Molecular Assessment Program: MAP

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Quality Improvement Cycle

- Process Implementation
- Training
- Communication
- Assessment
- Validations
- Verifications

• Process Improvement
• Preventative Actions
• Corrective Actions

• Program Decisions
• What to do
• How to do it

• Process implementation
• Training
• Communication

Act
Plan
Check
Do

Act: Preventative Actions
Plan: Process Implementation
Check: Corrective Actions
Do: Program Decisions

Assessment
NBS Molecular Assessment Program (MAP)

- Evaluation of molecular newborn screening programs
  - Invited site visit of molecular biologists from:
    - CDC's Newborn Screening and Molecular Biology Branch
    - State Public Health Newborn Screening Programs
    - Representatives from Association of Public Health Laboratories

- Support for newborn screening laboratories
  - Non-regulatory review of molecular testing activities
  - Guidance for expansion of NBS molecular testing
  - Provided at no cost to participating programs
Why MAP was Developed

- Gaps in current regulatory guidelines
  - No CLIA genetic testing specialty – CMS recommends use of general guidelines for high-complexity tests
  - Standard regulatory framework does not allow for complexity involved in molecular testing
  - Inflexible regulations may prevent use of new technologies
What Constitutes a High Complexity Test

- Specialized Knowledge
- Training and Experience
- Reagents and Materials Preparation
- Characteristics of Operational Steps
- Calibration, Quality Control, and PT Materials
- Test System Troubleshooting
- Interpretation and Judgment

Three point scale for each criteria – most molecular 18-21 points
Why MAP was Developed

- Molecular tests have different quality management requirements
  - DNA extraction
  - PCR amplification common step
  - Cross contamination risks
  - Types of positive and negative controls
Goals of MAP

- NBS Laboratory Support
  - Provide molecular testing-specific assistance for NBS laboratories implementing molecular testing
  - Guidance for laboratories that are expanding NBS molecular testing
  - Mechanism to communicate best practices and strategies for continual laboratory assay quality improvement
What is the Benefit for NBS Programs?

- Consider how to fit molecular testing into a screening program

- Balanced approach:
  - Application needs
  - Available resources
What is the Benefit for NBS Programs?

- MAP teams represent a range of molecular NBS experts
  - Provide alternate approaches for molecular screening
  - Best-practices and ideas for what has worked for other programs
  - Help in planning for new molecular screening assays
MAP Activity

- **Program Site Visits**
  - 2011: Wisconsin, New York State, Washington State
  - 2012: Michigan, Texas
  - 2013: Florida, Minnesota, Virginia, Ohio
  - 2014: New Jersey, Georgia, Massachusetts, Connecticut
  - 2015: Kentucky, Maryland, Puerto Rico, Iowa
  - 2016: Maryland, Oklahoma, Missouri

- **Program Partners**
  - APHL
  - Wisconsin
  - New York State
  - Washington State
  - Michigan
  - Texas
  - Ohio
  - New Jersey
Basis for Evaluations

- Assessment criteria modeled from multiple sources:
  - NNSGRC Performance Evaluation Assessment Scheme (PEAS)
  - CLIA regulations
  - Molecular Pathology Checklist (CAP)
  - Standards and Guidelines for Clinical Genetics Laboratories (ACMG)
  - Clinical Laboratory Standards of Practice (NYSDOH)
  - Good Laboratory Practices for Molecular Genetic Testing for Heritable Diseases and Conditions (MMWR)
Professional Guidelines

- American College of Medical Genetics (ACMG)
  - Standards and Guidelines for Clinical Genetics Laboratories
    - General Standards and Guidelines
    - Clinical Biochemical Genetics
    - Clinical Molecular Genetics
  - Disease/Phenotypic-Specific Standards and Guidelines

www.acmg.net – publications
Professional Guidelines

- Clinical and Laboratory Standards Institute (CLSI)
  - MM01-A2: Molecular Diagnostic Methods for Genetic Diseases
  - MM13-A: Collection, Transport, Preparation, and Storage of Specimens for Molecular Methods
  - MM14-A: Proficiency Testing (External Quality Assessment) for Molecular Methods
  - MM17-A: Verification and Validation of Multiplex Nucleic Acid Assays
  - MM19-P: Establishing Molecular Testing in Clinical Laboratory Environments
Professional Guidelines

- College of American Pathologists
  - Molecular Pathology Accreditation Checklist
  - CAP Learning Portal
  - Archived webinars and presentations
MAP: Molecular Assessment Program

Phase of Testing

- Pre-Analytical
- Analytic
- Post-Analytical

Components

- SOPs
- QA/QM Documents
- Assay Validation
- Personnel
- Laboratory Space
- Test Methods
- Proficiency Testing
- Test Workflow
- Test Interpretation
- Results Reporting

Molecular Testing Quality Assurance
Overview of MAP Site Visits

- **Pre-visit**
  - Review of written SOP and quality assurance manuals

- **Visit Day 1**
  - Overview of program and molecular activities
  - Assessment of molecular workspace and workflow
  - Review of quality assurance, validation documents and molecular reporting

- **Visit Day 2**
  - Exit discussion with program members

- **Post-visit**
  - Written report for program’s use
MAP Site Visit Agenda

- Two – Three Weeks Prior to Site Visit
  - Discuss what is the goal for the site visit
  - Molecular assay SOPs for review
  - Quality Assurance/Management (QA/QM) documents for review

- Day Prior to Site Visit
  - Team discusses SOPs and documents to prepare for site visit
  - Dinner with hosting laboratory program
MAP Site Visit Agenda

- **Day 1: Morning**
  - Meet with laboratory members for review of NBS program and current molecular testing activities and future molecular plans
  - Program expectations for site visit
  - Laboratory observation of molecular procedures

- **Day 1: Afternoon**
  - SOPs
  - Laboratory and molecular-specific QA/QM plans
  - Assay validation
  - Molecular assay results reports
Day 2: Morning

- Exit discussion with laboratory members
- Observations and recommendations
- Feedback to MAP team

Exit discussions usually finish before noon
Additional time can be allocated for specific topics
The NBS Molecular Assessment Program has conducted 10 site visits to state public health newborn screening laboratories. The purpose of NBS laboratory program requesting the site visits have included:

- An overall evaluation of molecular activities
- Suggestions for improving workflow efficiency
- Optimizing the utilization of workspace to reinforce unidirectional workflow
- Planning for implementing new assays
- Preparation for inspections
Results from Visits

- Harmonization of SOPs
- Definition of molecular QA processes
- Modification to workflow
  - Rearrangement of existing laboratory space
  - Acquisition of additional molecular-specific space
- Opportunities for program collaborations
- Increased preparation for annual regulatory inspections
Lessons Learned from MAP Visits

- Process must be flexible
  - Every program is unique

- Molecular-specific QA “Tips and Tricks”
  - Numerous valid molecular procedures for a given disorder
  - Readily accessible knowledge base for molecular screening is needed

- CDC and State Cooperation
  - Provides a “pulse-point” of molecular needs and challenges
  - Opportunities for State-State and Federal-State collaboration
Benefits of MAP

- Continual Quality Improvement process for molecular screening
- Address specific concerns of programs
- Recommendations for additional program support
- Provide opportunities for collaboration between public health NBS programs
MAP Site-Visit Teams

Heather Wood (MI)
Colleen Stevens (NY)
Carlos Saavedra-Matiz (NY)
Rachel Lee (TX)
Tim Davis (WA)
Mei Baker (WI)
Rosemary Hage (OH)
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APHL’s NBS Molecular Subcommittee
For More Information on MAP

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.