

Quality Control in Testing Laboratories



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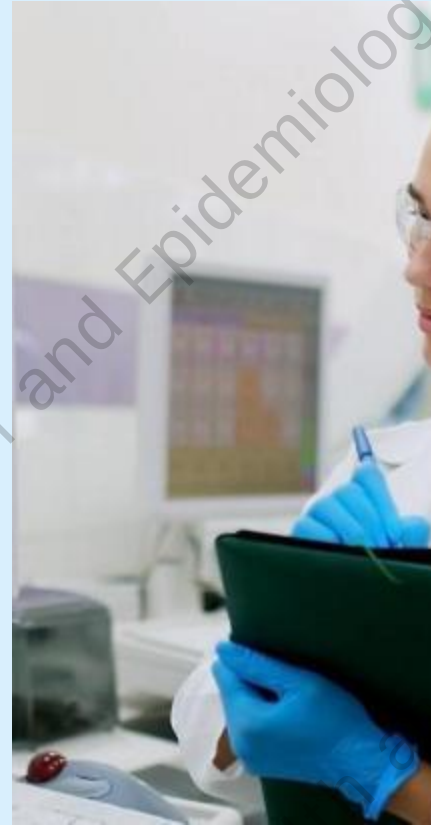
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01

CATALOGUE

Overview of Quality Control

Definition and Importance of Quality Control



Definition of Quality Control

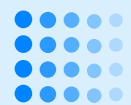


In the laboratory testing process, a series of technical measures and management methods are implemented to ensure the accuracy, reliability, and consistency of test results.



Importance

To ensure the accuracy and reliability of laboratory testing data, improve the level of laboratory testing, and enhance the laboratory's credibility and competitiveness.



Quality Control Objectives for Laboratories

Ensure the Accuracy of Test Results

Reduce or eliminate errors through effective quality control measures, bringing test results closer to the true value.



Improve Testing Efficiency

Optimize experimental workflows, reduce unproductive work and waste, and improve overall laboratory efficiency.



Ensure the Reliability of Test Results

Ensure that the laboratory obtains consistent results when repeatedly testing the same sample under the same conditions.



Establishment and Improvement of the QC System



Establish a Quality Control System

Develop a laboratory quality control plan that clearly defines quality control objectives, measures, and responsibilities, and establish corresponding management systems and standard operating procedures (SOPs).



Improve the Quality Control System

Continuously improve and optimize the laboratory quality control system, including strengthening personnel training, upgrading equipment, and refining experimental methods.



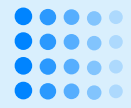
Strengthen Quality Awareness

Strengthen quality awareness education for laboratory personnel, enhancing the consciousness and proactiveness of all staff in participating in quality control.

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Sample Management and Preparation



Sample Receipt, Registration, and Storage

Sample Receipt

Establish a strict sample receipt procedure to ensure reliable sample origin and complete information. Upon receipt, perform a preliminary inspection of the sample and record any anomalies.



Registration and Management

Assign a unique identifier to each sample and meticulously record information such as sample name, quantity, specifications, source, and date of receipt. Ensure traceability of sample information.



Storage Conditions

Establish appropriate storage conditions based on sample properties and requirements, such as temperature, humidity, and light exposure. Regularly monitor and record the storage environment.

Sample Preparation Methods and Techniques



Objectives of Sample Pre-treatment

To remove interfering substances and improve analytical accuracy; to convert the sample into a suitable form for analysis.



Common Pre-treatment Methods

Dissolution, dilution, extraction, filtration, centrifugation, etc.
Select appropriate methods based on sample characteristics and analytical requirements.



Techniques and Considerations

Avoid cross-contamination by using clean containers and tools; minimize sample loss and improve recovery; address safety concerns during the pre-treatment process.

Sample Identification, Tracking, and Disposal

1

Identification Requirements

Clearly label samples with the sample name, identification number, quantity, condition, and other relevant information to prevent confusion during handling and transfer.

2

Tracking Management

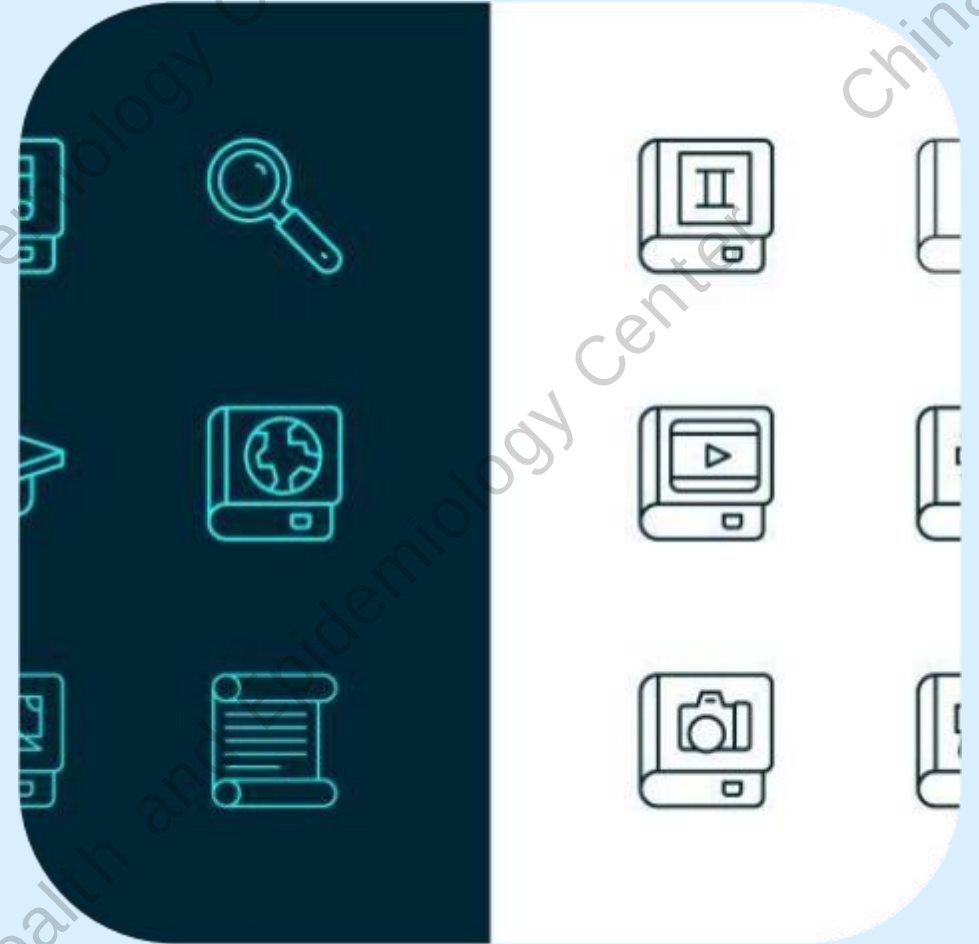
Establish a sample tracking record to document the sample's chain of custody, including the personnel involved in the transfer, date, time, and location. This ensures traceability throughout the sample lifecycle.

3

Disposal Procedures

Dispose of samples appropriately based on test results and laboratory regulations.

Hazardous or toxic samples must be handled and disposed of in accordance with applicable regulations.

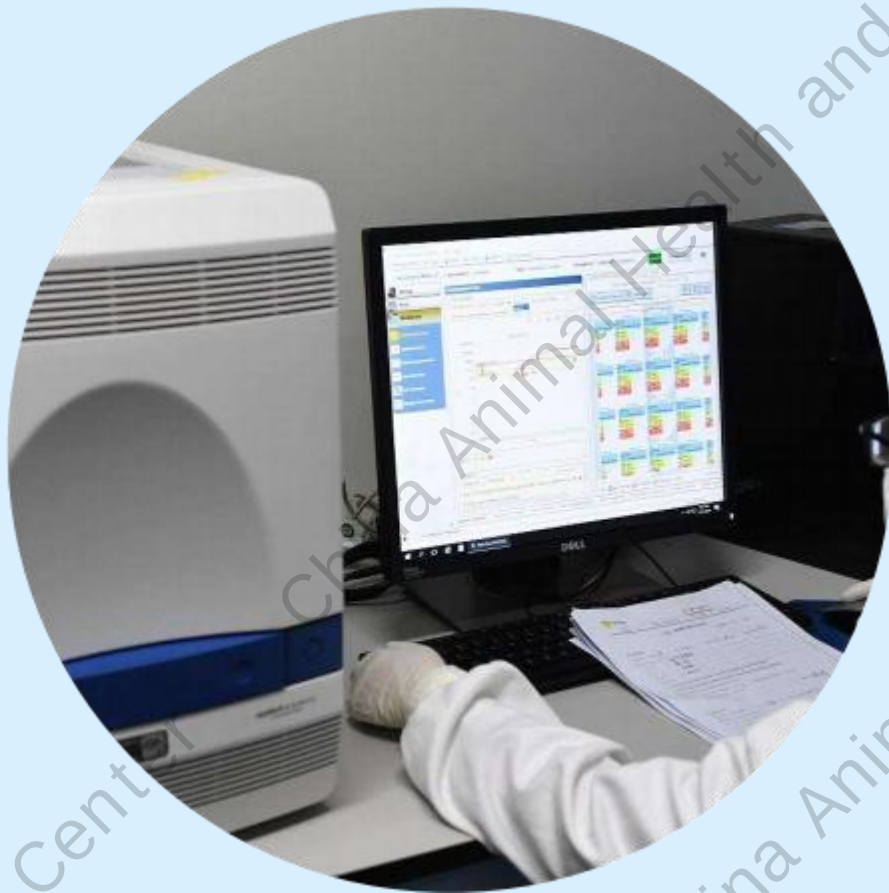


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Instrument and Equipment Procurement, Acceptance, and Documentation

Instrument and Equipment Procurement, Acceptance, and Documentation



Procurement Process

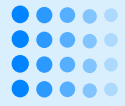
Develop Procurement Plan → Conduct Market Research → Select Supplier → Execute Contract → Implement Procurement.

Acceptance Criteria

Inspect equipment for conformance to contract specifications (e.g., appearance, performance, accessories). Complete acceptance record form.

Documentation Management

Establish equipment records, including equipment name, model/specifications, manufacturer, purchase date, acceptance records, operating manuals, maintenance records, etc.



Instrument and Equipment Operation, Maintenance, and Care



Operating Procedures

Develop standard operating procedures (SOPs) to ensure proper equipment usage and prevent damage due to incorrect operation.



Maintenance and Care

Perform routine maintenance and care, including cleaning, lubrication, tightening, and adjustment, to ensure equipment is in optimal condition.



Troubleshooting

In the event of equipment malfunction, promptly contact maintenance personnel for repair. Complete a maintenance record form.

In-process Verification and Calibration of Instruments and Equipment



01

In-process Verification

During the usage period of the equipment, periodically verify the equipment's performance, accuracy, etc., to ensure that the equipment operates normally within its validity period.

02

Calibration Standards

Develop an equipment calibration plan, and calibrate the equipment according to the plan to ensure the accuracy and reliability of the measurement results.

03

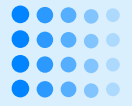
Calibration Records

Record the calibration results of the equipment, including the calibration date, calibration personnel, calibration conclusions, etc., and establish a calibration archive.

04

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Experimental Methods and Operating Procedures



Selection of Experimental Methods and Justification

**Selection of
Appropriate**

**Experimental Methods
Based on Research
Objectives and Sample
Characteristics.**



**Pre-experiment
and
Method Validation.**



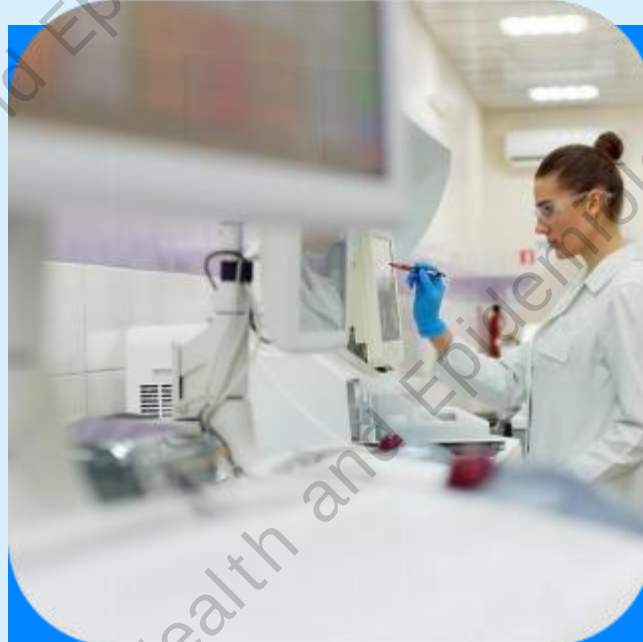
**Reference to Domestic
and International
Standards and Literature.**



Experimental Operating Procedures and Precautions



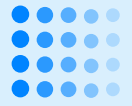
Adherence to
Experimental Operating
Procedures.



Instrument and
Equipment
Management.



Quality Control of
Reagents and
Consumables.



Experimental Data Recording, Organization and Reporting

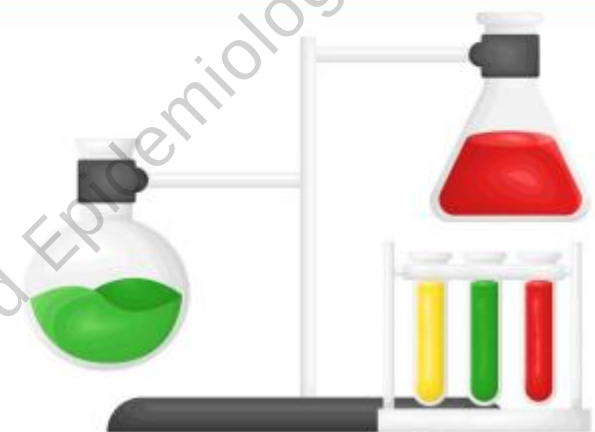
Raw Data
Recording



Experimental
Report Writing



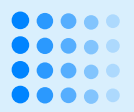
Data
Organization and
Analysis



05

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Result Evaluation Methods and Standard Selection



Selection of Evaluation Methods and Criteria for Results

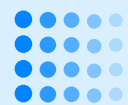
Qualitative Evaluation

Select appropriate evaluation methods based on the characteristics and requirements of laboratory testing projects, such as quantitative evaluation, qualitative evaluation, and relative evaluation.

Standard Selection

To ensure accuracy and comparability of evaluation results, choose national standards, industry standards, or international standards that are suitable for the laboratory testing projects as evaluation criteria.





Anomaly Detection, Analysis, and Handling

01

Abnormal result identification

By observing the distribution and trend of points on a quality control chart, abnormal results can be identified. Common abnormal results include points exceeding control limits, multiple consecutive points on the same side of the center line, and periodic changes in points.

02

Abnormal result analysis

For identified abnormal results, in-depth analysis is needed to find the causes. Possible causes include equipment failure, reagent issues, and operational errors.

03

Abnormal result handling

Based on the analysis, take appropriate corrective actions such as repairing or replacing equipment, switching reagent batches, or enhancing staff training. Track and verify the outcomes to ensure effective resolution.

06

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Uncertainty Evaluation and Comparison Testing

Sources of Uncertainty and Methods of Evaluation



Sources of Uncertainty

Measurement equipment error



Changes in environmental conditions

Sources of Uncertainty and Methods of Evaluation

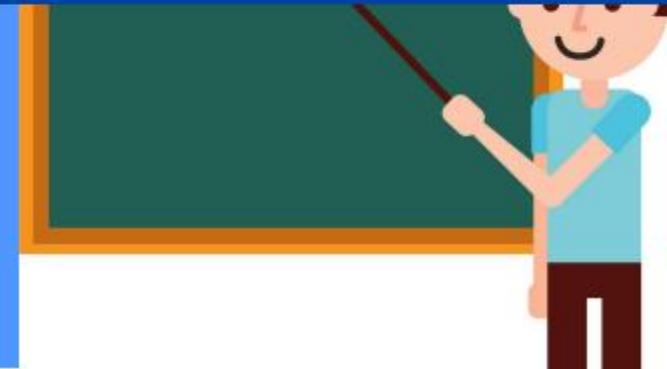
Operator differences

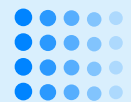


Incomplete measurement methods



Uncertainty Sources and Evaluation
Methods





Methods for Uncertainty Evaluation

- **Type A Evaluation**

Based on statistical analysis of observational data to assess uncertainty.

- **Type B Evaluation**

Based on experience or other information to assess uncertainty by examining factors such as measurement equipment, environment, and personnel.

- **Combined Uncertainty**

Integrate the results of Type A and Type B evaluations to obtain the total uncertainty.



Comparison Test Design, Implementation, and Result Analysis

Select Comparison Items

Choose which items need to be compared based on laboratory needs and practical considerations.

Develop a Comparison Plan

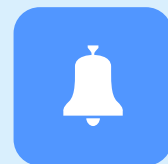
Define objectives, methods, sample quantity, and measurement equipment.



Comparison Test Design, Implementation, and Result Analysis



- Establish parameters such as measurement range, accuracy, repeatability, and reproducibility.
-



Comparison Test Design, Implementation, and Result Analysis

Prepare Samples and Measurement Equipment

Ensure that samples and equipment meet the comparison requirements.

Conduct Measurements

Follow the comparison plan to perform measurements and record the data.



Comparison Test Design, Implementation, and Result Analysis

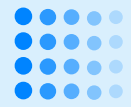


Data Processing

Organize, analyze, and process measurement data to obtain comparison results.

Result Comparison

Compare the results with reference or standard values to identify and assess any discrepancies.



Comparison Test Design, Implementation, and Result Analysis

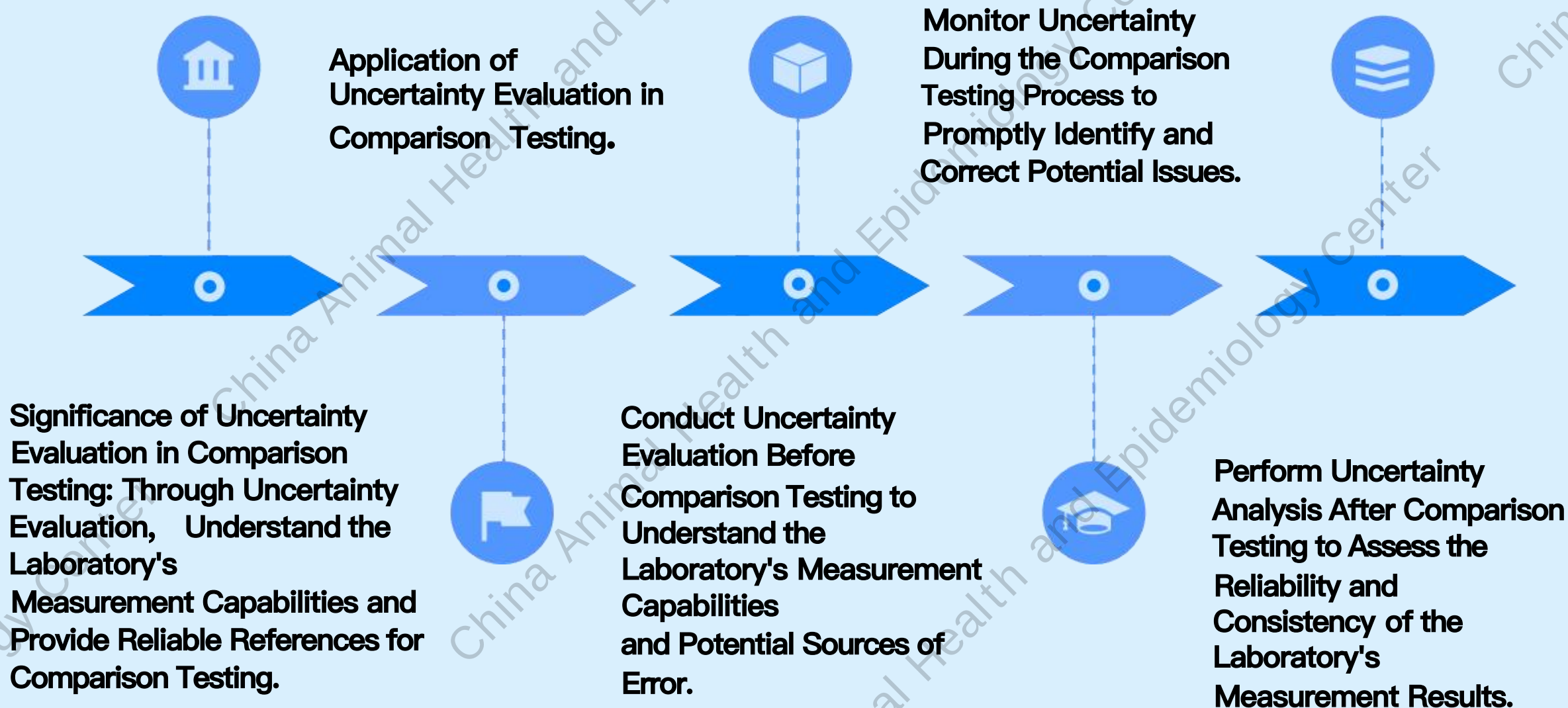
Statistical Analysis

Conduct statistical analysis of the comparison results to evaluate the laboratory's measurement capabilities.

Result Determination

Determine Whether the Laboratory's Measurement Results Are Reliable Based on Comparison Results and Statistical Analysis.

Application of Uncertainty Evaluation in Comparison Testing



07

CATALOGUE

Quality Supervision and Continuous Improvement

Responsibilities and Job Requirements of Quality Supervisors

Supervisors



Responsibilities of Quality Supervisors;

Responsible for comprehensive and systematic quality supervision of the laboratory's testing work;



Promptly identify and correct problems in the testing process to ensure the accuracy and reliability of testing results.



Responsibilities and Job Requirements of Quality Supervisors



- Track and verify issues discovered during the supervision process to ensure they are effectively resolved.

Responsibilities and Job Requirements of Quality Supervisors



01

Job Requirements;



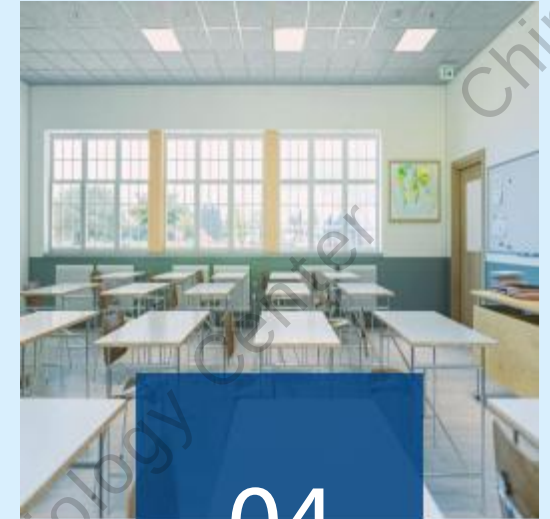
02

Familiar with the laboratory's quality management system and relevant laws and regulations;



03

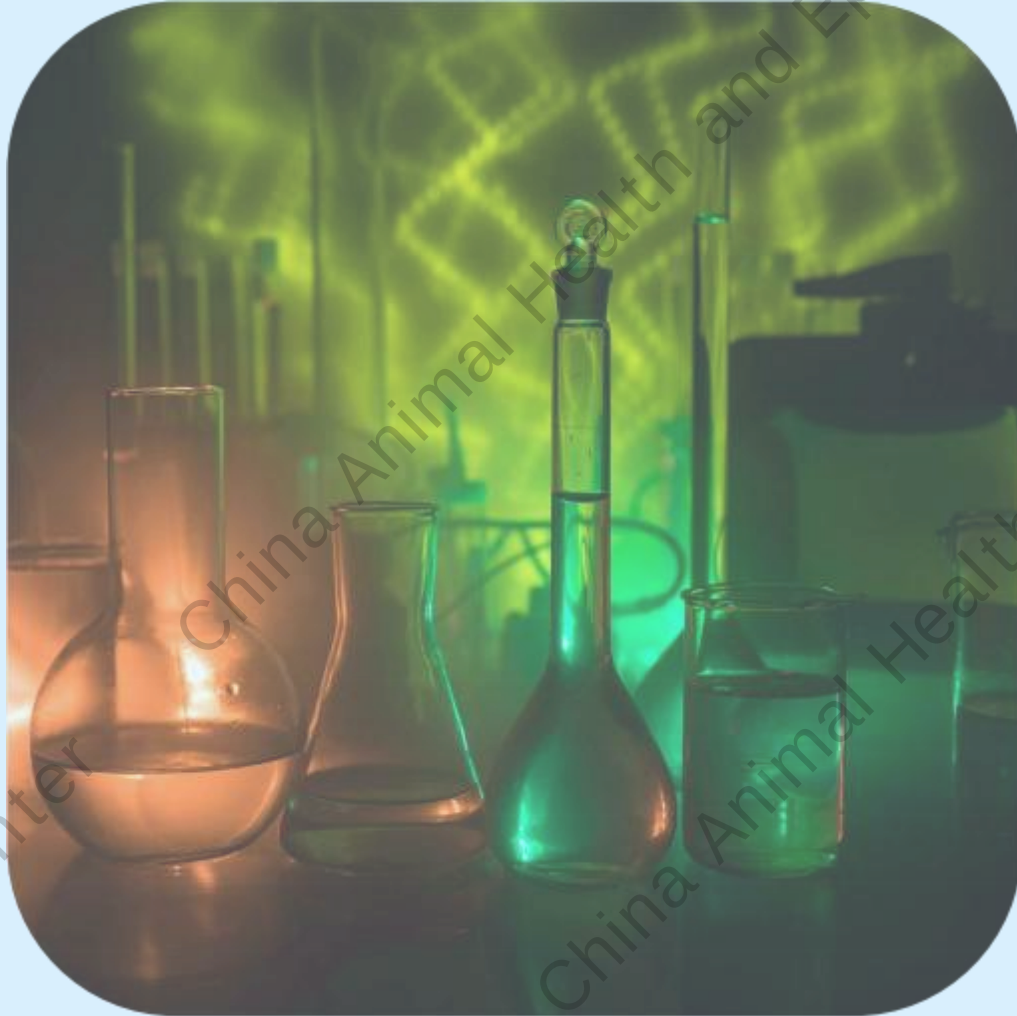
Possess strong communication skills and team collaboration spirit;



04

Able to perform duties objectively and impartially without interference from other factors.

Internal Audits, Management Reviews, and External Reviews



Purpose

To evaluate the effectiveness and consistency of the laboratory's quality management system;

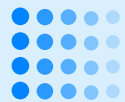
Content

Conduct comprehensive inspections of the laboratory's quality management documents, records, and operations;

Internal Audits, Management Reviews, and External Reviews

- **Results:**
- **Identify problems and propose improvement measures to promote the continuous improvement of the quality management system.**





Internal Audits, Management Reviews, and External Reviews

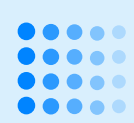
Purpose

Conduct high-level evaluations of the laboratory's quality management system.

VS

Content

Review internal audit results, completion status of quality objectives, customer complaints, etc.



Internal Audits, Management Reviews, and External Reviews



- **Results : Establish the laboratory's quality policy, objectives, improvement plans, etc.**

Internal Audits, Management Reviews, and External Reviews



Purpose

Undergo evaluations of the laboratory's quality management system by third-party organizations.



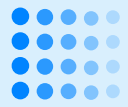
Content

Conduct comprehensive inspections of the laboratory's quality management system documents, records, operations, etc.



Results

Obtain certification or accreditation, enhancing the laboratory's credibility and competitiveness.



Continuous Improvement Strategies and Implementation Effect Evaluation



Continuous Improvement Strategies.

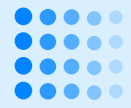


Establish a well-implemented improvement mechanism to encourage employees to propose improvement opinions and suggestions.



Conduct regular internal audits and external reviews of the laboratory's quality management system.





Continuous Improvement Strategies and Implementation Effect Evaluation

Develop specific improvement measures for identified issues and track their implementation and validation.





Continuous Improvement Strategies and Implementation Effect Evaluation

- **Implementation Effect Evaluation.**
- **Evaluate the effectiveness of implemented improvement measures, including comparisons before and after improvements, customer satisfaction surveys, etc.**
- **Integrate evaluation results into the laboratory's quality management system as the basis for continuous improvement.**
- **Continuously enhance the laboratory's testing capabilities and quality management level through ongoing improvements**



THANKS

