Current organization structure of PulseNet and WGS
Future organization structure
New tools
PulseNet Traditional

Micro (isolates) → PFGE Group → Epi

Perform PFGE
Analyze Date
Detect clusters
Communicate
Expertise is foodborne disease surveillance
PulseNet Current (PFGE + WGS)

- **Micro (isolates)**
  - Extraction
  - Quantification
  - Library Prep/Sequencing
  - Analysis
  - Communicate

- **WGS Core**
  - Perform PFGE
  - Analyze Date
  - Detect clusters
  - Communicate
  - Expertise is foodborne disease surveillance

- **Epi**
Standardized processes for multiple pathogens
Ensure quality, evaluate metrics
Efficiently use resources
Reduce TAT
Provide training
Prioritize sequencing projects
Extract
Quantitate
Request WGS
Priority

**PulseNet**

Analysis
Results
Communication

**WGS Core**

Sequence
Quality

**New Project**

Meet with WGS Core
Determine needs
Priority
Analysis
WGS Core
Sequence Quality

- PulseNet
- Viruses
- GAS
- Legionella
- Strep. pneumo
- C. difficile
- CRE
- GenomeTrakr
Post-PFGE WGS Core Composition

S and B Unit

PFGE
WGS Core
Sequence
Quality
MS Access

PulseNet
Legionella
C. difficile
GenomeTrakr
Viruses
GAS
Strep. pneumo
CRE
Current MN LIMS cannot provide sample tracking needed for NGS

- MS Access database for NGS sample tracking
  - Contains all sample info needed to perform library prep, sequencing, and sequence data QC
  - Separated by NGS project
Within projects, queries filter isolates for specific tasks

- For example, the ‘PulseNet WGS ID Request’ query shows only those isolates that are PulseNet and need a WGS ID assigned
Those performing library prep can see and select all isolates ready to be sequenced

- Samples sorted by priority level
- Sample data can be copy/pasted to library prep run worksheet
- Post sequencing-track basic coverage and repeat info
DNA Extraction and NGS Submission Template

- Sample identifiers and metadata
- Library prep tracking and QC metrics
- MiSeq Run tracking and QC metrics
- Control and instrument performance metrics
- Reagent inventory and lot-to-lot QC metrics
- Technical support and instrument maintenance tracking

MN LIMS

DNA Extraction

### DNA Extraction

- DNA Concentration

### Metadata

- Sample info
- MiSeq ID
- BaseSpace Project

### Sample Sheet

- Estimated Depth
- Indexing info
- FASTQ files

### NGS Database

- Airtable

### Nextera XT Run Worksheet

- Biosample ID

### MiSeq Run

- Illumina BaseSpace

### CDC PulseNet

### NCBI

### Bionumerics Database v7.6

### CDC LIMS

### PFGE/WGS

Before Sequencing

After Sequencing

DEPARTMENT OF HEALTH

3/18/2019
Data visualization dashboards update in real-time

PhiX %Error by Lot

Under-performing lot?

Cluster Density by Technician

Technician variation?
- Liquid handlers
- Nextera DNA Flex
- Identify ways to bring down costs
- New LIMS at MDH
Thank you.

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