Answers to All Your IQCP Questions

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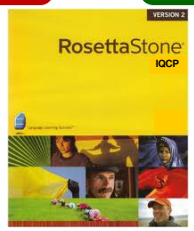
Scientific Affairs
Clinical, Technical, Educational

Disclaimers

- I work for Alere
- Alere produces testing devices for use at the POC…so I have more data on the testing areas my company covers.
- I hope this is more of a discussion than a lecture.
- Apologies for overlap with previous POC QC talks

Today…..

Some repeat/review → Let's talk IQCPs



The History Lesson

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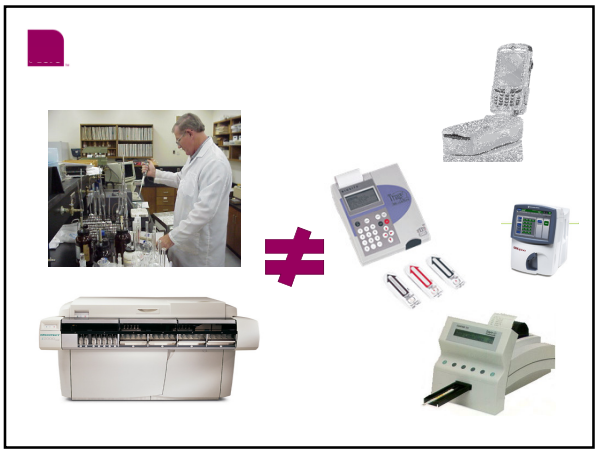
So what is QC? → Where did it come from? → How does QC assure quality data?

ARCHITECT® i2000 Immunoassay Analyzer



The Regulations…

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493.1256 – QC procedures

For each test system, the laboratory must test, at a minimum, two levels of external QC materials each day it performs a nonwaived test.

However, the regulations now allow the laboratory to reduce the frequency of testing external QC materials (equivalent QC procedure) for certain test systems.

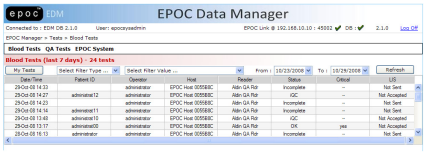
CLIA

CMS: Equivalent Quality Control Procedures Brochure #4

The epoc® System

- epoc® BGEM Test Card
- epoc® Reader
- epoc® Host Mobile
- epoc® Data Manager

Room temp storage
11 measured results
10 calculated results
~30 second test time



epoc QC Checks

Every time the Host and Reader connect, the Reader undergoes an automatic, 2 level, electronic QC test.

This will repeat every 8 hours if needed.

The Reader monitors the testing environment:

- The operating conditions are 15°-30° C, 400-825 mm Hg atmospheric pressure and <85% humidity.
- The Reader has internal thermometers and barometers and will shut down if these ranges are exceeded.
- The internal QC checks will fail if humidity is >85

Other epoc QC Checks

An audible beep is produced when adequate sample is applied to the card.

The system will flag the following conditions and not deliver a test result when:

- Using an expired card
- Rerunning an already used test card
- Putting in too little sample
- Introducing the sample too rapidly, too slowly or sample with an air bubble.
- Introducing the sample at the wrong time

493.1256 – QC procedures

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CLIA

CMS

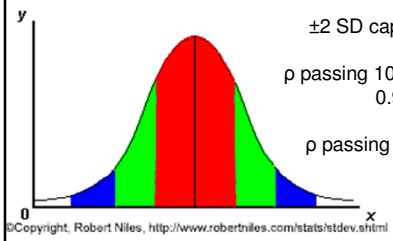
CMS: Equivalent Quality Control Procedures Brochure #4

EQC Evaluation

	Evaluation Process		External QC checks
Option 1 System monitors all analytic components	Daily testing with internal monitoring systems	10 consecutive days of passing external QC	At least once per month
Option 2 System monitors some analytic components	Daily testing with internal monitoring systems	30 consecutive days of passing external QC	At least once per week
Option 3 System monitors no analytic components	NA	60 consecutive days of passing external QC	At least once per week

CMS: Equivalent Quality Control Procedures Brochure #4

Normal Population Distributions



±2 SD captures 95% of data (0.95).
ρ passing 10 reps = 0.95^{10}=0.598.
0.95^{30}=0.215

ρ passing 10/11 reps = 0.897

©Copyright, Robert Niles, http://www.robertniles.com/stats/stdev.shtml

± 1 SD captures 68% of data
±2 SD captures 95% of data
±3 SD captures 99.7% of data

CLSI to the Rescue!!!

Clinical and Laboratory Standards Institute

EP23

User Defined QC Protocols for *In Vitro* Diagnostic Devices Based on Manufacturer's Risk Mitigation Information and the User's Environment

EP18

Risk Management Techniques to Identify and Control Laboratory Error Sources

CLSI. *Laboratory Quality Control Based on Risk Management; Approved Guideline*. CLSI document EP23-A. Wayne, PA: Clinical and Laboratory Standards Institute; 2011.

3/9/12 CMS Official Memorandum

Key concepts from EP-23 will be an acceptable alternative QC policy. The New CLIA QC policy will be entitled Individualized Quality Control Plan (IQCP)

IQCPs are a formal representation and compilation of many things laboratories currently do for quality.

IQCPs permits the laboratory to customize its QC plan according to environment, reagents, testing personnel, specimens, and test system.

IQCP will be voluntary: Laboratories will have two choices for QC compliance: 1) Two levels of QC per day or, 2) IQCP. Package insert requirements must be met.

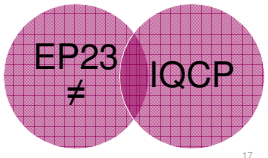
Education period: 1/1/14-1/1/16

EQC will be phased out at the end of the education and transition period

Remember…

EP23 → IQCP

- **CMS/CLIA Website:** http://www.cms.hhs.gov/clia/
- **CMS CLIA Central Office:** 410.786.3531
- **IQCP Link:** IQCP@cms.hhs.gov
- EP23 Workbook



17

Accrediting Agencies Updates

Accredited laboratories should continue to meet their accrediting organizations' QC standards until they receive notice from their AOs.

CMS will solicit accrediting organizations (AOs) to determine their interest in IQCP.

TJC introduced new IQCP Standard on March 24, 2014

Laboratories may use CLIA QC regulations, EQC, or IQCP

COLA be presented criteria in June 18, 2014 webinar

CAP requirements will be published with the July 2015 checklist updates

No word yet from some states with deemed status: NY, PA, OR, etc.

EZ-QCP

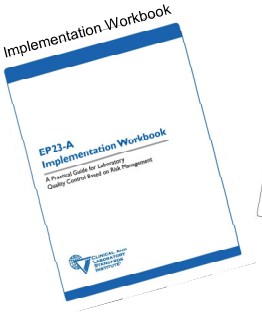
A Systematic Approach to Risk Management

QCmadeEZ™

- A step-by-step risk assessment of your entire test process
- Modules that are custom designed for each POC test device, pre-populated with the latest IVD manufacturer's specifications
- Reports that will help you substantiate your program, facilitate validations, and organize the information you'll need to defend your IQCP's during inspections
- An IQCP development process that encourages a committee approach
- Customize your QC Plan according to test method, utilization, environmental factors, and personnel competency to produce a QC plan that is clinically and economically beneficial
- Optimize your current QC/QA processes
- Adhere to federal, state and accrediting organization requirements
- Ensure continuous quality patient care, with optimal clinical outcomes
- Identifying new initiatives and ongoing measures to improve the quality of patient care

EP23 Companion Products

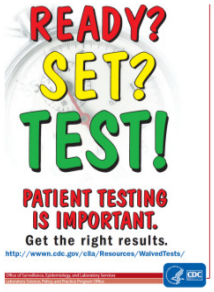
Implementation Workbook



Risk Assessment Worksheet

CLSI. *Laboratory Quality Control Based on Risk Management; Approved Guideline*. CLSI document EP23-A. Wayne, PA: Clinical and Laboratory Standards Institute; 2011.

CDC Guide to IQCP Coming .....



What Can We Expect from Inspectors?

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Not the Conclusions

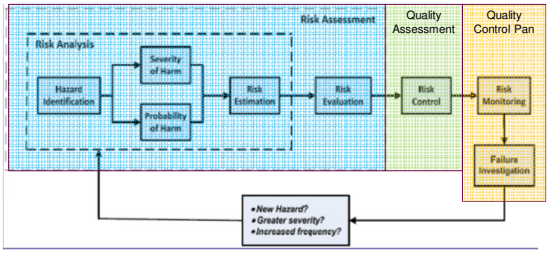
The Process

Risk Assessment
- Process to identify risks

Quality Control Plan
- List of errors and actions to mitigage the risks

Quality Assessment
- Monitoring of that plan

24



Life-Cycle Risk Management Process

Was the IQCP developed with input from the right personnel?

Were the data used in the Risk Assessment of reasonable quantity and quality?

Is there a process to monitor and review Quality performance?

26

What are Risk Assessments?

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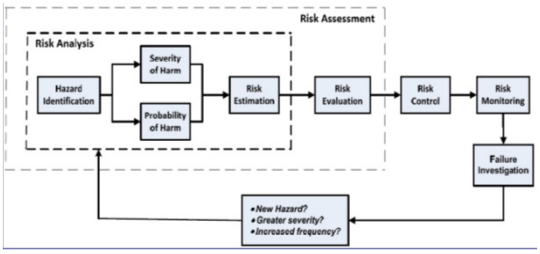


Life-Cycle Risk Management Process

Ask….

What could go wrong? → How likely is it to happen? → How bad could it get? → What controls do I have in place?

29

Risk Management 101

Understand the difference between hazard and risk

Understand that the hazard from an incorrect test result may NOT be DEATH

Understand that you cannot eliminate risk

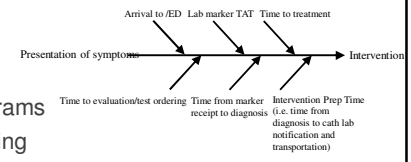
30

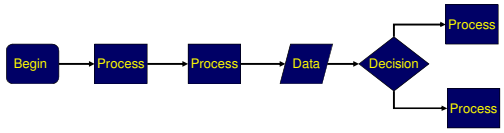
What could go wrong?

31

Risk Assessment Tools

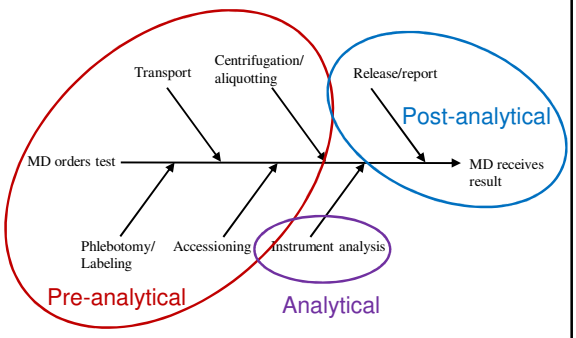
- Brainstorming
- 5 Whys
- Fishbone diagrams
- Process mapping





G. Cooper, BioRad. 2007 AACC QC Webinar

Testing Process Fishbone Diagram



Risk Management approach to QC

Ask the right questions

- What is needed to assure quality of test results? Does the manufacturer recommendation for QC minimize laboratory risk to an acceptable level?
- What are the key conditions or potential failures that could occur in the laboratory that pose risk of harm to the patient?
- What is controlled/not controlled?
- Are validation/verification studies sufficiently robust
- Are EQC features sufficient to protect patient from harm?
- How frequently (time and replicates) should QC be tested?

G. Cooper, BioRad. 2007 AACC QC Webinar

Variables to Consider

Environmental conditions: Temperature, humidity	Intended medical use of test result: HIV vs triglyceride	Clinical setting: Main lab, POC, Outpatient, ER, ICU, Ambulance, Non-traditional setting
Time lapse: Are result acted on immediately or not?	Testing frequency, testing personnel and turnover	Condition of ancillary equipment: Centrifuges, refrigerators, heat baths
Power requirements/ fluctuations	Radio and electromagnetic waves	Age of the device

G. Cooper, BioRad. 2007 AACC QC Webinar

Think in terms of the five elements of a process.

People: Training, Experience, Attitude	Materials (Reagents and consumables): Integrity, Storage, Reconstitution, Preparation (mixing), Use	Equipment (Hardware and Software): Use, Maintenance, Reliability	Methods: Calibration, Capability, Sensitivity, Specificity, Accuracy, Precision	Environment: Temperature, Humidity, Air flow, Power supply, Water quality

BTW: This is committee work!

G. Cooper, BioRad. 2007 AACC QC Webinar

Ask….

What could go wrong? → How likely is it to happen?

37

Ranking Severity of Failure and Probability 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
- Results in patient death

Frequent
- Once per week

Probable
- Once per month

Occasional
- Once per year

Remote
- Once every few years

Improbable
- Once in the life of the test system

ISO 14971

Risk Acceptability Matrix

	Severity of Harm				
Probability of harm	**Negligible**	**Minor**	**Serious**	**Critical**	**Catastrophic**
Frequent	X	X	X	X	X
Probable	OK	X	X	X	X
Occasional	OK	OK	OK	X	X
Remote	OK	OK	OK	OK	X
Improbable	OK	OK	OK	OK	OK

ISO 14971

Process Severity Evaluation Criteria

Effect	Severity of effect	Ranking
Hazardous, without warning	May endanger patient. Involves non-compliance with gov't. regulation without warning.	10
Hazardous, with warning	Same as above only with warning	9
Very High	Major injury to patient requiring emergency intervention	8
High	Minor injury to patient; patient dissatisfied	7
Moderate	Results acceptable; not cosmetically satisfactory	6
Low	100% of results may have to be retested; some patient dissatisfaction	5
Very Low	Timing/efficiency defects noticed by most users	4
Minor	Same as above, but, defect noticed by average user	3
Very Minor	Same as above, but, defect noticed only by the discriminating user	2
None	No effect	1

Adapted from Quality Support Group, Inc

Process Occurrence Evaluation Criteria

Probability of Failure	Possible Failure Rates	C_{pk}	Rankings
Very high, failure is almost inevitable	≥ 1 in 2	< 0.33	10
	1 in 3	≥ 0.33	9
High, repeated failures	1 in 8	≥ 0.51	8
	1 in 20	≥ 0.67	7
Moderate, occasional failures	1 in 80	≥ 0.83	6
	1 in 400	≥ 1.00	5
	1 in 2000	≥ 1.17	4
Low, relatively few failures	1 in 15,000	≥ 1.33	3
	1 in 150,000	≥ 1.50	2
Remote, unlikely	≤ 1 in 1,500,000	≥ 1.67	1

Adapted from Quality Support Group, Inc

Process Detection Evaluation Criteria

Qualitative probability	Quantitative probability of not detecting	Ranking
Remote likelihood that erroneous results would be undetected • detection reliability at least 99.99% • detection reliability at least 99.80%	 1/10,000 1/5,000	 1 2
Low likelihood that erroneous results would be undetected • detection reliability at least 99.5% • detection reliability at least 99%	 1/2,000 1/1,000	 3 4
Moderate likelihood of detection • detection reliability at least 98% • detection reliability at least 95% • detection reliability at least 90%	 1/500 1/200 1/100	 5 6 7
High likelihood that that erroneous results would be undetected • detection reliability at least 85% • detection reliability at least 80%	 1/50 1/20	 8 9
Extreme likelihood that erroneous results would be undetected	1/10 +	10

Adapted from Quality Support Group, Inc

Then the Quality Control Plan

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What controls do I have in place?

44

Now….What Needs Fixing?

- Identify those conditions that lead to unacceptable levels of error severity and frequency.
- Determine operating processes or tests (quality control) to detect those conditions

1st • Eliminate causes of failure so that it does not OCCUR

2nd • Reduce probability of OCCURRENCE

3rd • Reduce SEVERITY of the failure

4th • Improve DETECTION of the failure

Quality Support Group, Inc

A Triage Example

Each Triage device has a barcode that contains critical information, including expiration date.

Devices are stored at 2-8 degrees C and must be brought to RT for use.

Once at room temperature, the devices are stable for 14 days

Other Resources

- ISO (www.iso.org)
  - ISO 9000:2005 Quality Management systems-Fundamentals and vocabulary
  - ISO 14971:2007 Medical Devices-Application of risk management to medical devices
- But how are you supposed to understand all the instrument features that could mitigate risk?

J Westard, Westard QC, Inc and G. Cooper, BioRad. 2007 AACC QC Webinar

What Will Vendors do to Support IQCPs?

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Vendor Issues

- **Labs would like….** Full descriptions of hazards, failures, risks and potential clinical impact
- **Vendors bound by….** Anything put in writing could be interpreted as a claim
- **We know…** No vendor can provide a full IQCP for a lab

49

So How Do We Prepare?

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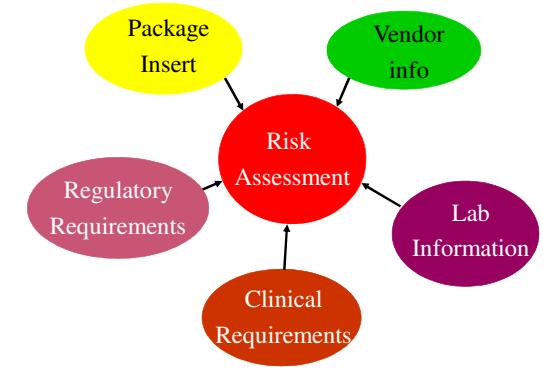


Think of Your Testing Process

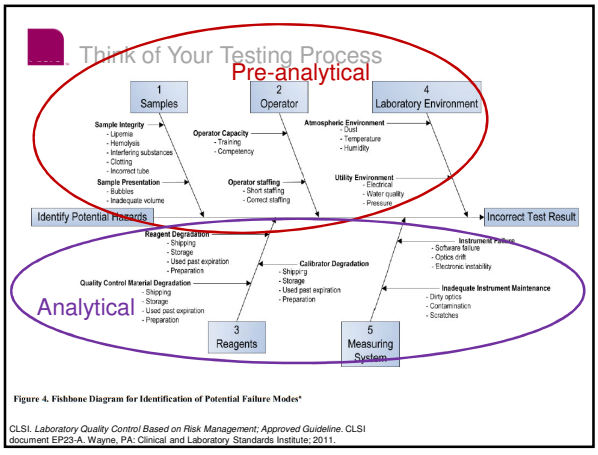
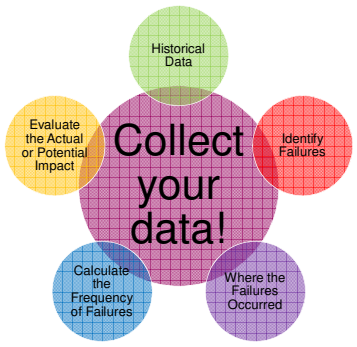


Figure 4. Fishbone Diagram for Identification of Potential Failure Modes*

CLSI. *Laboratory Quality Control Based on Risk Management; Approved Guideline*. CLSI document EP23-A. Wayne, PA: Clinical and Laboratory Standards Institute; 2011.

What Can I Do to Prepare for IQCPs?



EP23 Workbook Key Process Steps

1. Operator training and competency
2. Reagent/calibrator/parts procurement and storage
3. Patient sample acceptability evaluation
4. System startup
5. System calibration
6. Loading and testing of patient samples
7. Proper device function
8. Test result review

CLSI. *Laboratory Quality Control Based on Risk Management; Approved Guideline.* CLSI document EP23-A. Wayne, PA: Clinical and Laboratory Standards Institute; 2011.

In Summary….

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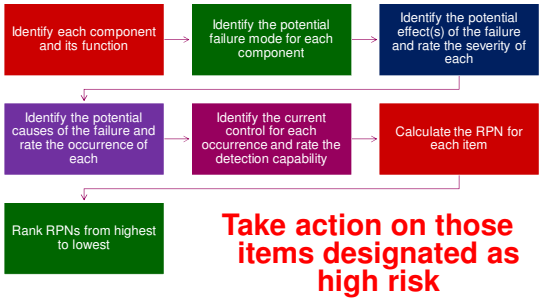
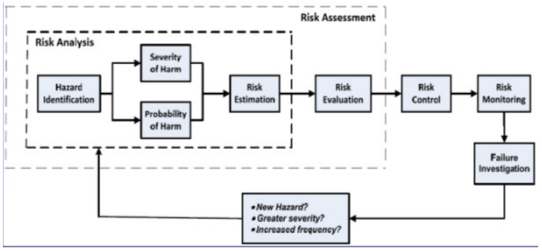
As a Result You Will



Take action on those items designated as high risk

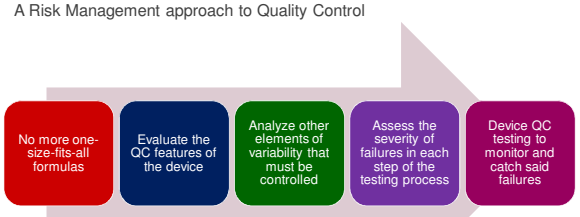
G. Cooper, BioRad. 2007 AACC QC Webinar



Life-Cycle Risk Management Process

This is the future for QC of POCT

A Risk Management approach to Quality Control



This is a shift from "Quality Compliance" to true Quality Control

Questions?

Thank You!

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Today is the youngest you'll be for the rest of your life. Act like it.