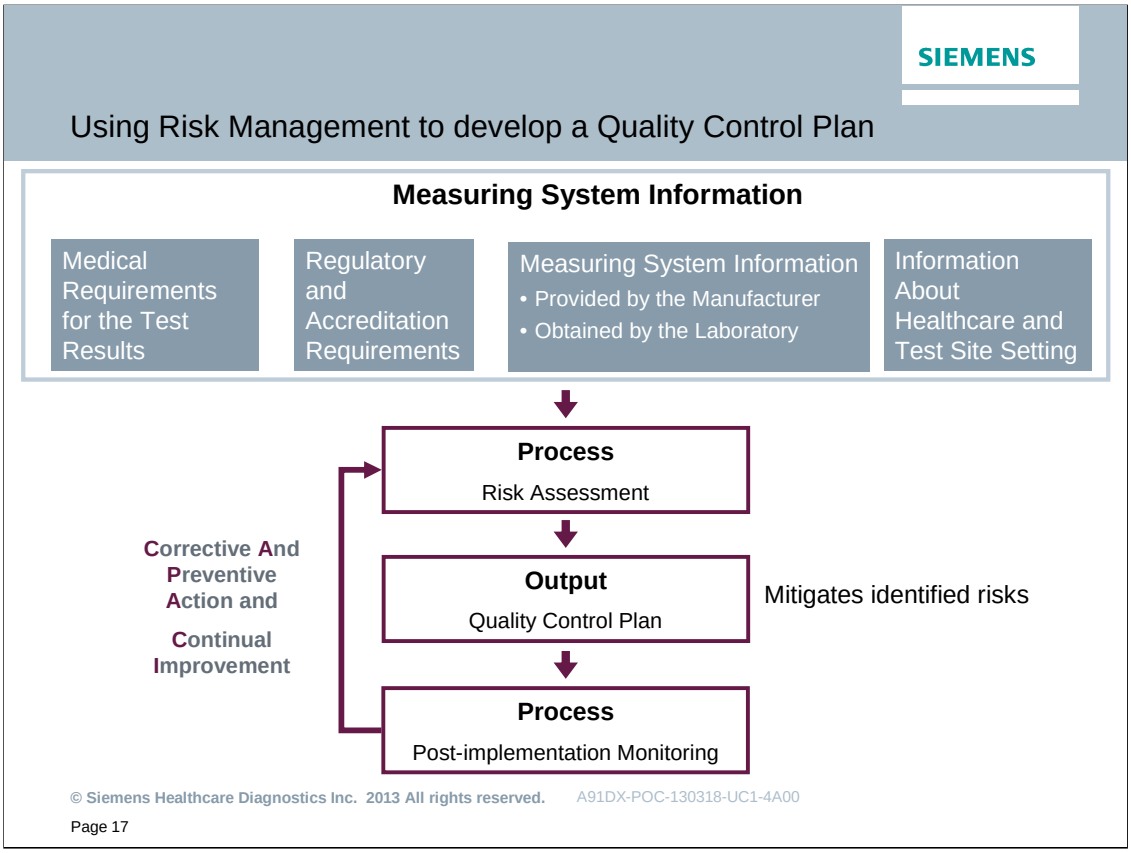
EP23

- What is it?
- Why is it?
- How do we use it?
- What's the impact?

How do we use EP23? It's all about using the concepts of risk management



How does risk management fit into a QC plan? The first step is to gather information about the testing process. We need to understand how the test results will be used medically because this determines the quality requirement we need to maintain. Some test results are one small part of a lot of information that may be used to make a decision once all the information is available. Other test results are used immediately as the sole decision making criterion. Clearly in these situations an inaccurate result may have a much greater potential to cause harm. So we need to understand the medical need to design our QC plan.

Next we need to make sure we are compliant with all regulatory requirements. Then we need information about the measuring system or testing device. We need to understand what it's normal performance characteristics are and what are the things we need to watch out for. Much of this information is supplied by the manufacturer and we'll discuss that shortly. Other information comes from the laboratory's experience with the test system or similar systems. Finally, we need information about the environment where the testing system is used. Is it a clinical laboratory, a doctor's office, a blood gas lab? We need to take into account whether room temperature is consistent or varies widely, where supplies are stored, where the test system will be used. Finally, we need to know about who will be operating the test system and their skills.

Once all the information is assembled, we use it to evaluate the testing process to identify where possible risks for reporting inaccurate patient results occur in the process and the potential for harm to patients if this happens. This is known as Risk Assessment. Once we have identified and assessed the possible risks, we put together a QC plan that manages those risks and we implement the plan. Once we are using the plan, we have to keep evaluating how the plan is working so we can improve it over time. This all sounds very abstract and complicated. However, it actually is what we have been trying to do all along with our QC practices. The difference is that now we are actually analyzing what we are doing and trying to optimize it rather than just assuming it works. Let's look at the steps involved in a little more detail.

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Step 1 – Information Gathering for Risk Assessment

Table 1. Sources for Collecting Information for Risk Analysis

Information	Source
Regulatory and accreditation requirements • Mandated QC procedures • Required quality assurance activities • Regulatory agency recall and device failure notifications	Regulatory authorities; accreditation agencies
Measuring system information • Intended use (including limitations, warnings, and precautions) • Environmental requirements • Instructions for calibration, maintenance, use, and reagent storage • Calibrator traceability information • QC features • Risk mitigation recommendations	*In vitro* diagnostic (IVD) manufacturer
Laboratory information • Environmental conditions, including facilities and utilities, and existing controls • Installation/operational qualification reports • Operator training and competency • Internal performance evaluation/verification data • External performance data (eg, proficiency test results) • Process map covering the steps analyzed	Laboratory
Publications and reports from laboratory peers • Published performance evaluations • Published clinical studies • Other users (eg, user groups, listservs, forums)	Laboratory
Clinical information • Clinical applications for use of a test result • Biological reference intervals and clinical decision levels • Foreseeable medical errors that could result from incorrect, delayed, or no results • The severity of patient harm that would result from the hazardous situations	Laboratory, in consultation with medical users of the test results

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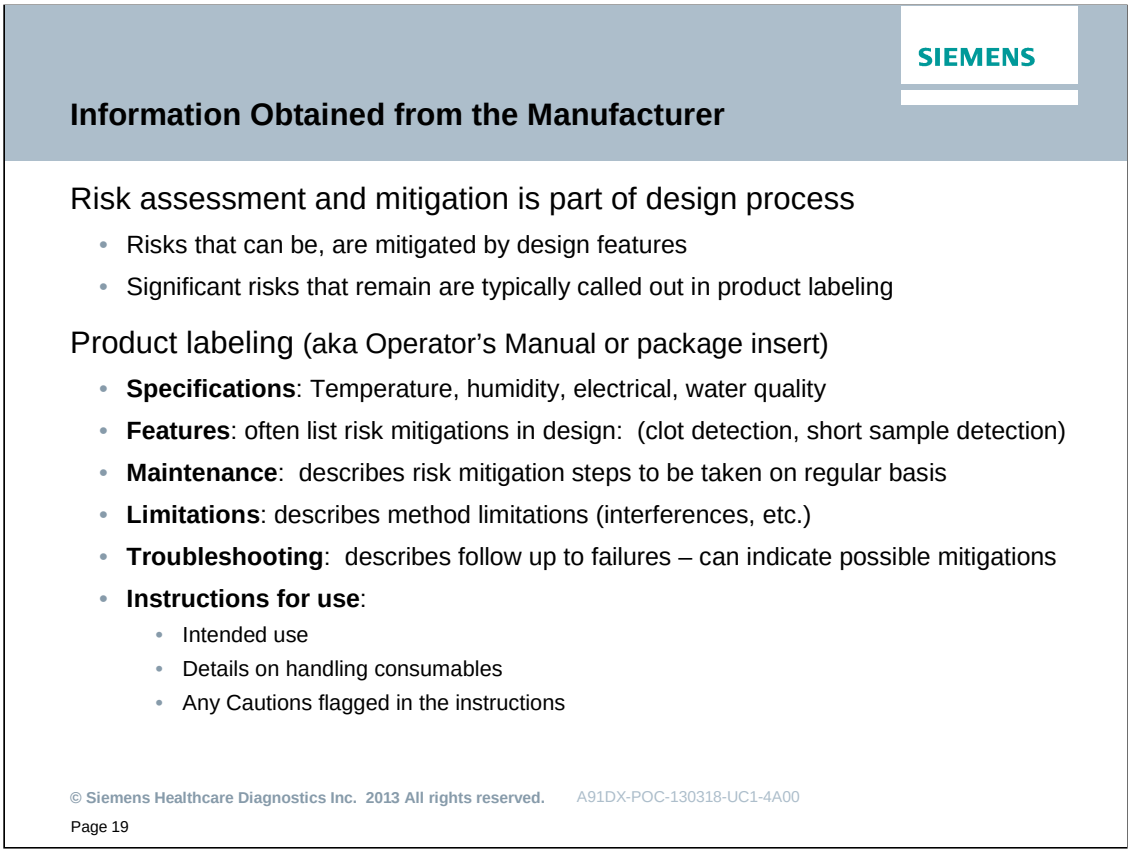
Step 1 is gathering information. The table from EP23 shown here provides an outline of the types of information we need to consider. Not everything will be applicable to all testing systems or environments, but we need to consider all this information. We do not have the time to discuss each category in detail, but I do want to spend some time on information obtained from the manufacturer since this is what you will be looking for from us.



First, we have to recognize that risk assessment and risk management are an integral part of the product design and development process and always has been. Throughout the process of designing and developing products, engineers do formal risk assessments and use the information to guide the design. Where practical, we build into the design of the product features to manage and reduce all identified risks. This is just part of good design. However, there are some risks that cannot be mitigated through the product design or that can only be partially mitigated. Sometimes, the laboratory needs to play a role in managing these residual risks. In this case the manufacturer has to inform the laboratory of the risk and provide instructions on how to mitigate the risk or know when a failure has occurred. This is done through product labeling. Primarily in the instructions for use, where specifications for the operating environment, design features that mitigate risk, instructions for how to maintain the test system to prevent failures, limitations of the test system, and guidance for how to troubleshoot are all included. This is all part of risk mitigation and represents the primary way manufacturers communicate risk information. They just haven't called it "risk mitigation information" in the past and haven't assembled all this information in a single place in the product labeling. Instead it is placed where it will be most useful in informing the operator when using the product.

When you first start working with EP23, you may feel as though you cannot find all the information you need in the product labeling. In that case you will need to contact the manufacturer.

Obtaining Information from the Manufacturer

Review available information

Create list / table of identified risks and mitigations

Review list for additional information that may be needed

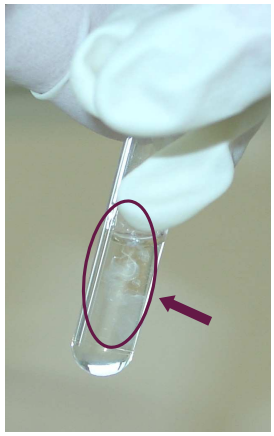
Have specific questions

- "What is the smallest clot that will be reliably detected? "
- "What factors may affect short sample detection?"
- Available data may not exactly answer question

Indicate working on an EP23 Quality Control Plan

Don't expect immediate answers

Be pleasant, professional, and persistent



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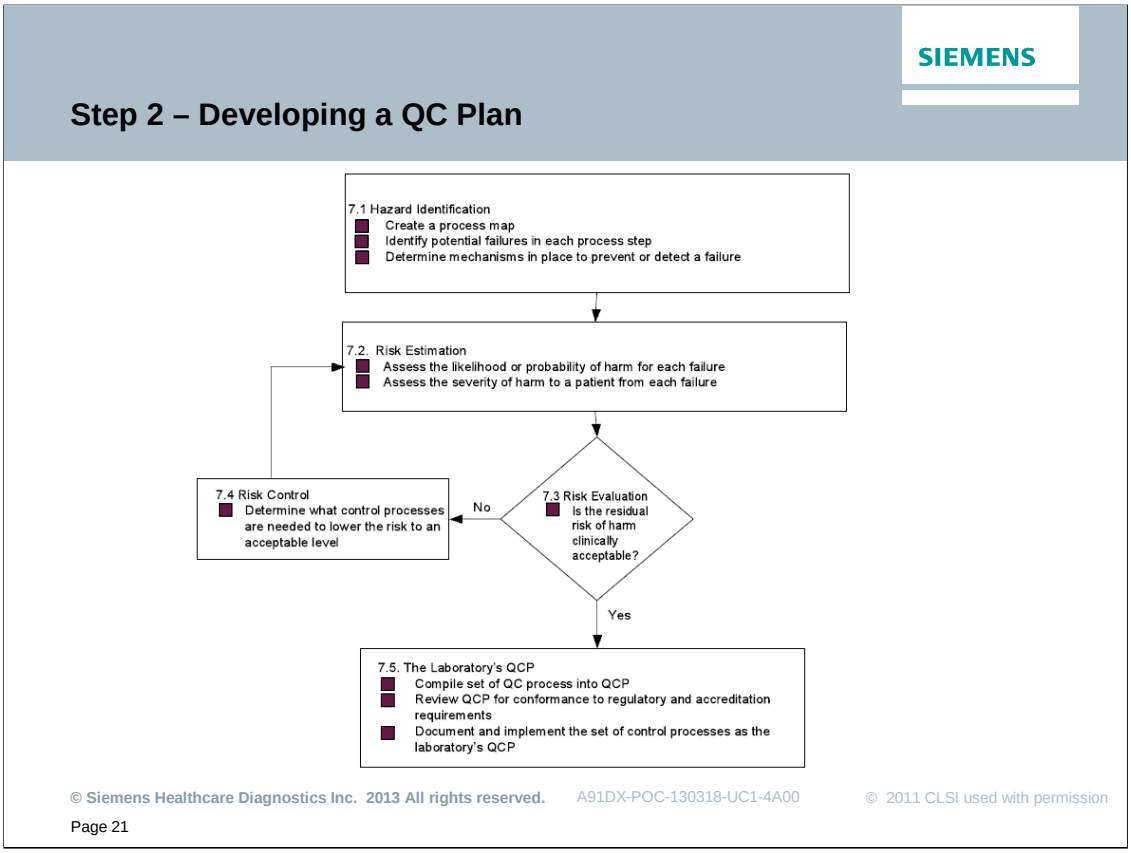
First, we need to recognize that we already have most, if not all, the information we need in the product labeling. To use this information in the EP23 process we need to review the information we already have and use it to build a list or table of possible risks. If, as part of this process, we find there is additional information needed for risk assessment, we should contact the manufacturer. When contacting manufacturers for additional information, keep the following in mind…

Before you call be familiar with the information you already have. Then, have specific questions for the manufacturer such as "What is the smallest clot that can be detected?" or "What factors affect short sample detection?" When asking for information like this, please keep in mind that the available data and information may not exactly answer the question you are asking With clot detection, for example, the design specification may be to detect clots of 1 mm or larger 99% of the time. This specification was verified by adding clots 1 mm or larger to samples and confirming that they would be detected at least 99% of the time. However, this data does not indicate how clots smaller than 1 mm would be detected, nor does it tell us what is the smallest clot that can be detected. So the information is useful, but may not be exactly what we ask for. That's the way it will work. The studies performed and the data collected are done to document that the design performed to specifications. It is unlikely that manufacturers will do special studies just to create data for EP23 inquiries. We will all have to work with the information that is available. When contacting a manufacturer, please indicate that you are asking the questions to develop an EP23 QC plan so the manufacturer is aware of why you are asking the question. Also note that the information may not be immediately available since the manufacturers are also just getting used to working with EP23 and it helps if you are pleasant, professional and persistent as that will help get answers.

Once all the necessary information is compiled it's time to develop the QC plan



This flow diagram from EP23 shows the steps to developing the QC Plan. First we create a process map, which is nothing more than a list or diagram of all the steps in the testing process. Key here is that the process map must include **all** the steps we REALLY do, not what's written in the procedure or the IFU. It has to accurately detail what is REALLY done. Once we have the map, we then identify all the places where things can go wrong, otherwise known as failure modes. When we have identified all the failure modes, we see if there are already mechanisms in place to detect or prevent each possible failure.

Now that we know what the possible failures are, we estimate the risk associated with each one. We will discuss this step in more detail in a moment. When we have determined which risks are essential to mitigate, we then look at our process to see if effective steps to detect and mitigate each possible failure mode are in place and we create a list of those steps. If the current process does not control the identified risk or if the steps already in place do not adequately mitigate the risk, we select a QC tool that will help and add it to the process.

Once we have assessed all the risks and identified all the steps to mitigate the risks, we compile a listing of the steps we will use into our QC plan. We review the plan to make sure it is compliant with regulations and that we haven't missed anything, and then we put it into use.

That's a lot to do and it can seem confusing. Let's take a closer look at a couple of the steps, starting with risk estimation.

Risk Estimation

- Risk cannot be completely eliminated
- Identify unacceptable risks based on criticality
  - Criticality = probability of harm x severity of potential harm

Probability of Harm

- Frequent = once per week
- Probable = once per month
- Occasional = once per year
- Remote = once every few years
- Improbable = once in the life of the measuring system

Severity of Harm

- Negligible = inconvenience or temporary discomfort
- Minor = temporary injury or impairment not requiring professional medical intervention
- Serious = injury or impairment requiring professional medical intervention
- Critical = permanent impairment or life-threatening injury
- Catastrophic = patient death

Risk estimation involves identifying those risks that are most critical. We know that we cannot eliminate all possible risks of reporting inaccurate results. It just is not possible in any realistic way. So, what we need to do is estimate the criticality of the identified risks to determine the risks that must be mitigated.

One accepted way to estimate criticality is to look at how often the failure is likely to occur, which establishes the probability that harm may be done, and then look at how severe the harm may be if the failure occurs. Fortunately it is quite rare for the results of a lab test to cause critical or catastrophic harm to a patient. These two factors are combined into a cross table to determine criticality

Risk Estimation

- Risk cannot be completely eliminated
- Identify unacceptable risks based on criticality
  - Criticality = probability of harm x severity of potential harm

Criticality

Table 3. Risk Acceptability Matrix

	Severity of Harm				
Probability of Harm	*Negligible*	*Minor*	*Serious*	*Critical*	*Catastrophic*
Frequent	*unacceptable*	*unacceptable*	*unacceptable*	*unacceptable*	*unacceptable*
Probable	acceptable	*unacceptable*	*unacceptable*	*unacceptable*	*unacceptable*
Occasional	acceptable	acceptable	acceptable	*unacceptable*	*unacceptable*
Remote	acceptable	acceptable	acceptable	acceptable	*unacceptable*
Improbable	acceptable	acceptable	acceptable	acceptable	acceptable

For each failure mode in our testing process, we need to establish the criticality of the associated risk

For example, one possible failure mode for a glucose meter might be inadequate sample which could lead to an inaccurate result. The severity of harm could be serious if the inaccurate result leads to misdiagnosis or the incorrect insulin dose, but the probability of harm is remote because the meter has an effective mechanism to detect short samples. So the overall criticality is “acceptable” and we don’t need to do anything else. On the other hand, another failure mode may be that, if the operator inserts the test strip into the meter upside down, the meter always gives a result of 60 mg/dl. Now the severity of harm is still serious for the same reasons we just discussed, but the probability of harm is now “probable” because this is an easy thing for an operator to accidentally do. In this scenario the criticality is “unacceptable” and we would need to add some step to our QC plan to prevent or detect this failure. This could be as simple as requiring the operator to check if the strip is upside down any time the test result is 60.

As we are estimating risk for each failure mode and establishing the criticality, we keep track of everything using a list or table

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Example: Gathering Information / Assessing Risks

An Illustrative Example of a Glucose Measurement on an Automated Measuring System						
Row #	Targeted Failure Mode (Hazard)	Measuring System Feature or Recommended Action	Known Limitations of Feature or Recommended Action	Control Process Effective?	The QCP Actions Required to Address Known Limitations	Residual Risk Acceptable? (Yes/No)
5	Incorrect results due to clots from the sample	Sample pressure monitored in probe. Measuring system software identifies signals indicative of the presence of clots.	Small microclots may not be detected.			

Here is an example table from EP23. Each row is a specific failure mode. For each failure mode, we list the design feature or steps we currently take to mitigate the risk of that failure. We also list any limitations of what we currently do. These limitations can leave some failure risk uncontrolled and we need to estimate the criticality of the uncontrolled or residual risk to decide if we need to do more

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Example: Developing Mitigations / Reassessing Risks

An Illustrative Example of a Glucose Measurement on an Automated Measuring System

Row #	Targeted Failure Mode (Hazard)	Measuring System Feature or Recommended Action	Known Limitations of Feature or Recommended Action	Control Process Effective?	The QCP Actions Required to Address Known Limitations	Residual Risk Acceptable? (Yes/No)
5	Incorrect results due to clots from the sample	Sample pressure monitored in probe. Measuring system software identifies signals indicative of the presence of clots.	Small microclots may not be detected.	Partial	Manufacturer recommendations: Perform routine maintenance so pressure sensor can function optimally to detect clots. Laboratory-implemented control processes: – Implement procedural step to inspect samples for visible clots and train staff on this procedure. – Monitor frequency of system clot errors	Yes

Once we have used criticality to assess the residual risk, we decide what additional steps we need to take, or what additional QC tools we need to use, to mitigate the risk to an acceptable level. We then reassess any remaining risk and finally get everything to an acceptable level. From this table then we can begin to list what actions we need to take in our QC plan to monitor and control the testing process

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Example: Developing Quality Control Plan

Maintenance

- Follow manufacturer's schedule (emphasize checking probe cleaning and lamp intensities).
- Monitor refrigerator temperature daily (implement continuous temperature monitoring for outpatient clinic).
- Monitor temperature and humidity at all laboratory locations (install continuous temperature and humidity monitoring with alarm at outpatient clinic).
- Install uninterruptible power supply (UPS)/surge protector at outpatient clinic laboratory and monitor UPS battery function.

Training

- Monitor refrigerator temperature daily.
- Check condition of the cold packs on receipt of new shipments of reagents.
- Double-check manual data entries, and stress consequences of incorrect data entry.
- Check for low-volume sample and clots before testing, and monitor frequency of measuring system error messages, which may indicate the need for staff counseling.

Here is an example QC plan developed from the risk table we have just been looking at. This is the end point we have been working toward. It is a description of the steps we need to take to assure that all critical risks are mitigated to an acceptable level. Note that this approach does NOT mandate the use on any specific QC tools. It does NOT require the testing of external QC samples only that all critical risks are properly mitigated.

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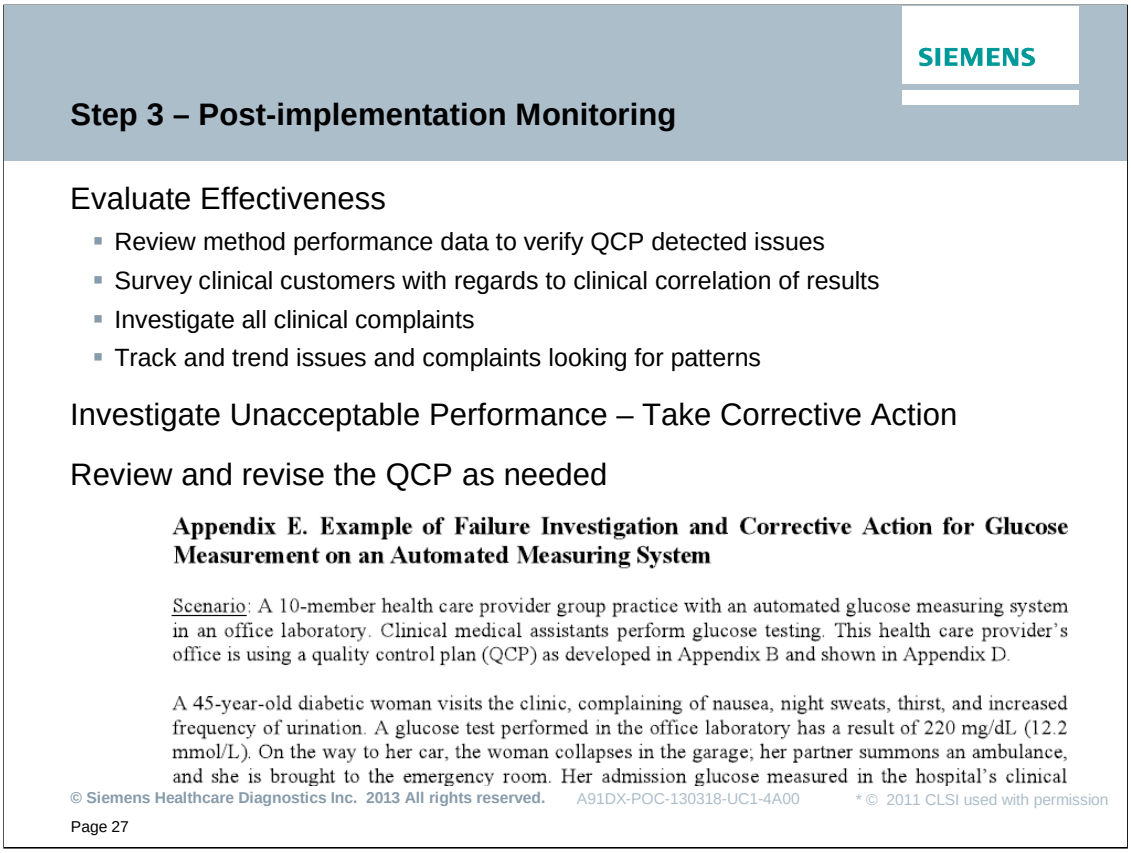

The last step in the process is to put our QC plan into place and monitor it's effectiveness. We evaluate effectiveness in a number of ways. One way is to review method performance data periodically to verify failures were detected. This can be a monthly review of QC results if QC samples are tested or it can be a periodic review of patient results against patient clinical status to assess whether the reported results matched the patient's condition. This can be by chart review or by surveying our clinical colleagues who use the results.. Part of this process is investigation of all complaints from our clinical colleagues and tracking and trending these complaints looking for patterns.

Any time we detect that performance of the test system has been unacceptable we need to investigate. If the test system failure was not detected or controlled by our QCP, then we need to understand why and, if necessary update the QCP to catch this failure mode in the future.

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Agenda

EP23

- What is it?
- Why is it?
- How do we use it?
- What's the impact?

So, that's how it works but what will the impact be?

EP23 & CLIA Compliance

Statement from CMS:

"The Centers for Medicare & Medicaid Services (CMS) is incorporating into the Interpretive Guidelines (IG) key concepts from Clinical and Laboratory Standards Institute (CLSI) Evaluation Protocol-23 (EP-23), 'Laboratory Quality Control Based on Risk Management', as alternative Clinical Laboratory Improvement Amendment (CLIA) Quality Control (QC) policy. The New CLIA QC policy will be entitled Individualized Quality Control Plan (IQCP). The interpretations in today's presentation are those of the presenter and may not necessarily reflect official CMS policy. For more information, visit the CLIA web site at:

http://www.cms.gov/Regulations-and-Guidance/Legislation/CLIA/Individualized_Quality_Control_Plan_IQCP.html

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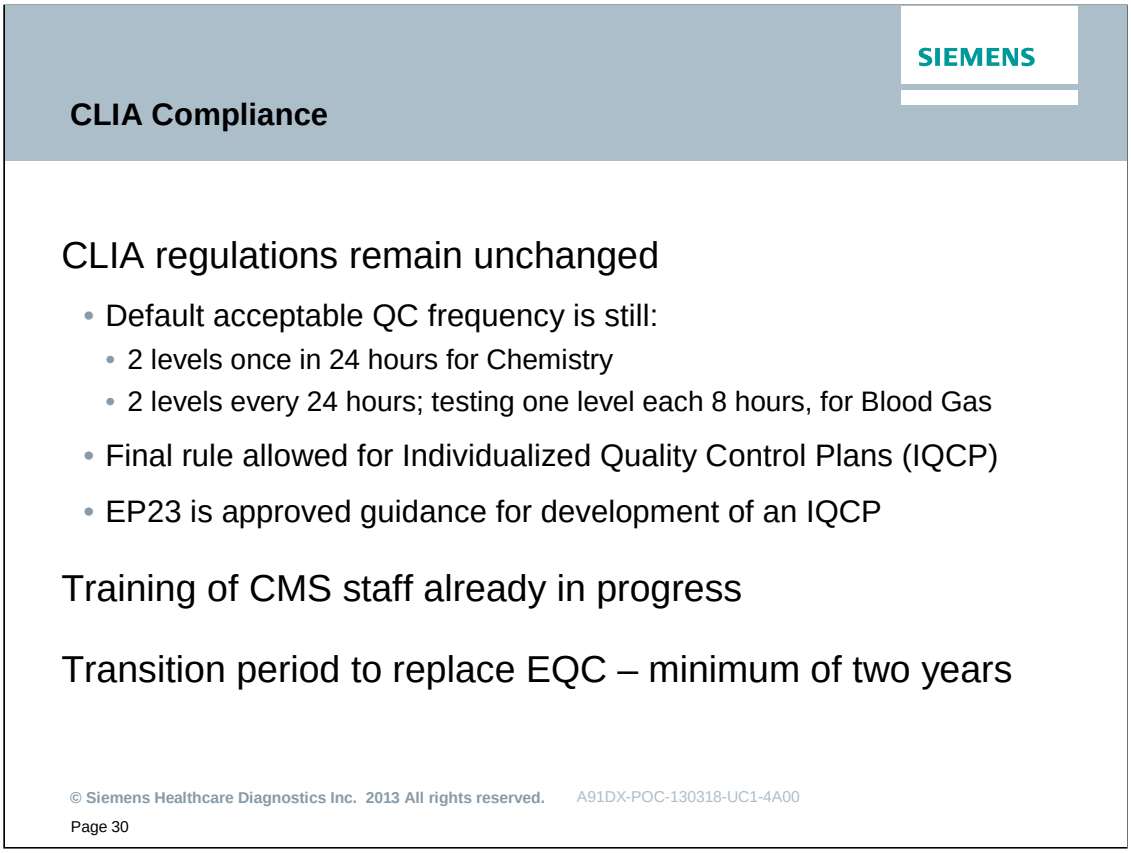
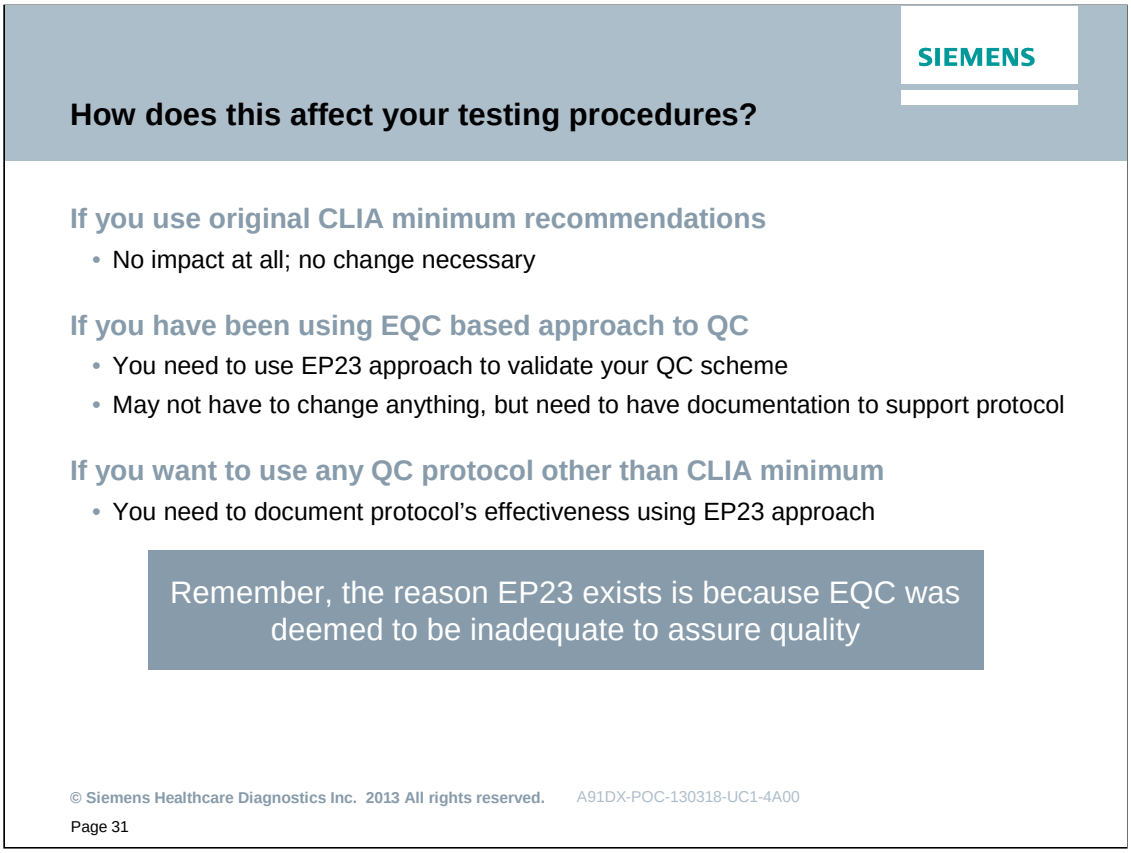
Our colleagues at CMS reviewed this presentation and asked us to include this statement. They have generously provided a link that can be used to keep up to date on how EP23 will relate to Individualized QC Plans.



As far as CLIA compliance is concerned.. The CLIA default QC remains unchanged and it is still acceptable. The final rule published in January 2004 allowed for Individualized QC plans as detailed in Appendix C of the State Operations Manual. EQC was the first attempt at an alternative to the default QC, now EP23 is approved guidance for how to develop an individualized QC plan.

The training of CMS staff to audit labs using EP23 was begun at the start of 2012 and is well underway.

We are in a transition period during which EQC will be phased out. CMS has stated that the transition will be a minimum of two years.

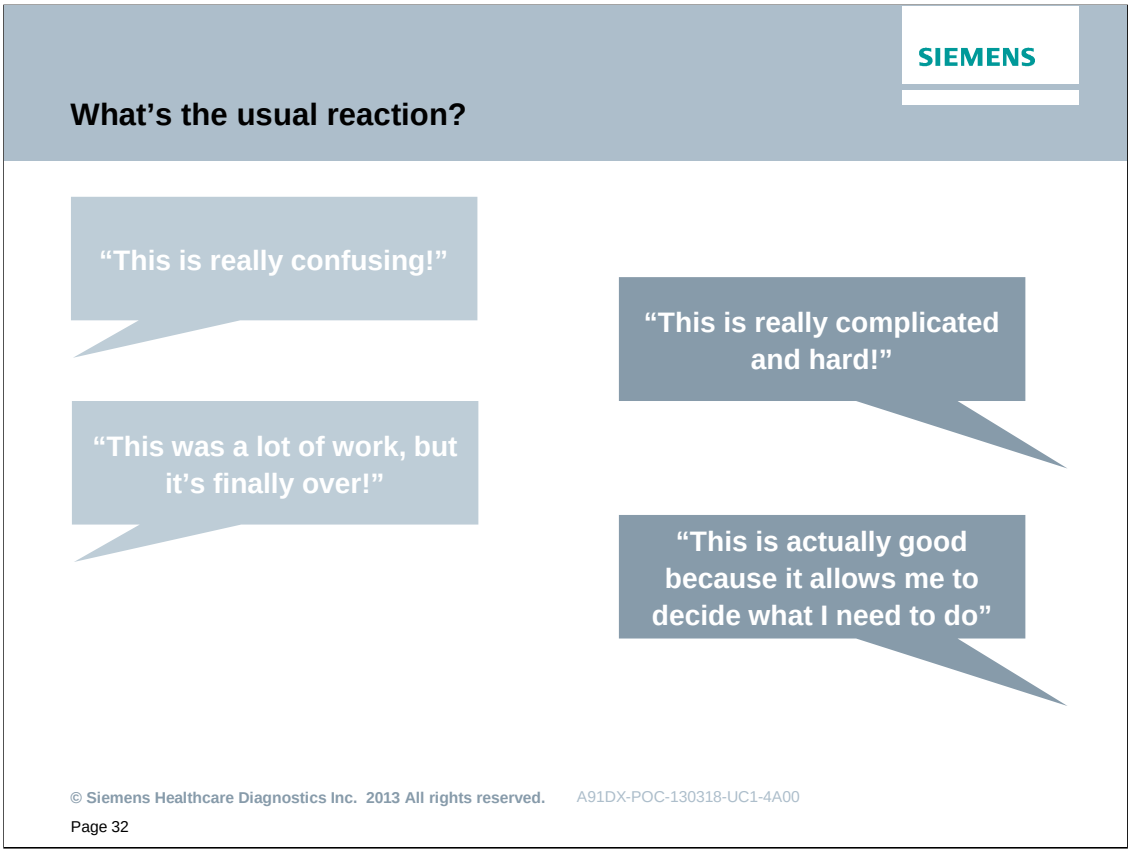


If we are using the CLIA mandated minimum standard QC protocol, we don't need to do anything. If what we are currently doing has been deemed to meet this standard, we are fine and will not need to change anything.

If we have been using the EQC protocol, we need to use the EP23 process to document that what we are doing meets the new standard. We may not have to change anything, but we will need the documentation to show that we evaluated our current QC plan using the EP23 process and found it to be adequate. That documentation must be available for an auditor to review and they will review it.

Keep in mind that the reason EP23 exists is because EQC was shown to be inadequate.

Finally, if we want to use any QC protocol other than the CLIA minimum standard, we will need to use the EP23 process to develop the supporting documentation



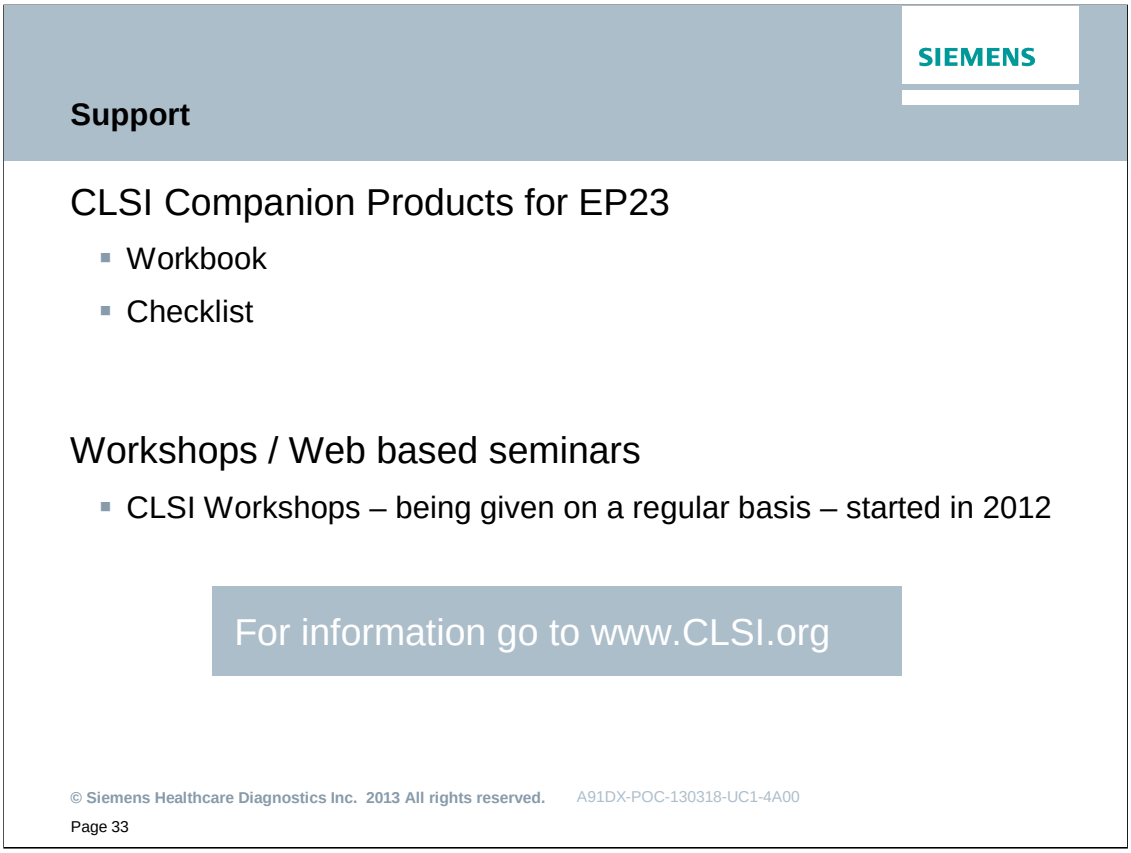
What's the usual reaction

First total confusion as to what's happening and what this means

Then, the feeling that this is really hard as we struggle to get used to risk management and have to compile all the information for the first time

Once we make it through, we will feel a huge sense of relief that a burdensome and time consuming task is over

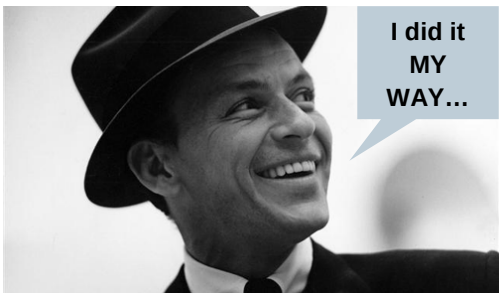
However, over time, many in the laboratory will see that this is the first time they have confidence that their QC process actually does the job and that they have the ability to do the type of QC that makes sense for them.



There are a number of support tools available to assist the use of EP23. CLSI has both a workbook and a checklist available. These are designed to guide and assist folks using EP23 for the first time and help make the tasks easier. These aids are specifically developed to support POC type testing environments and to help simplify the EP23 process.

CLSI also offers a series of ongoing workshops on EP23 and how to develop QC plans. These workshops were started in 2012 and they continue on a regular basis. The schedule is available on the CLSI website

Summary



You Can Do QC YOUR WAY!

BUT you have PROVE what you are doing actually works.

- EP 23 and Individualized QC Plans represent a maturing of CMS's expectations of testing sites
- Instead of mandating "one size fits all" QC that really doesn't work well for anyone, now there is a CLIA approved way to do QC that allows each testing site to decide what works best
- But you have to document it does the job

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To wrap up, with CMS accepting EP23 as the approved way to develop a QC plan it means **You can do QC any way you want**, but you have to be able to prove it works

EP23 represents the next step in the maturing of what is expected from clinical laboratories and testing sites. Instead of mandating one size fits all QC protocols that really don't work well for anyone, CMS has chosen to allow ANY QC plan a laboratory or testing site may want to use as long as they can document that it maintains quality and controls risk. This finally allows every lab and testing site to develop a QC plan that best fits their unique needs and use it. It also allows the laboratory to fully utilize any new features on new instruments that can assist in the QC process.

Acknowledgement

We would like to thank the Clinical and Laboratory Standards Institute (CLSI) for their support and permission to use excerpts from EP23-A